

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

AUG. 5 and 12, 1932.*

I.—GENERAL; PLANT; MACHINERY.

Refrigeration in chemical industries. A survey of applications. D. H. KILLEFFER (Ind. Eng. Chem., 1932, 24, 601—605).—Apart from well-known applications of refrigeration it is employed in the condensation of CS_2 and CCl_4 and of perfumes, in the potash industry for crystallisation, for separating C_{10}H_8 from coal gas and creosote, in processes requiring accurate temp. control, e.g., nitrations, silk weighting, and in the electrolytic production of H_2O_2 , etc. Low-temp. quenching is necessary for the modern Al alloys and some steels. C. I.

Methyl chloride [as refrigerant]. J. B. CHURCHILL (Ind. Eng. Chem., 1932, 24, 623—626).— MeCl , b.p. -23.7° , is non-corrosive; its stability is not affected by lubricants. The explosive range is 8.1—17.2% and it is moderately inflammable and of relatively low toxicity. It does not injure foods, furs, etc. Engineering data are supplied. C. I.

Dichloromethane and dichloroethylene as refrigerants. R. W. WATERILL (Ind. Eng. Chem., 1932, 24, 616—619).— CH_2Cl_2 and $\text{C}_2\text{H}_2\text{Cl}_2$ are liquids at room temp. Their use for air conditioning is occasioned by the necessity of a material which can be safely handled by unskilled attendants. They are operated under reduced pressure so that no outward leaks are possible, a large turbo-compressor being required. The load factor is variable and automatic control is essential. This is effected through the condenser water flow, and it is possible to cool fresh water in varying load to 1° without danger of freezing. C. I.

Freon [dichlorodifluoromethane], a refrigerant. R. J. THOMPSON (Ind. Eng. Chem., 1932, 24, 620—623).— CCl_2F_2 , an almost odourless gas (b.p. -29.8°), is non-toxic, non-corrosive, and non-inflammable. It is prepared from CCl_4 . Leaks are detected by a "halide lamp" burning EtOH , the air suspected of containing the gas being drawn through the flame and over Cu, when a green colour is produced by 0.01% of the gas. The vapour when brought in contact with flame normally yields HCl and HF , but not CO , Cl_2 , or COCl_2 , except under certain conditions. The gas is not absorbed by foods, furs, or other materials being refrigerated. C. I.

Solid carbon dioxide in industrial refrigeration. D. H. KILLEFFER (Ind. Eng. Chem., 1932, 24, 615—616).—Solid CO_2 is an expensive refrigerant, but is suitable where very low temp. are required or for small operations not justifying plant outlay. Such are the production of high vac., the manufacture of perfume absolutes, and the annealing of Al alloy rivets. C. I.

Liquid carbon dioxide as a refrigerant. J. H. PRATT (Ind. Eng. Chem., 1932, 24, 613—614).—Commercial liquid CO_2 is usually made by burning coke under controlled conditions, freeing the gases from dust and S compounds, and absorbing in Na_2CO_3 solution in coke-filled towers. The latter is boiled with exhaust steam and the gas evolved freed from H_2O by air-cooling. Commercial liquid CO_2 is of 99.5—99.8% purity. About 2% of the liquid CO_2 produced in the United States is used as a refrigerant principally where its non-toxicity is important. Although the crit. temp. is 31.3° , the refrigerating effect is still considerable with the condenser temp. above this point. The high operating pressures which have formerly been considered objectionable to its use are of no consequence with modern construction methods. C. I.

Sulphur dioxide as a refrigerant. C. W. JOHNSTON (Ind. Eng. Chem., 1932, 24, 626—630).—Liquid SO_2 has recently obtained widespread use in small refrigerating units. An evaporator temp. of -10° can be obtained without a vac. on the suction side of the machine. Fe compressors are used and H_2O -cooling is unnecessary in small units, some of which require only 0.7 kg. of SO_2 . Leaks are tested for with NH_3 . Inert gases in the SO_2 should not exceed 0.01% and the H_2O content is limited to 20—100 p.p.m., the latter to avoid corrosion. Carbonisation of oils by SO_2 is chiefly promoted by excessive H_2O content, high temp., or the presence of air. C. I.

Efficient production of manufactured ice. D. BURKS, JUN. (Ind. Eng. Chem., 1932, 24, 605—610).—For the production of transparent ice the concn. of dissolved salts in the H_2O should not exceed 600 p.p.m.; the opacity is minimised by air agitation during freezing. The author has increased the concn. limit by designing a more efficient air distributor. A final core of opaque ice is rejected. It has also been possible to reduce the brine temp. from -9° to -16° , the freezing time being halved. Cracking from too rapid warming is prevented by covering the finished ice with hair felt and by adding 75 p.p.m. of NH_4Cl to the H_2O . C. I.

Extraction of liquids. J. FRIEDRICH (Chem. Fabr., 1932, 199—201).—The theory of extraction is discussed, and formulæ applicable to extraction by successive shaking of the solution with the second solvent are derived; study of the extraction of BzOH from its aq. solution by means of CCl_4 indicates that in the aq. layer the acid exists almost entirely as double mols. The formulæ are applicable also to continuous extraction from a boiling solution. A new apparatus for continuous extraction of cold solutions with CCl_4 or CHCl_3 is described. H. F. G.

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

Pintsch distillation unit. B. BONDARENKO (GROZN. Neft., 1931, 1, No. 4—5, 72—76).

Moisture in granular substances.—See XI. **Condenser water.**—See XXIII.

PATENTS.

Pulverised-fuel furnaces. CLARKE, CHAPMAN & CO., LTD., ASSEES. OF FOURS & APPAREILS STEIN, SOC. ANON. (B.P. 372,982, 19.6.31. Fr., 23.6.30).—A no. of burners supplying fuel and insufficient primary air are situated between pairs of nozzles supplying converging streams of secondary air; the whole arrangement produces turbulent combustion in the centre of the furnace space. B. M. V.

Retort furnace. F. A. HANSEN, ASSR. TO HEVI DUTY ELECTRIC CO. (U.S.P. 1,825,790, 6.10.31. Appl., 10.8.29).—A furnace of the type into which the goods are lifted through the bottom is described. Forced circulation down the heated walls of the muffle chamber and up through the goods, *i.e.*, anti-convection, is employed. B. M. V.

Method of heating and furnace used therewith. L. A. MEKLER, ASSR. TO UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,828,373, 20.10.31. Appl., 11.3.27).—The goods, whether fluids in tubes or solid articles, are heated both by radiation and convection, the former from combustion flues in the walls and the latter by direct contact with the gases after emergence from the flues. B. M. V.

Economiser furnace for mineral wool production. E. R. POWELL, ASSR. TO BANNER ROCK CORP. (U.S.P. 1,828,293, 20.10.31. Appl., 3.8.28).—A melting furnace has the walls kept cool by the air for combustion and is provided with pokers extending through cooled apertures. B. M. V.

Furnaces for heat-treatment of metallic and other bodies. WELLMAN SMITH OWEN ENG. CORP., LTD., and H. W. SOWARD (B.P. 372,744, 29.1.31).—Furnaces of the walking-bed type are rendered especially suitable for sheets etc. by dividing both the fixed and moving rails into short lengths so that the sheets are continually being supported at different points. B. M. V.

Furnace and its operation. C. E. HAWKE, ASSR. TO CARBORUNDUM CO. (U.S.P. 1,828,839, 27.10.31. Appl., 5.1.28. Can., 15.6.26).—The walls of a combustion space (*e.g.*, of a boiler) are cooled by air outside, or in the thickness of, them to such an extent that fused ash adheres to them. It is necessary to use bricks of high thermal conductivity, *e.g.*, of SiC. B. M. V.

Dry kiln [for timber etc.]. H. L. HENDERSON (U.S.P. 1,829,139, 27.10.31. Appl., 31.5.29).—The atm. of a timber kiln is attemperated and caused to circulate in continually varying directions by means of swivelling steam-operated injectors. B. M. V.

Kiln heating. P. D'H. DRESSLER, ASSR. TO SWINDELL-DRESSLER CORP. (U.S.P. 1,828,492, 20.10.31. Appl., 16.3.28).—A tunnel kiln is provided with a no. of stoker-fired combustion chambers at the side in which combustion (of slack) is sufficiently complete for the gases to pass in contact with the goods. B. M. V.

Sintering apparatus. METALLGES. A.-G. (B.P. 373,542, 11.11.31. Ger., 5.12.30).—At the end of the return lift of the charge-trucks from the lower run of the conveyor to the upper, a cam is provided which straightens out the trucks and prevents rubbing or overriding although the trucks are touching. B. M. V.

Dryer. A. S. MACKENZIE, ASSR. TO CLAYTON GIN COMPRESS CO. (U.S.P. 1,813,750, 7.7.31. Appl., 27.10.28).—The material is spread between the lower runs of perforated conveyors above it and the upper runs of conveyors below it, passing in zig-zag manner through a casing. Below the upper runs of the conveyors (except the topmost one, which is idle) are heating means, and below those, inside the same conveyors, are ducts for withdrawal of moist air immediately after passing through the material. B. M. V.

Apparatus for drying liquid or pulpy material. W. SASSE (U.S.P. 1,827,617, 13.10.31. Appl., 28.7.28. Ger., 2.8.28).—The pulp is applied to the surface of a heated drum by a train of rollers so that heat is not transmitted to the feed bath. B. M. V.

Carrying out reactions in periodically heated chambers. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 373,600, 24.1.31).—Endothermic reactions, *e.g.*, the cracking of hydrocarbons, are carried out in the presence of periodically reheated regenerator materials the conductivity of which increases in the direction of flow of the gases, some portion at least having a conductivity of > 1.5 kg.-cal./m./hr./°C., at 1000°. B. M. V.

[Vapour-phase] catalytic apparatus. A. O. JAEGER, ASSR. TO SELDEN CO. (U.S.P. 1,826,548, 6.10.31. Appl., 24.7.26).—Exothermic reactions are carried out in an annular catalyst chamber; various schemes of flow for the cooling media, consisting of part or all of the gases before reaction, also an independent fluid, are claimed. B. M. V.

Effecting [catalytic exothermic] synthesis. F. C. BLAKE, ASSR. TO DU PONT AMMONIA CORP. (U.S.P. 1,829,734, 3.11.31. Appl., 26.10.25).—A route for the gases in heat exchange with themselves and with the catalyst and in contact with the latter is described. B. M. V.

Heat-exchange apparatus for fluids. J. G. MCKEAN and R. F. JONES (B.P. 373,455, 23.6.31).—The heat-transmitting wall comprises a plate with staggered grooves formed on both faces, but not extending to the margin of the plate. B. M. V.

High-temperature thermocouple. H. C. STAEBLE, ASSR. TO GEN. ELECTRIC CO. OF NEW YORK (U.S.P. 1,823,706, 15.9.31. Appl., 12.12.29).—A graphite tube forms the outer element of the apparatus, the inner consisting of a Ta carbide wire insulated therefrom by a plug of thoria or zirconia; the cold junction may be cooled with H₂O passing through a Cu coil fixed outside the tube. H. R.-D.

Method of insulating hot or cold objects. G. HOFBAUER and A. TREXLER (B.P. 372,745, 30.1.31).—A non-conducting covering is sheathed in non-radiating polished foil in the form of strip or bent sheet. [Stat. ref.] B. M. V.

Production of ice. W. TAMM (B.P. 373,242, 19.1.31. Ger., 17.1.30).—An apparatus for producing ice in thin sheets is described. B. M. V.

Hammer mill. W. J. CLEMENT, Assr. to BOSSERT CORP. (U.S.P. 1,828,490, 20.10.31. Appl., 13.11.29).—A disintegrator constructed of rolled steel is described. B. M. V.

Hammer mill. T. C. ALFRED (U.S.P. 1,829,325, 27.10.31. Appl., 17.7.28).—A fan draws fine material from a chamber below the semi-circular screen, around the horizontal edge of which additional air may be admitted. B. M. V.

Hammer crusher. W. A. BATTEY, J. E. STINE, and G. W. BORTON, Assrs. to PENNSYLVANIA CRUSHER CO. (U.S.P. 1,813,836, 7.7.31. Appl., 15.10.27).—The non-rotating crusher plate is resiliently mounted and is displaced by a cam at intervals, rebounding against a stop so as to project sticky material back into the crushing zone. B. M. V.

Crusher roll mechanism. AMER. ENG. CO. (B.P. 373,441, 11.6.31. U.S., 29.4.31).—Crusher rolls forming, e.g., the base of a boiler combustion chamber are subdivided and provided with a no. of intermediate bearings combined with which are operating mechanisms consisting of a ratchet and pawl. B. M. V.

Apparatus for crushing and screening material such as coke. R. CORT & SON, LTD., and A. G. SIMS (B.P. 372,756, 10.2.31).—A crusher of the cutting type, a reciprocating screen of smaller mesh, an elevator, and a rotary screen of larger mesh are arranged in that order. B. M. V.

Stone-breaking, granulating, and like machines. J. H. MASON (B.P. 373,527, 16.10.31).—A method of fastening renewable jaws to jaw-stocks is described. B. M. V.

Grinding mill. R. S. IGLEHART, Assr. to BAUER BROS. CO. (U.S.P. 1,827,986, 20.10.31. Appl., 24.10.29).—A disintegrator having toothed hammers is described. B. M. V.

Grinding mills. W. G. HAMBLIN (B.P. 373,617, 21.2.31).—The lower member is rotated and comprises a plain, flat, or conical surface; the upper, fixed, member has a continuous wavy band forming the other grinding surface. A stationary mixing arm is also provided. B. M. V.

Mills for pulverising minerals and other substances. M. I. WILLIAMS-ELLIS and A. E. FLEWIN (B.P. 373,289, 26.2.31).—A disintegrator having sloping hammer heads which may be easily changed for others of different slope to suit different materials is described. The discharge of heavy particles is through radial pockets and of fine material axially in an air current. B. M. V.

Clay ball disintegrator. L. O. BATES (U.S.P. 1,828,589, 20.10.31. Appl., 3.7.30).—A device for causing clay, among gravel, to become suspended in water is described. B. M. V.

Rotary drum screen. A. M. KIVARI, Assr. to DORR CO., INC. (U.S.P. 1,828,469, 20.10.31. Appl., 21.5.29).—Adjacent to one side of the screen is a settling chamber provided with a perforated bucket elevator for continuous

removal of solids. The incoming liquid is admitted tangentially to the upper part of the settling chamber, passes across a closed end of the drum, and circulates a few times before passing inwardly through one side of the screen and out axially at the other, open, end. The circulation of the feed liquor on the surface affords the elevator opportunities to remove floating matter. B. M. V.

Classification apparatus. A. D. MARRIOTT, Assr. to DORR CO., INC. (U.S.P. 1,827,894, 20.10.31. Appl., 29.1.29).—A rake classifier is provided with rakes of normal construction at the top and bottom of the slope, i.e., where they are always above or below (respectively) the surface of the liquid, but the intermediate portion has blades of increasing height so that all horizontal supporting parts are above the surface, with the object of preventing them lifting offensive floating matter from sewage etc. B. M. V.

Air separator [for grading materials]. T. J. STURTEVANT, Assr. to STURTEVANT MILL CO. (U.S.P. 1,826,406, 6.10.31. Appl., 1.2.30).—The oversize is collected in an inner cone and the undersize in an outer annular cone; forming an upward continuation of the inner cone is a louvred wall through which the return current of air enters from the annular space in a strictly tangential manner so that descending oversize is caught and rubbed against the louvres with the object of freeing the particles from any adhering dust. Above the louvred wall, in a preferably cylindrical part which forms the main separator, is a centrifugal spreader for the feed, and above that is the circulating fan. B. M. V.

Means for separating solid materials. F. S. SINNATT and L. SLATER (B.P. 372,759, 8.12.30 and 24.6.31).—The apparatus is of the type in which intermittent or alternating air currents are caused to flow vertically through the material by means of suction at one end and/or pressure at the other, preferably both simultaneously. The material is fed at a level intermediate between those at which the light and heavy strata are withdrawn. B. M. V.

Mixing device. J. J. TURNER and C. ABSMEIER, Assrs. to UNITED STATES GYPSUM CO. (U.S.P. 1,813,828, 7.7.31. Appl., 10.2.30).—The material, e.g., plaster of Paris, is wetted in a sag of a belt conveyor which forms a puddle kept full of water and is delivered to a mixer comprising scrapers, grinding balls, and screened outlets to prevent passage of any unbroken clots of material. B. M. V.

Settling tank. H. S. WALKER (U.S.P. 1,828,794, 27.10.31. Appl., 5.11.27).—A circular tank is provided with a no. of superposed level decks each provided with a curved rake and spaced from the wall of the tank, the circumferential spaces affording passage for both mud and feed liquid to pass lower down, the former eventually collecting in a conical bottom. Clear liquid is withdrawn from under the centre of each deck. B. M. V.

Sedimentation apparatus and skimmer therefor. DORR CO., INC. (B.P. 373,931, 16.11.31. U.S., 25.11.30).—In a thickener, floating material is prevented from leaving with the clarified liquor by drowning the outlet for the latter. A rotating skimmer attached to the

traction arm engages with another (swinging) skimmer pivoted on a wall of the thickener; together they trap the material and the swinging arm forces it through an elongated aperture in a wall of the tank at liquid level into a collecting chamber, which latter chamber is discharged only when the swinging arm is pressed against the wall of the tank and substantially blocks the outlet, preventing a rush of clear liquor. B. M. V.

Filters. J. ZWICKY, W. F. HUNT, and S. A. TYLER (B.P. 373,717, 2.4.31).—A filter is provided with a back-flush by means of a cam-operated piston. The filter itself may be attached to the piston. B. M. V.

Filtering device. B. F. ZIMMERMAN, ASSR. to F. E. BIGELOW (U.S.P. 1,828,484, 20.10.31. Appl., 23.1.28).—The prefit is admitted axially of a conical filter, at the base of which is an inclined baffle plate partly obstructing the entrance to a sediment chamber. B. M. V.

Drying and/or filtration of mixtures of liquids and solids. H. WARING, and GOODLASS WALL & LEAD INDUSTRIES, LTD. (B.P. 372,760, 11.12.30).—The filter medium is on the interior of one or a series of drums and the material is kept in motion by internal stirrers having a pressing action. B. M. V.

Manufacture of filter material. C. W. STUDER, ASSR. to HOOVER Co. (U.S.P. 1,829,618, 27.10.31. Appl., 2.8.29).—A dust bag for a vac. cleaner is constructed of cellulose fibres rendered moisture-proof by a varnish of synthetic resin, containing a plasticiser. B. M. V.

Replaceable-element [oil] filter. E. J. SWEETLAND (U.S.P. 1,825,983, 6.10.31. Appl., 21.9.26).—A long envelope of filter medium encloses a fabric of very coarse warp and fine woof to afford passage for the filtrate to a perforated pipe which is inserted at the centre of a long edge of the envelope. The latter is wound around the former into a spiral, a porous bulky mass being placed between the turns to provide passage for the prefit so that the whole surface of the envelope is utilised. B. M. V.

Centrifugal separators. AKTIEB. SEPARATOR (B.P. 373,885, 10.9.31. Swed., 16.9.30).—Material of which the middle layer is required pure, *e.g.*, paper pulp, is treated in an apparatus comprising a no. of concentric cylindrical walls between which the pulp flows zig-zag, the heavy impurities lodging on the insides and the light on the outsides of the walls, the apparatus being maintained full of flowing pulp. B. M. V.

Centrifugal process and mechanism. T. A. BRYSON (U.S.P. 1,828,096, 20.10.31. Appl., 14.6.29. Renewed 18.8.30).—A centrifuge for three products, the intermediate one, *e.g.*, paper pulp, being desired pure, has the drum divided into compartments by internal flanges, there being no peripheral communication between the compartments. The middle layer is transferred from compartment to compartment through small apertures in the flanges; on emerging from the apertures it expands violently, giving the impurities successive opportunities to escape. B. M. V.

Centrifugal separators. AKTIEB. SEPARATOR—NOBEL (B.P. 373,412, 26.5.31. Swed., 11.6.30).—A separator for three constituents is described; the heaviest product, *e.g.*, H_2SO_4 , being less viscous than the inter-

mediate product, *e.g.*, goudron from oil, is selectively discharged through capillary outlets at the max. radius. B. M. V.

Centrifugal separators. AKTIEB. SEPARATOR (B.P. 373,560, 9.12.31. Swed., 9.12.30).—In a separator fed under pressure, a very small gas outlet is formed in the axial feed compartment. Since the gases will entrain some unseparated liquid, they are led into the product which is least harmed thereby, *e.g.*, in the case of milk into the cream, or of transformer oil into the heavier sludge. By arranging that the liquid flows upwards in a chamber of diminishing diameter the speed of the liquid may be greater than that of the wall at the point where the gas separates, with beneficial effect on entrainment. B. M. V.

Centrifugal machine. C. SHAPLEY (U.S.P. 1,828,548, 20.10.31. Appl., 3.8.29).—A centrifuge having an internal helical rake for discharge of solid matter has no positive drive connexion between the helix and the drum, but these parts are slightly eccentric so that, because of the drag due to collected solids at the point where they are nearest the helix, the latter acquires the same peripheral velocity as the drum and, being of smaller diameter, a slightly greater angular velocity which gives the raking action. B. M. V.

Centrifugal process and apparatus. L. P. SHARPLES, ASSR. to SHARPLES SPECIALTY Co. (U.S.P. 1,829,547, 27.10.31. Appl., 11.3.27).—In a separator of the type in which separated solids are raked downwards in a conical basket or bowl, gas is admitted to the receiving chamber at the bottom and passes countercurrent to the solids while they are in a diffused state, then through the basket, and in contact with the liquid also in a diffused state. B. M. V.

Washing a liquid with another liquid. STANDARD OIL DEVELOPMENT Co., Assees. of P. J. HARRINGTON (B.P. 373,897, 25.9.31. U.S., 20.10.30).—A tower is divided into sections by perforated partitions, and is maintained full of the liquids, these being supplied from opposite ends so as to maintain countercurrent flow by gravity. The lighter fluid is broken up by the partitions into bubbles, and the heavier flows about half way to the next partition in a pipe; this and a float-operated discharge valve maintain the division levels of the two liquids at points intermediate the partitions. B. M. V.

Apparatus for cooling or heating liquids. A. B. SIDÉRIS (B.P. 373,631, 24.2. and 24.11.31).—Spiral grooves are formed on the outside of a hollow casting and are embraced by cylindrical covers. The inlet and outlet pipes are inside the casting, and several pairs for different liquids are provided which communicate with different sections of the spirals. B. M. V.

Reducing evaporation losses in tanks. J. VERNER, ASSR. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,813,870, 7.7.31. Appl., 2.11.29. Renewed 21.5.31).—The roof and, if desired, all or part of the walls of a tank are covered with a porous material, *e.g.*, a 1-in. layer of gypsum, which is kept wet. B. M. V.

Distillation vessels. A. IRINYI (B.P. 372,769, 5.2.31).—A still for the distillation of decomposable

materials by means of combustion heat is provided with horizontal fire-tubes of Λ -section having vertical ribs on the liquor side and, if desired, as an additional precaution against local overheating of the liquor, with a metallic sheath the spaces between the ribs of which are filled with a fusible alloy, *e.g.*, Sb-Pb. The incoming liquid is guided in close proximity to the tops of the tubes and flows down the ribs with a scouring action. B. M. V.

Apparatus for distilling liquids. F. N. HOLMQUIST (U.S.P. 1,827,846, 20.10.31. Appl., 8.1.30).—The vapour produced is, after compression, used as the heating agent. To allow for the increased pressure on the pure side the receiving tank for condensate is placed at the higher level. Heat losses are replaced by the power put into the compressor and by a separate surface heater using high-pressure steam. B. M. V.

Crystallisation. J. W. MARTIN, JUN., Assr. to DRYICE EQUIPMENT CORP. (U.S.P. 1,825,646, 29.9.31. Appl., 22.11.27).—Solid CO_2 is submerged in a crystallisable solution. B. M. V.

Sterilisation and the sterilised filling of casks and the like. SEITZ-WERKE GES.M.B.H. (B.P. 373,843, 23.7.31. Ger., 25.7.30).—The three operations, *viz.*, injection of germicidal gas, displacement by sterile air, and filling with the desired (loose) material, are performed through one device which remains in the bung hole throughout. B. M. V.

Fluid - treating apparatus. [Pasteurisers.] PFAUDLER CO., Assees. of J. N. JACOBSEN (B.P. 372,810 and 372,811, 6.2.31. U.S., 14.10.30).—Methods of operating pasteurisers in correct sequence are described; after emptying, the tanks are washed by sprays. B. M. V.

Rotatable gas filter. B. RICHTER (U.S.P. 1,826,256, 6.10.31. Appl., 29.7.29. Ger., 27.8.28).—A no. of filter cells are attached to a conveyor and are so constructed that in the active position the cells are horizontal but the gas flows vertically through them. The gas may pass through the cells on opposite runs of the conveyor either in series or parallel. B. M. V.

Separation of liquid particles from steam and other gases. G. H. C. CORNER, F. POSTLETHWAITE, J. MCGINN, and IMPERIAL CHEMICAL INDUSTRIES, LTD. (B.P. 373,661, 2.2.31).—The fluid is passed through a spiral pipe having a horizontal axis, and the liquid is drawn off at the lowest point of every spiral. B. M. V.

Gas- and vapour-treating apparatus. J. L. DORMON, Assr. to BASIC PATENTS CORP. (U.S.P. 1,828,734, 27.10.31. Appl., 13.9.28).—A rotatable casing is divided into cells which are subjected to three stages of treatment simultaneously and in succession, *e.g.*, removal of S from hydrocarbon vapour by formation of metallic sulphide (NiS), oxidation and removal of the S, and reduction of any metallic oxide by H_2 . B. M. V.

Apparatus for drying air or other gases. HALL & KAY, LTD., H. KAY, J. H. HALL, and A. MYERS (B.P. 372,740, 6.11.30).—The apparatus comprises a moving band impregnated with hygroscopic material which at some point in the travel is regenerated or replaced.

The band moves in a zig-zag course and the flow of gas is along the surface. B. M. V.

Eliminating easily condensable elements from gases. T. F. HARGREAVES. From M. FRANKL (B.P. 373,918, 24.10.31).—In, *e.g.*, the separation of air, CO_2 is deposited in one pair of two pairs of cold accumulators and, on reversal, is volatilised into the O_2 and N_2 after separation. In this invention part of the ingoing air is taken out of the cold accumulators at points where the temp. is about -100° , *i.e.*, before the CO_2 freezes out, in order that the whole of the outgoing gases may more easily volatilise the CO_2 deposited from the remainder of the air. That portion drawn off at the comparatively high temp. is heated by heat exchange with itself, the CO_2 removed chemically, cooled by heat exchange, and sent to a rather higher point in the rectifier than the fully cooled portion. B. M. V.

Adsorbing a gas in a solid adsorbent. F. H. WAGNER, JUN., Assr. to SILICA GEL CORP. (U.S.P. 1,825,707, 6.10.31. Appl., 24.5.27).—Granular adsorbent in sufficient quantity and of the correct size to give the necessary time of contact is allowed to gravitate counter-current to the gas and is then regenerated and returned to the top of the adsorption tower. Any finer adsorbent which is carried off by the stripped gas is separated in a cyclone and returned to the tower without regeneration. B. M. V.

Constant uniform delivery siphon. A. C. WILSON, Assr. to SILICA GEL CORP. (U.S.P. 1,826,112, 6.10.31. Appl., 2.2.29).—Liquid is siphoned from a supply vessel of const. horizontal cross-section into another vessel (with overflow) which is allowed to deliver liquid at a const. rate under clockwork control. The overflow from the second vessel dips into a third, whence the liquid is allowed to overflow down a wire into a Venturi throat carrying the main liquid which is to be treated with a small quantity of the siphoned liquid, *e.g.*, oil with H_2SO_4 . B. M. V.

Hydrometer. S. J. DUNKLEY, Assr. to SPRAGUE SELLS CORP. (U.S.P. 1,827,841, 20.10.31. Appl., 8.8.21).—The continuous regulation of the density of a flowing liquid is effected by means of a lever with a float on one end and upper and lower electric contacts on the other. B. M. V.

[Boiler-]furnace walls. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of A. R. SMITH (B.P. 373,024, 24.8.31. U.S., 26.8.30).

[Deflection-type] separators for steam and other fluids. COCKBURNS, LTD., and D. MACNICOLL (B.P. 373,721, 13.4.31 and 5.1.32).

Centrifuge for pulp.—See V. **Steel-monel metal [packings]. Alloy for pistons.**—See X. **Measuring smoke intensity.**—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Bright coals. A. JENKNER and E. HOFFMANN (Brennstoff-Chem., 1932, 13, 181—187).—The reflecting powers of a series of bright coals, determined on embedded and polished particles by means of a Leitz slit-microphotometer, increased with the rank of the coal, *i.e.*, with

decreasing volatile matter content, from 7.25% (C 78.4%, H 6.67%, volatile matter 39.55%) to 15.0% (C 94.5%, H 0.56%, volatile matter content 2%). The coals also became increasingly anisotropic with higher rank. Most of the bright coals of 18–35% volatile matter content possessed coking properties, although some of equal rank differed considerably in that respect. A method of following the course of evolution of volatile matter during carbonisation is described, in which the crucible containing the coal is suspended in the furnace from one arm of a balance. The electrical conductivity of the powdered coke prepared from the coals (cf. B., 1932, 535) passed through a max. with rising rank. A. B. M.

Extraction of coal with high-boiling organic compounds. P. E. RAASCHOU (Trans. Tokyo Sect. Mtg., World Power Conf., 1929, 1, 44–71).—The yields of extract obtained with $C_{10}H_8$, NH_2Ph , and $PhOH$ at 175° were about 5, 15, and 20%, respectively. With $PhOH$ and NH_2Ph the yields continued to increase for >16 hr., but with $C_{10}H_8$ they decreased after a few hr.; all 3 solvents combine with the coal substance. Identical results were obtained in CO_2 . Results are given for 4 English and 10 American coals. CH. ABS.

Gases enclosed in coal. F. FISCHER, K. PETERS, and A. WARNECKE (Brennstoff-Chem., 1932, 13, 209–216).—The coal was finely ground in a ball mill which could be evacuated and heated to 100°; the gases evolved were pumped off, collected, and analysed. The quantities obtained varied from 100 to 900 c.c. per 100 g. of coal. The gases from a Ruhr coal and from an anthracite consisted principally of CH_4 ; that from a Minden coal contained considerable quantities of C_2H_6 , C_3H_8 , and C_4H_{10} , and smaller quantities of still higher paraffins; an Obernkirchen coal yielded principally CH_4 , C_2H_6 , and CO_2 , and a Barsinghausen coal gave only CH_4 and CO_2 , the composition of the gas having probably been influenced by the porosity of the overlying strata. The coals contained small quantities of He. Methods previously used for determining the gases in coal are critically discussed, and shown to lead generally to incorrect results. A. B. M.

Sampling and analysis of coal. ANON. (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 5–12).—Full details are given of the T.A.P.P.I. tentative standard method of sampling and analysing coal. H. A. H.

Tendency of coal to spontaneous combustion. II, III. D. J. W. KREULEN (Chem. Weekblad, 1932, 29, 367–371, 382–383; cf. B., 1932, 487).—II. The heat liberated on treating 5 coals (volatile matter 14.7–41.6%) with HNO_3 and with H_2SO_4 has been determined, but the results do not lead to a definite classification. In determining the degree of carbonation of a coal, O_2 is passed at const. temp. over the specimen and the humic acid so produced is extracted with aq. $NaOH$ and titrated with 0.01N- $KMnO_4$ (standardised with dry humic acid); apparatus is described. Determination of the humic acid produced by oxidising the coal samples at various temp. yields a series of curves sufficiently spaced with regard to temp. to permit easy recognition of the group to which a coal belongs; e.g., 0.5 g. of a coal containing 41.6% of

volatile matter gave 20 mg. of humic acid when oxidised at 180° in a current of O_2 (10 litres per hr.) for 30 min., whilst under the same conditions a coal containing 14.2% of volatile matter required a temp. of 296° to yield the same result.

III. The "initial temp." of specimens of vitrain, durain, and fusain have been determined as 138°, 152°, and 176°, respectively. From the temp.–humic acid curves the vals. for the temp. at which 20 mg. of humic acid are produced from 0.5 g. of coal during oxidation in a current of O_2 (10 litres per hr.) are 190°, 205°, and 243°, respectively. H. F. G.

Carbonisation of lignite. T. UBALDINI and C. SINIRAMED (Annali Chim. Appl., 1932, 22, 175–193).—Xyloid lignite from Valdanno (Tuscany) was carbonised under pressure in presence of H_2O in an atm. of N_2 at 215–343°. The process takes place in different manner according to the nature of the fuel under treatment, but leads to products having a higher calorific val. and a high content of bituminous substances sol. in $EtOH-C_6H_6$. Lignite from Mercure carbonised in presence of H_2O at 320–325° gives an artificial coal which when distilled at low temp. gives 10.95% of tar, whilst the original lignite gave 1.20%. These artificial coals have only a limited analogy with natural coals. O. F. L.

Fuel value of sewage solids. G. M. FAIR and E. W. MOORE (Sewage Works' J., 1932, 4, 242–246).—Vals. obtained by the authors and other workers when plotted show the following relationship between the fuel value (Q) of sludge in terms of B.Th.U. per lb. of dry solids and the % loss on ignition (P), viz., $Q = CP^{4/3}$, where C is a const. depending on the origin of the sludge and lies between 18 and 36. For fresh sludge, whether digested or not, the average val. for C is 29, the corresponding val. for activated sludge being 25. C. J.

Influence of electric discharge on coke-oven gas. H. A. J. PIETERS (Chem. Weekblad, 1932, 29, 380–381).—Passage of coke-oven gas (approx. 59% H_2 , 24% CH_4 , 6.7% N_2) through an ozoniser yields a condensable substance, corresponding approx. to the formula $(CH_2O)_n$, which is strongly reducing, sol. in aq. $NaOH$, and insol. in C_6H_6 . NO_2 and, possibly, NO are also formed. H. F. G.

Improvements in dry gas purification effected by the extraction method of working up the spent purifying masses and by efficient purifier operation. H. BROCHE, H. NEDELMANN, and H. THOMAS (Brennstoff-Chem., 1932, 13, 201–209).—Extraction of S from the spent masses can be effected by means of CS_2 , tetralin, benzol, toluol, etc. Extraction under pressure with a solvent of low b.p. is recommended; by operating at temp. above the m.p. of S the extraction may be combined with the separation of part of the S in the molten form. Solvents of high b.p. are difficult to remove completely from the extracted mass. The high temp. coeff. of solubility of S in some solvents, e.g., benzol, tetralin, enables a purer product to be obtained in one operation, the dissolved S separating on cooling the solution. The extracted mass can be used repeatedly for the purification of fresh quantities of gas without

appreciable loss of absorptive capacity (cf. Gemmell, B., 1922, 739 A), provided not too high a temp., e.g., $> 250^{\circ}$, is used in the extraction. The activity of the mass falls after extraction, but may be restored to a val. sufficiently high for efficient operation by the addition of 3–5% of alkali, CaCO_3 , etc. Improvements in the plant and its operation, e.g., more efficient design of the boxes, careful control of the air added for regeneration, determination of the rate of S removal in each box at suitable intervals, and control of the H_2O content of the gas, are discussed. A. B. M.

Hydrocarbons from phenolic tars. II. Catalytic hydrogenation under pressure. C. PADOVANI and E. DE BARTHOLOMAEIS (Annali Chim. Appl., 1932, 22, 221–260).—Experiments on phenolic tars and their fractions obtained from two xyloid lignites from Tuscany, using Mo and Co sulphides as catalysts, show that these can be converted into saturated hydrocarbons with almost theoretical yield. A high yield of light hydrocarbons, C_6H_6 and its homologues, was obtained by direct hydrogenation of the original lignites in presence of 20% of H_2O . By increasing the concn. of H_2 the formation of C_6H_6 and gaseous hydrocarbons, or with lower concns. of H_2 that of liquid hydrocarbons and higher homologues of C_6H_6 , is favoured. A new titration burette and the technique used in the determination of aromatic hydrocarbons are described. O. F. L.

Acids from low-temperature tar from lignites. I. J. VON BRAUN, E. ANTON, and W. KELLER (Annalen, 1932, 495, 291–299).—The tar from a lignite from Wölfersheim is freed from wax by distillation; the acids isolated from the distillate, b.p. $100\text{--}250^{\circ}/0\text{--}2$ mm., are esterified (MeOH-HCl), the esters fractionated, and the resulting fractions hydrolysed (alkali) to the acids. These consist of fatty acids containing C_{8-16} characterised by conversion into the amines (C_{7-15}) by treatment with N_3H (A., 1931, 1396); palmitic acid is isolated from the acid fractions, b.p., $185\text{--}210^{\circ}$ and $210\text{--}250^{\circ}/14$ mm. The acids from a wax-free tar ("Fresol") from a central German lignite consist of fatty acids containing C_{11-24} ; an acid, $\text{C}_{24}\text{H}_{48}\text{O}_2$, m.p. $68\text{--}69^{\circ}$ (anilide, m.p. $93\text{--}94^{\circ}$), is isolated from the fraction, b.p. $140\text{--}240^{\circ}/0\text{--}5$ mm., whilst *n*-hexadecylamine is present in the amines obtained from the residual acids and N_3H . The isolation of this amine indicates that heptadecic acid is present. The difference (C contents) in the two series of acids may depend on the sources of the lignites or the carbonisation processes. H. B.

Sulphur content of tar and tar oils. W. A. DAMON (68th Ann. Rep. on Alkali etc. Works, 1931, 25–32).—The distribution of the S content of tar between gas, condensate, and residue in distillation was studied. Tars of various origins containing 0.3–0.57% S were distilled. Gases contained 5–15% of the S present. Division between condensate and pitch was about in proportion to the yield of each and varied between different types of tar. Slow distillation increases the H_2S evolved, as does steaming. In the distillation of light oil up to 190° , 1–4% of the S present appears as gas. It is slightly reduced by NaOH washing.

Benzolised wash oil gives an appreciable quantity of H_2S . Crude benzol yields very little, the bulk of the volatile S compounds present being CS_2 and the like. In all stages of the distillation of all these substances noxious gases are evolved. C. I.

Corrosion of tar stills. W. A. DAMON (68th Ann. Rep. on Alkali etc. Works, 1931, 22–25; cf. B., 1931, 706).—The resistance of mild steel to corrosion is equal to that of other ferrous metals. Coating with Ni or Cr does not give complete protection. Glue, CaO , and Na stearate reduce corrosion, but even after excess above the NH_4Cl equiv. of the last two is added corrosion is still considerable. Steaming may reduce the NH_4Cl content from 0.2–0.4% to 0.02–0.07% and about halves the corrosive power. CaO does not improve the effect of steaming. The use of steam is the only method likely to lead to success and should be studied on the plant scale. With reference to the corrosion of still tops it is shown that the higher phenols have a slight action on FeS . C. I.

Hydrogenation of coal tar produced by low-temperature carbonisation. N. A. ORLOV, E. J. PROKOPETZ, and I. I. ERU (Khim. Tverd. Top., 1931, 2, No. 1, 6–16).—Tar obtained in a Fischer retort from Lisichanski long-flame coal was hydrogenated at $450\text{--}460^{\circ}$ and (initially) 86–90 atm. during 3–5 hr. in presence of catalysts; characters of the product are recorded. S present in the tar enhances the activity of Mo catalysts. The hydrogenation of fractions is described; a considerable amount of cycloparaffins was obtained. The activity of W, V, U, Zn, Al_2O_3 , CuO , and FeO catalysts is small. CH. ABS.

Testing of asphalt emulsions. F. SCHULZ (Petroleum, 1932, 28; Asphalt u. Strassenbau, No. 4, 2–7).—The emulsions have been submitted to the "stone coating" test, in which 465 g. of stone (basalt or limestone of 6–18 or 5–12 mm. particle size, respectively) are washed with distilled H_2O and then mixed for 3 min. with 35 g. of the emulsion. A good emulsion showed no breakdown within the 3 min. and covered the stone completely with a layer of asphalt, which was not disturbed when, after being allowed to dry, the stone was immersed in H_2O . The emulsion did not break down as rapidly on limestone as on basalt. The test in which the surface of a porcelain crucible is coated with the emulsion and the dry coating is examined for stability proved unsatisfactory. The moisture contents of the emulsions were determined as follows: some discs and a roll of filter paper were placed in a weighing bottle (4 cm. diam., 6.5 cm. high), dried at 135° , and weighed; 3–5 g. of the emulsion were added, weighed, dried at 135° , and again weighed. In this way the bottle remained clean and after being refilled with filter paper was ready for another determination. A. B. M.

Acids of Caucasian petroleum. A. E. TSCHITSCHIBABIN, F. V. TSCHIRIKOV, M. M. KATZNELSON, S. I. KORJAGIN, and G. V. TSCHELINCEV (Bull. Acad. Sci. U.S.S.R., 1932, 203–224).—The crude naphthenic acids from Caucasian petroleum were freed from hydrocarbons and roughly separated by fractionation of their Me esters. The *d* and n_D of the acids recovered from the

lowest fractions indicated the presence of saturated fatty acids, and isoamylacetic and $\beta\beta$ -diethylpropionic acids were identified as their amides. The acids having b.p. $>215^\circ$ contain increasing amounts of cyclic acids and practically no fatty acids are found in the fractions above 260° . For the separation of the acids the fractional pptn. of the Cd salts was employed; the Cd salts of primary fatty and alicyclic acids are sparingly sol., those of secondary and *tert.* acids fairly sol., particularly those of secondary acids of the cyclopentane series; Cd cyclopentanecarboxylate is the most sol. The presence of cyclopentanecarboxylic acid in naphthenic acids is very probable, whilst cyclohexanecarboxylic acid was identified with certainty. The fatty acids present are mainly primary and the alicyclic acids mainly secondary (cf. Braun, B., 1931, 957, 1369); *tert.* acids have not been definitely identified. Naphthenic acids contain optically active constituents.

G. A. R. K.

Cracking and catalytic hydrogenation of Ragusa oil. M. G. LEVI, C. PADOVANI, and A. MARIOTTI (Annali Chim. Appl., 1932, 22, 157—175).—The crude oil from the distillation of Ragusa shale was subjected to cracking and hydrogenation in the laboratory plant described. The best results obtained by cracking were: pressure distillate 55% of wt. of original oil, fraction b.p. $<180^\circ$ 27% (30% of this consisted of aromatic hydrocarbons), fraction b.p. $<230^\circ$ 40%. In the hydrogenation, using Co_2O_3 as catalyst, at 200 atm. and 470° (average temp.): pressure distillate was 85% of wt. of original oil, fraction b.p. $<180^\circ$ 40% (30% of this consists of aromatic hydrocarbons), fraction b.p. $<230^\circ$ 65%.

O. F. L.

Hydrogenation [of oil]. A. N. SACHANOV (Groz. Neft., 1931, 1, No. 4—5, 56—62).—Hydrogenation of petroleum is best effected at 425 — 480° and 200—250 atm. Formation of coke can be avoided. Repeated hydrogenation of a paraffin distillate gave 80% of gasoline; 1% of H_2 was consumed by heavy products and 0.75% by light oils. The hydrogenation of heavier products requires the use of catalysts. CH. ABS.

Oxidation mechanism of mineral oils. T. YAMADA (J. Soc. Chem. Ind., Japan, 1932, 35, 202 B; cf. B., 1932, 297).—The oxidation of mineral oils is accelerated by BzOH , stearic, oleic, and naphthenic acids, and the acids obtained by oxidising petroleum in a closed vessel but not by $\text{H}_2\text{C}_2\text{O}_4$ or the acids obtained from petroleum exposed in an open vessel. H. A. P.

Petroleum coke. J. C. MORRELL and G. EGLOFF (Chem. and Ind., 1932, 467—469).—Cokes derived from the cracking of heavy oils from the Mid-Continent, Texas, Arkansas, Pennsylvania, Kentucky, and California fields were analysed for their moisture, volatile matter, free C, ash, and S contents, the figures being tabulated. Their calorific vals. ranged from 15,295 to 16,403 B.Th.U./lb. The shatter indices showed wide variations; the porosity varied from 12 to 46%. CS_2 and $\text{C}_5\text{H}_5\text{N}$ were found to have the greatest solvent action on the cokes.

C. B. M.

Benzene synthesis from carbon monoxide and hydrogen at atmospheric pressure. XI. K. FUJIMURA (J. Soc. Chem. Ind., Japan, 1932, 35, 179—

182 B; cf. A., 1931, 1018, 1376).—The best catalyst examined for the production of liquid hydrocarbons from CO and H_2 at 200—205° contained 8 Co : 1 Cu : 0.15 Th : 0.15 U on kieselguhr, and was obtained in a highly porous form by addition of starch to the mixture of nitrates. H. A. P.

Crude benzol and the chemical reactions occurring during its refining. O. KRUBER (Brennstoff-Chem., 1932, 13, 187—190).—The presence of cyclopentadiene, *n*-hexylene, *n*-heptylene, tetrahydrobenzene, and (probably) dihydrobenzene in crude benzol has been established. In refining benzol with H_2SO_4 part of the thiophen condenses with the olefines present to form products which appear as higher-boiling liquids or as H_2O -sol. gums. Other high-boiling liquids and gums, insol. in H_2O , some sol. and others insol. in C_6H_6 , are formed by the condensation of C_6H_6 with the unsaturated hydrocarbons, as well as by direct polymerisation of the latter (cf. B., 1932, 216). A. B. M.

Refining cracked gasoline with anhydrous aluminium chloride. I. BESPOLOV and A. DEGTAREVA (Azerbaid. Neft. Choz., 1931, No. 11—12, 88—90).— $<1\%$ AlCl_3 is required. Stability in storage is poor. The S content is reduced by 50%. Combined treatment with AlCl_3 and H_2SO_4 did not yield a better product.

CH. ABS.

Knocking properties of motor fuel and its prevention. II. Relation between antiknock values and chemical construction of organic compounds. E. ENDO (J. Fuel Soc. Japan, 1932, 11, 53).—150 non-metallic org. compounds were added to petrol and their antiknock properties tested under standardised conditions (cf. B., 1931, 1034). N and OH compounds are antiknocking, ethers and aldehydes pro-knocking, and ketones and esters intermediate. The tendency to knock increases with increasing length of the straight C chain of aliphatics. For the same compound, the antiknock val. of normal compounds is greater than that of their isomerides. In aromatic compounds, the antiknocking tendency is increased when NH_2 or OH groups are added directly to the C_6H_6 ring and decreased when they are added to the side chain. C. B. M.

Comparison of Russian and foreign petroleum products. Low-viscosity oils. G. V. ANDREEV. **Petrolatums.** A. S. VELIKOVSKI and S. S. NIFONTOVA (Trans. State Petrol. Res. Inst., Moscow, 1930, No. 8, 36—47, 126—167).

Refrigeration.—See I. C for paper industry.—See V. **Analysis of asphaltic mixtures.**—See XIV. **Gas from sewage.** **Gas-works liquor.**—See XXIII.

PATENTS.

Treatment [colouring] of coal. DELAWARE, LACKAWANNA, & WESTERN COAL CO., Assees. of H. S. MORK (B.P. 372,038, 19.3.31. U.S., 19.3.30).—A multi-colour effect is produced on coal by immersing it in or spraying it with a dil. suspension or solution of Prussian-blue, MnO_2 , or an org. dye. A. B. M.

Apparatus for the burning of fine coal and the like. W. PARKER and L. S. DAVIS (B.P. 372,429, 16.2. and 12.9.31).—Pulverised coal is burned in a rotary

furnace comprising a metal shell with a refractory lining, into one end of which the fuel and air are fed; the other end opens into the flue etc. into which the hot gases are required to pass. The lining is provided with ledges which raise the fuel and allow it to fall again through the air as the furnace rotates. The furnace is surrounded by a jacket through which air for cooling the shell is passed, the air so preheated being supplied to the furnace, if desired. A. B. M.

Regenerative chamber ovens for production of coke and gas. C. STILL (B.P. 372,485, 19.3.31).—In coke ovens of the type described in B.P. 364,943 (B., 1932, 298) the regenerators are connected with the heating flues by vertical ducts formed in the partitions of the heating walls and provided with a no. of outlets on each side into the heating flue at different levels. The ducts of adjacent heating walls are connected respectively to gas and air regenerators. A. B. M.

[Carbonisation] retort. G. McD. JOHNS (U.S.P. 1,828,499, 20.10.31. Appl., 6.5.27).—The heat is transmitted to the material, *e.g.*, cannel, lignite, through metal plates upon a conveyor the side passages of which, containing the rollers, are divided off from the distillation zone by spaced plates and form the outlet passages for distillate, oily matter from which is allowed to condense on the rollers. Provision is made to admit separately condensed oil as additional lubricant. B. M. V.

Heating of retort settings. H. J. RISBY, and R. DEMPSTER & SONS, LTD. (B.P. 372,387, 8.1.31).—In order to obtain a uniform distribution of heat in horizontal or inclined retort settings, combustion of the fuel gases is carried out in stages. The whole of the fuel gas is admitted to a central zone together with a restricted supply of secondary air, the unburnt fuel gas then circulating with the products of the first stage of combustion and receiving a further addition of air (*tert.* air supply) for its combustion, which may be effected in the upper regions of the heating chambers. A. B. M.

Distillation of coal. E. S. MEAD, Assr. to J. P. EDWARDS (U.S.P. 1,827,896, 20.10.31. Appl., 12.8.29).—Anthracite dust mixed with sufficient crude oil to form a paste is destructively distilled at $> 400^\circ$, preferably 315° , for 1 hr. The product contains 14–18% of volatile matter and may be used as boiler fuel or blended and briquetted with coal. R. N. B.

Distillation and briquetting of coal. B. MÓRY (B.P. 372,282, 2.12.30).—Coal is ground, dried, preheated, and then fed to a briquetting press wherein it is heated to a temp. within the limits between which tar formation occurs and is briquetted by means of mechanical pressure while maintaining an increased pressure, *e.g.*, up to 1 atm. above the normal, on the gases and vapours in contact with the coal. The finished briquettes are cooled in the press under the same pressures. A. B. M.

Gasification and distillation of coal and other carbonaceous substances. A. A. MACINTOSH (B.P. 372,341, 6.1.31. Austral., 20.1.30).—A retort setting and a gas producer are combined in such a manner that carbonisation in the retorts is carried out under const. pressure, whilst the pressure of the air on the inlet side

and of the gas on the outlet side of the producer are also maintained const.; the distillation gas and the producer gas are mixed in any desired proportion. A. B. M.

Manufacture of carbon. SOC. CARBONFIX, Assees. of J. I. MAREK (B.P. 372,336, 6.11.30. Belg., 8.11.29).—Lignin is freed from resin, washed with warm H_2O , and carbonised by a wet method, *e.g.*, by heating with H_2SO_4 at 165 – 200° , the material being freed from silicates by suitable acid and/or alkali washes either before or after carbonisation. A. B. M.

Removal of soot. C. DANTSIZEN, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,828,646, 20.10.31. Appl., 14.2.28).—Gases containing smoke are treated with an atomised oil spray and pass up a vertical electrostatic precipitator at the top of which H_2O is injected tangentially. The H_2O , which may act as an electrode, sweeps the soot particles to a separating tank at the bottom of the precipitator, where they are skimmed off, the H_2O being pumped back for further use. R. N. B.

Soot disposal. W. R. WHITNEY, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,828,631, 20.10.31. Appl., 13.3.28).—Smoke particles are electrostatically pptd. as described in U.S.P. 1,828,646 (preceding abstract). The H_2O , however, is treated with $< 1\%$ of a wetting agent, *e.g.*, CO_2 , $EtOH$, or Et_2O . The soot which sinks to the bottom of the settling tank is withdrawn and the mixed liquids are recycled. R. N. B.

Destructive hydrogenation of carbonaceous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 371,833, 21.1.31).—Tars and oils of high b.p. are converted into hydrocarbons of lower b.p. by destructive hydrogenation in the presence of catalysts consisting of one or more complex compounds of Mo and/or W, in the mols. of which > 1 radical containing O and one of the said metals are present. The catalysts may be mixed with other non-reducible substances. *E.g.*, equal pts. of NH_4 phosphomolybdate and Zn phosphate may be stirred into a paste with H_2O , dried, and reduced with H_2 at 450° under pressure; or equal pts. of NH_4 polymolybdate ($3NH_3, 15MoO_3, 6H_2O$) and $Al(OH)_3$ may be made into a paste with 30% HNO_3 , dried, and similarly reduced. A. B. M.

Destructive hydrogenation of carbonaceous materials. INTERNAT. HYDROGENATION PATENTS Co., LTD., Assees. of E. J. GOHR and R. C. CLINE (B.P. 372,715, 22.1.32. U.S., 2.2.31).—When the type of feed stock undergoing hydrogenation is changed, undesirable fluctuations in temp. and pressure are avoided by gradually replacing increasing amounts of the stock under treatment by the new stock. A. B. M.

Manufacture of carburetted water-gas. T. W. STONE, Assr. to WESTERN GAS CONSTRUCTION Co. (U.S.P. 1,829,767, 3.11.31. Appl., 13.10.27).—The plant comprises a generator (*A*) equipped with a self-clinking grate, a carburettor (*B*), a superheater (*C*), a wash-box, and a regenerator (*D*) inserted in the back-run pipe between the bottom of *A* and the wash-box. The sequence of operations is as follows: (*a*) air preheated in *D* is passed up through *A* and the hot blow gases are burned with secondary air in *B* and *C*, (*b*) steam is passed through *D* and up through *A*, the water-gas

formed being carburetted in the usual manner, (c) steam is passed through *C*, *B*, and *A* in series, and thence through *D* and wash-box to storage. This "back-run" is followed by a short up-run and the cycle is then repeated.

A. B. M.

Manufacture of combustible gas from liquid fuel. O. O. THWING, Assr. to GEN. OIL GAS CORP. (U.S.P. 1,830,574, 3.11.31. Appl., 26.1.25).—A stream of oil atomised by steam is injected into the gasifying zone of a generator into which O_2 is also delivered in such a manner that incomplete combustion commences some distance from the point of injection and proceeds progressively through an initial gasifying zone maintained at about 870° and a second gasifying zone at about 925° ; gasification is then completed in a heat-storage zone. The generator is suitably lined with refractory material and packed with chequer-brick.

A. B. M.

Removal of naphthalene and tar from fuel gas. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,830,178, 3.11.31. Appl., 9.7.26. Cf. U.S.P. 1,578,687; B., 1926, 430).—The gas on leaving the primary cooler is scrubbed with tar, tar oil, or petroleum oil in two stages, in the first of which the suspended tar and part of the $C_{10}H_8$ are removed and in the second the remaining $C_{10}H_8$. The scrubber is packed with turnings of Al or other non-corrodible metal. The contaminated solvent from the first stage may be recirculated after allowing part of the impurities to separate under gravity; it is preferable to use fresh solvent in the second stage.

A. B. M.

Manufacture of aqueous bituminous emulsions. (A) L. KIRSCHBRAUN and (B) F. C. OVERBURY, (B) Assr. to FLINTKOTE Co. (U.S.P. 1,829,722, 27.10.31. Appl., 8.12.19. Renewed 25.8.23).—Const. streams of hot bitumen and an aq. colloidal suspension, e.g., of finely-divided clay, are churned together by high-speed agitators, a portion of the product being discharged constantly from the apparatus while the remainder is recirculated through the mixer.

A. B. M.

Purification of phenol-containing liquors. W. C. HOLMES & Co., LTD. From KLAR & ENTPHENOLUNGSGES. M.B.H. (B.P. 372,399, 7.2.31).—The greater part of the PhOH is extracted with a solvent immiscible with H_2O , e.g., tar oil or C_6H_6 , and the remainder is then removed by filtering the liquor through activated C. A. B. M.

Vapour chamber [for oil-cracking apparatus]. R. T. POLLOCK, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,827,106, 13.10.31. Appl., 11.4.21. Renewed 15.10.29).—Heated oil issues from a jet into a header, and thence into a no. of tubes of comparatively small bore in which the velocity of flow is maintained high to prevent deposition of C; the vapour separates through a cut-away portion of the header into a surrounding shell.

B. M. V.

Cracking of oils. TEXAS Co., Assees. of L. DE FLOREZ (B.P. 373,239, 21.11.30. U.S., 30.11.29).—Preheated petroleum oil is passed into the top of a separating chamber (*A*) the vapours from which pass into a fractionating column (*B*) and thereafter are condensed to yield anti-knock gasoline. The liquid

from *A* is pumped into coking chambers, which also receive the liquid from *B* after it has been heated to about $620^\circ/100$ —400 lb. per sq. in. in a cracking coil.

D. K. M.

Treatment of aliphatic hydrocarbons. G. W. HOWLETT, Assr. to R. M. CORL (U.S.P. 1,826,787, 13.10.31. Appl., 24.2.23).—Petroleum oils are converted into products of lower b.p. by heating with halogen-substituted hydrocarbons or substances yielding these, e.g., $AcCl$, $MeCl$, or $MeOH$, H_2SO_4 , and $NaCl$.

D. K. M.

Conversion of petroleum oil. R. CROSS, Assr. to GASOLINE PRODUCTS Co. (U.S.P. 1,825,337, 29.9.31. Appl., 22.7.22).—Hydrocarbon oil is passed through heating tubes under cracking conditions of temp. and pressure, and then at a reduced rate of flow through a stage maintained at cracking temp. and under sufficient pressure to prevent distillation. The oil is then passed at an increased rate of flow through separate cooling stages maintained at substantially different pressures wherein it is cooled to a degree sufficient to prevent vaporisation when it is released to atm. pressure.

H. S. G.

Heating of petroleum oil. A. OBERLE, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,812,217, 30.6.31. Appl., 19.4.23. Renewed 14.9.28).—Oil is preheated in an initial heating zone (*A*) and passed to a secondary heating zone where it is cracked. The vapours are passed to a dephlegmator and vapours and condensate therefrom are returned to *A*, from which vapours are removed and condensed.

H. S. G.

(A) Method of, (B) apparatus for, coking petroleum residues from the distillation of petroleum oils. E. W. THIELE, Assr. to STANDARD OIL Co. (U.S.P. 1,825,374—5, 29.9.31. Appl., [A] 14.5.28, [B] 27.7.29).—Finely-divided coke is heated to about 760° by partial combustion thereof in the upper part of a closed retort. Petroleum residue heated to about 427° is continuously distributed over the heated coke, and allowed to coke in the absence of extraneous heat. Vapours are withdrawn from the upper part of the retort and coke is continuously withdrawn from the lower portion.

H. S. G.

Conversion of hydrocarbons. W. M. CROSS, Assr. to GASOLINE PRODUCTS Co. (U.S.P. 1,825,338, 29.9.31. Appl., 1.2.26).—Oil is heated to cracking conditions of temp. and pressure and passed to conversion, evaporating, and dephlegmating stages, the character of the vapours discharged from which is controlled by submitting the vapours to heat-exchange relationship with a mechanically driven cool air draught maintained at a predetermined temp. Air preheated by the discharged vapours is passed to the heating stage.

H. S. G.

Treatment of hydrocarbon oil. J. D. SEGUY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,812,308, 30.6.31. Appl., 19.12.28).—Oil is cracked under pressure and the vapours are removed, condensed, and collected. The liquid residue from the cracking zone is removed before it contains objectionable amounts of sludge and coke, and is then mixed with hydrocarbon oil distillate, b.p. 204 — 316° , in such amount and at such temp. as to cool the residue below cracking temp. The pressure is

subsequently reduced to cause partial vaporisation and further cooling. H. S. G.

Production of aromatic hydrocarbons. A. S. RAMAGE, Assr. to COALS & CHEMICALS, LTD. (U.S.P. 1,812,372, 30.6.31. Appl., 18.5.28).—A mixture containing olefinic gaseous hydrocarbons, H_2 , and CO are brought in contact with metallic Fe at 537—815° and at atm. pressure, the proportions of the gases being regulated so that the Fe is maintained active. H. S. G.

Hydrogenation of hydrocarbons. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 372,496, 26.3.31).—Oils containing olefines and more highly unsaturated hydrocarbons are mixed with saturated or aromatic hydrocarbons which are vaporous under the conditions of the process, and the mixture, which preferably contains < 1.5% of hydrocarbons more highly unsaturated than olefines, is treated with H_2 at elevated temp. and under pressure, preferably in the presence of a catalyst containing Mo, W, etc. A. B. M.

Decolorisation of oils by filtration through paper. W. S. BAYLIS, Assr. to FILTROL CO. OF CALIFORNIA (U.S.P. 1,825,300, 29.9.31. Appl., 24.4.28).—The oil, which may be pretreated with a decolorising agent or acid, is filtered through paper which has had incorporated, during manufacture, with 10—25% of its finished wt. of an acid-activated clay containing 0.1—0.5% of free H_2SO_4 . H. S. G.

Refining of hydrocarbons. F. A. APGAR, Assr. to SINCLAIR REFINING CO. (U.S.P. 1,812,426, 30.6.31. Appl., 29.2.28).—Hydrocarbon vapours are passed through an absorptive catalyst in admixture with a relatively inactive gaseous diluent, the proportion of which is decreased as the operation proceeds. H. S. G.

Refining of hydrocarbons. W. MENDIUS, Assr. to SINCLAIR REFINING CO. (U.S.P. 1,812,446, 30.6.31. Appl., 10.2.28).—Hydrocarbon vapours are brought in contact with an absorptive catalyst in a vertical tower. Annular members slope downwardly from the shell at spaced intervals within the region normally occupied by the catalyst charge, and auxiliary vapour connexions with valves communicate with the shell beneath these members. H. S. G.

Refining of low-boiling hydrocarbons. SILICA GEL CORP., Assees. of E. B. MILLER and G. C. CONNOLLY (B.P. 373,174, 18.2.31. U.S., 19.2.30).—Hydrocarbon oil is degummed by agitation with acid or an acid-forming substance, e.g., H_2SO_4 , HCl, AcOH, $AlCl_3$, Me_2SO_4 , preferably 80—95.3% H_2SO_4 (0.3—0.5 wt.-% on oil), and, after removal of sludge, by heating at 90—180° in the liquid phase. After cooling, the oil is either washed with aq. NaOH or H_2O (the latter when considerable quantities of unsaturated hydrocarbons are present) and distilled, or passed through a bed of absorbent material, e.g., bauxite, clay, SiO_2 gel, and washed and/or distilled. D. K. M.

Removal of paraffin wax from hydrocarbon oils. EDELEANU-GES.M.B.H. (B.P. 373,538, 4.11.31. Ger., 4.11.30).—Wax is removed from paraffin distillates by adding fuller's earth and a halogen-substituted acyclic hydrocarbon, e.g., $MeCl$, CCl_2F_2 , which is gaseous at room

temp. and may be partly replaced by another solvent, e.g., benzene, liquid SO_2 ; after cooling, the mixture is filter-pressed or centrifuged. D. K. M.

Treating hydrocarbon oils [to remove waxy constituents]. R. E. MANLEY, Assr. to TEXAS CO. (U.S.P. 1,825,324, 29.9.31. Appl., 16.11.27).—Oil is diluted with a solvent and chilled, mixed with comminuted solid material, and filtered under pressure. A portion of the oil absorbed in the material deposited on the filter is displaced by forcing a current of cooled gas therethrough, and the remainder is removed by treatment with a solvent at such temp. that no substantial quantity of the waxy constituents is dissolved. A cool gas is subsequently forced through the filter-cake to displace any solvent. H. S. G.

Production of high-melting paraffin and ceresin. A. LOEBEL, Assr. to DE BATAAFSCHE PETROLEUM MAATS. (U.S.P. 1,825,533, 29.9.31. Appl., 22.10.28. Holl., 15.11.27).—To the residue obtained from a mixed-base oil by distilling off the fractions of b.p. $\geq 400^\circ$ is (are) added one or more hydrocarbons, b.p. $> 200^\circ$, which are materially sol. in SO_2 , e.g., Edeleanu extract. The mixture is distilled and the hard paraffin separated from the distillate. H. S. G.

Removing a salt from oil. H. C. EDDY, Assr. to PETROLEUM RECTIFYING CO. OF CALIFORNIA (U.S.P. 1,825,309, 29.9.31. Appl., 3.10.27).—The oil or emulsion containing solid cryst. particles is mixed with a solvent capable of dissolving the solids, thereby forming an emulsion which can be separated by electrical or other means. H. S. G.

Breaking of petroleum emulsions. M. DE GROOTE, L. T. MONSON, and E. H. KEISER, Assrs. to TRETOLITE CO. (U.S.P. 1,812,393, 30.6.31. Appl., 3.3.30).—As demulsifying agent the use of NH_4 acetylsulphuricinate is claimed. H. S. G.

Treatment of oil-water emulsions. J. C. WALKER, Assr. to EMPIRE OIL & REFINING CO. (U.S.P. 1,829,205, 27.10.31. Appl., 4.11.26).—Petroleum oil- H_2O emulsions are cut by treatment at 32—56° with aq. NH_4 sulphostearate or a mixture of this salt with aq. liquorice extract. D. K. M.

Prevention of corrosion in oil wells. J. C. WALKER, Assr. to EMPIRE OIL & REFINING CO. (U.S.P. 1,829,705, 27.10.31. Appl., 12.3.25).—Aq. Na cresoxide is added to the well- H_2O . A. R. P.

Treatment [sieving] of coal slurry. B. and H. NORTON (B.P. 374,457, 3.3.31).

Coke dischargers for retorts for carbonisation of coal and the like. F. J. WEST, E. WEST, and WEST'S GAS IMPROVEMENT CO., LTD. (B.P. 374,226, 7.5.31).

[Portable] kilns for burning charcoal and similar purposes. J. A. BUCHANAN and P. HARRIS (B.P. 374,051, 28.2.31).

Reactions in heated chambers. Crushing coke. Oil filter. Centrifugal separator. Vapour-treating apparatus. Siphon.—See I. Waterproofing composition.—See VI. Arsenical solutions.—See VII. Pavements. Asphalt compositions.—See IX. Rubber latex prep. Chicle substitute.—See XIV.

III.—ORGANIC INTERMEDIATES.

[Behaviour of] phenylenediamines in ultra-violet light. H. FREYTAG (Textilber., 1932, 13, 322).—Irradiation of moist filter-paper and cotton fabric impregnated with solutions containing about 0.1% of *o*-, *m*-, or *p*-phenylenediamine or mixtures of these resulted in yellow to brown colour formation due to oxidation of the base, which was assisted by the presence of 0.1% of NaNO₃ and KNO₃; the resulting colours were faster to washing when NH₂Ph was also present. The process could be adopted for producing photographic prints on fabric as described previously (B., 1932, 541).
A. J. H.

Sulphonation of naphthalene with equimolecular amounts of sulphuric acid. A. A. SPRUISKOV (J. Chem. Ind., Russia, 1931, 8, No. 20, 41—45).—Vapours of benzine, previously refluxed with H₂SO₄, are passed through the sulphonation mixture to remove H₂O. Excess (3—4%) of H₂SO₄ should remain. The yield is 97%.
CH. ABS.

Utilisation of tar from the production of β -naphthol. A. I. ZAKHAROV (J. Chem. Ind., Russia, 1931, 8, No. 20, 22—23).—The tar produced in the vac. distillation of crude β -naphthol contains C 55—70, inorg. salts 10—15, liquid tar 12—15, β -naphthol 4—10, β -dinaphthol 2—3, and hydroxyperylene compounds 1—1.5%.
CH. ABS.

Refrigeration.—See I. Hydrocarbons, and acids, from tar. Acids in petroleum. Benzene synthesis.—See II. Flotation agents.—See X. EtOH from artichokes.—See XVIII. Detection of CH₂Ph·OH.—See XX.

PATENTS.

Pyrolysis of propylene. N. V. DE BATAAFSCHE PETROLEUM MAATS., Asses. of H. P. A. GROLL (B.P. 369,351, 21.2.31. U.S., 24.2.30).—C₆H₆ is obtained by passing propylene through a tube at 800°, the time of heating being about 30 sec. The tube is preferably of Ni-Cr steel, and H₂S etc. should be removed from the gas before reaction.
C. H.

Production of formic acid. A. L. MOND. From I. G. FARBENIND. A.-G. (B.P. 369,296, 24.12.30).—1—10% of Na₂SO₄ is added to a mixture of Ca(HCO₃)₂, HCO₂H, and H₂SO₄, and HCO₂H is distilled off. The ratio Ca(HCO₃)₂:HCO₂H may be about 1:0.6—1.0.
C. H.

Concentration of aqueous formic acid. LONZA ELEKTRIZITÄTWERKE U. CHEM. FABR. A.-G. (B.P. 369,118, 20.7.30. Ger., 18.7.31).—A high-boiling base (quinoline, quinaldine, benzimidazole, or *o*-phenylenediamine) about equiv. to the acid is added to aq. HCO₂H, H₂O is distilled off at atm. pressure, and then conc. HCO₂H at reduced pressure.
C. H.

Manufacture of salts of iodomethanesulphonic acid. SOTERIA CHEM. FABR. A.-G. (B.P. 369,473, 29.5.31. Austr., 12.6.30).—CHI₃ is heated with aq. Na₂SO₃ (2 mols.), preferably at 120—140° under pressure and in presence of Cu powder, whereby CH₂I·SO₃Na is produced.
C. H.

Manufacture of acetic anhydride. R. E. ELLIS. From C. F. BOEHRINGER & SOEHNE G.M.B.H. (B.P.

369,283, 1.4.31).—The thermal decomp. of AcOH is effected in presence of acid-treated asbestos (or other natural silicate leaving a SiO₂ skeleton) on which may, if desired, be deposited a catalyst, *e.g.*, Pt. C. H.

Manufacture of acetic anhydride. COURTAULDS, LTD., and J. BROWN (B.P. 369,710, 2.2.31).—AcOH vapour is bubbled through molten B₂O₃ at 850—1000°, with or without addition of a catalyst (TiO₂ or Al₂O₃).
C. H.

Production of acetic anhydride from ethylidene diacetate. CANADIAN ELECTRO PRODUCTS CO., LTD., Asses. of H. W. MATHESON (B.P. 368,835, 12.12.30. U.S., 12.12.29).—Ethylidene diacetate vapour is heated rapidly to 300—450° for 1—6 sec. in absence of catalyst. The conversion is 96%.
C. H.

Production of ethyl alcohol from ethylene. G. F. HORSLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 369,216, 15.12.30 and 15.9.31).—C₂H₄ and steam are passed, preferably under pressure (*e.g.*, 70 atm.) at 100—300°, over a phosphate of Cd, Be, Zn, Al, Sn, or Pb. With a contact time of 6 sec. Cd phosphate gives 0.39% conversion.
C. H.

Manufacture of aliphatic alcohols [from olefines]. DISTILLERS CO., LTD., W. P. JOSHUA, and H. M. STANLEY (B.P. 368,935, 5.2.31).—A mixture of steam and an olefine (C₂H₄) is passed over a metal sulphate (NaHSO₄) alone or on a carrier (pumice) below 350°, *e.g.*, at 150—160°. The conversion is 0.78—1.2%.
C. H.

Manufacture of ethylene glycol [from ethylene]. K. E. SKÄRBLÖM (B.P. 369,141, 26.8.31).—C₂H₄ and O₂ or air are passed into H₂O containing I or a substance which liberates I, *e.g.*, HI, C₂H₄I₂, KI₃, FeI₃, preferably in presence of an oxidation catalyst, *e.g.*, a salt of Fe or Mn.
C. H.

Preservation of ether. E. MALLINCKRODT, JUN., and H. V. FARR, Asses. to MALLINCKRODT CHEM. WORKS (U.S.P. 1,829,529, 27.10.31. Appl., 31.10.28. Cf. U.S.P. 1,697,320; B., 1929, 453).—Oxidation of the interior surface of the container is effected by heat. E. H. S.

Manufacture of vinyl ethers [from acetylene]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 369,297, 24.12.30).—C₂H₂ (diluted with N₂) is caused to react, preferably under pressure, with liquid org. OH-compounds at 120—180° in strongly alkaline medium, whereby vinyl ethers are quantitatively obtained. Examples are ethers produced from EtOH (b.p. 36°), BuⁿOH, *n*-C₅H₁₁·OH (b.p. 111°), cyclohexanol, glycol Et ether (b.p. 126°), glycol, PhOH (b.p. 155—156°), *m*-cresol, β -naphthol (m.p. 33°, b.p. 264°), ar-tetrahydro- β -naphthol (b.p. 143°/18 mm.), PrⁿOH (b.p. 64°), Pr^sOH (b.p. 54—56°), MeOH (b.p. 9°), diglycol (b.p. 90—97°/20 mm.), octadecyl alcohol (b.p. 190°/10 mm.), reduced by H₂ and Ni to Et octadecyl ether (b.p. 190°/10 mm.), octyl alcohol (b.p. 75°/5 mm.), decyl alcohol (b.p. 110°/4 mm.), dodecyl alcohol (b.p. 120°/4 mm.), di-(β -hydroxyethyl)amine (b.p. 100—110°/8 mm.), and tri-(β -hydroxyethyl)amine (divinyl ether, b.p. 120—130°/8 mm.).
C. H.

Preparation of esters. J. MARTIN and I. J. KRCHMA, Asses. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,817,898—9, 4.8.31. Appl., 16.5.28).—An alcohol

above C_7 is passed as vapour over a uranyl carbonate of Ca, Sr, Ba, Mg, Zn, Ag, or Pb with (A) Ag_2CO_3 or Ag, (B) Ag_2CO_3 or Ag and Cu, Ni, Fe, or Co (or compounds, e.g., carbonates, of these); in each case Al_2O_3 , ThO_2 , ZrO_2 , or BeO may be present. C. H.

Production of [rubber-like] mixed esters by means of polyhydric alcohols. H. A. BRUSON (B.P. 369,363, 27.2.31. U.S., 4.3.30).—Glycerol or other polyhydric alcohol is heated at 230° with a monobasic higher fatty acid (ricinoleic) and adipic acid or a higher homologue (pimelic, suberic, azelaic, etc.). C. H.

Preparation of moistening, emulsifying, and equalising preparations for the textile and leather industries. N.V. CHEM. FABR. SERVO, and M. D. ROZENBROEK (B.P. 368,812 and 368,853, [A] 6.12.30, [B] 7.12.30. Holl., [A, B] 7.12.29).—(A) Alkyl phosphites, phosphorous or phosphoric acid chlorides or mixtures of these are added before, during, or after sulphonation of fatty acids above C_8 , in presence of sulphonation promoters (lower fatty acid salts, AcOH, Ac_2O , S_2Cl_2 , SO_2Cl_2 , $COCl_2$, $SOCl_2$, B, B_2O_3 , etc.). The acid-washed, unneutralised product is preferably left in contact with alkyl phosphite and then neutralised, e.g., with amines such as tri(hydroxyethyl)amine, pyridine, etc. (B) After sulphonation, in presence of promoters (PCl_3 , $POCl_3$, alkyl phosphites and phosphates), of fatty acids etc. above C_9 (castor oil or castor oil acids), the washed acid products are heated with alcohols, alkyl H sulphates, alkyl sulphates, or alkyl chlorosulphonates, under pressure if desired; the products may then be neutralised as in (A). [Stat. ref. in (B).] C. H.

Manufacture of organic compounds containing nitrogen [higher alkylamines]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 369,614, 15.9.30).— NH_3 or an org. amine is alkylated with a sulphuric or phosphoric ester of an aliphatic alcohol above C_5 . Alkylamines are thus prepared from: dodecyl H sulphate and NH_3 ; octadecyl H sulphate and NH_2Me (m.p. $40-45^\circ$), β -hydroxyethylamine, NH_3 (sec. amine, m.p. $73-74^\circ$), tri-(β -hydroxyethyl)amine (a β -hydroxyethyl group being displaced), or γ -hydroxypropylamine; phosphoric or sulphuric esters of alcohols from reduction of coconut oil, and cyclohexylamine, $NPhMe_2$ (b.p. $> 170^\circ/8$ mm.), β -hydroxyethylamine, $NHMe_2$, NMe_3 , or NEt_4Cl ; H sulphate of oleyl alcohol and $NHMe_2$; H_2 sulphate of octadecylene glycol (from reduction of castor oil) and NH_2Bu^+ ; sorbityl H sulphate and NH_2Bu^+ . C. H.

Production of dispersions and agents for treatment [dyeing, impregnating, oiling] of fibrous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 368,746, 9.9.30. Cf. B.P. 366,961; B., 1932, 545).—Hydroxyalkyl ethers of hydroxylated alkyl- or cycloalkylalkylamines, or their salts, are used for dispersing insol. dyes etc. in printing pastes etc. Examples are: tri-(β -hydroxyethoxyethyl)amine for dispersing Indanthrene Brilliant Violet 2R; β -hydroxyethyl- β' -hydroxyethoxyethyl- β -ethylhexylamine for indanthrene. C. H.

Manufacture of fatty acid nitriles [from unsaturated nitriles]. J. Y. JOHNSON. From I. G. FARB-

ENIND. A.-G. (B.P. 369,690, 14.1.31).—Unsaturated nitriles are smoothly hydrogenated, substantially without production of amines or polymerides, in presence of Cu catalysts. The reduction of acrylic, crotonic, oleic, and fumaric nitriles is described. C. H.

Stabilisation of organic nitrates. R. MCGILL, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,817,456, 4.8.31. Appl., 3.6.30).—Olefine oxides of suitably high b.p., e.g., epichlorohydrin, are stabilisers for nitroglycerin. C. H.

Manufacture of di-iodochelidamic acid. SCHERING-KAHLBAUM A.-G. (B.P. 369,528, 25.9.31. Ger., 7.10.30).—Chelidamic acid in excess of aq. alkali is treated with I and acidified at 100° , the mixture being made alternately alkaline and acid as often as desired. After, e.g., 5 acidifications the acid filtrate is cooled, and the di-iodochelidamic acid separates in 85% yield. C. H.

Manufacture of nitro- β -hydroxy-pyridine and -alkylpyridines. I. G. FARBENIND. A.-G. (B.P. 369,850, 4.8.31. Ger., 2.8.30. Addn. to B.P. 360,188; B., 1932, 251).—The products of the prior patent are obtained by adding the nitrate of the hydroxypyridines to conc. H_2SO_4 at $20-50^\circ$. Products from 3-hydroxypyridine (m.p. $68-69^\circ$), 3-hydroxy- γ -picoline (m.p. $90-92^\circ$), and 3-hydroxy-2-methyl-5-ethylpyridine (m.p. $163-165^\circ$) are described. C. H.

Production of agents for reducing the surface tension of [aqueous] liquids [wetting agents]. H. T. BÖHME A.-G. (B.P. 369,072, 20.5.31. Ger., 21.7.30).—Heterocyclic amides of aliphatic acids above C_8 , e.g., oleic piperidide, are sulphonated, e.g., with conc. H_2SO_4 at $0-5^\circ$. [Stat. ref.] C. H.

Manufacture of sulphonic acids suitable as wetting-out, emulsifying, dispersing, peptisation, and cleansing agents. DEUTS. HYDRIERWERKE A.-G. (B.P. 369,301, 1.1.31. Ger., 29.9.30).—Mineral acid esters of primary hydrocyclic alcohols above C_5 are treated with neutral sulphites, preferably under pressure and in presence of catalysts (1% NaI). Naphthenic acids, b.p. $70-140^\circ/10$ mm., e.g., are reduced to alcohols, converted into chlorides with HCl, and heated with aq.-alcoholic Na_2SO_3 at $150-180^\circ$. C. H.

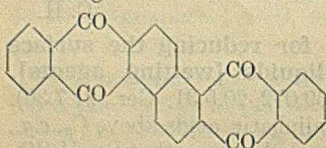
Manufacture of condensation products from aromatic hydrocarbons. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 369,613, 17.12.30. Cf. B.P. 356,189; B., 1932, 95).—The catalysts of the prior patent may be replaced wholly or in part by more readily fusible, difficultly reducible oxides, e.g., alkali-metal oxides. Examples are: Ph_2 from C_6H_6 over KOH, ThO_2 , and Co_2O_3 on pumice at 760° ; $C_6H_4Ph_2$ from C_6H_6 and CO_2 over $MgCO_3$ and Li_2CO_3 at 500° ; a hydrocarbon, m.p. -30° , b.p. 282° , mol. wt. 165, from PhMe and CO_2 over KOH, K_2O , ThO_2 , and Co_2O_3 on pumice at $750-800^\circ$. C. H.

Apparatus for chlorination [of toluene etc.]. E. B. CONKLIN, Assr. to SOLVAY PROCESS Co. (U.S.P. 1,828,859, 27.10.31. Appl., 3.4.26).—PhMe flows down a column containing suitable filling material and constructed of sections of glass tubing cemented at the joints with Cl_2 -resisting cement, and Cl_2 is introduced at the lower end of the column. Means are provided

for subjecting the contents of the column to the influence of chemically active rays, and for withdrawing HCl and the chlorination products from the top and bottom of the column, respectively. L. A. C.

Manufacture of hydroxy-benzocarbazoles [naphthacarbazoles]. I. G. FARBENIND. A.-G. (B.P. 369,453, 30.4.31. Ger., 30.4.30).—A 1:6- or 1:7-dihydroxynaphthalene is boiled with aq. NaHSO₃ and the product is condensed with an arylhydrazine. Only the α -OH group reacts. Examples are α -naphthacarbazoles from 1:6-dihydroxynaphthalene and NPh·NH₂ (m.p. 263°), NPhMe·NH₂ (m.p. 218°), 5-chloro- α -naphthylhydrazine (m.p. 273—275°); 4:7-dibromo-1:6-dihydroxynaphthalene and NPh·NH₂ (m.p. 222°); 1:7-dihydroxynaphthalene and NPh·NH₂ (m.p. 248—250°), and *p*-tolylethylhydrazine (m.p. 166—167°). C. H.

Manufacture of 1:2:5:6-diphthaloylnaphthalene and halogen-substitution products thereof. I. G. FARBENIND. A.-G. (B.P. 368,930, 31.1.31. Ger., 31.1.30. Addn. to B.P. 353,113; B., 1931, 1086).—A 1:5-diaroylnaphthalene-2:6-dicarboxylic acid or its halide is condensed by heating alone or with an acid condensing agent (AlCl₃, H₂SO₄, P₂O₅). The following are described: 1:2:2':1'-dianthraquinonylene (annexed formula), m.p. 428°, from 1:5-dibenzoylnaphthalene-2:6-dicarboxylic acid, m.p. 324—326°, or its chloride, m.p. 293—295°;



8:8'-dichloro-1:2:2':1'-dianthraquinonylene from the di-*o*-chlorobenzoyl compound. C. H.

Production of the disulphuric acid ester of 2-aminoanthraquinone. IMPERIAL CHEM. INDUSTRIES, LTD., D. A. W. FAIRWEATHER, and R. F. THOMSON (B.P. 369,674, 31.12.30).—2-Acetamido- or other 2-acylaminoanthraquinone is treated with pyridine-sulphuric anhydride, Cu, and pyridine at 80° for 3 hr. C. H.

Manufacture of condensation products of the anthraquinone series [amino-1:4-dianthraquinonylaminoanthraquinones]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 368,789, 11.12.30).—Aminotrianthrimides are obtained by oxidising 1-aminoanthraquinones having a free 4-position, e.g., with MnO₂ and dil. H₂SO₄; the quinonoid primary products are reduced, e.g., with SnCl₂ and HCl. The prep. of 1- α -anthraquinonylamino-4-(4'-amino-1'-anthraquinonyl)-aminoanthraquinone [4-amino-1:1':4':1''-trianthrimide] from 1-aminoanthraquinone, of a trichloroaminotrianthrimide from 1:8-chloroaminoanthraquinone, and of 4-methylamino-*NN'*-dimethyl-1:1':4':1''-trianthrimide from 1-methylaminoanthraquinone, is described. C. H.

C₁₀H₈ from fuel gas. PhOH from liquors.—See II. **Rubber-like products. Vulcanisation accelerator.**—See XIV. **Abs. EtOH. Higher alcohols.** See XVIII.

IV.—DYESTUFFS.

Behaviour of phenylenediamines.—See III.

PATENTS.

Manufacture of vat dyes [from naphthalene-tetracarboxylic dianhydride and *o*-diamines]. I. G. FARBENIND. A.-G. (B.P. 369,604, 22.12.30. Addn. to B.P. 341,357; B., 1931, 386).—The separation of the 1:4:5:8- and 1:5:4:8-isomerides is effected by treatment with caustic alkali, preferably in EtOH. Thus the crude product from the dianhydride and *o*-C₆H₄(NH₂)₂ is warmed with alcoholic KOH; the K salt of the orange dye is filtered off, the red dye being recovered from the filtrate by dilution with H₂O. C. H.

Manufacture of vat dyes [of the anthraquinone series]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 369,568, 19.12.30).—Yellow vat dyes are obtained by condensing an α -aminoanthraquinone with a diphenylcarboxylic halide or anhydride, preferably in presence of high-boiling solvent (*o*-dichlorobenzene, C₆H₃Cl₃, PhNO₂) and an acid-absorber (collidine). Examples are diphenyl-4-carboxylic derivatives of 1-amino-, 1-amino-5-benzamido-, 1-amino-4-methoxy-, and 5-benzamido-1-(5'-aminoanthraquinone-2-carboxylamido)-anthraquinones. C. H.

Manufacture of derivatives of polymerised cyanoanthraquinone compounds [vat dyes]. I. G. FARBENIND. A.-G. (B.P. 369,238, 28.8.30. Addn. to B.P. 309,193; B., 1930, 942).—NH₂-derivatives of polymerised cyanoanthraquinones are acylated. Products from 2-amino-3-cyanoanthraquinone and its 1-Br-derivative are benzoylated to give yellow vat dyes. C. H.

Manufacture of vat dyes [from glyoxylidene-bisanthrones]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 369,765, 13.4. and 13.11.31).—A glyoxylidenebisanthrone is treated with an acid condensing agent (AlCl₃ or H₂SO₄), preferably in presence of a diluent and an oxidant (MnO₂, Cl₂); if desired, condensation may be preceded by an alkaline treatment (alcoholic KOH). Examples of starting materials are the products from glyoxal and anthrone (red-brown vat dye), 2-chloroanthrone (red-brown), 2:6-dichloroanthrone (brown). C. H.

Manufacture of [direct] azo dyes. I. G. FARBENIND. A.-G. (B.P. 369,259, 15.10.30. Ger., 16.10.29).—Nitrobenzoylated aminoazo compounds are subjected to mild alkaline reduction to give azoxy and/or azo compounds. Examples are the reduction of: 4-*p*-nitrobenzamidoaniline-2-sulphonic acid \rightarrow 1-*p*-sulphophenyl-3-methyl-5-pyrazolone (golden-yellow); 4-*p*-nitrobenzamidoaniline-2:6-disulphonic acid \rightarrow γ -acid (blue-red); β -naphthylamine-4:6-disulphonic acid \rightarrow *m*-toluidine, *p*-nitrobenzoylated (green-yellow). C. H.

Manufacture of [green] azo dyes [from amino-indigos and -thioindigos]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 368,726, 3.10.30).—A leuco-sulphuric ester of a blue to violet amino-indigoid or -thioindigoid vat dye is diazotised, preferably in AcOH, and coupled with an acylacetic arylamide or a pyrazolone; a green dye results on acid oxidation in substance or on the fibre. Examples of suitable vat dyes are indigoids from: 5-nitroisatin α -chloride and

4-chloro- α -naphthol or α -anthrol; 5-nitro-4 : 7-dimethylsatin α -chloride and 4-methoxy- α -naphthol; 6-chloro-5-nitro-7-methylsatin α -chloride and 4-chloro- α -naphthol; 5-nitrothioindoxyl and 5-chloro-7-methoxy-4-methylsatin α -chloride. In each case the condensation product is converted into leuco-sulphuric ester and the NO_2 group is reduced. C. H.

Manufacture of [photosensitising] dyes. J. D. KENDALL, and ILFORD, LTD. (B.P. 369,236, 16.12.30).—Carbocyanines carrying a substituent in the polymethine chain are obtained by condensing together 2 mols. of an acid anhydride (Ac_2O , Bz_2O) and 2 mols. of quaternary salts of heterocyclic N bases, having reactive α -Me groups, in presence of $\frac{1}{2}$ mol. of acid binder (NaOAc , HCO_2Na , Na salicylate). From 2-methylbenzthiazole ethiodide, Ac_2O , and NaOAc there is obtained 8-methyl-2 : 2'-diethylthiocarbocyanine iodide. Similar dyes are prepared from : 2 : 3 : 3-trimethylindolenine ethiodide; quinaldine ethiodide; 2-methylbenzoxazole ethiodide [m.p. 220—230° (decomp.)]; 2-methyl- α - or - β -naphththiazole ethiodide. C. H.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Viscose. XLII. The "spinnometer" and its application. III. S. IWASAKI and E. SUGINO (J. Soc. Chem. Ind., Japan, 1932, 35, 206—208 B).—The effect of ageing of alkali-cellulose on the spinning properties of the derived viscose is studied for various times of ripening in air and H_2 . The effects observed are dependent on the nature of the spinning bath. (Cf. B., 1932, 460.) H. A. P.

Continuous batch beating [for wood pulp]. C. W. MORDEEN (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 62—64).—A new type of vertical beater is described. H. A. H.

Determination of unbleached sulphite [fibres]. E. SUTERMEISTER (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 26).—By gently heating the paper sample after immersion in Millon's reagent, unbleached sulphite fibres may be differentiated from bleached fibres, and roughly estimated, since they appear as brownish hairs. Mechanical pulp also turns brown with this reagent. The tests were carried out on laboratory hand-made sheets only, and may not be suitable for mill-made paper. The degree of cooking of the unbleached pulp also affects the result. H. A. H.

Carbon uses in the pulp and paper industry. A. D. CAMP (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 105—106).—Wherever corrosion problems are encountered in the pulp and paper industry, C can be considered as a constructional material. H. A. H.

Pumping wood pulp and paper stock. M. M. KLOSSON (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 85—88).—Factors affecting the choice and mode of installation of pumps capable of dealing with stock up to 8% consistency are considered. H. A. H.

Comparative pulping value of Russian and Canadian spruce by the sulphite process. W. H. MONSSON and G. H. CHIDESTER (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 56—59).—The wood from Russia was thought to be Norway spruce (*Picea excelsa*) but a positive identification could not be made owing to

the absence of bark. The tests revealed no significant difference in the quality of the pulp produced, nor was there any difference in the yield when calc. on the wt. of wood used. When calc. on a vol. basis, however, the yield from the Canadian spruce was lower. Complete details of the chemical tests, experimental digestion, and mechanical tests of the resulting paper are given. H. A. H.

Preheating of [wood-pulp] sulphite liquors. G. SOLTAU (Zellstoff u. Papier, 1932, 12, 237—238).—The results of application in America and in Europe of patented processes for preheating sulphite liquors are given and illustrated. Max. possible preheating temp. is affected by max. digestion temp. and by moisture content of the wood (slightly), but not by concn. of the wood in the digester. T. T. P.

Control of the quality of cellulose in sulphite cooking. B. MILOV (Bumazhn. Prom., 1931, 10, No. 2, 32—51).—A discussion of reaction and temp. of the liquor. CH. ABS.

Influence of addition of black liquor in sulphate wood-pulp digestion. E. HÄGGLUND and G. SCHOLLIN-BORG (Papier-Fabr., 1932, 30, 359—363).—Digestion of fir wood with the addition of black liquor proceeds more rapidly than with completely fresh liquor at the same temp. and concn. of alkali and sulphide. No appreciable difference is noted for pinewoods. The yield and lignin content of pulp are only slightly affected, but the colour of pulp is lowered by the addition of black liquor. T. T. P.

Effect of relatively high sulphur dioxide concentration in sulphite pulping. G. H. CHIDESTER and J. N. MCGOVERN (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 44—46).—The total SO_2 in the cooking liquor was varied from 5.5 to 20%, as compared with 6—7% in commercial practice. With increasing initial SO_2 concn. there is a small though distinct increase in pulping action. The results of a large no. of digestions with varying amounts of SO_2 and at varying temp. and pressures are given. H. A. H.

Bleaching of kraft pulp. O. KRESS and R. L. DAVIS (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 143—149).—Kraft pulp cannot be bleached to a good colour by single-stage hypochlorite bleaching without considerable chemical degradation and loss in strength. Multi-stage hypochlorite bleaching effects a saving in bleach, but the same degree of degradation occurs. Intermediate treatment with conc. alkali increases the whiteness, but decreases the bursting strength; the α -cellulose content is not appreciably raised. An alkaline condition during the second stage of the hypochlorite bleaching process, however, increases both strength and degree of purity. Cl_2 , either as gas or in aq. solution, causes very little degradation even when amounts equiv. to 20% of bleach are used. The use of alkali either during chlorination or for intermediate washing shows no advantages. Max. strength, colour, and purity are obtained by carrying out the first stage with an amount of Cl_2 equiv. to half of the total bleach consumption, washing with H_2O and then with sufficient alkali to leave 1% excess after neutralising the acid produced, and finally completing the second stage with hypochlorite. H. A. H.

Forming and testing pulp sheets. ANON. (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 154—161).—A description, with a few minor modifications, of the pulp-evaluation equipment which has been adopted as standard by the Paper-Makers' Association of Great Britain and Ireland. It is recommended that this method be tentatively adopted by T.A.P.P.I. Modifications which permit the method to be used for routine control work are suggested. H. A. H.

Shrinkage reduction by chlorination [in leather-board manufacture]. H. W. RICHTER (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 35—36).—Controlled chlorination results in important economies through slime reduction and increased production of leather-board. Felt life is not adversely affected if the residual Cl is kept at 0.2 p.p.m. H. A. H.

Paper coating strength factors. H. R. RAFTON (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 28—30).—The segregation of the pigment in a colour film by gravity may, under certain conditions, adversely influence the strength of the resulting coating. This settling of pigment may be minimised by increasing the viscosity of the adhesive, by using pigments of low *d*, and especially those of small particle size. H. A. H.

Heat requirements for drying coated paper. E. G. MILHAM and S. BALCH (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 95—97).—A method of calculating the heat required for drying coated paper while festooned is given. H. A. H.

Effect of volume of fresh air in heat test for stability of paper. P. F. WEHMER (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 33—34).—No appreciable differences are produced in either chemical or physical tests by wide variations in the vol. of air in contact with the test sheets during the accelerated ageing of paper in an oven at 105° for 72 hr. H. A. H.

Determination of α -cellulose. W. R. WILLETS (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 97).—It is recommended that the T.A.P.P.I. standard method of determining residual lignin in the α -cellulose obtained from unbleached pulps by mercerisation should be modified so as to overcome the difficulty of dissolving the oven-dried cellulose in 72% H_2SO_4 . H. A. H.

Determination of α -cellulose in paper. ANON. (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 119—120).—Details are given of the T.A.P.P.I. tentative standard method for determining α -cellulose in papers free from unbleached and groundwood pulps and other highly lignified fibres. A 17.5% solution (by wt.) of NaOH is employed. Corrections must be applied when mineral filler, resins, starch, glue, etc. are present in appreciable quantities. H. A. H.

Water-resistance of papers. P. W. CODWIRE (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 46—49).—A modified dry-indicator method for determining the H_2O -resistance of paper is described. Results obtained therewith justify the use of this test as a standard method for papers ≥ 0.009 in. thick. Where surface sizing is important supplementary tests should be applied. H. A. H.

Determination of total acidity of paper. ANON. (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 120).—Details are given of the determination of acidity by extraction and titration with 0.01N-NaOH, according to the T.A.P.P.I. tentative standard method. The result is recorded as % SO_3 . H. A. H.

Determination of rosin in paper. E. SUTERMEISTER and W. V. TORREY (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 25—26).—It is proposed that the T.A.P.P.I. standard method of determining rosin in paper be modified by substituting EtOH acidified with H_2SO_4 for the EtOH-AcOH mixture now employed, in order better to break down the rosin-alum complex. The sample should be soaked in the solvent prior to extraction, which should be continued much longer than the time specified. It is suggested that the extract be dried at 100° for only $\frac{1}{2}$ hr., in order to minimise losses by volatilisation. H. A. H.

Hygrometry in paper testing. F. T. CARSON and F. V. WORTHINGTON (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 16—24).—The results of investigations to determine the humidity requirements in paper testing are recorded, and hygrometric methods are fully discussed. The dew-point method has several practical limitations. Filament hygrometers are not reliable as standards. It is claimed that wet- and dry-bulb psychrometers are best for measuring moisture conditions in the laboratory. Psychrometric conversion data are an essential part of this method. An extensive bibliography is given. H. A. H.

Electron tubes in the paper industry. C. P. BERNHARDT (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 98—105).—A no. of possible uses of the photo-electric cell in the papermaking process are discussed. H. A. H.

Nomographic charts in the paper industry. D. S. DAVIS (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 13—14).—Charts are given to illustrate their use in papermaking calculations. H. A. H.

Steam savings by forced-circulation evaporation [in sulphate-pulp mills]. W. T. HINCKLEY (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 40—42).

Calibration of the Elmendorf tearing tester [for paper]. J. D'A. CLARK (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 1—2).

Colouring of paper.—See VI. **Alloys for paper and pulp industries.**—See X. **Cellulose factory effluent.**—See XVI. **Nitrocellulose.**—See XXII. **Silk-mill waste.**—See XXIII.

PATENTS.

Production of non-explosive, non-inflammable, soluble cotton. F. S. VIVAS, Assr. to INTERNAT. FIREPROOF PRODUCTS CORP. (U.S.P. 1,822,254, 8.9.31. Appl., 8.10.27).—Nitrocellulose is treated with a solution of H_3BO_3 and $MgCl_2$ in EtOH, and the EtOH is removed from the compressed or centrifuged product by means of CCl_4 . H. R.-D.

Manufacture of cellulose acetate. W. W. TRIGGS. FROM RUTH-ALDO Co., INC. (B.P. 372,844, 19.2.31).—Cellulosic material, after a preliminary softening with

AcOH vapour, is acetylated in two stages: (a) with excess AcOH, Ac_2O , and a catalyst, (b) with excess Ac_2O , AcOH, and a reduced quantity of catalyst; mixture (a) is added in at least two portions of identical composition, one being added after the reaction due to the other has subsided. F. R. E.

Production of artificial silk, particularly viscose silk. H. SUTER (B.P. 373,530, 21.10.31. Ger., 23.12.30).—The freshly spun threads are withdrawn by a toothed roller and deposited in the form of loose loops in a slowly rotating, perforated, cloth-lined spinning pot, wherein they are washed, after-treated, and dried; the pot is then rotated in the reverse direction and the threads are wound on to reels etc. F. R. E.

Delustring of artificial silk. F. C. NONAMAKER, Assr. to FURNESS CORP. (U.S.P. 1,822,416, 8.9.31. Appl., 26.9.29).—Artificial silk having subdued lustre is spun from cellulose solutions to which has been added (after their usual prep.) finely-divided cellulose (regenerated cellulose, oxycellulose, hydrocellulose, kapok, etc.) or a cellulose derivative. A. J. H.

Production of staple fibres from continuous filaments or threads. BRIT. CELANESE, LTD. (B.P. 373,406, 21.5.31. U.S., 21.5.30).—Continuously with their production, the filaments are stretched and immediately cut into staple fibre. F. R. E.

Production of artificial threads, filaments, ribbons, etc. H. DREYFUS (B.P. 371,343, 16.1.31).—A solution of an org. derivative of cellulose containing high-boiling solvents or plasticisers is spun into an aq. coagulating bath (containing thiocyanates, $ZnCl_2$, mineral acids, carbohydrates, etc.) of high viscosity and at a relatively high temp., part at least of the coagulating bath being caused to move so that a stretch is applied to the products, which is increased during the later stages. F. R. E.

Manufacture of filaments, threads, etc. BRIT. CELANESE, LTD., and W. I. TAYLOR (B.P. 371,360, 20.12.30).—The spinning solution, e.g., cellulose acetate in CO_2 , is extruded through a film of limited thickness composed of a coagulating liquid which is less volatile than the solvent (aq. diacetone alcohol, Et lactate or tartrate), so that the filaments carry with them an amount of liquid insufficient to cause them to cling together; the filaments are finally set by the usual dry-spinning methods. F. R. E.

Production of artificial filaments, straw, ribbons, etc. BRIT. CELANESE, LTD., and W. I. TAYLOR (B.P. 371,428, 15.1.31).—A no. of filaments of an org. derivative of cellulose, after passing through a die, are softened, either by application of a solvent or softener or by heat, and are then passed through a further die so that they cohere into a product the cross-section of which is the same as that of the die. F. R. E.

Envelopes for gas cells. I. G. FARBENIND, A.-G. (B.P. 371,604, 22.4.31. Ger., 22.4.30).—A material composed of one or more layers of an org. cellulose derivative sol. in org. solvents and one or more layers of a protein (gelatin, glue, casein), each of which may, if desired, contain softening agents, natural or artificial

resins, or filling materials, is used alone or united with one or more layers of a web (cotton fabric). F. R. E.

Compositions [artificial leather] containing rubber and cellulose derivatives. J. E. COOPER and A. E. LEVER (B.P. 373,415, 28.5.31).—A plastic of rubber and C_6H_6 is kneaded with another consisting of a solid cellulose derivative (acetate or nitrate), a plasticiser, a solvent, and a precipitant (H_2O) for the cellulose derivative. F. R. E.

Centrifuge specially applicable for purification of paper pulp and similar material. L. N. REDDIE. From CENTRIFUGAL ENG. & PATENTS CORP. (B.P. 373,199, 19.2.31).—Each of two or more concentric rotatable centrifuge barrels is provided with a separate inlet tube for the material and with an annular part projecting radially inwards, for the purpose of building up a cushion of fibre which retains the impurities while the purified pulp flows continuously over the lip of each barrel. F. R. E.

Removing printing ink from paper. M. E. and B. W. KINYON (U.S.P. 1,826,179, 6.10.31. Appl., 23.7.30).—Comminuted printed paper is agitated in a warm (49–82°) solution of naphtha soap in soft H_2O (p_H 8.4–8.7). Preferential wetting of the C particles occurs, and the suspension so obtained is filtered through a screen that passes the C while retaining the paper fibres, which are subsequently washed and recovered. S. S. W.

De-seeding of flax. LINEN INDUSTRY RES. ASSOC., and G. O. SEARLE (B.P. 374,622, 4.6.31).

Drying apparatus [for webs of cloth etc.]. W. W. SPOONER (B.P. 374,152, 5.11.31).

Manufacture of [press-]moulded articles from fibrous materials. A. E. BRADSHAW (B.P. 374,021, 26.2. and 20.4.31).

[Drive for] spinning centrifuges [for artificial silk]. BRIT. BEMBERG, LTD. (B.P. 373,500, 24.8.31. Ger., 25.8.30).

Filter material. Centrifugal process.—See I.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Dyeing of cotton. J. REHNER, JUN. (Rev. Soc. brasil. Chim., 1931, 2, 503–506. Cf. Amer. Dyestuff Rep., 1930, 19, 465).—The fixing of dyes on to cellulose or protein is considered to be a chemical reaction, since when basic or acid dyes are employed the p_H of the solution falls or increases, respectively; combination between the dye and the protein (etc.) residue is indicated. Bitancourt's suggestion (Rev. Soc. brasil. Chim., 1931, 2, 297), that the dye combines with the H ion from the cellulose, cannot be general in application. E. L.

Tendering of cotton yarns dyed with sulphur blacks. II. Development of sulphuric acid on sulphur-black dyeings. III. After-treatments to prevent tendering. T. KUBOTA (J. Soc. Chem. Ind., Japan, 1932, 35, 203–204 B, 204–105 B).—II. Samples of dyed fabric were exposed to air at 100° for 50–250 hr. and the free S, H_2SO_4 , and SO_4^{2-} produced determined. It is concluded that tendering is caused by H_2SO_4 from oxidation of the dye, and not of adhering S.

III. The formation of H_2SO_4 from S on dyed fabric is not accelerated by soap. After-treatment of S-black dyeings with alkalis neutralises the H_2SO_4 formed by oxidation and thus prevents tendering. H. A. P.

Dyeing with "folha-de-bolo." Brazilian vegetable dyes. O. ROTHE and J. DE M. SENRA (Rev. Soc. brasil. Chim., 1931, 2, 470—475).—A dye can be extracted from the sawdust of *Platycyamus Regnellii*, Benth., by boiling with an aq. solution of Na and K carbonates. The dye is pptd. by excess of H_2O or acids, is sol. in EtOH, and appears to be a tannin. A non-fast "bois-de-rose" colour is obtained by direct dyeing on wool, and a fairly permanent dark brown on wool mordanted with $Fe(OAc)_3$. Dyeing is slow and the pigment is not likely to be able to compete with artificial dyes. E. L.

Production of insoluble azo dyes on wool. A. WAHL (Rev. Gén. Mat. Col., 1932, 36, 101—203).—Tobias acid has an affinity for wool. It is applied in the form of Na salt (3%) with HCO_2H (10%) and Na_2SO_4 (20%); mineral acid is avoided. Treatment with *p*-nitro-diazobenzene gives Para-red on the fibre, coupling being complete in 2 hr. Similar results are obtained with the 1-sulphonic acid of Naphthol AS. C. H.

Influence of hydrogen-ion concentration on the colouring of paper. S. PESTALOZZI (Zellstoff u. Papier, 1932, 12, 238—239).—For a given dye there is a particular range of $[H^+]$ over which the colouring of paper pulp in a beater is most effective, particularly in the case of dil. colours used for "shading." A no. of dyes commonly used for paper colouring are dealt with and the optimum $[H^+]$ range for each is given. T. T. P.

Surface protection of aeroplane fabrics. E. K. O. SCHMIDT (Farben-Chem., 1932, 3, 165—171, 209—214).—An account is given of the application of aeroplane dopes and of the testing of the doped fabric for tensile strength (*R*), elongation, elasticity, breaking strain, H_2O -absorption, combustibility, ignition point, and durability (*W*). Some data and graphs are given as well as photographs of burst and weathered fabrics. The *R* of cellulose acetate lacquers is much reduced in damp atm. The *R* and *W* of colourless lacquers are increased by incorporating pigments, e.g., Fe oxide or Al. The first coats must be brushed on; spraying disturbs the fibres, producing an uneven surface and thereby hindering penetration by the lacquer. The same lacquer suffices for fibres of varying thicknesses. The non-inflammability of lacquers is discussed. S. M.

Refrigeration.—See I.

PATENTS.

Apparatus for bleaching textile fibres with a gaseous current, e.g., ozonised air. E. CRESPI and M. P. OTTO (U.S.P. 1,823,352, 15.9.31. Appl., 21.6.29. Fr., 2.2.26).—Apparatus for carrying out the process of F.P. 622,646 (B., 1930, 280) on fabric in open width is described. A. J. H.

Inchoate marking of articles. E. H. HUNTRESS, Assr. to PLYMOUTH CORDAGE Co. (U.S.P. 1,822,146,

8.9.31. Appl., 29.2.28).—Ropes and other textile articles are suitably treated with a solution of a Naphthol AS compound so that they may be identified afterwards by development of a colour when treated with a diazotised amine. A. J. H.

Production of pattern effects on [cellulose derivative] textile materials. BRIT. CELANESE, LTD., and G. H. ELLIS (B.P. 369,572, 20.12.30).—In producing discharge effects on cellulose acetate (etc.) fabrics coloured with a ground colour, the formation of a halo around the printed parts is prevented by treating the fabric, after the discharge but before the usual relatively lengthy ageing or steaming, with a reagent opposite in character (oxidising or reducing) to the discharging agent; an alkali perborate is very effective with reduction-discharge methods, especially when an acidic ($SnCl_2$) discharge paste is used. A. J. H.

[Stretching] treatment of [cellulose ester and ether] filamentary and other products. BRIT. CELANESE, LTD., H. DREYFUS, and W. I. TAYLOR (B.P. 371,461, 20.12.30. Cf. B.P. 370,430; B., 1932, 638).—The stretching of cellulose acetate yarn for increasing its resistance to delustering in hot aq. liquors (B.P. 277,089; B., 1927, 964) after treatment with swelling agents is carried out while the yarn is in the form of a "sheet of warp" and after treatment with a swelling agent for an optimum period which varies with the agent used. A. J. H.

Treatment [partial hydrolysis] of textile materials made of or containing organic ester of cellulose. BRIT. CELANESE, LTD. (B.P. 369,586, 22.10.30. U.S., 22.10.29).—Uniform hydrolysis of cellulose acetate (etc.) fabric with consequent raising of its safe ironing temp. is obtained by treating it with alkaline solutions of successively decreasing concn., the first solution having an alkalinity equiv. to < 1% (preferably 3—5%) NaOH. A. J. H.

Sizing composition for artificial silk intended to be crêped. P. JEANPRÊTRE (B.P. 371,786, 21.12.31).—Crêpe yarns which crêpe uniformly when subsequently processed in the form of fabric are sized with a 1½% solution of beeswax containing soap and/or dextrin as dispersing agents. A. J. H.

Waterproofing composition and preparing same. O. E. CUSHMAN and B. B. FARRINGTON, Assrs. to STANDARD OIL Co. of CALIFORNIA (U.S.P. 1,821,932, 8.9.31. Appl., 8.10.27).—The composition, which also prevents mildew in fabrics to which it is applied, is prepared by adding yellow beeswax and soft paraffin wax to a smooth paste of petrolatum and Al palmitate, heating the mixture, cooling, and thinning out with a petroleum fraction of b.p. 105—230°. A. J. H.

Fireproofing and waterproofing of textiles. H. R. OFFORD, and N. T. MIROV (U.S.P. 1,821,317, 1.9.31. Appl., 24.7.29).—The material is soaked in a solution of Na_2SnO_3 of *d* 1.225, then squeezed, dried, passed through aq. $(NH_4)_2SO_4$ of *d* 1.075, again squeezed, and dried without rinsing. After removal of Na_2SO_4 by dipping in cold H_2O , the material is dried, soaked in C_6H_6 containing 1 g. of gilsonite per 100 c.c., squeezed, and air-dried. H. R.-D.

Manufacture of mildew-proof fabric. R. HARVEY and H. V. DAY, Assrs. to PANTASOTE LEATHER CO. (U.S.P. 1,827,083, 13.10.31. Appl., 21.11.28).—A pyroxylin dope containing a mildew-proofing agent (*e.g.*, oleate, palmitate, stearate, and resinolate of Al, Zn, Pb, Ca, etc., and particularly Zn resinolate) is applied to duck fabric also impregnated with a mildew-proofing agent such as $\text{Al}(\text{OAc})_3$, Pb oleate, or a rare-earth metal salt. A. J. H.

Conditioning of yarn. W. W. TRIGGS. From MASCHINEN- U. APPARATE BAUANSTALT G.M.B.H. (B.P. 371,436, 21.1.31).—Yarn wound on spools is moistened by a non-circulatory process in which a measured quantity of a liquid is driven outwardly through the yarn, *e.g.*, by compressed air, from the inside of the spools. A. J. H.

Treatment of animal fibres. A. FERRETTI, Assr. to SOC. INVENZIONI BREVETTI ANONIMA-TORINO (U.S.P. 1,827,356, 13.10.31. Appl., 30.12.29).—To a slurry of animal fibres containing rubber latex as binding agent is added a vulcanising agent, *e.g.*, colloidal S; an accelerator and antioxidant may also be introduced. The liquids of the slurry are extracted, *e.g.*, by suction boxes, before vulcanisation has proceeded to a detrimental degree. The dried and vulcanised product is of very uniform character. D. F. T.

Width dyeing machines. H. W. METTLER (B.P. 374,784, 9.12.31. Switz., 11.12.30. Addn. to B.P. 356,470).

Wetting etc. agents.—See III. **Detergents.**—See VII.

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

Thermal production of phosphoric acid. B. G. KLUGH (Ind. Eng. Chem., 1932, 24, 371—374).—The reduction of P_2O_5 is effected only by solid C, not by CO, and begins at 1200° . Fusion is necessary for effective contact. The usual equation is $(\text{CaO})_3\text{P}_2\text{O}_5 + 5\text{C} + 2\text{SiO}_2 = \text{P}_2 + 5\text{CO} + 3\text{CaO}, 2\text{SiO}_2$, though variation in the CaO-SiO₂ ratio is possible. The electrothermal process in which the above reaction, oxidation of P, and hydration of P_2O_5 are combined in one continuous process is in successful use at Anniston, Alabama. The gases must be cooled to 200° for hydration. The hot gases are very corrosive; all hot gas conduits therefore should be sufficiently good conductors for the walls to be protected by the corrosion products. The advantages of using electric heating instead of combustion furnaces are pointed out. At temp. $> 1400^\circ$ volatilisation of CaO-SiO₂ constituents occurs and complex compounds with P_2O_5 are formed. Such a temp. rise is avoided by careful sizing and mixing of materials, maintenance of a uniform depth of charge, etc. The utilisation of the heat of combustion of the evolved gases for preheating the charge by contact is impossible as side reactions cause this to cohere to a solid mass. Successful heat economy therefore depends on development of refractories which will withstand the conditions. C. I.

Anhydrous ammonia. R. J. QUINN (Ind. Eng. Chem., 1932, 24, 610—613).—Properties of NH_3 are described with commercial specifications of purity. C. I.

Operation of continuous caustic recovery plants. W. E. PIPER (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 88—89).—Various practical considerations are outlined. H. A. H.

Alkali recovery patent review. C. L. WAGNER (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 187—189).—A summary of patent literature covering the last 60 years. H. A. H.

Titanium content of raw phosphates. C. KRÜGEL and A. RETTER (Superphosphate, 1932, 5, 95—100).—Ilmenite and rutile are partly dissolved by H_2SO_4 in the ordinary process of manufacture of superphosphate. The reversion of superphosphate by formation of $2\text{TiO}_2, \text{P}_2\text{O}_5$ is discussed. Minerals containing Ti in soil undergo slow decomp. by atm. agents to produce solutions of Ti salts which interact with sol. P fertilisers, producing unassimilable phosphate. A. G. P.

Absorption of sulphur dioxide by calcium phosphate. F. K. CAMERON (J. Elisha Mitchell Sci. Soc., 1932, 47, 30).—At $25-100^\circ$ and 3—10 atm. $\text{Ca}_3(\text{PO}_4)_2$ is sol. in saturated aq. SO_2 . Dry treatment of phosphate rock with SO_2 at high temp. renders 66% of the P_2O_5 available as a fertiliser, but S is liberated. Ordinary treatment with H_2SO_4 is preferred. CH. ABS.

Determination of zinc oxide in presence of zinc sulphide. C. V. BORDEIANU (J. Pharm. Chim., 1932, [viii], 15, 554—559).—A method is described for the prep. of pure ZnS. ZnO may be quantitatively separated from ZnS by treating a mixture of the two with aq. NH_4Cl and NH_3 at 100° . A. L.

Determination of aluminium and excess acid in aluminium salts. H. L. DAVIS (J. Physical Chem., 1932, 36, 1449—1453).—To the approx. *N*-solution of the Al salt containing thymol-blue is added *N*-NaOH (*a* c.c.) sufficient to reprecipitate the ppt. and give a practically clear blue solution. The excess of OH⁻ added is determined by adding *N*-HCl (*b* c.c.) until a full yellow colour is obtained. If a further *c* c.c. of acid are required to produce a faint red tint, then *c* corresponds with the Al content and (*a*—*b*—*c*) with the amount of acid originally present. In the analysis of $\text{Al}_2(\text{SO}_4)_3$ heating is not permissible, and about 2 g. of NaCl should be added for each 10 c.c. of solution to be titrated. In analysing basic salts a measured vol. of standard acid may be added at the start. W. T. H. (c)

Sulphur burner. R. F. BACON (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 166—170).—The S burner described produces a gas containing 19—20% SO_2 without the formation of SO_3 . The gas is delivered to towers under pressure, thus eliminating fans, and it is claimed that the conversion of S into SO_2 takes place with 99—100% efficiency. H. A. H.

Refrigeration.—See I. **Chalks for putty.**—See IX. **Gas masks for COCl_2 and Cl_2 .**—See XXIII.

PATENTS.

Manufacture of ammonia [or ammonium chloride]. A. MENTZEL (B.P. 371,709, 24.7.31. Ger., 15.8.30).—Crude alkali bicarbonate from the NH_3 -soda process is used when cyanidising a mixture of alkali and carboniferous material by means of N_2 at a high

temp. The NH_3 in the waste gases is absorbed and, with the NH_3 from the hydrolysis of the cyanide, is used in the NH_3 -soda process, and obtained finally as NH_4Cl . F. Y.

Production of sodium carbonate and ammonium chloride. A. MENTZEL (B.P. 371,621, 7.5.31. Ger., 20.5.30).— NaHCO_3 produced by the NH_3 -soda process is mixed with C and converted by the action of heat in an atm. of N_2 into NaCN , which is then decomposed by superheated steam into Na_2CO_3 , the NH_3 simultaneously formed being introduced into the NH_3 -soda process and obtained as NH_4Cl . (Cf. B.P. 347,426; B., 1931, 630.) [Stat. ref.] F. Y.

[Purification of gases for synthetic] production of ammonia. L. C. JONES, Assr. to CHEM. ENG. CORP. (U.S.P. 1,830,167, 3.11.31. Appl., 26.3.25).—The N_2 - H_2 mixture is passed under 100 atm. pressure through liquid NH_3 containing <1% H_2O until the H_2O content rises to 10%. A. R. P.

Treatment of brine. C. F. PRUTTON, Assr. to DOW CHEM. CO. (U.S.P. 1,829,539, 27.10.31. Appl., 4.9.28).—Mother-liquors from the treatment of brine, which contain more MgCl_2 than CaCl_2 , are conc. and cooled to -20.7° to -52° so that $\text{MgCl}_2 \cdot 12\text{H}_2\text{O}$ crystallises. The liquor from the crystals is again evaporated and cooled to between 20° and -30° to separate $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$. A. R. P.

Detergents. H. A. KERN and G. J. FINK, Assrs. to NAT. ALUMINATE CORP. (U.S.P. 1,829,522, 27.10.31. Appl., 12.9.29).—A composition containing 85 pts. of Na_2CO_3 and 15 pts. of Na aluminate is added to laundering fluids to prevent adherence of Mn and Fe hydroxides to the fabrics. L. A. C.

Preparation of an oxide-free halide of a rare refractory metal [potassium fluouranate]. J. W. MARDEN and H. C. RENTSCHLER, Assrs. to WESTINGHOUSE LAMP CO. (U.S.P. 1,826,806, 13.10.31. Appl., 16.2.27).—A mixture of aq. $\text{UO}_2(\text{OAc})_2$, KF, HF, and HCO_2H is exposed to bright sunlight until all the U is pptd. as KUF_5 . The ppt. is washed, dried, and fused in a non-oxidising atm. with a 1:1 mixture of KCl and NaCl to remove H_2O of crystallisation. The melt is extracted with H_2O to remove alkali chlorides and leave a residue of pure KUF_5 . A. R. P.

Treatment [chlorination] of oxidic compounds. H. C. J. H. GELISSEN (U.S.P. 1,830,696, 3.11.31. Appl., 21.1.29. Holl., 24.1.28).—In the process of converting refractory oxides into chlorides by mixing them with C and heating in a current of Cl_2 , the metal container is lined with CaF_2 or AgCl . A. R. P.

Manufacture of chemical [calcium bisulphite] solutions. T. L. DUNBAR, Assr. to CHEMIPULP PROCESS, INC. (U.S.P. 1,826,753, 13.10.31. Appl., 5.2.29).—Hot SO_2 from a S burner is passed under pressure with H_2O or dil. aq. SO_2 through a tower containing perforated shelves on which CaO or CaCO_3 is placed. A. R. P.

Production of finely-divided metallic compounds [zinc oxide]. R. H. EAGLES (U.S.P. 1,829,395, 27.10.31. Appl., 11.1.27).—Zn vapour, diluted with CO_2 or the residual gases from the combustion chamber

in quantity such that the ZnO particles formed on combustion are of min. size, is burned at jets in a chamber in which the products impinge upon a cool surface to yield particles of irregular shape. Suitable apparatus is described. L. A. C.

Treatment of aluminium phosphates. CHEM. WERKE VORM. H. & E. ALBERT, Asses. of H. MÄNDLEN and H. HUBER (B.P. 371,632, 13.5.31. Ger., 14.5.30).— $\text{Al}(\text{OH})_3(\text{PO}_4)_2$ is dissolved in dil. caustic alkali by heating, additional alkali is added to keep the Al in solution as aluminate, and the liquid is supercooled for the separation of tri-alkali phosphate, the residual aluminate liquor being treated with CO_2 in known manner. The tri-alkali phosphate is dissolved in warm H_2O , treated with CO_2 , and the solution cooled, when the secondary phosphate separates out quantitatively. F. Y.

Manufacture of stannic chloride. W. S. LIENHARDT (U.S.P. 1,826,800, 13.10.31. Appl., 27.8.29).—Molten Sn is sprayed into a H_2O -cooled steel vessel through which a current of dry Cl_2 is passed. The Sn burns to SnCl_4 , which is condensed, and the excess Cl_2 is recirculated through the reaction vessel. A. R. P.

Treatment of ores of titanium containing chromium and recovery of the sulphuric acid. N. SPECHT, Assr. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,827,691, 13.10.31. Appl., 6.4.29. Ger., 14.4.28).—After removal of the TiO_2 by hydrolysis the H_2SO_4 mother-liquor is evaporated to 92% H_2SO_4 and kept at 300° for some time to render the $\text{Cr}_2(\text{SO}_4)_3$ insol. A. R. P.

Treatment of arsenical solutions. H. A. GOLLMAR, Assr. to KOPPERS Co. (U.S.P. 1,827,082, 13.10.31. Appl., 17.3.27).—Thioarsenite solutions which have been used in the removal of H_2S from coal gas are aerated until pptn. of S ceases; the filtered solution is then saturated with CO_2 , which yields a yellow ppt. containing most of the As. The washed ppt. is redissolved in NaOH or Na_2CO_3 with aëration and the solution returned to the purifying circuit. A. R. P.

Production of mica products [in thin flakes of substantial area]. F. C. ATWOOD (U.S.P. 1,829,031, 27.10.31. Appl., 16.7.28).—Mica is flexed under H_2O (by corrugated rollers), so as to admit H_2O between the laminations, and is then broken up by heating it under pressure and suddenly reducing the pressure, or by passing it between rollers moving at different speeds. L. A. C.

Production of mica powder. J. DAVENPORT (U.S.P. 1,829,039, 27.10.31. Appl., 30.11.28).—Pieces of mica are triturated with H_2O in a ball mill; the heavier particles are removed by sedimentation in a hydraulic separator, and the fine powder (passing off in the overflow) is allowed to settle and the sludge is dried and graded. L. A. C.

Production of hydrogen. R. WILLIAMS, Assr. to DU PONT AMMONIA CORP. (U.S.P. 1,826,974 and 1,830,010, [A] 13.10.31, [B] 3.11.31. Appl., [A] 31.5.28, [B] 21.5.28).—A mixture of steam and a saturated hydrocarbon, preferably CH_4 , is passed at $<700^\circ$ (500°) over pumice impregnated with Ni and one of the following oxides: (A) CdO , ZnO , CaO , or preferably BeO ; (B) ThO_2 .

TiO₂, ZrO₂, SiO₂, or preferably CeO₂. The products are H₂ and CO₂ free from CO. A. R. P.

Mineral wool. Catalytic synthesis. Eliminating elements from gases.—See I. **Roasting Pb to PbO.**—See X. **Lithopone. Blanc fixe.**—See XIII.

VIII.—GLASS; CERAMICS.

Analysis of silico-aluminous products. II. E. DELFELD (Bull. Soc. chim. Belg., 1932, 41, 202—208; cf. B., 1931, 1091).—The chemical composition of aluminosilicates is of less importance for ceramic purposes than are the physical properties. The extent to which the latter can be judged from the chemical analysis is discussed. E. S. H.

Tendency to increased fuel economy in the ceramic industries. S. R. HIND (Fuel Econ. Rev., 1932, 11, 144—151).

PATENTS.

Lehrs. J. E. POLLAK. From HAZEL-ATLAS GLASS Co. (B.P. 373,430, 4.6.31).—Practically the whole of the conveyor, including the sprockets, is surrounded by heat-insulating walls and roof, and adjustable hoods are provided near the discharge point. B. M. V.

[Manufacture of an alumina] refractory article and composition therefor. R. H. MARTIN, Assr. to NORTON Co. (U.S.P. 1,818,903, 11.8.31. Appl., 31.7.25).—Bricks, saggars, muffles, etc. made of bonded cryst. Al₂O₃ are rendered impervious to gases and resistant to alkaline vapours by coating them with a mixture of 21% of MgO and 79% of zirkite ground to a colloid, and firing the coated article until the mixture fuses over the surface to form a white glaze. A. R. P.

Composite glass. A. KAMPFER and A. C. PLÖTZE (B.P. 374,193, 1.4.31. Ger., 24.10.30).

Casting refractory materials. CORHART REFRACTORIES Co., Assees. of F. W. SCHROEDER (B.P. 374,283, 15.6.31. U.S., 14.6.30).

Kiln heating.—See I. **Removing coatings.**—See X.

IX.—BUILDING MATERIALS.

Florescence. V. Staining of facing bricks. F. L. BRADY and B. BUTTERWORTH (Trans. Ceram. Soc., 1932, 31, 193—201; cf. B., 1932, 342).—A brown stain at the junction of some sand-faced bricks and the setting mortar, in bad cases running over the brick below, is shown to be due to an efflorescence of FeSO₄ reacting with the Ca(OH)₂ of the mortar. Oxidation produces the brown Fe(OH)₃. Some possible methods of reducing the trouble are suggested. H. H. M.

Lime-containing chalks in manufacture of putty. K. WERNER (Farben-Chem., 1932, 3, 175—176).—A reply to Sander (B., 1932, 601). The apparent minute proportions of CaO in CaCO₃ found by titration with acid are due to the feeble solubility of the CaCO₃ and do not account for the occasional failure of putty. S. M.

Types, uses, and testing of refractory cements. W. R. KERR (Chem. & Met. Eng., 1932, 39, 331—332).

Asphalt emulsions.—See II. **Fire-proof paints.**—See XIII.

PATENTS.

Manufacture of porous cement. E. WALTER (U.S.P. 1,829,381, 27.10.31. Appl., 31.7.26).—Mixtures of cement, H₂O, a liquid insol. in and more volatile than H₂O (CS₂, CCl₄, petrol, C₆H₆, etc.), a free alkali, and a metal powder yielding H₂ by reaction with the H₂O in the presence of the alkali, are heated, e.g., by live steam at a temp. < 100° but above the b.p. of the volatile liquid. L. A. C.

Addition means and method for improving cement and cement mortar. CHEM. FABR. GRÜNAU, LANDSHOFF & MEYER A.-G. (B.P. 371,770, 6.11.31. Ger., 17.2.31).—The addition of HCNS or its salts alone or with chlorides or nitrates is particularly suited to cements of high CaO content. C. A. K.

Cold glazing of cement-asbestos plates. W. W. TRIGGS. From ETERNIT EMAILLÉ Soc. ANON. (B.P. 371,522, 20.2.31).—Freshly made plates while still damp are coated with successive layers of cement paste each of which is smoothed and polished with hot rollers. The coated sheets may then be exposed to CO₂ or a solution of an alkali fluosilicate. C. A. K.

Asphalt compositions. A. WOLF (B.P. 372,754—5, 10.2.31).—(A) An acid-resisting asphalt consists of a mixture of bitumen (40%) and kaolin (60%) with or without a siliceous filler. (B) Bitumen is mixed with a material, e.g., Florida earth, activated clays, or gels, which has previously been used for decolorising or refining oil. C. A. K.

Manufacture of a mixture for making pavements. A. B. C. DAHLBERG (B.P. 372,940, 5.5.31).—Porous material, e.g., diatomaceous earth, impregnated with a fluxing agent forms part of a bituminous mixture. When spread and compressed the porous mass is crushed and releases the flux on the surface of the coated aggregate. C. A. K.

Coloured granule etc. [for coating roofing material]. I. E. SPROAT, Assr. to R. T. VANDERBILT Co., Inc. (U.S.P. 1,830,489, 3.11.31. Appl., 18.4.29).—Crushed rock granules are coated with a coloured cellulose lacquer. A. R. P.

Mixers for mixing concrete and the like. C. B. ABBEY and N. HARRISON (B.P. 374,501, 11.3.31).

Making concrete or like roads, areas, walls, foundations, etc. J. H. WALKER (B.P. 374,068, 24.2.31).

Manufacturing artificial stone, specially applicable to concrete tiles. R. ABRAHAM, LTD., and R. A. ABRAHAM (B.P. 374,358, 26.5.31. Addn. to B.P. 313,295).

Building blocks. W. H. GUYATT (B.P. 374,533, 17.3.31).

Timber kiln. Mixing device.—See I.

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

Effect of composition of raw materials on coke consumption in blast furnaces. A. D. GOTLIB (Domez, 1930, No. 6, 1—31).—Graphs showing the coke consumption as a function of the C and S contents

of the (Donetz) coke are given for Krivorog Fe ore. For coke high or low in S the consumption is increased by 0.12–0.25 or 0.03–0.10, respectively, per 1% S.

CH. ABS.

Yield point and endurance of steel at high temperatures. F. KÖRBER and A. POMP (Stahl u. Eisen, 1932, 52, 553–559).—Up to 300–350° for plain C steels and 350–450° for alloy steels the yield point is a function of the tensile strength at room temp. At higher temp., owing to the effect of time of application of the load on the results, direct determinations must be made, but a better idea of the behaviour of steel at these temp. is obtained by determining the load required to cause a small permanent deformation within a definite time interval, e.g., 10–15 hr. after the beginning of the test. Methods of determining the yield point and endurance at high temp. are described and the results obtained with numerous steels tabulated. A. R. P.

Tensile tests on rods and wires at low temperatures. F. PESTER (Z. Metallk., 1932, 24, 67–70, 115–120).—The tensile strength of Cu, bronze, Al, aldrej, and steel rises linearly with fall in temp. from 20° to –77°, the increases being 20.9, 18, 14.85, 17.2, and 17.33%, respectively. The elongation and reduction in area of Cu, bronze, and steel are reduced by fall in temp., whereas those of Al and aldrej are hardly affected. The no. of alternate bendings which a wire will undergo without fracture increases with fall in temp. to –60° in the case of Cu, bronze, and Al, remains unaffected in the case of aldrej, and for steel reaches a max. at –20°. A. R. P.

Alloy cast iron for use in the paper industry. J. S. VANICK and F. L. LAQUE (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 37–40).—The advantages of Ni–Cr–Fe alloys in many pulp- and paper-making operations is indicated. H. A. H.

Alloy steel in the sulphite[-pulp] industry. A. CHRISTIANSEN (Paper Trade J., 1932, 94; T.A.P.P.I. Sect., 31–32).—The importance of Cr–Ni steel is emphasised for structural work where resistance to Ca bisulphite liquor is required. An alloy containing 18–20% Cr, 7–10% Ni, and small quantities of Mn, Si, and C has found the widest application. H. A. H.

Changes in the supercooled state in nickel-iron alloys. High permeability of air-cooled perm-alloy. O. DAHL (Z. Metallk., 1932, 24, 107–111).—When Ni–Fe alloys with 40–92% Ni are quenched or furnace-cooled from 950° and subsequently annealed at temp. up to 800° and quenched the electrical resistance remains const. up to 350°, then falls abruptly to a min. at 425–450°, after which it rises again; simultaneously with the fall in resistance there is a slight increase in hardness followed by a slight decrease as the resistance begins to rise again. In alloys quenched from 950° the original resistance and hardness are restored above 650°, but in slowly cooled alloys the increase in resistance after the min. is much greater than the initial decrease as the furnace-cooling itself produces a considerable reduction in the resistance compared with that of the quenched alloys. The conductivity of alloys which have been annealed for a long time at 425° increases

with the Ni content to a max. at 68% Ni, then falls slightly, shows a second (more pronounced) max. at 76% Ni, after which there is a steep fall. These changes are attributed to the formation of compounds, FeNi₃ and FeNi₂, with regular at. distribution in the lattice, similar to those which occur in the Au–Cu system. Honda's assumptions that after slow cooling the alloys consist of the normal solid solution and that this state is the cause of the low initial permeability are therefore incorrect. Addition of Mn to Fe–Ni alloys with 74% Ni increases considerably the effects observed in annealing at 425°, whereas 2% Si restrains them almost completely.

A. R. P.

Rendering steel more heat-resistant by alloying with chromium, nickel, aluminium, and silicon.

W. OERTEL and A. SCHEPERS (Stahl u. Eisen, 1932, 52, 511–513).—The tensile properties and loss in wt. by scaling at 700°, 900°, and 1000° of various steels with 13–21% Cr, 0.2–10% Ni, 0–2.8% Al, 0.1–3.2% Si, and 0.18–0.38% C are tabulated. The best results were obtained with 8:18 Ni–Cr steel containing 0.5–1% Al and 2–2.5% Si, which has a fine-grained austenitic structure and suffers a loss of < 10 mg. per sq. cm. in 36 hr. in an electric furnace at 1200° and has a tensile strength of > 5 kg. per sq. mm. at 1000°.

A. R. P.

Resistance of iron-aluminium alloys to oxidation at high temperatures.

N. A. ZIEGLER (Amer. Inst. Min. Met. Eng., Tech. Pub., 1932, No. 450, 6 pp.).—2–4% Al increases resistance to oxidation; with 8% Al the resistance is as good as, or better than, that of Ni–Cr alloys. The C content has little effect on the oxidation-resistance of these alloys. CH. ABS.

Prevention of intergranular corrosion in corrosion-resistant chromium-nickel steels.

P. PAYSON (Amer. Inst. Min. Met. Eng., Tech. Pub., 1932, No. 464, 25 pp.).—Alloys containing C 0.09–0.17, Ni 8, and Cr 18–22%, with W, Mo, V, Si, or Ti, were examined. Intergranular corrosion is not directly related to magnetic properties. Small quantities of W, with Cr up to 22%, improved, but > 0.8% decreased, the resistance. 3.3%, but not 1.87%, Mo improved the steel. V, Si, and Ti retarded deterioration. Some of the agents are considered to cause the formation of ferrite, and carbides may be pptd. in this rather than in the grain boundaries where they may cause intergranular attack.

CH. ABS.

Analysis of alloy steels. P. L. BLANKEN (Chem. Weekblad, 1932, 29, 384–385).—Determination of V in alloy steels by the persulphate method (titration with KMnO₄) yields always low results, owing to incomplete oxidation by the (NH₄)₂S₂O₈. Potentiometric methods, however, yield concordant results, but the combined method, in which, after oxidation with (NH₄)₂S₂O₈, the Mn is determined with H₂C₂O₄, the Cr and V are reduced with FeSO₄, and the V is titrated with KMnO₄, yields somewhat low results, probably as a result of using an excess of FeSO₄.

H. F. G.

Oxy-acetylene welding of alloy steels and irons.

J. H. CRITCHETT (Met. & Alloys, 1931, 2, 253–256).—Procedures for Cr–Fe, Cr–Ni, Cr–Mn, Mn–Fe, and Si–Fe are given. CH. ABS.

Use of the reaction products of phosphorus pentasulphide and cresol as flotation agents. L. M. BECKER (Tzvet. Met., 1931, 477—486).—The prep. of "aerofloat" from American, Russian, or German cresol is described; crude PhOH was unsatisfactory. The chief constituents are tolyl phosphates and thiophosphates, thiocresols, cresols, and dissolved H_2S .

CH. ABS.

Babbitt metal with tin base and low antimony and copper. A. M. BOCHVAR and S. I. IRODOV (Tzvet. Met., 1931, 1139—1147).—Below 6—8% Sb the cubic β -crystals (solid solution of Sn and Sb) are absent; the soft ground-mass consists of a solid solution of Sn and Sb in which hard crystals of a solid solution of Cu and Sn are embedded. The hardness is lower than that of alloys with higher Sb content. The alloys are practically non-ageing.

CH. ABS.

Resistance of copper, tin bronzes, and tin to corrosion by inorganic acids. W. CLAUS and H. FINCKE (Z. Metallk., 1932, 24, 64—66, 112—114).—The rate of dissolution of annealed bronze in cold 3—6% HCl increases with increasing % Sn to a max. at 10% Sn, then falls until at 14% Sn it reaches a val. almost equal to that of pure Sn. In 15% HCl the rate falls irregularly from that of pure Cu to that of pure Sn. In all cases both constituents of the alloy are dissolved as $CuCl_2$ and $SnCl_4$ respectively. There is relatively little difference between the behaviour of annealed and cast bronzes in HCl. The rate of dissolution in dil. H_2SO_4 is roughly 25—50% of that in HCl, but in all cases is >25 g. per sq. m. per day; in aq. H_3PO_4 bronze is corroded to about the same extent as it is in dil. H_2SO_4 .

A. R. P.

Metallurgy of nickel in Brazil. H. E. DE ARANJO (Rev. Soc. brasil. sci., 1931, 2, 438—441).—It is proposed to fuse the ore with CaO and $CaSO_4 \cdot 2H_2O$; Ni silicates are converted into sulphide. Excess of CaO is advised. The matte (Fe 30—40, Ni 30—40, S 25—28%) is blown in a Bessemer converter in presence of added SiO_2 ; Fe silicate is formed, but NiS is unaffected. The latter is oxidised in a reverberatory furnace, the oxides are reduced, and Ni is purified electrolytically.

CH. ABS.

Metallurgy of nickel in Brazil. A. GUERREIRO (Rev. Soc. brasil. Chim., 1931, 2, 493—499).—A new ore, termed "vilmite" (a kind of Ni pyrites: Ni 75, Al 16—18, S 7—9%) has been found associated with pimelite in Aureliano Mourão, but is commercially unimportant. The concentrate from the matte process, which is difficult to separate from the slag, contains only 25% of Ni together with 20% of S, besides Ca, Si, etc. A new process is mentioned which effects a fuel economy of 20—23%, yields a product containing 60—65% Ni, from which the slag (d 2.4) is easily removed, and is easy to work up for the metal.

E. L.

System $PbO-Sb_2O_3$ and its relation to lead softening. C. G. MAIER and W. B. HINCKE (Amer. Inst. Min. Met. Eng., Tech. Pub., 1932, No. 449, 12 pp.).—The equilibria were studied by thermal analysis, v.p. measurement, and microscopically. A compound $PbO \cdot Sb_2O_3$ is formed. With increasing PbO the v.p. decreases, becoming very small at 40% PbO, indicating that free Sb_2O_3 is present up to this concn. of PbO.

CH. ABS.

Corrosion-resistance of the B.N.F. ternary alloys of lead in buildings. F. L. BRADY (Metal Ind., 1932, 40, 297—298).—The resistance of alloys containing (a) Cd 0.25, Sb 0.50%, (b) Cd 0.25, Sn 1.50%, towards $Ca(OH)_2$ (1.51 g. per litre) and AcOH (2%) is equiv. to that of pure Pb.

CH. ABS.

Equilibrium relations in aluminium-zinc alloys of high purity. W. L. FINK and K. R. VAN HORN (Amer. Inst. Min. Met. Eng., Tech. Pub., 1932, No. 474, 11 pp.).—The increased strength of Al is attributed to the high solid solubility of Zn in Al and its variation with temp. The X-ray method afforded the following vals. for the solubility of Zn in Al: 2.7% at 25°, 5.2% at 100°, 7.4% at 150°, 9.4% at 200°, 13.4% at 250°.

CH. ABS.

Anti-friction alloys with magnesium base. A. M. BOCHVAR and F. A. LUNEV (Tzvet. Met., 1931, 1135—1139).—Mg-Si, but not Mg-Ca or Mg-Si-Ca, alloys can be employed. Alloys with 1.68—3.21% Si possess a suitable structure, m.p. 650—700° according to the Si content, and Brinell hardness 30—40.

CH. ABS.

Effect of small percentages of certain metals on the compressibility of lead at an elevated temperature. L. ZICKRICK (Amer. Inst. Min. Met. Eng., Preprint, 1932, 14 pp.).—Cu causes a rapid increase in deformation pressure of Pb up to 0.08%; larger quantities have no appreciable effect. Ca, Bi, Sn, and Sb also increase the deformation pressure.

CH. ABS.

Surface effects on assay beads caused by metals of the platinum group. J. L. BYERS (Amer. Inst. Min. Met. Eng., Preprint, 1932, 17 pp.).—Pt-group metals have effects, depending on the particular metal and its concn., on the structure and appearance of the cupellation bead. The presence of such metals is correlated quantitatively with their characteristic structural and surface effects, with particular reference to Au beads.

CH. ABS.

Apparatus for long-period temperature-stress tests on metals. W. H. HATFIELD, G. STANFIELD, J. WOOLMAN, and N. B. MCGREGOR (J. Sci. Instr., 1932, 9, 150—153).—The specimen is heated in an electric furnace of carefully controlled temp. The load is applied by a lever.

C. W. G.

Resistance to abrasion in relation to hardness [of metals]. S. A. MAIN (Proc. Inst. Mech. Eng., 1931, 121, 523—532).—Whilst the degree of hardness of a metal is related to the resistance to abrasion, it is not the normal hardness of the material which matters, but, in cases in which abrasion deforms the surface, the hardness which the material acquires by such deformation. This view is in concordance with hardness tests on surfaces used in crushers.

C. A. K.

Electrolytic pickling of iron. V. F. STEFANOVSKI (Domez, 1930, No. 5, 59—67).—A current of 4.5 volts is passed through the solution of H_2SO_4 (6.7—20.6%) at 25—27° or 60° with the Fe articles as cathode and a Pb anode; there is an economy of 9—11% in H_2SO_4 , a saving of 50% of Fe otherwise lost by dissolution, and a saving of time.

CH. ABS.

Deposition of copper and brass from cyanide solutions. G. M. SMITH and J. A. SOUTHERS (J. Tenn.

Acad. Sci., 1931, 6, 191—198).—Cathode efficiency decreases with increasing c.d. and decreasing molal ratio $\text{Cu}^{++}:\text{NaCN}$, and is very low for ratios below 1:4. Anode efficiency increases as the molal ratio $\text{Cu}^{++}:\text{NaCN}$ decreases and as c.d. decreases. For a brass bath containing respectively 15.87 and 16.32 g. of $\text{Cu}(\text{CN})_2$ and $\text{Zn}(\text{CN})_2$ per litre, anodic corrosion is increased by the presence of Zn. Increase of c.d. decreases the rate of anodic corrosion. Temp. has little effect. Increase of Zn concn. increases cathodic efficiency in dil., but decreases it in concn., solutions. The % of Cu in the plate formed is decreased by increasing the Zn in the electrolyte, increasing the c.d., and lowering the temp.

CH. ABS.

Anodes for production of electrolytic zinc. II. H. R. HANLEY, C. Y. CLAYTON, and D. F. WALSH (Trans. Amer. Inst. Min. Met. Eng., Gen. Vol., 1931, 142—146; cf. B., 1930, 912).—Ca (0.1%) in the Pb anode lowered the anode potential in the SO_4^{--} bath by approx. 50%. Pb anodes containing 0.1% Ca and 4% Tl were most stable and produced Zn cathodes with the lowest Pb content, the lowering of potential being about 40%. Sn almost completely neutralised the effect of Ca.

CH. ABS.

Furnaces for heat-treatment of wire. R. WHITFIELD (Fuel Econ. Rev., 1932, 11, 140—143).

Mechanical stokers for metallurgical furnaces. H. C. ARMSTRONG (Fuel Econ. Res., 1932, 11, 48—52).

Refrigeration. Solid CO_2 as refrigerant.—See I. **Corrosion of tar stills.**—See II. **Heat-treating alloys.**—See XI. **Painting edges.**—See XIII.

PATENTS.

Melting of metals [iron in a reverberatory furnace]. COLUMBIA MALLEABLE CASTINGS CORP., Assees. of (the late) L. R. ZIFFERER (U.S.P. 1,825,841, 6.10.31. Appl., 17.4.30).—Claim is made for the use of oil or gas firing for melting the metal, followed by powdered coal for heating the molten metal to the casting temp. A. R. P.

Purification of (A) ferrous metals, (B) steel in the Bessemer process, (C) steel in the open-hearth process. C. T. HENNIG (U.S.P. 1,826,880—2, 13.10.31. Appl., [A] 22.8.28, [B, C] 16.8.29).—(A) The molten metal is treated with 2—4 lb. (per ton) of lumps obtained by fusing a mixture of Na_2CO_3 90, CaO 3—4, MnO_2 0.25—1, and CaCl_2 0.8%. (B) Steel from the converter is treated in the ladle with briquettes containing Na_2CO_3 80, CaO 2—6, MnO_2 0.25—1, and CaCl_2 or NaCl 0.8% bonded with glucose or molasses. (C) The charge in an open-hearth furnace is treated with 2—4 lb. (per ton) of the briquettes claimed in (B). In all cases the Na_2CO_3 removes the S and by forming a readily fusible silicate causes such inclusions to rise to the surface. A. R. P.

Treatment of ores in the manufacture of rustless steel. C. HART, Assr. to P. SHIELDS (U.S.P. 1,826,932, 13.10.31. Appl., 26.9.30).—Fe ore containing small quantities of Cr and Ni is heated at 400—500° in a current of Cl_2 , preferably with the addition of a small quantity of reducing agent. In this way much of the Fe is removed as FeCl_3 , leaving Fe_2O_3 enriched in Cr

and Ni; this residue is then smelted with the addition of a little ZrO_2 ore to obtain pig Fe containing Cr, Ni, and Zr. A. R. P.

Manufacture of iron and steel. HIRSCH, KUPFER-U. MESSINGWERKE A.-G. (B.P. 373,295, 26.2.31. Austr., 26.2.30).—The molten metal is deoxidised and degassed by heating in an induction furnace at 250° above the m.p. under a layer of slag formed from a mixture of glass 1—50 (40), Fe_2O_3 1—20 (10), CaF_2 1—5 (1)%, and CaO the remainder (49%). A. R. P.

Manufacture of malleable iron. I. R. VALENTINE, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,830,630, 3.11.31. Appl., 16.7.28).—White Fe is heated at 1000° for 4 hr. until all the C has entered into the solid solution, then tempered at 700—750° for 4—36 hr. until complete pptn. of temper C has occurred. The second treatment may be shortened by holding the metal for about 4 hr. at progressively falling temp. within the above range. A. R. P.

Treatment of iron and steel [prior to enamelling]. C. M. DENNIS (U.S.P. 1,827,223, 13.10.31. Appl., 2.2.28).—After pickling in acid, the metal is washed in a solution of $\text{Na}_2\text{B}_4\text{O}_7$, and a sol. chromate. A. R. P.

Treatment of metal [non-rusting steel]. F. J. CROLIUS and R. W. STULER, Assrs. to STAINLESS STEEL CORP. (U.S.P. 1,813,840, 7.7.31. Appl., 12.11.30).—The alloy steel is made and refined in an Ajax high-frequency induction furnace, and the current is then cut off and suddenly switched on full again so as to “shock” the metal bath; this treatment is stated to cause vigorous evolution of absorbed gas and the rejection of globules of slag entrapped in the molten metal, so that the resulting castings are sound and dense. A. R. P.

Heat-treatment of [non-rusting] alloy steel articles. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of F. C. KELLEY (B.P. 373,292, 26.2.31. U.S., 28.2.30).—The material which has been worked to provide a bright surface is annealed at 1100° in a closed container placed in an electric furnace through which H_2 is passed. The mouth of the container is sealed with a mixture of Al_2O_3 and 15% of Mn or ferrosilicon so that any H_2 which diffuses into the container is free from oxidising gases, e.g., H_2O vapour. A. R. P.

Plating of [ferrous] metals. W. E. WATKINS, Assr. to COPPER PLATE SHEET & TUBE CO. (U.S.P. 1,825,763, 6.10.31. Appl., 9.4.29).—Fe or steel sheets are coated with a suspension of finely-divided Cu or CuO in an oil having an asphaltic base, the coated sheets are annealed to produce a bright film of Cu, and finally the metal is coated with Sn or Pb by passing it at >100 ft. per min. through a molten Sn or Pb bath at just above the m.p. A. R. P.

Production of ferrophosphorus low in or practically free from silicon. METALLGES. A.-G., and HOCH-OFENWERK LÜBECK A.-G. (B.P. 372,412, 12.2.31. Ger., 13.3.30).—A mixture of native $\text{Ca}_3\text{P}_2\text{O}_8$, scrap Fe sufficient to combine with the P, coke to reduce the P_2O_5 and Fe_2O_3 , and sand in such a quantity that the mol. ratio of $(\text{SiO}_2 + \text{Al}_2\text{O}_3):\text{CaO}$ is >1:1 is smelted in the blast furnace under such conditions that the temp. does not exceed 1650°. A. R. P.

Refining of ferrochromium. K. M. SIMPSON (U.S.P. 1,826,261, 6.10.31. Appl., 10.4.29).—The crude alloy is dissolved in HCl, the insol. impurities are removed by filtration, the solution is evaporated to dryness, and the residual chlorides are reduced to metal by H_2 at 1550° , the HCl formed being used again in the process. A. R. P.

Manufacture of wrought [molybdenum]-iron alloy. HIGHLAND IRON & STEEL Co., Assees. of F. H. DECHANT (B.P. 372,915, 16.4.31. U.S., 24.11.30).— $CaMoO_4$ or ferromolybdenum is added to the cupola charge to produce Fe containing $\geq 2\%$ Mo; the product is then treated in the puddling furnace in the usual way. A. R. P.

Magnetic [nickel-iron] dust cores. STANDARD TELEPHONES & CABLES, LTD. FROM WESTERN ELECTRIC Co., INC. (B.P. 372,837, 19.2.31).—Powdered 81:19 Ni-Fe alloy is mixed with a small quantity (0.05—0.9%) of a heavy hydrocarbon oil and the mixture is heated in a closed annealing box at 770 — 1080° . The product is suitable for the manufacture of rust cores with a low hysteresis loss. A. R. P.

Improving the physical properties of alloy steel containing copper. VEREIN. STAHLWERKE A.-G. (B.P. 373,453, 19.6.31. Ger., 8.7.30).—Steel containing $\geq 0.4\%$ C, 0.4—5% Cu, and $\geq 2\%$ of Cr or other element which increases the formation of austenite is shaped by working at $<600^\circ$ and then annealed at 350 — 600° . A. R. P.

(A, B, D) Compositions of matter. (c) Metal aggregate. [Cutting tools and dies.] (A—D) G. J. COMSTOCK and (B, D) E. B. WELCH, ASSRS. to FIRTH-STERLING STEEL Co. (U.S.P. 1,826,454—7, 6.10.31. Appl., [A, B] 9.4.28, [C] 14.4.28, [D] 30.4.29).—Claim is made for sintered aggregates composed of (A) 50—95% of SiC bonded with Ni powder, (B) 87% of WC bonded with powdered high-speed steel containing 14—18% W, (c) 70—95 (94)% of ground, vitrified ZrO_2 bonded with 30—5 (6)% of Ni powder, and (D) 87% of ground, vitrified ZrO_2 bonded with high-speed steel containing 14—18% W. A. R. P.

Surface-hardening [nitrogenisation] of steel. H. W. McQUAID, ASSR. to TIMKEN—DETROIT AXLE Co. (U.S.P. 1,804,176, 5.5.31. Appl., 10.6.29).—The steel is heated in NH_3 , first for 5—10 hr. at about 650° , then for 10—40 hr. at about 525° . The treatment is claimed to prevent brittleness. A. R. P.

Nitrogenisation of iron, steel, and alloys thereof. ELECTRO METALLURGICAL Co., Assees. of J. J. EGAN (B.P. 373,284, 26.2.31. U.S., 26.2.30).—The articles are heated at 460 — 580° in an atm. of NH_3 containing an oxide of N, preferably in a 2:3 mixture of NH_3 and NO. A. R. P.

Hardening the surface of mild steels. H. J. LORANG, ASSR. to F. J. KUNA (U.S.P. 1,826,008, 6.10.31. Appl., 27.5.29).—The steel is heated at 850° in a pulverulent mixture of 92.5% of charcoal (pea size), 3.125% of lampblack, 1.25% of ferromanganese (20-mesh), and 3.125% of ferrochromium (20-mesh). A. R. P.

Heat treatment [precipitation-hardening] of bodies [steel] produced at high temperatures. F. KRUPP A.-G. FRIEDRICH-ALFRED-HÜTTE (B.P. 373,017, 18.8.31. Ger., 23.8.30).—Steel containing, e.g., 0.17% C, 0.38% Si, 1.2% Mn, and >0.5 (0.75)% Cu is cooled slowly from the rolling temp. to 450° , maintained at this temp. for 20 hr., and quenched. The yield point is thus raised from 32 to 50 kg./sq. mm. and the tensile strength from 59 to 66 kg./sq. mm. A. R. P.

Welding [of stainless steel]. E. G. BUDD MANUF. Co., Assees. of E. J. W. RAGSDALE (B.P. 372,324, 28.10.30. U.S., 5.6.30).—The metal is spot-welded by resistance welding under pressure, using a current of the order of 300,000 amp. per sq. in. of contact applied for 0.04—0.002 sec. A. R. P.

Welding of ingot iron, grey cast iron, cast steel, cast silicon steel, and structural steel. F. KRUPP A.-G. (B.P. 372,678, 30.9.31. Ger., 4.10.30).—The use of welding rods of steel containing 10—30 (25)% Cr, 2—30 (20)% Ni, and 0.15% C is claimed. A. R. P.

[Resistance] welding [of nickel-iron alloys]. C. T. SIEBS, ASSR. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,827,210, 13.10.31. Appl., 4.12.28).—The parts to be welded are immersed in CCl_4 and a current is passed between them while they are held together under pressure. A. R. P.

Composite [steel-monel] metal and brazing process therefor. C. STEENSTRUP, ASSR. to GEN. ELECTRIC Co. (U.S.P. 1,804,237, 5.5.31. Appl., 16.10.25).—A monel metal rod is inserted in a closely-fitting mild steel tube, the ends are closed with steel plugs which are then welded to the tube, and the whole is heated at 1400° in H_2 so that the monel metal melts and welds to the steel case. The composite rod is then rolled into flat strip suitable for the construction of labyrinth packings for steam turbines. The strip is readily welded to the carrying members by the application of brazing Cu and heating in H_2 . A. R. P.

Manufacture of alloys. W. P. DAVEY, ASSR. to GEN. ELECTRIC Co. (U.S.P. 1,829,635, 27.10.31. Appl., 28.5.29).—The metals are co-pptd. as oxides or hydroxides and the ppt. is ignited and reduced in H_2 to produce an alloy powder which is sintered into shape for mechanical working. A. R. P.

Improvement of metals. E. S. FISHER, ASSR. to UTAH METALS FLUX Co. (U.S.P. 1,828,701, 20.10.31. Appl., 25.6.24).—The metal is melted with 5—15% of a carbonaceous Utah shale. A. R. P.

Protection of metal surfaces. S. R. MASON, ASSR. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,827,204 and 1,827,247, 13.10.31. Appl., 18.10.27).—The article, preferably after first coating with Zn, is treated as a cathode for 5—15 min. in a solution containing (A) 5 g. of $K_2Cr_2O_7$ per litre, or (B) < 50 (22) g. of CrO_3 per litre, at a c.d. below that at which Cr is deposited. The passivated surface thus obtained is covered with a protective coat of paint. A. R. P.

Protection of lead against corrosion. COMP. GÉN. D'ELECTRICITÉ (B.P. 372,936, 1.5.31. Ger., 7.5.30).—Pb pipes and cable sheaths are coated with tar, pitch,

bitumen, cement, concrete, etc. in which is incorporated S or a S-bearing material, e.g., Mexican bitumen.

A. R. P.

Treatment of metals [against corrosion]. J. G. E. WRIGHT, ASSR. to GEN. ELECTRIC CO. (U.S.P. 1,829,623, 27.10.31. Appl., 16.11.29).—The surface is coated with a suspension of Al powder in a "glyptal" resin, and the coated article is heated to volatilise the resin and cause the Al to alloy with the metal surface.

A. R. P.

Caustic bath [for removing vitreous coatings from metals]. M. W. WARD, ASSR. to GEN. ELECTRIC CO. (U.S.P. 1,829,693, 27.10.31. Appl., 29.9.30).—The bath is maintained electrically at about 550–600°, and revived by the intermittent or continuous admission of dry steam.

L. A. C.

Ore-leaching process [for copper sulphide ores]. G. MOTT, ASSR. to PINTO VALLEY CO. (U.S.P. 1,825,752, 6.10.31. Appl., 2.3.27).—The ore is leached in heaps by percolating acid $\text{Fe}_2(\text{SO}_4)_3$ solution through the mass. The $\text{Fe}_2(\text{SO}_4)_3$ is continuously regenerated by admission of air to the heaps. The leach liquor is run over chalcocite to reduce its acidity and to convert Fe^{+++} into Fe^{++} before cementing out the Cu on scrap Fe.

A. R. P.

[Phosphorus-silver-copper] alloy. R. H. LEACH, ASSR. to HANDY & HARMAN (U.S.P. 1,829,903, 3.11.31. Appl., 14.5.31).—A Ag solder for brazing purposes comprises 10–25% Ag, 67–88% Cu, and 2–8% P. The alloys are malleable and have m.p. 610–727°.

A. R. P.

White bronze. J. H. CHEETHAM, ASSR. to MUELLER CO. (U.S.P. 1,826,239, 6.10.31. Appl., 16.4.29).—Claim is made for an alloy containing Cu 52–55, Sn 1.5–2.5, Pb 10–12, Zn 15–19, Ni 15–18, Fe \geq 0.75, and Mn \geq 0.25%.

A. R. P.

Refining of metals [copper and its alloys]. W. C. SMITH, ASSR. to ALLIED PROCESS CORP. (U.S.P. 1,812,993, 7.7.31. Appl., 21.6.29).—The greater part of the oxides in the molten metal is reduced by addition of P at 1100–1250° and final deoxidation is effected with \geq 0.05% Li.

A. R. P.

Treatment of [zinc] ores [containing ferrites]. C. C. HAAS (U.S.P. 1,825,949, 6.10.31. Appl., 28.5.28).—Franklinite or roasted Zn ores containing ZnFe_2O_4 are heated at $>$ 400°, preferably at 550°, in a current of CO , H_2 , or hydrocarbon gas to reduce the Fe_2O_3 to Fe_3O_4 . The Zn and Cu can then readily be leached out with aq. NH_3 or dil. H_2SO_4 .

A. R. P.

Purification of [columbite] ores [from tin]. F. M. BECKET, ASSR. to ELECTRO METALLURG. CO. (U.S.P. 1,822,266, 8.9.31. Appl., 17.11.28).—The crushed ore is heated with C at 1000° to reduce the SnO_2 to Sn, the metal being removed by a subsequent heating with NH_4Cl , HCl, S_2Cl_2 , or other chlorinating agent.

A. R. P.

Protective coating for [tinplate] cans. A. C. RICHARDSON, ASSR. to CALIFORNIA PACKING CORP. (U.S.P. 1,830,244, 3.11.31. Appl., 19.6.28).—The cans are sprayed with a 2% solution of casein in dil. aq. NH_3 containing 5–40% EtOH, then dried, and hardened in an atm. containing CH_2O .

A. R. P.

Roasting apparatus [for converting lead into litharge]. E. J. FOWLER (decd.) and D. BAIRD, ASSRS. to NICHOLS COPPER CO. (U.S.P. 1,825,947, 6.10.31. Appl., 16.5.28).—The apparatus comprises a furnace with a conical hearth heated tangentially with an oil flame and provided with an inclined rotating rabble carrying a series of hollow teeth through which air is passed to oxidise the molten Pb in the hearth. The teeth are so arranged that they carry the PbO formed in the process continuously towards the periphery of the hearth, where it is discharged into a collecting channel. Alternatively, the hearth may slope downwards towards the periphery and the PbO is then stirred towards a central discharge pipe.

A. R. P.

Lead alloy. R. J. SHOEMAKER, ASSR. to S. & T. METAL CO. (U.S.P. 1,815,528, 21.7.31. Appl., 2.12.29).—The alloy comprises Pb with 0.05–0.4% Ca, 0.5–2% Cd, 0.1–1% Hg, and 0.02–0.1% Al; Hg and/or Al may be omitted.

A. R. P.

Extraction of mercury from mercury-bearing ores or products. S. CROASDALE (U.S.P. 1,827,971, 20.10.31. Appl., 9.7.29).—The ore is leached with a 4.5:1 mixture of dil. aq. $\text{Na}_2\text{S}_2\text{O}_3$ and CuSO_4 , whereby $\text{Hg}_2\text{S}_2\text{O}_3$ dissolves in the $\text{Na}_2\text{S}_2\text{O}_3$ solution and Cu_2S is pptd. in the ore. The leach liquor is run over amalgamated Cu plates to ppt. the Hg and regenerate the solution for use again.

A. R. P.

Manufacture of tungsten [filaments]. W. B. GERO and E. S. DAVENPORT, ASSRS. to WESTINGHOUSE LAMP CO. (U.S.P. 1,826,514, 6.10.31. Appl., 26.11.26).—Coils of W wire having an elongated overlapping crystal structure substantially resistant to sag and offsetting are prepared by drawing wire containing 0.75–1% ThO_2 to a size larger than that required, annealing the wire at a white heat under slight tension, drawing down to the finished size, coiling into the desired shape while cold, and finally annealing within the temp. range of rapid grain growth until the desired crystal structure is developed.

A. R. P.

Treatment of metallic [tungsten] filaments. J. H. RAMAGE, ASSR. to WESTINGHOUSE LAMP CO. (U.S.P. 1,826,524, 6.10.31. Appl., 10.11.27).—Drawn W wire is heated from 800° to $>$ 2200° at a uniform rate of 1 min. per mil diam. of the wire with a min. of 3 min., whereby the wire is converted into a single crystal or several large crystals. The operation is preferably conducted when the coiled filament is mounted in the lamp.

A. R. P.

Homogeneous body [filament] consisting of rhenium. W. and I. NODDACK, ASSRS. to SIEMENS & HALSKE A.-G. (U.S.P. 1,829,756, 3.11.31. Appl., 18.5.29. Ger., 18.6.25).—Re wire is claimed as a filament in electric lamps and radio valves; in vac. it volatilises much less readily than W.

A. R. P.

[Silicon-aluminium] alloy for use as a material for pistons for internal-combustion engines. C.M.D. ENGINEERING CO., LTD., and A. W. BLUNT (B.P. 373,434, 5.6.31).—The alloy consists of Al with 10–17% Si, 4–8% Ni, and 1–5% Cu or 0.5–2% Mg.

A. R. P.

[Copper-aluminium] alloys. METAL CASTINGS, LTD., and A. H. NICHOLSON (B.P. 373,213, 14.2.31).—

Alloys for pressure castings in H₂O-cooled steel dies comprise Al 91—77.5, Cu 6—12, Ni 1—3, Cr 0.5—5, and Mg 0.5—2.5%. For pistons of internal-combustion engines the alloy contains Al 88.5, Cu 6, Ni 2, Cr 2, and Mg 1.5% and for piston rings Al 82.5, Cu 12, Ni 2, Cr 2, and Mg 1.5%. A. R. P.

Aluminium[—silicon—manganese] alloy. W. MORRILL, ASSR. to GEN. ELECTRIC CO. (U.S.P. 1,829,668, 27.10.31. Appl., 4.2.31).—The alloy comprises Al (82.4%) with 4—13 (8)% Mn, 4—13 (8)% Si, and about 1% Cu, 0.5% Mg, and 0.1% Na. A. R. P.

Aluminium[—zirconium—manganese] alloy. C. S. TAYLOR and J. D. EDWARDS (U.S.P. 1,830,142, 3.11.31. Appl., 19.6.31).—The alloy comprises Al with 0.5—8 (3.1)% Mn and 0.05—3 Zr, Ti, V, and/or Cr (0.45% Zr). The resistivity is 17.7% compared with 64% for pure Al. A. R. P.

Flux for use in soldering metals [aluminium etc.]. C. H. ASTON (B.P. 372,996, 1.7.31).—The flux is prepared by heating together Venice turpentine (1 pt.), copaiba balsam (3 pts.), liquefied resin (1 pt.), and paraffin oil (1 pt.). A. R. P.

Casting of magnesium and its alloys. F. BADGER (B.P. 372,973, 9.6.31).—The metal is cast into sand-moulds containing chills coated with a 4:1 mixture of French chalk and rouge made into a thin suspension with paraffin oil. A. R. P.

Production of protective metal coatings [e.g., chromium plate]. C. G. FINK and C. H. ELDRIDGE, ASSRS. to UNITED CHROMIUM, INC. (U.S.P. 1,813,842, 7.7.31. Appl., 23.7.25).—The article is plated with the desired metal, e.g., Cr, the surface is mechanically worked, e.g., by buffing, to close up pores and pinholes, and the article again plated with the same or another metal. A. R. P.

Electrolytic production of alkali and alkaline-earth metals. J. J. GREBE and R. H. BOUNDY, ASSRS. to DOW CHEM. CO. (U.S.P. 1,826,773, 13.10.31. Appl., 5.7.28).—In the electrolysis of NaCl or CaCl₂ high current yields of Na or Ca are obtained by addition of substances, e.g., Al, AlCl₃, Al₂O₃, B₂O₃, or SiO₂, which react with any free Na₂O₂, Na₂O, or CaO formed in the bath to produce compounds which are insol. in the molten halide. A. R. P.

Discharge grate for sintering plant. METALLGES. A.-G. (B.P. 374,743, 2.10.31. Ger., 8.10.30).

Heat-treatment furnaces. Sintering apparatus.—See I. Corrosion in oil wells.—See II.

XI.—ELECTROTECHNICS.

Electric induction furnaces for heat-treatment of alloys and their automatic regulation. E. PRÉTER (Mem. Soc. Ing. Civ. France, 1932, 84, 1682—1689).—The furnace comprises a tube of ferromagnetic alloy with a Curie point of θ° surrounded by a second tube of a non-magnetic alloy which acts as a secondary to the primary winding of H₂O-cooled Cu tube which surrounds it, with a layer of refractory insulating material between. On passing an a.c. through the primary the secondary heats the magnetic core up to θ° , at which temp. the core becomes non-magnetic, the

induction in the secondary falls rapidly, and the temp. remains const. With a current of 60—80 amp. and a core of 70:30 Fe-Co alloy the muffle can be kept indefinitely at 960° without attention. Other ferromagnetic alloys with Curie points between 300° and 1100° can be substituted for the Fe-Co alloy to give const. temp. between these vals. A. R. P.

Rapid determination of moisture in seeds and other granular substances. R. M. DAVIES (Proc. Physical Soc., 1932, 44, 231—245).—A thermionic oscillator method, best suited for use with large-grained seeds, and a d.-c. resistance method, for any type of seed, are described. N. M. B.

Measurement of power factor and loss in dielectrics. T. J. MIRCHANDANI, G. YOGANANDAM, S. K. ROY, and N. V. NARAYANASWAMI (J. Indian Inst. Sci., 1932, 15B, 17—32).

Refrigeration.—See I. Coke-oven gas.—See II. Electron tubes and paper.—See V. Permalloy. Ni. Pickling of Fe. Deposition of Cu and brass. Zn.—See X. Separating ions from soils.—See XVI. Electrometry and sugar.—See XVII.

PATENTS.

Electric-discharge lamps. GEN. ELECTRIC CO., LTD., and N. L. HARRIS (B.P. 373,776, 20.5.31).—A hot-cathode Hg lamp, wholly or partly surrounded by an envelope of U glass, is used in conjunction with a hot-cathode Ne lamp, the luminous output of the latter being 5—20% of that of the former. J. S. G. T.

Luminous electric-discharge tubes [operating on direct current]. GEN. ELECTRIC CO., LTD., ASSEES. OF PATENT TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 373,928, 12.11.31. Ger., 14.2.31).—The polarity of the electrodes of the tube is reversed at intervals of time (e.g., 5—6 hr.) less than that required to produce a visible colour change due to separation of the gas-filling by the discharge. J. S. G. T.

Photoelectric cells. N. V. PHILIPS' GLOEILAMPEN-FABR. (B.P. 373,867, 25.8.31. Ger., 6.12.30. Addn. to B.P. 343,930; B., 1931, 498).—The metal coating, e.g., of Ag, deposited upon the inside wall of the cell is covered with a layer consisting of an alkali metal, e.g., Cs, and its oxide, and Ag, intimately mixed. J. S. G. T.

Device for transforming electrical variations into sound variations. F. W. HEHLGANS, ASSR. to GEN. ELECTRIC CO. (U.S.P. 1,814,801, 14.7.31. Appl., 1.4.30. Ger., 23.4.29).—The electrodes of a Kerr cell are separated by *o*-toluidine. J. S. G. T.

Electrical rectifiers. R. AUDUBERT (B.P. 373,849, 29.7.31. Fr., 30.12.30).—A couple composed of Si and a bromide or iodide of Cu, the latter being polarised, if desired, by addition of MnO₂, PbO₂, ZnO, or Ni oxide, is claimed. J. S. G. T.

[Electrical] apparatus for measuring the intensity of smokes. G. M. B. DOBSON (B.P. 373,744, 28.4.31).—Light, reflected from the sky and from the smoke respectively, passes through a filter which transmits ultra-violet radiation of short wave-length and falls upon a light-sensitive cell after passing through

one or other of a pair of apertures. Means are provided for alternating the light incident upon the cell, for adjusting the respective amounts of radiation incident upon the cell to equality, and for determining the necessary adjustment. J. S. G. T.

Electric-discharge lighting tubes with rare gas filling, in particular for illuminated advertising purposes. F. SKAUPY (B.P. 373,817, 29.6.31. Ger., 14.7.30).

Manufacture of [dry] rectifiers. SIEMENS & HALSKE A.-G. (B.P. 373,914, 19.10.31. Ger., 17.10.30).

Dry-[cell] rectifier. E. LICHTENTHAL (E. LINDEN) (B.P. 373,633, 26.2.31. Ger., 26.2.30).

X-Ray apparatus [for packaged tobacco, food, or other products]. F. S. SMITH (B.P. 374,628, 8.6.31).

Hydrometer.—See I. **Soot removal.**—See II. **Treating steel. Ni-Fe alloys. Welding. Protecting metal surfaces. Filaments. Cr plate. Alkali etc. metals.**—See X.

XII.—FATS; OILS; WAXES.

Iodine value of fats. J. LUND (Tidsskr. Kjem. Berg., 1932, 12, 84—89).—A discussion. H. F. H.

Action of hydrochloric acid on fatty substances in relation to the constants of butter fat. K. SCHERINGA (Chem. Weekblad, 1932, 29, 386—387).—When commercial stearine (5 g.) is heated with EtOH (40 c.c.) and HCl (10 c.c.) and the mixture is evaporated to dryness after addition of NaOH, appreciable decomp. of the fatty acids occurs. Similar treatment of stearic acid leads to the formation of, presumably, paraffins. H. F. G.

New relation for the determination of vegetable oils in butter. P. S. VEIRA (Rev. Soc. brasil. Chim., 1930, 2, 237—248).—The relation 100(Polenske val.)/xylene val. should provide a delicate criterion of the presence of (coco-)nut oils in butter, since for pure butter the figure averages 10 and is as high as 1529 for a typical babassu fat. E. L.

Composition of arachis oil. D. MAROTTA and S. ANSELMINI (Annali Chim. Appl., 1932, 22, 193—196).—Following Vulté and Gibson's technique (B., 1901, 370) the presence of hypogæic, palmitic, and stearic acid was confirmed. O. F. L.

Quince-seed oil. W. H. DICKHART (Amer. J. Pharm., 1932, 104, 335—336).—Quince seeds contain 22% of a mucilage yielding on hydrolysis $H_2C_2O_4$ and arabinose. The oil (15%) has I val. 112.4, sap. val. 187.6, unsaponifiable matter 9.35%. J. H. B.

Relation between the iodine value and refractive index of fresh and rancid cod-liver oil. F. ENDER, A. JERMSTAD, and J. M. AAS (Arch. Pharm., 1932, 270, 256—262).—Parallelism exists between the I val. and n_D for refined, fresh (but not rancid), and probably for crude cod-liver oil. The more rancid the oil, the greater is the variation of these consts. from those of the fresh oil. R. S. C.

Thermal decomposition of ergot oil. K. BODENDORF and E. REICHNER (Arch. Pharm., 1932, 270,

291—293).—Distillation of ergot oil in vac. gives 54% of fatty acids (40% of ricinoleic and 60% of oleic acid); the residue, when hydrolysed, affords glycerol and a mixture of acids. R. S. C.

Identification of chaulmoogric acid in the oil of *Carpotroche brasiliensis*. O. ROTHE and D. SURERUS (Rev. Soc. brasil. Chim., 1931, 2, 358—365).—The "sapucainha" or "canudo" grows and fruits freely in Minas Geraes, where the oil is known as an insecticide and antileprotic. It bears fruit at the fourth year. A sample of oil had: d_{20}^{20} 0.9486, $[\alpha]_D^{20}$ +52.0°, I val. 101.6, sap. val. 204.4, n_D^{40} 1.4761, R.—M. val. 0.55, Polenske val. 0.12, m.p. of fatty acids 29.5°, mean mol. wt. of fatty acids 286.8; it closely resembled chaulmoogra oil from *Taraktogenus kurzii*, King. Chaulmoogric acid was identified. Oils from different varieties of *Carpotroche* differ considerably; some are not optically active. E. L.

Acidimetric titration of glycerol in fatty oils. H. BULL (Tidsskr. Kjem. Berg., 1932, 12, 78—84).—The fatty oil (4 g.) is mixed with 70 c.c. of ligroin, and 10 c.c. of glycerol lye (a mixture of glycerol and aq. KOH) are added. After mixing, the whole is centrifuged and the solution of the fatty oil pipetted off and made up to 100 c.c. with ligroin. 15 c.c. of this solution, now free from fatty acids, are added slowly (with stirring by a current of H_2) to 3 c.c. of NaOEt solution (method of prep. given). After 5 min. the whole is centrifuged, the ppt. washed with ligroin by decantation and centrifuging and then dissolved in 0.5 c.c. of H_2O , 5 c.c. of EtOH are added, and the solution (also stirred with H_2) is titrated with 0.1N-HCl (to phenolphthalein). H. F. H.

Acids from tar.—See II. **Rubber-seed [oil].**—See XIV. **Coconut products.**—See XVI.

PATENTS.

Production of cod-liver oil. F. W. NITARDY, Assr. to E. R. SQUIBB & SONS (U.S.P. 1,829,571, 27.10.31. Appl., 30.3.26).—The oil from the steam-cooked livers is allowed to settle out at $> 60^\circ$ and is then dried by spraying into a vac. chamber (or by centrifuging), and the dry solids are removed by filtration. All processes are conducted in an inert atm. of steam or CO_2 . E. L.

Wetting etc. agents.—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Fire-proof silicate paste paints. ANON. (Farben-Chem., 1932, 3, 172—175).—Water-glass is superior to glue, magnesian cement, or CaO as fire-resistant coating for wood. Paints made from water-glass (d 1.26) and fine sand, SiO_2 powder, or burnt clay produce hard, adherent films which dry in 6—8 hr. They are, however, H_2O -sol. and possess low n and elasticity. Use of K_2SiO_3 in place of Na_2SiO_3 reduces the solubility, but this is also affected by the duration of exposure of the film, the fineness of the sand used, the presence of components which can react with the silicate, the concn. of the water-glass, and the n val. of the paste. Adding finely-ground materials, e.g., clay, talc, increases n considerably; various org. substances increase n ,

but also reduce the H_2O -resistance and durability of the film. Replacement of the water-glass by alkalis and silicic acid retards the hardening and H_2O -resistance. Details are appended for the manufacture and application of silicate paints. S. M.

Protection of edges by rust-resisting paints. PETERS (Farbe u. Lack, 1932, 292).—Factors affecting the hiding power of coats of paints on edges are discussed, and the testing of paints for edge protection is described. S. M.

Antimony white. C. P. VAN HOEK (Farben-Ztg., 1932, 37, 1222—1224, 1255—1257).—The literature is summarised and a complete bibliography (170 references) given. Sb white is recommended as a paint pigment. Although freer from chalking tendency, it is inferior to Ti white in covering and staining power etc., and to Pb and Zn whites in drying power, hardness, weather-resistance, etc. S. S. W.

Surface and interstices [of pigment particles]. E. KLUMPP (Farben-Ztg., 1932, 37, 1290—1291).—The results of an investigation (largely microscopical) by H. GÉRET on particle surface, size distribution, oil absorption, etc. of pigments and extenders are summarised. The work is criticised on various grounds; e.g., dispersion in paraffin oil leads to agglomeration in many cases, thus accounting for the abnormally high particle sizes found. The results are also discussed from the angle of oil absorption and "oil sheaths," the author summarising his own views. S. S. W.

Solvent power and dilution ratio of nitrocellulose solvents. L. IVANOVSKY (Farbe u. Lack, 1932, 293—294).—A discussion of the lack of agreement in published data for the dilution ratios of nitrocellulose lacquers. The solvent power should be expressed by the η of a standard nitrocellulose solution of fixed concn. S. M.

Copaiba balsam. E. DEUSSEN (Arch. Pharm., 1932, 270, 263—276).—Colour reactions for copaiba balsam and colophony are criticised. R. S. C.

Casein as a basis for a plastics industry. K. HAUPT (Chem. & Met. Eng., 1932, 39, 319—320).

Paper coating.—See V. **Protection of aeroplane fabrics.**—See VI. **Applications of photometry.**—See XIV. **Casein solutions.**—See XIX.

PATENTS.

Paint solvent for removing paints and varnish. S. T. PLUME (B.P. 370,070, 14.1.31).—A mixture of benzol, "carbolic crystals," paraffin wax, and methylated spirit in stated proportions is claimed. H. R.-D.

Lithopone manufacture. H. H. MORRIS, ASSR. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,822,933, 15.9.31. Appl., 25.8.27).—In preparing raw lithopone slurry by mixing $ZnSO_4$ and BaS solutions in galvanised metal equipment, an alkaline material, e.g., NaOH, Na_2CO_3 , excess of BaS, is added until the mixture has p_H about 8.8, corrosion of the equipment being thus prevented. S. S. W.

Manufacture of lithopones of high zinc sulphide content. T. G. STEPHENS, ASSR. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,822,911, 15.9.31. Appl., 20.6.29).—S is ground into BaS_x solution and the ppt.

so formed is slowly added at about 75° to an aq. solution of $ZnSO_4$ with which an insol. basic Zn compound, e.g., ZnO, $ZnCO_3$, has been incorporated; the resulting ppt. is separated and calcined. S. S. W.

Manufacture of blanc fixe. J. B. PIERCE, JUN. (U.S.P. 1,828,846, 27.10.31. Appl., 16.5.28).—An aq. suspension of $BaCO_3$ is added to aq. $NaHSO_4$ (nitre cake) in such quantities that the mother-liquor remains slightly acid. After removal of the $BaSO_4$ ppt. the liquor is neutralised with Na_2CO_3 to ppt. the impurities and the filtrate evaporated to recover Na_2SO_4 . A. R. P.

Production of inks for intaglio printing. H. KURZ and K. ALBERT (B.P. 371,527, 24.2.31. Austr., 25.2.30).—Pigments are ground in a vehicle prepared by dissolving a resin, e.g., acaroid, dammar, rosin, or an EtOH-sol. saponifiable artificial resin, in a H_2O -sol. medium, e.g., 96% EtOH, CO_2 , partly saponifying the resin by addition of alkali, admixing suitable high-b.p. solvents, e.g., methylcyclohexanone, Tetralin, and diluting the whole with H_2O containing, if desired, sol. dyes. S. S. W.

[Quick-drying] coating composition. C. ELLIS, ASSR. to ELLIS-FOSTER CO. (U.S.P. 1,824,757, 22.9.31. Appl., 24.12.27).—Nitrocellulose of medium viscosity (e.g., "4—10 sec.") is mixed with a compatible synthetic resin, e.g., of the polybasic acid—polyhydric alcohol type, sol. in C_6H_6 -anhyd. MeOH mixtures, ester and resin being present in proportions giving a smooth hard film. S. S. W.

Manufacture of stable homogeneous nitrocellulose-drying oil mixtures. J. E. BOOGE, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,825,773, 6.10.31. Appl., 8.10.25).—The drying oil, e.g., linseed, tung, perilla, is blown with air or other O_2 -containing gas at about 100° , until compatible with pyroxylin jelly, when suitable mixtures of oil, nitrocellulose, and a common solvent for both can be made. S. S. W.

Production of pigmented pyroxylin compositions. A. M. TAYLOR and A. R. CHAPMAN, ASSRS. to ATLAS POWDER CO. (U.S.P. 1,824,177, 22.9.31. Appl., 28.7.24).—Pigment containing H_2O is wetted with an anhyd. and highly hygroscopic org. liquid, e.g., abs. EtOH, and incorporated with a nitrocellulose solution containing solvents with which EtOH is miscible. S. S. W.

Removal of finish coatings [paints, lacquers, etc. from metals]. J. G. DAVIDSON and E. W. REID, ASSRS. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,829,583, 27.10.31. Appl., 5.11.28).—Mixtures of an alkylbenzene, e.g., PhEt, and an ethanalamine, with or without a glycol ether, are claimed. A. R. P.

Synthetic resins. BRIT. THOMSON-HOUSTON CO., LTD., ASSEES. of R. D. KLEEMAN (B.P. 371,627, 12.5.31. U.S., 12.5.30).—Powdered "alkyd" resin in the B-stage is mixed with a small amount (e.g., 10%) of clay, H_2O is added, and the mixture is heated to b.p. with rapid stirring until a colloidal suspension forms, which after incorporation of colouring materials, fillers, etc., if desired, is suitable for coating surfaces of metal or glass, or for the prep. of mouldings, with subsequent heat curing in each case. S. S. W.

Manufacture of materials capable of being moulded. A. G. BLOXAM. FROM SOC. CHEM. IND. IN BASLE (B.P. 371,481, 29.1.31).—"Amine" resins (cf. B.P. 342,325—6; B., 1931, 405) are applied to a support, *e.g.*, a textile fabric, in the form of finely-dispersed suspensions in H_2O or other non-solvent, with or without the addition of wetting agents, protective colloids, softening or hardening agents, dyes, pigments, fillers, etc., and the coating is fixed by moulding under increased pressure and temp. S. S. W.

Manufacture of [resinous] polymerisation products. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 371,396, 14.11.30).—Mixtures of acrylic acid, an acrylic ester, and/or acrylonitrile with styrene are polymerised without emulsification in a non-solvent liquid, preferably in the presence of small amounts of peroxidic accelerators, *e.g.*, H_2O_2 , Bz_2O_2 , and, if desired, org. anhydrides, *e.g.*, Ac_2O , giving H_2O -insol. products suitable for use as threads, coatings, etc. S. S. W.

Manufacture of artificial (A) masses, (B) resins. SOC. CHEM. IND. IN BASLE (B.P. 372,075—6, 20.4.31. Switz., [A] 9.7.30, [B] 11.7.30).—(A) The fusible product of condensation of an arylamine with > 1 equimol. proportion of CH_2O in the presence of acid is treated with an aldehydic hardening agent (*e.g.*, a $PhOH-CH_2O$ resin which can split off CH_2O) or the infusible product obtained by the use of > 1 mol. proportion of CH_2O is treated with an aldehydic fluxing agent (*e.g.*, $PhOH-CH_2O$ resins which cannot split off CH_2O). The hardening or fluxing agent is dispersed in the acid condensation solution or the neutralising solution and pptd. with, or on, the condensation product before drying and comminution. (B) The condensation product obtained by the action of > 1 equimol. proportion of CH_2O on arylamines (*e.g.*, NH_2Ph) in the presence of an approx. equiv. amount of acid is combined with an additional quantity of an aldehyde, or substance yielding an aldehyde (*e.g.*, furfuraldehyde, furfuralamide, phenolpolymethylols) by grinding, co-pptn. as in (A) etc., so that the final resin shall contain substantially > 1.1 mols. of aldehyde per mol. of amine. E. L.

Manufacture of artificial materials [modified aldehyde-urea resins]. L. LILIENFELD (B.P. 368,772, 8.9.30).— β -Hydroxytrimethylene sulphide (B.P. 25,246 of 1911; B., 1912, 786) is added to a condensation product of the CH_2O -urea type or to the reactants during condensation; if desired, an ester of a di- or poly-hydric alcohol (*e.g.*, α -dichlorohydrin) may be present. Suitable reactants are urea, thiourea, or dicyanodiamide, and CH_2O , hexamethylenetetramine, or acetaldehyde. The products give elastic films, and the aq. solutions may be used for coating textiles, wood, metal, etc. C. H.

[Manufacture of synthetic resin] watch glasses. BAKELITE CORP., Assees. of H. E. LINDHE (B.P. 371,451, 23.1.31. U.S., 24.1.30).—Thermoplastic resinoids, hard at blood heat, *e.g.*, "glyptals" $PhOH-CH_2O$ + high-boiling plasticisers, are formed into "unbreakable" non-shrinking, and light-fast watch glasses by known means. S. S. W.

Forming objects from artificial resins. HEROLD A.-G. (B.P. 371,344, 16.1.31. Ger., 25.2.30).— $PhOH-$

CH_2O resins, hardened to the C-stage, are die-pressed while warm. S. S. W.

Production of resin esters. A. C. JOHNSTON, Assr. to HERCULES POWDER CO. (U.S.P. 1,824,020, 22.9.31. Appl., 12.4.28).—A resin acid, *e.g.*, abietic acid, is heated with a halogenohydrin, *e.g.*, ethylene chlorohydrin, and an alkali, *e.g.*, $NaOH$, in the presence of a solvent *e.g.*, $EtOH$. S. S. W.

Manufacture of organic esters [abietates]. I. GUBELMANN and C. O. HENKE, Assrs. to NEWPORT CO. (U.S.P. 1,829,480—1, 27.10.31. Appl., 2.7.28).—Material containing abietic acid or the pure acid is heated with (A) a tetrahydronaphthol to 300—350° and the ester recovered by removal of unchanged acid and fractionation, or (B) commercial (95%) $EtOH$ in presence of a condensing agent. E. H. S.

Sealing composition. R. L. JENKINS and C. G. HARDY, Assrs. to SWANN RES., INC. (U.S.P. 1,822,033, 8.9.31. Appl., 21.4.30).—A coloured pigment is stirred into a molten 1:1 mixture of chlorinated Ph_2 resin and pine rosin heated to about 160°; the product is cast. H. R. D.

Preparing a printing plate. B. J. LEWIS (B.P. 372,014, 4.3.31).

De-inking paper.—See V.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Technico-chemical analysis of material containing asphalt, caoutchouc, and factice and the application of the so-called ebonite method in this analysis. F. C. VAN HEURN and M. A. BEGHEYN (Kautschuk, 1932, 8, 90—91).—The earlier method (cf. B., 1931, 769) for the determination of rubber and asphalt in their mixtures can be extended to the analysis of mixtures containing also mineral fillers and factice. The finely-divided material is subjected to extraction with C_6H_6 for 8 hr. The extracted sol. matter includes the whole of the asphalt and the sol. parts of the caoutchouc and of the factice together with S and resins. The dried extract is divided into 2 portions each of which is heated with S according to the "ebonite method." In one of these products the ebonite (and hence its rubber) content is determined by extraction with xylene. In the other treated portion, extraction with C_6H_6 gives a residue of factice and ebonite, so that the proportions of rubber, factice, and asphalt in the C_6H_6 extract are calculable. The C_6H_6 -insol. residue contains the major portion of the rubber together with factice and mineral fillers, in which mixture the factice can be determined by saponification. The quantities of the various ingredients are then totalled. Examples are given of the analysis of such a mixture and of a vulcanised mixture of hard asphalt, linseed oil, and pale crêpe rubber. D. F. T.

Applications of photometry in rubber technique. L. HOCK (Kautschuk, 1932, 8, 79—83, 92—93).—Based on Lambert's law, a diagram is constructed enabling extinction coeffs. to be calc. graphically. Experiments with Bloch's leucometer are cited in illustration of the convenience of this new method for use with such problems as degree of transparency and covering power of pigments. D. F. T.

PATENTS.

Rubber latex preparation and manufacture of goods therefrom. R. A. DUNHAM, Assr. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,826,392, 6.10.31. Appl., 17.10.28).—The Edeleanu extracts from petroleum distillates, or other extracts of similar composition, when added to latex cause swelling and softening of the rubber particles without coagulation. Rubber goods made from such latex, *e.g.*, by dipping, are of enhanced density and tensile strength. The vulcanisation temp., however, should be $\geq 163^\circ$. D. F. T.

Manufacture of goods of rubber or similar material. DUNLOP RUBBER CO., LTD., ANODE RUBBER CO., LTD., W. H. CHAPMAN, and D. W. POUNDER (B.P. 371,445, 23.1.31).—Composite articles of sponge-like or cellular rubber comprising at least two integrally united portions are produced by one or more known operations, such as moulding, from frothed aq. emulsions of rubber (cf. B.P. 332,525—6; B., 1930, 1040). D. F. T.

Production of compositions of or containing derivatives of balata resin or other rubber resins. DUNLOP RUBBER CO., LTD., D. F. TWISS, and F. A. JONES (B.P. 371,339, 13.1. and 19.3.31).—Resin from balata, gutta-percha, or rubber is treated with CH_2O , or a polymeride or derivative thereof, in the presence of a condensing agent, *e.g.*, H_2SO_4 , and with or without the addition of a small proportion of polymerised or polymerisable hydrocarbon such as rubber or turpentine. The product is a tenacious adhesive which retains its mechanical strength at 100—110°. D. F. T.

Vulcanisation of rubber. B. W. NORDLANDER, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,827,604, 13.10.31. Appl., 16.5.27).—If S and Se are melted together in suitable proportions (*e.g.*, 45 : 55 by wt.) and the product is maintained at a temp. slightly below its m.p. for about 2 hr. a brittle non-cryst. mass is obtained which after being finely ground is a much more active vulcanising agent than ordinary S. The amorphous ppt. obtained by introducing H_2S and H_2SeO_3 into H_2O containing a coagulant such as AlCl_3 is similarly active. D. F. T.

Vulcanisation accelerator [for rubber] and manufacture thereof. J. A. NIEUWLAND, Assr. to CANADIAN ELECTRO PRODUCTS CO., LTD. (U.S.P. 1,804,226, 5.5.31. Appl., 10.1.27).— C_2H_2 is passed into an amine, *e.g.*, NH_2Ph , in the presence of CuCl , preferably at 60—120°. The product, in the formation of which mol. proportions combine, can be purified and separated by distillation, the fraction b.p. 200—275° from the $\text{C}_2\text{H}_2\text{-NH}_2\text{Ph}$ product being especially useful and consisting mainly of quinaldine or its derivatives. D. F. T.

Age-resisting rubber compounds. IMPERIAL CHEM. INDUSTRIES, LTD., H. M. BUNBURY, J. S. H. DAVIES, and W. J. S. NAUNTON (B.P. 371,474, 28.1.31).—Oxidation of rubber intended for cold vulcanisation is retarded by incorporating a compound of the formula $\text{HO}\cdot\text{R}\cdot\text{S}\cdot\text{R}'\cdot\text{OH}$, where R and R' represent arylene residues devoid of substituents with acidic or basic functions, *e.g.*, 4 : 4'-dihydroxydiphenyl sulphide. D. F. T.

Artificial rubber. E. TSCHUNKUR and W. BOCK (U.S.P. 1,826,846, 13.10.31. Appl., 17.8.29. Ger., 10.6.27).—By intimately mixing at least two different plastic masses produced, by various polymerisation processes, from diolefines such as $\alpha\gamma$ -butadiene or its homologues and incorporating finely-divided C (*e.g.*, 30—80%) not exceeding lampblack in particle size, subsequent vulcanisation yields products of remarkably good tensile strength and extensibility, the tensile product (kg./sq. cm. \times % stretch) ranging from 50,000 to 190,000. D. F. T.

Manufacture of rubber-like products. W. S. CALCOTT, F. B. DOWNING, and D. H. POWERS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,829,502, 27.10.31. Appl., 12.8.27. Renewed 13.6.31).—A synthetic or partly synthetic rubber of high elasticity and plasticity is obtained from C_2H_2 by polymerisation, *e.g.*, in contact with an aq. suspension of CuCl and NH_4Cl at about 25°, whereby divinylacetylene is the main product together with some methylenepentamethylene. The product is emulsified in H_2O containing in addition to the usual protective agents a dispersed stable viscous material such as guayule resin or *Hevea* resin and also, desirably, an antioxidant. Polymerisation of the divinylacetylene which occurs spontaneously, the change requiring several months at 20°, but being almost instantaneous at 150°, is allowed to occur in the emulsion although partial polymerisation may satisfactorily precede emulsification. The polymerised emulsion is coagulated in any known way and dried. The product is distinguished from previous synthetic rubbers by the fact that the diffraction pattern obtained in an X-ray photograph of the stretched material closely resembles that obtained with natural rubber. D. F. T.

Composition of matter [chicle substitute] and its manufacture. W. F. ZIMMERLI and W. L. SEMON, Assrs. to B. F. GOODRICH CO. (U.S.P. 1,829,029, 27.10.31. Appl., 7.10.27).—A mixture of rubber (1 vol.), oil, *e.g.*, purified mineral oil (3—6 vols.), and innocuous pigment, *e.g.*, C black or whiting (2—4 vols.), made by introducing the additional ingredients into rubber latex or by incorporating the pigment in a pasty mixture of the rubber and oil, has "chewing" properties almost identical with those of gum chicle. The addition of a H_2O -insol. soap is beneficial. Sweetening and flavouring agents, also real chicle, pontianac, etc., may be added as desired. D. F. T.

Rubber-like esters.—See III. **Artificial leather.**
—See V. **[Rubbered] fibres.**—See VI.

XV.—LEATHER; GLUE.

Non-tans—their nature and functions. M. PHILIPS (J. Soc. Leather Trades' Chem., 1932, 16, 324—328).—Penetration of pelt by tannins is delayed unless the solutions contain non-tans or substances which do not form a H_2O -resistant linking with collagen. The weak acids in the non-tans act as buffers and maintain the p_{H} at such a val. that the chain-like mols. of the collagen become charged and repel one another, the capillary spaces between them thereby being widened and the penetration of the tannin mols. facilitated, but the affinity of the tannin for the collagen is only moderately

increased. The distance between the collagen mols. is progressively increased by the non-tan degradation products of the cell walls of tanning materials which yield hemicelluloses, uronides, and pectins, some of which are weak acids containing CO_2H groups. D. W.

Report of the second pan-European Commission on the analysis of vegetable-tanned leather. P. CHAMBARD (J. Soc. Leather Trades' Chem., 1932, 16, 305—318).—Methods to be followed when making the official determinations of moisture, grease, H_2O -sol. matter, hide substance, and ash in leather, and when reporting the results, are given in detail. D. W.

Basicity interval. New method of investigation of one-bath chrome-tanning liquors. W. ACKERMANN (Collegium, 1932, 345—348).—25 c.c. of the diluted chrome liquor, 1 c.c. of phenolphthalein solution, and 500 c.c. of H_2O are mixed and titrated cold with 0.416N-NaOH. The basicity is calc. from this figure and the liquor then boiled and titrated further with the NaOH, and the basicity calc. afresh. The difference between respective % basicities obtained gives the amount of masked Cr compounds present. D. W.

Salt stains [on raw skins]. B. PETER (Collegium, 1932, 327—338).—The orange and brown salt stains on the flesh side of raw skins (cf. B., 1930, 433, 732) are differentiated from those on the grain by being distinct independent phenomena. The grain damage is caused by putrefactive bacteria, which develop in spite of salting on all dead substrates if conditions (raised temp.) are favourable. Growth commences in the hair follicles and spreads first to the grain layer and then to the corium. Salt stains may develop simultaneously on the flesh side of the skin, but only if the skins are grain-damaged by putrefactive organisms are the salt-stained inferior to non-stained skins. D. W.

Detection of formaldehyde in leather. A. KÜNTZEL (Collegium, 1932, 344—345).—Free leather fibres after treatment with boiling H_2O show a 66% shrinkage, but when CH_2O is present the fibres can subsequently be stretched to double their shrunken length. D. W.

Measurement of apparent density and its variation in sole leather. R. S. EDWARDS (J. Soc. Leather Trades' Chem., 1932, 16, 292—305).—Apparatus is described for weighing leather samples in air and in Hg, from which wts. their apparent d can be calc. The grain layer of sole leathers was the least dense portion. The apparent d of sole leather was diminished by hammering or rolling the leather and increased as the R.H. of the atm. was increased. Measurements should be made at 75% R.H. The apparent densities of various leathers are tabulated. D. W.

Problems in the preservation of adhesives. H. STADLINGER (Farben-Chem., 1932, 3, 180—182, 221—222).—The alkali salts of H_3BO_3 , BzOH, and salicylic acid are not effective preservatives, but *o*-phenylphenol and esters of *p*-hydroxybenzoic acid are effective only when converted into their alkali salts. *p*-Chloro-*m*-cresol is dissolved in spirit or emulsified with soap solution; chloro-xyleneol and -thymol are treated with alkali or soap solution. Alkalis in sufficient quantity may reduce the binding power of adhesives made from animal glues by decomposing the gluten; aldehydes may

harden the adhesive, increase its η , and destroy the gel structure. The stability and proportions of preservatives are discussed. S. M.

Brasilian vegetable dyes.—See IV.

PATENTS.

Manufacture of leather. H. WADE. FROM ONTARIO RES. FOUNDATION (B.P. 371,587, 13.4.31).—Leather is degreased by means of a suitable solvent, the solvent evaporated off in an atm. of 50% R.H., and several coats of japan or enamel are applied to the leather at 21° and in an atm. of 50% R.H. and dried in such atm. D. W.

Hardening of gelatin. I. G. FARBERIND. A.-G. (B.P. 373,829, 10.7.31. Ger., 11.7.30).—When gelatin is hardened with a dialdehyde, e.g., glyoxal or mesoxaldehyde, the after-hardening is much less than when CH_2O is used. J. L.

(A) **Retarding the setting of casein glue, and (B) manufacture of slow-setting casein glue, and dry glue base for use in such processes.** L. BRADSHAW and H. V. DUNHAM, ASSTS. to CASEIN MANUF. CO. OF AMERICA, INC. (U.S.P. 1,829,258—9, 27.10.31. Appl., [A] 2.4.26, [B] 19.5.26).—The glue bases comprise casein, $\text{Ca}(\text{OH})_2$, and an alkali salt (NaF , Na_2CO_3 , Na_3PO_4), together with (A) de-oiled cottonseed or peanut meal, or (B) de-oiled soya-bean meal, to retard the setting time of the glue. L. A. C.

Wetting etc. agents.—See III. **Artificial leather.**—See V. **[Adhesive] compositions containing resins.**—See XIV.

XVI.—AGRICULTURE.

Neubauer-Schneider method applied to various soil types. V. NOVÁK, J. HRDINA, and P. HRUBEŠ (Mitt. Tschechoslov. Akad. Landwirts., Roč., 1931, 7 [6—7]; Proc. Internat. Soc. Soil Sci., 1932, 7, 70).—The root-assimilable K and P of subsoils varies considerably with soil type and texture, and the nature of the parent rock. In podsols the illuvial layer has a higher proportion of either or both constituents than the upper humus layer, and vals. are smallest in the eluvial layer. Greatest deviations from the normal growth of seedlings occur in podsols (eluvium), brown earths (first and second horizons), and sulphate-rich soils (lower layers). Black earths (including those rich in sulphates of the alkali and alkaline-earth metals) have higher proportions of assimilable K and P in the humus layer than have podsols. The customary association of high root-sol. K with clays is not confirmed. A. G. P.

Use of the moisture equivalent in the textural classification of soils. G. B. BODMAN and A. J. MAHMUD (Soil Sci., 1932, 33, 363—374).—Soil texture may be characterised by means of determinations of the moisture equiv. and total sand content. Textural classification is adequately expressed by means of a triangle diagram based on that of Davis and Bennett (U.S. Dept. Agric. Circ., 1927, No. 419). A. G. P.

Permeability of soils. F. ZÜNCKER (Z. Pflanz. Düng., 1932, 25A, 1—24).—The determination of pore space, permeability, and sp. surface area of soils is described and the mathematical representation of the results discussed in relation to soil structure. A. G. P.

I. Manganese content of Latvian soils and rocks.

II. Effect of manganese dioxide on the quinhydrone electrode. III. Manganese as an exchangeable base. K. KRUMINŠ (Latvij. Univ. Raksti, Lauks. Fak., Riga, 1931, II, [2]; Proc. Internat. Soc. Soil Sci., 1932, 7, 60—63).—I. In the soils examined, Fe is more readily sol. in HCl than in HNO₃, but Mn is equally sol. in the two acids, provided, in the case of HNO₃, org. matter is present. The difference between total and acid-sol. Fe is considerable and that of Mn small. During the ageing of soils, leaching of carbonates is accompanied at first by an increased Mn content, followed later, as the soil becomes acid, by the washing down of Mn from the surface layers. The latter process is accelerated by the presence of much org. matter. Cultivated soils have higher Mn contents than forest soils.

II. For the field determination of active MnO₂ in soils, a measured vol. of soil in a tube is mixed with a definite proportion of benzidine. After the addition of H₂O and a few drops of dil. AcOH, the mixture is shaken and the colour compared with standards. Active MnO₂ so determined decreases with falling p_H and is usually absent in soils of $p_H < 5$ and abnormally high in soils of $p_H > 8.5$. Peat soils with p_H 3.5—6.7 and mineral content < 70% show no benzidine reaction and positive tests are more rare in sandy soils than in clays and loams. Surface soils have less active MnO₂ than the nearest subsoil horizons. p_H vals. determined by the quinhydrone electrode and colorimetrically may differ by 1—2 units where active MnO₂ occurs. At all reactions $> p_H 5.5$ the quinhydrone electrode is liable to error.

III. A close correlation exists between the p_H of soils and the exchangeable Mn contents. At $p_H > 7.0$ the amount present is small, but increases rapidly with falling p_H . Anaërobic conditions and the presence of much org. matter probably tend to increase the proportion of exchangeable Mn. The Mn content of certain trees and cereal crops is closely related to the p_H and exchangeable Mn content of the soils in which they grow. On limed soils (p_H 6.7—7.5) failure of red clover is associated with lowered exchangeable Mn contents. A relationship between optimum p_H ranges for the growth of certain crops and the presence of exchangeable Mn or Fe is indicated. A. G. P.

Use of the centrifuge [in mechanical analysis of soils]. M. KÖHN (Z. Pflanz. Düng., 1932, 25A, 102—106).—The method of Wolf, Schlatter, and Jung (B., 1931, 646) yields results differing widely from those of the customary processes, even when the centrifugal separation is repeated many times. A. G. P.

Influence of hydrogen peroxide on soils. K. K. GEDROIZ (Udobr. Urozhai, 1931, 3, 814—827, 910—922).—By treatment of a chernozem containing 0.467% N with H₂O₂ most of the N is converted into NH₄⁺ and enters the base-exchange complex; only traces of NO₃⁻ are formed. In presence of CaCO₃ the conversion is much less complete. Chernozem contains a stable form of humus which is not completely oxidisable by H₂O₂. Changes in p_H are recorded. The H₂O-sol. substance was increased, chiefly by org. material, but Ca, Mg, and sesquioxides increased. Chernozem soils

were treated with H₂O₂ and then with N-NaCl, -NH₄Cl, or 0.05N-HCl. Sol. Ca was 27, 40.3, and 49.3 milliequiv. (untreated, 47.0, 56.3, 53.7; total 56), respectively; the NH₄Cl and HCl extract Ca released by org. matter on oxidation with H₂O₂. Leaching the chernozem with 4N-NH₄Cl extracts all the replaceable Ca. H₂O₂ treatment does not change the base-exchange capacity of the mineral fractions of soils, and may serve to differentiate the base-exchange capacities of the mineral and org. fractions of soil. Org. matter in soil decreases the degree of dispersion of the mineral constituents. CH. ABS.

Natural and artificial marls. TACKE (Z. Pflanz. Düng., 1932, 11B, 193—204).—The nature, properties, evaluation, and use of marls and liming materials generally are discussed. A. G. P.

Loam structure and the synthesis of [soil] aggregates. A. DEMOLON and S. HENIN (Soil Research, 1932, 3, 1—9).—Two classes of aggregate particles in soil are differentiated, viz., stable aggregates formed by the flocculation of colloids on, and enveloping, mineral particles, and unstable aggregates formed by compressive adhesion of small aggregates of the above. Mechanical analysis of aggregates in H₂O is unsatisfactory owing to the peptisation of the cementing colloid. A solution (0.1%) of Ca(NO₃)₂ is preferred for the purpose, and the suspension is shaken in a rotary machine for 30 min. Reproducible analyses are obtained which are characteristic for each soil. To produce stable aggregates from sand-colloid mixtures, drying must follow the flocculation of the colloid in the presence of sand. In such preps. the degree of aggregation increases with the proportion of colloid used. On a wt. for wt. basis, org. colloids are the more effective cementing agents, but humus-clay preps. tend to greater stability. Ca salts stabilise aggregates by preventing the peptisation of the colloid. A. G. P.

Porosity of soils in the evaluation of cultivation implements. N. F. MISTSCHENKO (Soil Research, 1932, 3, 24—36).—Methods and apparatus for porosity determinations are described. A. G. P.

Influence of tractor work on the physical properties of soil. P. KORNIÉVA (Sci. Notes, Sugar Ind., Kiev, 1931, 13, [2]; Proc. Internat. Soc. Soil Sci., 1932, 7, 79—80).—Effects of tractor cultivation on the aggregate structure, porosity, etc. of soils are recorded. A. G. P.

Influence of tractors and other agricultural implements on physical and biochemical processes in soils. I. I. KANIVETZ (Sci. Notes, Sugar Ind., Kiev, 1931, 13, [2]; Proc. Internat. Soc. Soil Sci., 1932, 7, 79).—On cultivated soils, along the traces of tractor wheels, there was an active growth of *Azotobacter*, an increased proportion of aggregate soil particles, greater vol.-wt., higher concn. of electrolytes and H₂O content, an increase in nitrate and available (?) P contents, and increased crop yields. Soil ground to pass a 0.25-mm. sieve, after storage for 40 days at 28—30° with 70% of its moisture capacity, regains its original aggregate structure. A. G. P.

Azotobacter in tractor-cultivated soils. B. VON LEVANTIVSKA (Sci. Notes, Sugar Ind., Kiev, 1931, 13,

[2]; Proc. Internat. Soc. Soil Sci., 1932, 7, 68).—On a chernozem soil *Azotobacter* activity is influenced by the use of various tractors.

A. G. P.

Nitrate accumulation under various cultural treatments. M. C. SEWELL and P. L. GAINNEY (J. Amer. Soc. Agron., 1932, 24, 284—289).—In relatively dry areas (soil-H₂O 11—15%) there is sufficient NO₃' accumulation to carry average crops. Cultivation is probably a more important factor than moisture content in controlling nitrification in soils having average H₂O contents of > 20%. Surface scraping to remove stubble and weeds did not affect nitrate production. Cultivation did not stimulate nitrification in mulched soils.

A. G. P.

Determination of nitrous and nitric nitrogen in soils. G. S. FRAPS and A. J. STERGES (Texas Agric. Exp. Sta. Bull., 1931, No. 439, 22 pp.).—Differences between the phenoldisulphonic acid method and that of Tiemann and Schulze for determining NO₃' in soils are due to the presence of NO₂', which is recorded by the former but not by the latter. In the former method errors due to matching of colour with standards averaged 5% (max. observed 13%). Aq. NH₃ is preferable to alkali hydroxides for developing the colour. CaO is a better clarifying agent than K alum. Results are not affected by the presence of CaCO₃. To ensure the complete extraction of NO₃' from the soil, the sample should be washed 15—20 times with small quantities of H₂O. The Zn-FeSO₄ reduction method for NO₃' and the α -naphthylamine method for NO₂' are modified for use with soils.

A. G. P.

Carbon and nitrogen cycles in the soil. V. Origin of the humic matter of the soil. H. J. PAGE. VI. **Extraction of the organic nitrogen of the soil with alkali.** R. P. HOBSON and H. J. PAGE (J. Agric. Sci., 1932, 22, 291—296, 297—299; cf. B., 1932, 275).—V. Results so far recorded in this series are discussed. The presence of N in soil humic matter in a form not readily removed is not incompatible with the hypothesis that the humic matter is derived from lignin.

VI. The alkali-extraction of the N from soils of certain plots of the permanent experiments on Barnfield and Broadbalk at Rothamsted follows a closely similar course to the alkali-extraction of C from the same soils.

W. G. E.

Organic matter changes in dry farming regions. M. C. SEWELL and P. L. GAINNEY (J. Amer. Soc. Agron., 1932, 24, 275—283).—A steady loss of C and a narrowing of the C:N ratio occurs in semi-arid soils as a result of cultivation unless adequate replacements of plant residues are maintained. The effects of various cropping systems are recorded and discussed. A. G. P.

Nitrate reduction by *Azotobacter*. A. ITANO and S. ARAKAWA (Ber. Ohara Inst. landw. Forsch., 1932, 5, 281—289).—*Azotobacter* can reduce nitrates to nitrites and are able to utilise both as sources of N. The reduction process is influenced by the nature of the source of C and is stimulated by glucose, fructose, galactose, sucrose, maltose, raffinose, starch, dextrin, inulin, Na succinate and malate.

A. G. P.

Microbiology of soil. V. Decomposition of pentosans. J. ZIEMIECKA (Rocz. Nauk Roln. i Lés-

nycz, 1931, 25; Proc. Internat. Soc. Soil Sci., 1932, 7, 68; cf. B., 1931, 603).—An organism (*Bac. xylophagus*) isolated from soils, farmyard manure, etc. is able rapidly to decompose xylans under aerobic, non-acid conditions.

A. G. P.

Interaction between ammonia and soils as a new method of determining the state of saturation and p_H values of soils. A. N. PURI (Soil Sci., 1932, 33, 397—403).—The degree of saturation with bases and the total adsorptive capacity of soils is determined by means of NH₃ absorption before and after treatment with dil. acid. CaO requirements and p_H vals. may be calc. directly from these data (cf. B., 1931, 555).

A. G. P.

Cellulose decomposition in soils. I. Physiological activities of some stock cultures. A. ITANO and S. ARAKAWA (Ber. Ohara Inst. landw. Forsch., 1932, 5, 291—297).—The activity of *Cellulomonas* is influenced by the nature of the culture medium used. Org. forms of N (e.g., casein, yeast extract) are necessary for the development of the organisms, which on suitable media retain their activity during repeated sub-cultivation.

A. G. P.

Modified Morse-Kopeloff anaerobic culture method. A. ITANO and S. ARAKAWA (Ber. Ohara Inst. landw. Forsch., 1932, 5, 299—300).—Smaller proportions of pyrogallol and KOH may be used (cf. Morse and Kopeloff, J. Pub. Health, 1922, 12, 119).

A. G. P.

Electrodialysable bases of soils. Y. KAMOSHITA (J. Sci. Soil Manure, Japan, 1931, 5, No. 1, 61—67).—In the 6 soils examined, exchangeable Ca was almost entirely electro dialysed; the extremely large or small contents of dialysable bases were found in infertile soils. The p_H vals. of the soils were lowered by electro dialysis.

CH. ABS.

Exchangeable cations in the soil and the plant. II. Relation of liming to quantity of exchangeable calcium and magnesium in the soil. K. K. GEDROIZ (Udobr. Urozhai, 1931, 3, 1047—1058; cf. B., 1931, 856).—When 80 milli-equiv. of CaCO₃ were used on a chernozem soil completely saturated with H⁺, oats, buckwheat, clover, flax, and mustard suffered or failed to grow; addition of equal amounts of CaCO₃ and dolomite afforded a max. yield of all but mustard. A balance between Ca and Mg in the complex capable of base exchange is important for plant growth.

CH. ABS.

Separation of similarly charged ions from soils by electro dialysis. A. LÖDDESÖL (Soil Sci., 1932, 33, 375—395).—A 5-compartment apparatus for electro dialysis is described. The possibility of separating similarly charged ions in dialysates by the use of membranes of varying permeability (e.g., parchment, cellophane, fish skin, rubber) placed between the pairs of anode or cathode chambers is indicated. Pptn. of certain ions in the intermediate chambers can be effected. In certain cases Fe⁺⁺⁺, Al⁺⁺⁺, and Mg⁺ ions may migrate to the anode. The separation of humic acids is examined.

A. G. P.

Determination of exchangeable calcium and magnesium in soils containing calcium carbonate.

N. I. SOKOLOV (Udobr. Urozhai, 1931, 3, 836—838).—The soil (2 g. for 2—3% CO₂; 0.5—1 g. for 4—10% CO₂) is shaken for 1 hr. with *N*-NH₄Cl, *p*_H 7.0 (200—250 c.c.), and filtered; washing with NH₄Cl is continued until Ca is removed. Of the liquid, 25—100 c.c. are titrated with 0.05*N*-HCl (Me-orange) to give Ca as CaCO₃; in another aliquot part the total Ca is determined, the difference being the exchangeable Ca.

CH. ABS.

Origin, nature, and importance of soil organic constituents having base-exchange properties. J. MITCHELL (J. Amer. Soc. Agron., 1932, 24, 256—275).—The Ca—Mg equilibrium consts. for org. base-exchange reactions vary with soil type. Ignition at 350—400° destroys the org. exchange complex without affecting the inorg. material. Soil org. matter varies greatly in its base-exchange capacity, but in many cases accounts for a large proportion (up to 65%) of the total capacity of the soil. Extraction of soil with common org. solvents does not remove or even reduce the exchange capacity. Of the total org. matter only the hemicellulose and "lignin-humus" fractions possess base-exchanging properties. The "lignin-humus" fraction gives to soil its more or less permanent exchange capacity and in peats represents 60—80% of the total capacity. That lignin or a very similar derivative is responsible for org. base exchange is indicated by (a) absence of any relationship between the N content of this fraction and its exchange capacity, (b) the base-exchange properties of chemically separated lignin, (c) similarity between the Ca—Mg equilibrium consts. for prepared lignin and the "lignin-humus" fraction.

A. G. P.

Various forms of acidity in soils under the influence of sulphur oxidation. A. A. KALUZSKI and A. E. SOLNTZEVA (Udobr. Urozhai, 1931, 3, 923—930).—With the advance of incubation with S all forms of acidity of a sandy loam chernozem soil increased and the hydrolytic and exchange acidities reached a const. which did not change with increase in total acidity.

CH. ABS.

Buffer capacity of acid soils. A. M. SMITH and R. COULL (Soil Research, 1932, 3, 10—12).—For strongly acid soils determinations of buffer capacity by Jensen's method are unsatisfactory since, owing to the large amount of Ca(OH)₂ frequently required, the soil:H₂O ratio may reach 1:10 or more. The use of 0.1*N*-Ca(OH)₂ in a 2% sucrose solution gives satisfactory results.

A. G. P.

Relations of buffer capacity for acids to basicity and exchangeable bases of the soil. G. S. FRAPS and J. F. FUDGE (Texas Agric. Exp. Sta. Bull., 1932, No. 442, 54 pp.).—A method is described for determining the buffer capacity of soils toward acids and an adaptation for ascertaining the basicity of siliceous liming materials and fertilisers. In this process the vigorous stirring of soil with acid for 15 min. proves as satisfactory as the customary stirring and leaving overnight. For soils containing much CaCO₃ 40 hr. keeping after stirring is necessary. The buffer capacity of a soil is adequately expressed either by a buffer curve or by data giving the total capacity up to a limiting *p*_H together with the sp. capacity between definite pairs

of *p*_H vals. Leaching of salts from soil after acid treatment results in an increased *p*_H. Addition of KCl to the acid used for treating soils increases the acidity of soils of low buffer capacity, but does not affect that of soils of high capacity. Addition of KCl to soil after acid treatment and leaching raises the *p*_H to approx. the val. of the original soil-acid mixture. The acidity of a natural soil increases with its sol. salt content and vice versa. Additions of NaNO₃, (NH₄)SO₄, CaSO₄, etc. may produce temporary increases in acidity. The CaO requirement of soils treated with H₂SO₄ and subsequently washed differs according to the method used for its measurement. After correction for the CaCO₃ content of the soils, Veitch's method indicates approx. 30% and Jones' method 20% higher vals. than correspond to the net equiv. amount of acid added. Hopkins' method gives erratic and low results. Titration of the washed soil residue with Ba(OH)₂ also gives vals. > the amount of acid used. The exchangeable H⁺ content of acid-treated soils is frequently < the equiv. acid added. The removal of bases other than those of the exchange complex is suggested. Soils may contain both CaCO₃ and exchangeable H⁺. Differences in the amounts of bases removed from different soils per unit decrease in *p*_H indicate variations in the nature of the adsorbing complex. The total exchange capacity of soils is not altered by acid treatments used to produce *p*_H changes. Treatment of soil with acid gives only an approx. measure of exchangeable bases since the acid consumed is equiv. to 81—86% of the bases present in the complex. The proportion of exchangeable H⁺ for the same degree of acidity produced by H₂SO₄ treatment varies with different soils. In the residue from acid-treated soil 80% of the exchangeable bases are replaceable by H⁺. Soil bases neutralised by acid are derived from carbonates, from the exchange complex, and from other substances.

A. G. P.

Correction of soil acidity. C. DUPONT and JACQUIN (Ann. Agron., 1931, N.S., 1, [6]; Proc. Internat. Soc. Soil Sci., 1932, 7, 58).—Methods of examination of soils and results of liming operations are recorded.

A. G. P.

Relations between the reaction and root-soluble potash contents of soils. L. SCHMITT (Ernähr. Pflanze, 1932, 28, 216—218).—Neubauer tests indicate higher proportions of assimilable K in neutral and alkaline than in acid soils. Soils of *p*_H 5.5 are deficient in assimilable K as a result of the general depletion of exchangeable bases, including K, and the lowered adsorptive capacity.

A. G. P.

Soil examination and fertiliser estimates. S. GERICKE (Z. Pflanz. Düng., 1932, 11B, 220—223).—In the practical application of the results of Neubauer tests of the P requirement of soils the importance of a consideration of the CaO status and the period of application of the fertiliser is emphasised. Neubauer vals. presuppose that the whole of the added P fertiliser will remain available. Citric acid determinations of P requirements agreed with field trials in 75% of cases examined. With Neubauer tests 65% of field results showed agreement.

A. G. P.

Liming and soil fertility. S. S. YARUSOV (Udobr. Urozhai, 1931, 3, 541—547).—Yield increases on limed podsol soil are recorded; there was also higher utilisation of P_2O_5 and N by the oats, barley, and clover. CH. ABS.

Influence of lime on the fertility of chernozem. S. SERGIEVSKI (Udobr. Urozhai, 1931, 3, 547—550).—The NO_3' content increased with increase in CaO, the H_2O -sol. P_2O_5 decreased with depth, and the P_2O_5 content of the oats and sunflower increased. Hence liming mobilises the N and P_2O_5 of degraded chernozem. The yield of oats was increased. CH. ABS.

Properties of potash fertilisers. A. TURLAPOVA (Udobr. Urozhai, 1931, 3, 516—518).—Beneficial results with lupins, rye, oats, and potatoes are recorded. CH. ABS.

Does potash manuring increase the root-solubility of soil phosphates? O. ENGELS (Ernähr. Pflanze, 1932, 28, 220—221).—In the majority of soils examined, K manuring increases the assimilable PO_4''' (Neubauer). A. G. P.

Test for replaceable and water-soluble potassium in soils. R. H. BRAY (J. Amer. Soc. Agron., 1932, 24, 312—316).—Replaceable and sol. K is extracted with a solution prepared by dissolving 1 kg. of NaOAc in 1600 c.c. of H_2O and mixing 7 pts. of this solution with 3 pts. (by vol.) of 1:1 HNO_3 . K is determined turbidimetrically by the cobaltinitrite method. None of the ions commonly extracted from soil influences the accuracy of the method, and in normal soils the amount of NH_4 salts extracted is insufficient to vitiate results. Good agreement with standard quant. methods is obtained. A. G. P.

Ammonification in soils in relation to fertiliser applications. M. G. TYAGRUI-RYADNO (Udobr. Urozhai, 1931, 3, 531—541).—Decomp. of org. matter by *B. mycoides* affords much NH_3 ; ammonification and nitrification are favoured in the soil, the former being retarded as decomp. advances. The favourable effect of manure may depend partly on its content of *B. mycoides*. The two processes are stimulated by addition of PO_4''' ; other bacteria are also stimulated, but the yield of NH_3 is high enough to provide the necessary N. CH. ABS.

Phosphate composts with soil and organic substances. A. A. MALYUGIN (Udobr. Urozhai, 1931, 3, 808—813).— H_2O -sol. P decreased with advance of the composting period, but the decrease was less with podsol than with chernozem composts. Composts of raw phosphates with manure and weeds decreased the sol. P from the manure. Manure and weeds alone increased the sol. P on composting; addition of soil decreased the sol. P. Dried blood alone decreased the solubility of P more than soil alone. In all composts nitrification was high. A phosphate-soil-straw compost increased the H_2O -sol. P. Addition of blood increased the NO_3' , but decreased the sol. P. CH. ABS.

Effect of composts on the continuous application of mineral fertilisers. M. HONJYO (J. Sci. Soil Manure, Japan, 1931, 5, No. 4, 12—21).—The reaction of soil was well buffered and humus favourably maintained. CH. ABS.

Calcium cyanamide. I. Decomposition of calcium cyanamide in the soil and its effects on germination, nitrification, and soil reaction. E. M. CROWTHER and H. L. RICHARDSON. II. Microbiological aspects of nitrification in soils under varied environmental conditions. B. J. MUKERJI. III. Storage and mixing with superphosphate. H. L. RICHARDSON (J. Agric. Sci., 1932, 22, 300—334, 335—347, 348—357).—I. Free $CN \cdot NH_2$ is catalytically decomposed to urea by a no. of minerals which occur in the coarser fractions of most soils. The toxicity of $CaCN_2$ to germinating seeds is due to $CN \cdot NH_2$ and falls off rapidly with increasing time interval between application of fertiliser and sowing of seed. The final stage of NO_3' formation proceeds more slowly in soils treated with $CaCN_2$. The rate varies with soil type and environmental conditions; it is accelerated, however, by aëration.

II. Commercial $CaCN_2$ markedly increases bacterial nos. of soils in uncropped pots. Adequate aëration accelerates oxidation of the N through the various stages and the final amount of NO_3-N is increased. Although dicyanodiamide has a greater depressing effect on NO_3' formation in soils than $CaCN_2$, the latter substance is much more toxic to nitrifying organisms in culture solution. In soils the toxic effect of $CaCN_2$ is obscured by its rapid decomp. to urea.

III. Commercial $CaCN_2$ under good farm storage conditions takes up H_2O and CO_2 , the increase in wt. amounting to about 10% after 27 months. No N is lost, but at 12 months up to 1% of the total N is converted into dicyanodiamide. This compound is also produced when $CaCN_2$ is mixed with superphosphate, the amount produced depending on the degree of heating permitted and on the composition of the mixture. It is suggested that the production of the relatively less available dicyanodiamide may be advantageous under conditions where N is required by a crop, e.g., grassland, partly in a slowly available form. W. G. E.

Cheapening of agricultural production by the use of artificial fertilisers. BIEREI (Z. Pflanz. Düng., 1932, 11B, 204—214).—The economics of the use of artificial fertilisers in German agriculture is discussed. A. G. P.

[Fertilising] trials with town sewage containing effluent from cellulose factories. W. ZIELSTORFF and A. KELLER (Z. Pflanz. Düng., 1932, 11B, 215—220; cf. B., 1929, 992).—On soils treated with sewage effluent, crop injury followed the inclusion of effluent from cellulose factories. The extent of the injury increased with the total solid content of the mixed effluent. Mixtures of 1 pt. of factory effluent and 50 pts. of town effluent were not appreciably injurious. The harmful effect did not persist in the second season. Results of pot and field cultures and of digestibility trials with hay from treated meadows are recorded. A. G. P.

Composition and fertilising value of sewage sludge. G. S. FRAPS (Texas Agric. Exp. Sta. Bull., 1932, No. 445, 23 pp.).—In digested sludge (1.9% N, 1.6% P_2O_5 , 0.2% K_2O) the availability of the N is approx. half that of cottonseed meal. Dried digested sludge resembles farmyard manure in composition and

action, but is a poorer source of humus. Nitrification of the sludge varied considerably in different soils. Dried activated sludge (5% N, 2% available P_2O_5) has approx. 70% of the fertilising val. of cottonseed meal and similar N availability. A. G. P.

Use of city wastes as fertilisers for vegetables. P. K. SHEREMETEVSKI (Udobr. Urozhai, 1931, 3, 804—808).—Analyses of sweepings and garbage are given and field trials are recorded. CH. ABS.

Use of cardboard and sawdust for soil covering instead of double ploughing. J. APSITS (Ann. Agron., 1931, N.S., 1, 467—494; Proc. Internat. Soc. Soil Sci., 1932, 7, 78).—Use of mulching sheets improved the yields of potatoes, sugar beet, and carrots (especially where attacked by *Triosa viridula*) to a greater extent than surface working. Sawdust mulching gave favourable results with carrots, but decreased the yields of other crops. A. G. P.

Transformations of urea in the soil. F. V. TURCHIN (Udobr. Urozhai, 1931, 3, 555—561).—Except with a sandy soil and a carbonate soil urea was quickly transformed on incubation at 25—27°; the change was specially rapid with podsol or slightly degraded chernozem. The N is transformed more rapidly into NO_3' than into NH_4' . Addition of SO_4'' or especially of Cl' depresses nitrification. Inoculation of soil with urease or fertiliser depresses nitrification of urea. Urea is one of the best fertilisers, except on alkaline soils. CH. ABS.

Microbiology of organic manures. I. Microbiological decomposition of rape cake in soils under the paddy-field and dry farm conditions. A. ITANO and S. ARAKAWA (J. Sci. Soil Manure, Japan, 1931, 5, No. 4, 1—11).—The action of *Actinomyces* is intimately related to the decomp. CH. ABS.

Correlation between decomposition of nitrogenous substances in green manures of different dryness and their chemical composition. H. MISU (J. Sci. Soil Manure, Japan, 1931, 5, No. 1, 1—36).—Close correlation was observed between the total N in grasses and the max. amount of NH_3 or HNO_3 produced by decomp. in the soaked or dry condition. The titratable acidity was greater on decomp. in the soaked condition. CH. ABS.

Chemical changes in the preparation of artificial manures. T. IWANAGA (J. Sci. Soil Manure, Japan, 1931, 5, No. 4, 22—36).—Changes in dry matter, N, humus, hemicellulose, etc. occurring on decomp. of straw in presence of $CO(NH_2)_2$, $(NH_4)_2SO_4$, or $CaCO_3$ were studied. CH. ABS.

Physiological action [on plants] of homologous ionic series. II. K. PIRSCHLE (Jahrb. wiss. Bot., 1932, 76, 1—92; cf. A., 1931, 774).—The effects of alkali, alkaline-earth, and halogen ions were determined by means of their action on root and shoot elongation of seedlings. The order of activity of the members of the series was not changed by variations in the concn. of salts used. Differences between the effects of Na' and K' were small in comparison with those between Ca' and Mg' or between F' and Cl'. The stimulatory effect of difficultly-sol. salts (e.g., CaF_2 , $BaSO_4$) was not in accord with that of more sol. compds in com-

parable concns. Differences in lighting and temp. did not alter the effective order of the ions in their series. The effect of the more toxic ions was not appreciably influenced in intensity by temp. variations. Differences between the effects of members of any one series decreased with the concn. of salt solutions used. Persistence of toxicity with greater dilution was more marked in ions higher in the individual series. The series Li—Cs and F—I (but not Be—Ba) show an inversion of the order of toxicity with dilution. At high concn. the initial, and at low concn. the final, members are the more toxic. Mixtures selected from the chlorides and nitrates of Ca, Mg, K, Na, and NH_4 have better effects on growth than have the individual salts. Detoxification (ion antagonism) is general among binary mixtures, especially in the presence of Ca'. The characteristic gradation in the series of ions persists in binary mixtures and tends to produce additive effects. Certain abnormal effects of NH_4 are ascribed to partial hydrolysis with the formation of free NH_3 . There is considerable variation in the sensitiveness of different plants to the action of particular ions. Relationships between the effects of members of homologous series and the concepts of at. physics are examined and discussed. A. G. P.

Maintenance of the yield and quality of crops. ECKHOFF and PIETSCHMANN (Ernähr. Pflanze, 1932, 28, 182—188).—In fertiliser trials, K manuring increased the wt. per bushel of cereals and the % sugar in beet. In grassland treated regularly with N, P, and K the poorer grasses are gradually being replaced by more valuable species. A. G. P.

Nitrogenous fertilisers on small grains following sorghums. J. P. CONRAD (J. Amer. Soc. Agron., 1932, 24, 316—322).—Applications of $(NH_4)_2SO_4$ and $NaNO_3$ increased yields of cereals following sorghum in proportion to the amounts used. Poor growth of unfertilised crops is ascribed not to the presence in soil of toxic material (e.g., vanillin) arising from sorghum residues, but to one or both of the following causes: high sugar content of sorghum residues, leading to increased bacterial activity and consequent temporary withdrawal of available N; heavy exhaustion of soil by the sorghum crop. A. G. P.

Fertilising the flax crop. V. A. KRYNKOV (Udobr. Urozhai, 1931, 3, 509—515).—Yield increases were, for seed and straw, respectively: $CaCN_2$ 61, 70; NH_4NO_3 47, 67; $NaNO_3$ 27, 35%. In general, excess of N is injurious, NO_3' being more dangerous than NH_4' . Physiologically acid types of P_2O_5 are desirable; on sandy soil Thomas slag was preferred. Direct application of CaO is injurious. CH. ABS.

Agro-chemical characteristics of hemp. I. J. KISELEV (Udobr. Urozhai, 1931, 3, 550—554).—Fertiliser experiments in 1929 and 1930 are described. CH. ABS.

Effects on cotton of irregular distribution of fertilisers. A. L. MEHRING and G. A. CUMINGS (J. Agric. Res., 1932, 44, 559—570).—Uneven distribution of fertilisers resulted in an increase in the no. of seeds germinating, but less regular spacing in the rows, less rapid and uniform growth, later blooming and maturing, and smaller yields. A. G. P.

Cause of small response to fertilisers in cotton areas of Armenia. K. P. MIRIMANIAN (J. Amer. Soc. Agron., 1931, 23, [9]; Proc. Internat. Soc. Soil Sci., 1932, 7, 74—75).—Trials with CaCN_2 indicate that in these soils fertiliser inefficiency results from unfavourable physical conditions in soils which suppress the normal feeding process of the plant. A. G. P.

Turnip manuring experiments in the South Island. ANON. (New Zealand J. Agric., 1932, 44, 201—208).—Injury to germinative capacity in turnip by use of superphosphate was reduced by applications of CaO . Yield increases following the use of superphosphate and CaO as compared with superphosphate alone were largely attributable to the increased no. of plants obtained. Heavy applications of superphosphate gave uneconomic crop returns owing to loss of germination. Admixture of Ephos phosphate with superphosphate reduced germination losses, but CaO was more effective. Superphosphate- CaO mixtures may be made immediately before application, but slightly better results were obtained by mixing a week previously. A. G. P.

Effect of silicic acid on plant nutrition. A. DENSCH and K. STEINFATT (Forts. Landw., 1931, 6, [11]; Proc. Internat. Soc. Soil Sci., 1932, 7, 70—71).—In many soils colloidal SiO_2 facilitates the intake of P by young plants. This effect is less apparent in soils rich in colloids. On sandy soils addition of large amounts of SiO_2 gel may cause plant injury as a result of the excessive intake of SiO_2 . Non-colloidal forms of SiO_2 have little or no action. A. G. P.

Importance of lime for forest trees. G. DEINES and R. KLEINSCHMIT (Z. Pflanz. Düng., 1932, 11B, 224—225).—Polemical against Winkelmann (B., 1932, 74). The reduced growth rates of trees more than 20 years old is a natural phenomena and is not necessarily due to increased soil acidity. A. G. P.

Influence of heavy potash manuring on the burning properties of tobacco. P. WAGNER (Ernähr. Pflanze, 1932, 28, 208—210).—Heavy applications of K fertilisers increase the K content of tobacco and (provided chloride is avoided) improve its burning properties. High K and low Cl contents in the leaf are associated with good burning properties. A. G. P.

Influence of phosphates on the phosphoric acid content of the plant. A. W. BLAIR and A. L. PRINCE (J. Agric. Res., 1932, 44, 579—590).—The P content of a no. of crops examined was not markedly increased by light dressings of superphosphate (100—250 lb. per acre), but definite increases (up to 40%) followed applications of 500—1000 lb. of superphosphate per acre. On potatoes no effect was observed. Mixed herbage treated with phosphate had a slightly increased P content, but this was possibly the result of changes in the type of vegetation rather than of an increase in the P content of any one species. The proportions of P in crops were not related to those of the soils carrying them. In general, P fertilisers affect the P content of crops to a much smaller extent than N fertilisers affect the N content. A. G. P.

Acetic acid and pyroligneous acid in comparison with formaldehyde as soil disinfectants. W. L.

DORAN (J. Agric. Res., 1932, 44, 571—578; cf. B., 1928, 583).—Applications of AcOH (1 gal. of 56% acid to 50 gals. of H_2O) to soil at the rate of 2—2½ quarts per sq. ft., 10 days prior to sowing, was as effective as CH_2O in preventing "damping off" of seedlings. Germination was not affected. Pyroligneous acid (3—4 : 100) at the rate of 2 quarts per sq. ft. was similarly effective and increased the dry-wt. yields of plants. When applied 1 day before sowing no injury to germination occurred. A. G. P.

Course of growth of cereals, especially of oats. H. WAGNER (Z. Pflanz. Düng., 1932, 25A, 48—102).—There is a general decline in the % of N, P, and K in plants from a max. in the early stages of growth to a min. at the ripening period. The N curve for leaves shows a break early in the stage of shoot production (with a corresponding break in the P and K curves) and a second at the blossoming period. The % of Ca in both leaves and roots increases with growth. High percentages of N and P in the leaves are associated with a high % of K in the stems. Subsequent to the period of max. total N, P, and K contents in leaves and stems, there is a translocation to the seed of N and P from leaves and stems and of K from leaves only. Under optimum growth conditions the intake of N, P, and K by leaves and stems precedes the production of org. matter. In flowers and seeds nutrient intake and org. matter production simultaneously attain the same proportion of their respective maxima, except at the commencement of ear formation, when the K intake is slightly in excess of this ratio. The ratio of the intake of other nutrients to that of N (= 1) is not const. during the whole growth period. The intake of N:K was usually narrow in stems and variable in leaves, whereas that of N:P was wide in both leaves and stems. The ratios of the total nutrient contents of the whole aerial portion of the plants varied considerably at different growth stages, but those of the ears were approx. const. under all conditions. In plants grown on N-deficient soils the % N in leaves was lower than that of K, the % N in stems and leaves reached a max. earlier than on a fully manured soil, N storage in leaves was relatively small, and the N:K and N:P ratios were abnormally narrow. A. G. P.

Intensive system of grassland management. VIII. Comparative digestibility and feeding value of fresh and artificially dried grass. IX. Digestibility of artificially dried hay. S. J. WATSON and W. S. FERGUSON. X. Further study of the mineral content of intensively treated pasture. W. S. FERGUSON. XI. Effect of nitrogen on the yield, composition, and digestibility of grassland herbage. S. J. WATSON, J. PROCTER, and W. S. FERGUSON (J. Agric. Sci., 1932, 22, 235—246, 247—250, 251—256, 257—290; cf. B., 1931, 940).—VIII. Grass dried in a band-drier by heated air with an inlet temp. of 200° is not less digestible than the fresh undried grass. Higher drying temp. impairs the nutritive val. of the finished product.

IX. Hay made by passing hot air through grass in a stack is of much greater feeding val. than good meadow hay or seed hay.

X. The mineral content of intensive pasture is equa

to that of the best type of pasture produced by other systems of management. Seasonal variations of sol. ash, K_2O , Na_2O , and P_2O_5 depend principally on climatic conditions, the effect of drought being to lower the % sol. ash, K_2O , and P_2O_5 .

XI. Results of 2 years' experiments show that applications of $(NH_4)_2SO_4$ to grassland increase the yield of dry matter and crude protein per unit area of herbage. The digestibility of the N-treated grass is similar to that of the non-N-treated grass and is of a high order. The more uniform distribution of growth throughout the season is a special feature of this system of management.

W. G. E.

Composition of fodder value of grass silage.

J. N. WHITTE (Agric. Gaz. New South Wales, 1932, 43, 167—173).—Grass silage compared favourably with maize silage although its composition varied considerably with soil conditions and manuring.

A. G. P.

Physiological activity of rye seed under the influence of time and its significance in the seedling method [for determining nutrient values of soils].

A. KUKE (Z. Pflanz. Düng., 1932, 25A, 24—48).—The loss of germinating power of rye during 1 year was considerable under ordinary storage conditions, less when stored over CaO , and practically nil when stored over $CaCl_2$. Loss of vitality was observed under all conditions of storage. The K and P intakes of seedlings grown in soil under identical conditions, but at varying periods of the year, were liable to marked variations, being generally high in autumn, slightly less in winter, and low in spring and summer. Such variations did not occur among seedlings grown in sand on nutrient solutions.

A. G. P.

Ecological study of closely-cut turf treated with ammonium and ferrous sulphates.

G. E. BLACKMAN (Ann. Appl. Biol., 1932, 19, 204—220).—Applications of 3 lb. of $(NH_4)_2SO_4$ per 1000 sq. ft. of lawn every 14 days during spring and summer markedly reduced the proportion of weeds. The effect was increased by simultaneous applications of $FeSO_4$ in equimol. proportions. Weed destruction is not the result of increased soil acidity, but is probably due to the toxicity to weeds of the NH_4^+ ion which stimulates the growth of grasses.

A. G. P.

Products from rubber seed. I. Preparation and properties.

T. R. DAWSON and T. H. MESSENGER (J. Res. Assoc. Brit. Rubber Manufs., 1932, 1, 33—44).—The literature is reviewed covering the general characteristics of *Hevea* seed, its collection, keeping qualities and storage, decortication, and drying; methods of production of oil and cake are examined and the properties and composition of the products are given.

D. F. T.

Coconuts and coconut products.

F. C. COOKE (Dept. Agric. Straits Settlements and Fed. Malay States, 1932, Gen. Series No. 8; cf. B., 1931, 641; 1932, 313).—The cultivation of the coconut in Ceylon and Malaya is compared, with reference to soil, climate, agriculture, harvesting, etc. Production of copra is discussed in detail, and experiments in drying processes are described. The uniformly high quality of Ceylon copra is attributed to the care exercised in drying, storage,

etc., and suggestions are made for the improvement of the average quality of Malayan copra.

E. L.

Yield of tea. II. Seasonal and sampling variation in yield and mineral composition of the tea leaf.

T. EDEN (J. Agric. Sci., 1932, 22, 386—395).—Samples of tea leaf from different portions of a field were analysed for ash, N, K_2O , and P_2O_5 on 35 consecutive plucking rounds during a 17 months' period. A significant though small positive correlation exists between the yield of dry matter and its N content. Although the ash content is negatively correlated with rainfall, no connexion appears to exist between this and sunshine. The P_2O_5 content is markedly lower during dry weather.

W. G. E.

Size and shape of plot in relation to field experiments with sugar beet.

F. R. IMMER (J. Agric. Res., 1932, 44, 649—668).—Relationships between the wt. of roots, % sugar, and apparent purity are examined and the influence of size and shape of plots on standard deviations discussed. The wt. of roots is negatively correlated with % sugar, but not with apparent purity. Sugar % was highly and positively correlated with apparent purity. Factors influencing plot-to-plot variation are examined.

A. G. P.

Sampling technique with sugar beet.

F. R. IMMER (J. Agric. Res., 1932, 44, 633—647).—The effects of soil heterogeneity and of the no. of replications of experimental plots on the standard error in sugar determinations is examined and discussed mathematically. Variations in sugar vals. between different plots and within one plot must be considered in deciding sampling technique and no. of replications of plots, to produce a given standard error. Even when composite samples are used, two samplings per plot are necessary to standardise the sampling error.

A. G. P.

Diurnal and seasonal changes in the sugar content of the sap and tissue of potato plants as affected by soil fertilisation.

R. C. COLE (Soil Sci., 1932, 33, 347—362).—The % of glucose was consistently higher than that of sucrose in both leaves and stems. Diurnal variations in the glucose content were regular, minima occurring at 4—8 a.m. and maxima at 12—4 p.m. The sucrose content was approx. const. throughout the day. The total sugar content increased with the age of the plant. Fertiliser applications were without effect on the sugar content.

A. G. P.

Factors affecting the development of loose smut in barley and its control by dust fungicides.

R. W. LEUKEL (U.S. Dept. Agric. Tech. Bull., 1932, No. 293, 19 pp.).—Very wet conditions in soil minimise the development of loose smut and favour its control by dusting. Reverse effects are associated with drier soils. Except on a few varieties of barley, dust fungicides are not generally effective.

A. G. P.

Loss of toxicity of pyrethrum dusts on exposure to air and light.

F. TATTERFIELD (J. Agric. Sci., 1932, 22, 396—417).—Pyrethrum dusts are inactivated on exposure to light, but are relatively stable when stored in closed vessels in the dark or exposed to light *in vacuo* or in N_2 or CO_2 . Incorporation of certain anti-oxidants, e.g., pyrocatechol, resorcinol, quinol, pyrogallol, and, in particular, tannic acid, affords considerable

protection against loss of toxicity. PhOH and phloroglucinol, however, are ineffective in this respect.

W. G. E.

Toxic action of Hanahiri-no-ki (*Leucothoe grayana*, Maxim) and its application for control of *Yuri-mimizu*. C. HARUKAWA (Ber. Ohara Inst. landw. Forsch., 1932, 5, 311—324).—Powdered dried leaves of *L. grayana*, mixed with the surface soil, act as a contact insecticide. An alkaline aq. EtOH extract of the leaves was less satisfactory.

A. G. P.

Control of fire-ants in the Lower Rio Grande valley. S. W. CLARKE (Texas Agric. Exp. Sta. Bull., 1931, No. 435, 12 pp.).—Ca(CN)₂ applied to nests was satisfactory; washes containing PhOH or creosote were unsatisfactory for use among citrus. Poisoned baits containing As were not successful, but the use of Ti₂SO₄ (2½ oz. per gal. of sugar syrup) gave good control.

A. G. P.

Control of tomato leaf mould. W. F. BEWLEY and O. B. ORCHARD (Ann. Appl. Biol., 1932, 19, 185—189).—Spraying with salicylanilide ("Shirlan paste") combined with a sulphonated oil (Agral I) controls leaf mould and certain other diseases.

A. G. P.

Control of *Thrips imuginis*, Bagnall. E. H. ZECK and N. S. NOBLE (Agric. Gaz. New South Wales, 1932, 43, 231—236).—Among many standard preps. examined, kerosene emulsions (1:11 to 1:100) were the most satisfactory. Strong soap solution was superior to many standard sprays. Scorching of foliage followed the use of benzol emulsion and of CaO-S-nicotine sulphate-emulsified oil preps. on peach. Dusts caused no foliage injury and in some cases showed a repellent action 24 hr. after use.

A. G. P.

Hard fern control by spraying with arsenic pentoxide. E. B. LEVY and E. A. MADDEN (New Zealand J. Agric., 1932, 44, 186—193).—The use of 1 lb. of As₂O₅ in 32 gals. of H₂O is recommended as producing min. recovery of fern in the subsequent season. Greater dilutions provide insufficient As, and more conc. solutions are less effective owing to the instant killing of the exposed parts of the plant and consequent inability of the As₂O₅ to penetrate to the roots via the sap. Dead material is burned after spraying.

A. G. P.

Iron licks for bush sickness. B. C. ASTON (New Zealand J. Agric., 1932, 44, 171—176).—Use of limonite and of Fe NH₄ citrate in salt licks for sheep proved a successful treatment for "bush sickness." The citrate was somewhat unpalatable and sheep would not always take sufficient to maintain health.

A. G. P.

Apparent incompatibility of barium fluosilicate and nicotine sulphate. F. S. CHAMBERLIN (J. Econ. Entom., 1932, 25, 413).—Mixed sprays containing these materials caused considerable scorching of tobacco under conditions in which neither, alone, had any appreciable ill-effect.

A. G. P.

Insecticidal properties of *Tephrosia macropoda*, Harv., and other tropical plants. F. TATTERSFIELD (Ann. Appl. Biol., 1932, 19, 253—262).—A no. of fish-poisoning plants are examined. All plants possessing both insecticidal and fish-stupefying properties are *Leguminosae*.

A. G. P.

CaCN₂. Ti in raw phosphates. Absorption of SO₂ by Ca₃(PO₄)₂.—See VII. Moisture in seeds etc.—See XI. Chaulmoogric acid.—See XII. Sewage sludge as fertiliser.—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Juice of dried beets as a colloidal system. A. V. DUMANSKI and I. Y. BEN (Nauk. Zapiski Tzuk. Prom., 1931, 13, 79—101).—EtOH ppts. 2.04% (on dry wt.) of colloids. The colouring matters are colloids or are combined with colloids. The colloids of normal or diffusion juices are not coagulated by acids. A dialyser and apparatus for continuous ultra-filtration are described.

CH. ABS.

Combined method for decolorising the thick and thin [sugar] juices with chlorine and norit. J. B. MINTZ, A. K. KARTASCHOV, and N. S. TROFIMOVSKI (Nauk. Zapiski Tzuk. Prom., 1931, 13, 893—897).—Cl₂ and norit (3%) treatment decolorises carbonatation and thick juices; Cl₂ coagulates colloids and produces p_H 3.5—4, further treatment with norit producing p_H 6.7. No invert sugar was formed, and the regeneration of the norit was facilitated.

CH. ABS.

[Sugar]-factory experiments with electro-metric p_H apparatus. P. F. PRINSEN GEERLIGS (Internat. Sugar J., 1932, 34, 186—187).—Using the van Oort apparatus (A., 1932, 586), provided with platinised gauze, satisfactory results were obtained at the second carbonatation, excepting that every 4 hr. the electrode had to be replaced by a clean one, and the gauze and glass parts required cleaning. The same apparatus when used to control the sulphitation process was unsatisfactory, as were also the Sb, quinhidrone, and W electrodes.

J. P. O.

Determination of starch by the polarimeter. A. P. SCHULZ and G. STEINHOFF (Z. Spiritusind., 1932, 55, 83).—Starch heated with alkali and H₂O₂ immediately yields a clear solution which has a const. [α]_D provided the solution is kept in that condition and further degradation of the starch is prevented by neutralising the alkali. For the determination, 0.5 g. of starch flour is shaken with 5 c.c. of H₂O in a 100-c.c. flask and made into a paste with 1 c.c. of 10% aq. NaOH. 10 c.c. of 3% H₂O₂ are added and the liquid is heated for 3—4 min. in a water-bath until clear, the vigorous action being checked by cooling. The mixture is made neutral to phenolphthalein by AcOH, made up with H₂O to 100 c.c., and, if necessary, clarified by the addition in equal quantities of 1—3 c.c. of a 30% solution of ZnSO₄ and a 15% solution of K₄Fe(CN)₆. The polarimeter reading of the filtered solution is taken and the % of starch is calc. from [α]_D²⁰ = 193.6° for pure starch.

C. R.

Sugar beet.—See XVI. Lactose in milk etc.—See XIX.

PATENTS.

Manufacture of an adhesive composition [from starch]. L. K. FACKLER and H. F. GARDNER, Assrs. to STEIN, HALL & Co., INC. (U.S.P. 1,813,236, 7.7.31. Appl., 9.12.27).—Starch (e.g., 100 pts. of tapioca flour), H₂O (500 pts.), and phthalic anhydride (1 pt.) are

heated at 90–95° until a clear liquid is obtained which sets to a soft paste on cooling. Sulphanilic, naphtholsulphonic, or naphthylaminesulphonic acid may be used instead of phthalic anhydride. A. R. P.

XVIII.—FERMENTATION INDUSTRIES.

Comparative maltings. G. KRAUSS (Woch. Brau., 1932, 49, 113–116, 121–125, 134–136, 140–143, 149–152, 156–160).—Full chemical and technical data are given for series of both floor- and drum-maltings carried out at different temp. on a range of similar high-grade Hungarian barleys. The data extend to the beers brewed from the malts. With floor-malting the best yield is obtained at low temp. and these malts give the highest brewery extracts. In drum-malting, high temp. gives the highest yields of all, and though the brewery extracts do not quite reach those of the cold-floored malts, the yield of brewery extract on barley is higher. The beers are of much the same quality for all malting conditions, with a tendency in favour of high-temp. malts. Enzyme production is favoured by cold malting, the different enzymes being similarly affected by altered growth conditions. F. E. D.

Determination of moisture on malt kilns. A. BECKER (Woch. Brau., 1932, 49, 174–175).—In constructing graphs for recording the working of malt kilns, the rate of fall of moisture in the load can be followed by determining the 1000-corn wt. at intervals and making an ordinary moisture determination, preferably towards the end of the process. Approx. figures are obtained by assuming a moisture content of 44% in the green malt at loading. F. E. D.

Determination of extract in malt for brewery-yield calculations. F. KUTTER (Woch. Brau., 1932, 49, 129–134).—On malts mashed by modifications of the "congress" method, the apparent extract increases with the concn. This is shown to be due in part to inhibition of H₂O by the grains and in part to error in Plato's extract table. In comparing laboratory with brewery extracts, due attention must be given to practical conditions, especially to the effect of the composition of the brewing liquor. F. E. D.

Experimental Linhart-type [hop] kiln. A. H. BURGESS (J. Inst. Brew., 1932, 38, 226–231).—The kiln consists of four superimposed floors the upper three of which are constructed of perforated steel plates pivoted longitudinally so that they may be tilted from the horizontal to the vertical position. After having moved progressively from the uppermost floor, the dried hops are removed from the lowest floor, which is fitted with four small wheels and consists of a drawer with a horsehair cloth bottom. SO₂ is led into the kiln between the second and third floors, the gases being deflected by a baffle of sheet Fe placed at the opening of the duct. The output varied from 1.06–2.91 times that of an ordinary English kiln which was chosen as the control. Although the samples from the experimental kiln had a duller appearance due to the high temp. of the air when it reached the freshly loaded hops, their preservative vals. were slightly higher. The extra labour required for the more frequent handling

with the Linhart model was more than counterbalanced by the economy of fuel. C. R.

Kiln-drying of barley. T. S. MILLER (J. Inst. Brew., 1932, 38, 232–240).—During kiln-drying there appears to be a decided loss of solid matter. This "sweating" loss is determined from the amounts of moisture of the barley before and after kiln-drying, and its "apparent" val. varies according to the method used for the determination of the moisture. Drying in an unventilated oven at 98° is efficient, whilst the most useful method of drying in a current of dry air at 98° shows a higher apparent loss of solid matter than heating in a vac. at 110° in the presence of P₂O₅. The actual products of decomp. during kiln-drying have not been identified, but the loss is not due to the evolution of H₂O or to the liberation of CO₂. The temp. to which barley can be heated without destruction of the germ depends on the ripeness and amount of moisture present in the barley. Kiln-dried barley can be heated to 65° without impairing the germinative capacity, but the germs of unripe barleys containing 18–22% of H₂O are completely killed at that temp. C. R.

Steeping of barley and the so-called saturation point. W. A. BENTON (J. Inst. Brew., 1932, 38, 245–264).—The wt. of barley immersed in H₂O progressively increases to a const. with two breaks, the first of which occurs after approx. 10–20 hr. During the first stage of steeping the increase in wt. of the barley is almost entirely due to the absorption of capillary H₂O by the two paleæ, the spaces between these and the pericarp, and the exterior layers of the pericarp. At the break H₂O appears to act on some gelatinous matter which forms a boundary between it and the aleurone and endosperm proper. During the second period, which extends from the break to the steep-ripeness flat, the endosperm and embryo swell by imbibition of pure H₂O. The close of this period is marked by the wt. remaining const. for several hr. At this stage the endosperm and embryo have absorbed all the H₂O they require and a condition of osmotic equilibrium exists. The resumption of imbibition then takes place and the third period is one of oversteeping. The semi-permeable layer is partly or completely broken down and a Donnan equilibrium is set up when the Adrian Brown equilibrium is reached with the grain absorbing no more H₂O. An instrument, termed a saturation tester, is described by means of which the increasing wt. of the steeping barley is followed. C. R.

Are *B. coli* viable in beer? R. KOCH (Woch. Brau., 1932, 49, 110–112, 116–120).—Beers were inoculated under various conditions with 10 races of coliform organisms, at seeding rates of generally several hundred millions per c.c. Under all conditions of storage the no. of added organisms decreased rapidly. This was favoured by relatively high temp. (20°) and acidity. The more typical strains were least resistant, and it is concluded that the possibility of the still more sensitive typhoid bacillus surviving for a sufficient time to cause infection is very remote. F. E. D.

Production of alcohol from Jerusalem artichokes. B. LAMPE (Z. Spiritusind., 1932, 55, 121–122).—The

artichoke tubers varied in wt. from 4 to 60 g. and contained H_2O 79.33% and protein 1.78%. With a fermentation of 9 days a max. yield of EtOH of 8.75 litres per 100 kg. of tubers was obtained when the mash was prepared in the cold and acidified with HCl to 0.5°. Heating of the mash to 55° for 1 hr. before fermentation did not increase the yield, whilst a slight increase of EtOH obtained with 1% of added malt was derived from the malt itself. When the time of fermentation was varied and the acidity of the mash retained at the optimum, a max. yield of 9.4 litres of EtOH per 100 kg. of artichokes was obtained with a fermentation of 7 days. To obtain the same yield of EtOH per acre from potatoes, the latter would require to have a starch content of 19.3%. The artichokes, however, have the disadvantage that they rapidly deteriorate and soon show mould. C. R.

Determination of fusel oil in spirits. F. BUDAGJAN and N. IVANOVA (Z. Unters. Lebensm., 1932, 63, 200—211).—Von Fellenberg's modification of Komarovski's method (B., 1910, 1030) is criticised. In the author's modification, the distillate from a 200-c.c. sample is adjusted to 50 vol.-% EtOH, and to a portion dil. H_2SO_4 is added and the whole neutralised to phenolphthalein, 1 c.c. of KOH being then added in excess with 2 c.c. of $N-AgNO_3$. After 30 min. on the water-bath under reflux, MeCHO is determined in the distillate by Mohler's method, and fusel oil by addition to another portion of the distillate of Et-alcoholic salicylic acid and dil. H_2SO_4 , the colour being matched after 20 min. against that of a standard containing a mixture of MeCHO and amyl alcohol. J. G.

Detection of salicylic and benzoic acids present together in wines and foods in general. G. GIBERTINI (Boll. Chim. farm., 1932, 71, 397—398).—100 c.c. of the wine, acidified with H_2SO_4 , are shaken but not emulsified with three 50-c.c. lots of a light petroleum-Et₂O mixture (1 : 1), the extracts, filtered if necessary, being mixed with 20 c.c. of aq. NH_3 and the solvent expelled by gentle evaporation. The aq. residue, which should be distinctly alkaline, is evaporated on a water-bath until the NH_3 is removed and the vol. reduced to a few c.c. This is filtered through a wet filter and the filtrate tested with a drop of dil. neutral $FeCl_3$ solution: a flesh-red ppt. shows BzOH and a violet coloration salicylic acid. If the colour reactions are disturbed in any way, the final liquid, either with or without the $FeCl_3$, should be again extracted with the solvent mixture, such extraction being repeated if the trouble reappear. Preserved vegetables, jams, etc. are pulped with H_2O and the acidified aq. extract is treated as above. T. H. P.

PATENTS.

Production of water-free ethyl alcohol. DEUTS. GOLD- U. SILBER-SCHNEIDANSTALT VORM. ROESSLER, Assees. of A. GORHAN (B.P. 368,793, 5.9.30. Ger., 9.9.29).—Aq. EtOH vapour is passed in countercurrent over a dehydrating salt (KOAc) which is supplied to the column either in fused form or as an alcoholic solution of the molten salt. The aq. solution of the salt withdrawn from the lower end of the column is heated to

remove H_2O and convert it directly into fused salt, which is re-used. C. H.

Production of higher alcohols by fermentation. J. F. LOUGHLIN (B.P. 371,865, 28.1.31. U.S., 31.1.30).—BuOH and Pr β OH are produced by fermenting a sterilised saccharified grain mash with a culture of *Clostridium americanum* which has previously been grown in a medium containing Pr β OH. Pulverised inert substances such as C may be added to the mash before sterilisation. C. R.

Preservation of enzyme solutions. L. WALLERSTEIN, Assr. to WALLERSTEIN CO., INC. (U.S.P. 1,820,957, 1.9.31. Appl., 6.10.28).—0.5 wt.-% of pine oil is added to such solutions. H. R.-D.

XIX.—FOODS.

Analysis of wheat from Montes Claros, State of Minas Geraes. O. DE A. COSTA (Rev. Soc. brasil. Chim., 1931, 2, 390—391).—The grain is exceptionally rich in N compounds. E. L.

Apparatus for determining the plastic qualities of flours. G. ISSOGLIO (L'Ind. Chim., 1932, 7, 421—427).—An apparatus for determining the tenacity and elasticity of flour is described. O. J. W.

Iodometric determination of lactose in milk and milk products. P. A. KOMETIANI (Z. Unters. Lebensm., 1932, 63, 194—200).—Various iodometric methods and the Hagedorn-Jensen micro-method are criticised and vals. obtained by these are compared. A method based on that of Blanchetière (A., 1924, ii, 786) is finally recommended for 10—100 mg. of lactose, in which the protein in a 20% dilution of milk is cleared with Bertrand's $CuSO_4$ solution in the presence of NaOH, and the filtrate is shaken with mixed Bertrand's solutions, boiled, cooled, acidified with $H_2C_2O_4$, and excess of 0.1N-I added, the excess being titrated with $Na_2S_2O_3$ and starch. J. G.

[Thermometric] technique for the f.-p. determination of milk. P. WEINSTEIN (Z. Unters. Lebensm., 1932, 63, 188—194).—Pritzker's method (B., 1928, 910) is recommended, but the results may be influenced by the following factors: (a) Size and shape of the thermometer bulb; a relatively long and wide cylindrical type of instrument is recommended. (b) Failure of the glass to shrink to its original dimensions between readings. A calibrated old thermometer is preferable in this respect. (c) Intermittent instead of continuous action of the stirrer; this gives lower but more accurate thermometer readings. (d) Abnormal acidity, allowance for which should be made. J. G.

Cheese control in Denmark. F. E. NOTTBOHM (Z. Unters. Lebensm., 1932, 63, 183—188).—Details are given of the regulations governing the marketing (shape, wt., sampling, marking, etc.) of cheese in Denmark. Cheeses are classified as hard or soft according to their fat and H_2O contents. Raw casein and rennet curds should contain $\geq 65\%$ H_2O and acid curds $\geq 70\%$ H_2O . H_2O is determined in a dish on coarse pumice, and the Gerber-Gulik method for

fat is used for sorting purposes, the result being confirmed if low by any of the usual methods. J. G.

Varieties of cheese; descriptions and analyses.

C. F. DOANE and H. W. LAWSON (revised K. J. MATHE-SON) (U.S. Dept. Agric. Bull., 1932, No. 608, 67 pp.).—Over 100 varieties are described. A. G. P.

Viscosity of casein solutions. H. C. BRYSON (Brit. Plastics, 1932, 3, 411, 423, 510, 512, 514, 567, 573; 4, 12, 35).—The η of casein solutions (graphs given) rises to a max. with increase of NaOH, then falls rapidly and uniformly until $p_H = 10$; with borax a second rise is obtained. The η is approx. proportional to the inorg. ash content and is influenced by the treatment and pptg. agent employed; pptn. with acids gives a high-viscosity product. Grinding many colloids into casein solution decreases its η , but clay, CH_2O , and satin-white increase it. The conditions for the prep. of reversible and irreversible gels, using CH_2O and $K_2Cr_2O_7$, have been determined. The η decreases on keeping; the greater the amount of base present, the slower is the onset of putrefaction and the more rapid is the decrease, but complete putrefaction produces considerable decrease. $PhNO_2$ is one of the best preservatives; alkalis do not prevent mould growth. Casein films hardened either by keeping or by addition of CH_2O (40% solution) are resistant to H_2O and ultra-violet light. The prep. of rennin and lactic casein is described and analyses are given.

S. M.

Vitamin-A and protein content of fish meals.

L. A. MAYNARD, R. C. BENDER, and C. M. McCAY (J. Agric. Res., 1932, 44, 591—603).—Manufacturing methods considerably affect the feeding val. of fish meals. Vac.-dried white fish meal has a higher vitamin-A content and greater protein efficiency than steam- or flame-dried menhaden meal. The latter has no vitamin-A. A. G. P.

Nitrogen-balance studies with various fish meals. B. H. SCHNEIDER (J. Agric. Res., 1932, 44, 723—732).—The protein digestibility of fish meals in feeding trials with rats was in the decreasing order vac.-dried white fish meal, steam-dried menhaden meal, flame-dried menhaden meal. The % utilisation of absorbed N was greater for the first-named material than for the last. A. G. P.

Creatine and creatinine in meat extract. J. SCOTT (Food Tech., 1932, 1, 393).—The gritty deposit found in most meat extracts when mixed with H_2O is creatine. Its properties are briefly described.

E. B. H.

Bleaching of peanuts. D. J. R. VAN WYK and C. NAUDE (Farming in S. Africa, Feb., 1932, Reprint No. 17, 4 pp.).—Nuts discoloured by reddish soil are bleached by brushing for 5 min. in H_2O and then in 2% $NaHSO_3$, rinsing in running H_2O , and sun-drying. The shell and kernel absorb small amounts of SO_2 .

E. B. H.

Electrical conductivity of honey. J. STITZ and B. SZIGVÁRT (Z. Unters. Lebensm., 1932, 63, 211—214).—The conductivity vals. of various honeys have been measured, and the use of these vals. as a means of detecting added H_2O is suggested. J. G.

Hydrogen-ion concentration of honey. J. STITZ and J. SZONNTAG (Z. Unters. Lebensm., 1932, 63, 215—218).—If a Pt electrode be immersed in a mixture of quinhydrone and the honey as received, the $[H^+]$ may be determined without the necessity of dilution, and changes due, e.g., to the hydrolysis of proteins are avoided. The vals. obtained for 17 samples (1923—1931 seasons) varied from 3.18 to 4.29. There appeared to be no relation between the p_H val. and age of the sample, and the honeys examined were so well buffered that dilution by 10—100% was also without influence. After 10 days, however, the p_H of a 10% solution fell by 0.8 owing, probably, to fermentation. The effect of the presence in honey of org. acids and sugars is discussed in relation to their ionisation consts. Comparison of the p_H and titration vals. of honey will indicate the presence of HCl from artificially inverted sugar. J. G.

Occurrence and detection of choline on coffee.

F. E. NOTTBOHM and F. MAYER (Z. Unters. Lebensm., 1932, 63, 176—182; cf. B., 1932, 367).—The filtrate after removal of trigonelline hydrochloride (*loc. cit.*) is freed from EtOH by evaporation, diluted, and again heated at 4.5 atm. with dil. HCl. The solution is evaporated, extracted with EtOH, re-evaporated, and treated with animal charcoal in the presence of HCl. After further evaporation and extraction with EtOH, the solution is pptd. with phosphotungstic acid in the presence of HCl, the washed ppt. being decomposed by addition of cold saturated $Ba(OH)_2$ and the solution, after removal of Ba phosphotungstate, again evaporated and extracted with EtOH. The final product is determined (cf. *loc. cit.* and Roman, A., 1930, 752) by addition of I—KI, a solution in EtOH of the resulting dark-brown oily crystals being titrated with 0.1N- $Na_2S_2O_3$ (1 c.c. \equiv 1.335 mg. of choline) as for trigonelline. Santos coffee contained 0.022%. J. G.

Determination of ammonia, trimethylamine, and other amines in foodstuffs.

F. OKOLOV (Z. Unters. Lebensm., 1932, 63, 129—154).—Current methods are described, compared experimentally, and criticised. The accuracy of the determination of NH_3 by formol titration is affected by the presence of a primary amine, though not by secondary amines. Me-red is unsuitable as an indicator for this titration, but neutral-red, litmus, or phenolphthalein or rosolic acid in EtOH gives results with an accuracy of 97—101% for 1—50 mg. of NH_3 -N. Rosolic acid is preferable in the presence of 5—25 c.c. of NMe_3 , and gives results for 2—10 mg. of NH_3 -N with an accuracy of 99—106%. NH_3 may be determined in the presence of primary and secondary amines by distillation with MgO , titration of the boiled distillate with H_2SO_4 to phenolphthalein, and extraction of the NH_2Me from the residue after evaporation by means of 15 c.c. of cold abs. EtOH. The EtOH solution is evaporated and the residue re-extracted, and formol titration is applied to both solutions; accuracy 102—105% for 20 mg. NH_3 -N and 4—9 mg. NH_2Me -N. NMe_3 is determined in the presence of NH_3 by adding $NaNO_2$ and AcOH to the solution, the mixture then being boiled to decompose any NH_2Me (without, however,

affecting NMe_3); dil. NaOH is then added and 75% of the liquid distilled into 0.1N-acid, CO_2 being removed from the distillate by boiling, and the excess acid nitrated to rosolic acid with 0.1N-NaOH. J. G.

Occurrence and determination of aluminium in foods. I. **Determination of aluminium in organic materials.** G. E. COX, E. W. SCHWARTZE, R. M. HANN, R. B. UNANGST, and J. L. NEAL. II. **Aluminium content of foodstuffs cooked in glass and aluminium.** G. D. BEAL, R. B. UNANGST, H. B. WIGMAN, and G. J. COX (Ind. Eng. Chem., 1932, 24, 403—405, 405—407).—I. For the determination of Al in foods or animal tissues, the material is dried at 110° and ashed at a low red heat. The ash is treated with HCl, the solution freed from SiO_2 , and the Al pptd. as Fe Al phosphate. After removal of Fe, the Al is determined colorimetrically as lake with aurintricarboxylic acid, a standard solution of thymol-blue being used. The Fe-free solution should give no pink colour with a drop of thiolacetic acid and NH_3 .

II. Determinations of Al in foods cooked in pyrex glass showed that most foods contain up to 1 p.p.m. Al. In many cases no appreciable addition to the Al content was observed after cooking in Al vessels, but acid fruits or vegetables cooked with NaHCO_3 may contain up to 100 p.p.m. Al. This is much below the min. amount capable of causing danger to health. Sugar tends to decrease Al corrosion. C. I.

Effect of acidity on the colour of canned vegetables. W. B. ADAM (Food Tech., 1932, 1, 343—345).—Attempts to fix natural colour by canning peas at the optimum p_{H} of 7.2—7.6 have been abandoned as the good colour is retained only for 4—5 months, the peas are soft, the tinplate blackens, and the lacquer is removed. E. B. H.

Importance of hydrogen-ion concentration in the canning industry. J. GRANT (Food Tech., 1932, 1, 396—398).—The effect of p_{H} on the activity of enzymes and bacteria, and hence its effect on conditions necessary for sterilisation and on the general keeping properties of tinned fruit and vegetables, is described. E. B. H.

Rate of heat penetration in certain heat-sterilised foods. C. M. BURNS (Food Tech., 1932, 1, 348—351, 400—402).—The effect of size and shape of tin, size of meat particles, influence of pre-cooking, and presence of air and fat on the rate of heat penetration through tinned meat products has been studied. The presence of air accelerates heat penetration, and fat, particularly if it forms a surface layer, retards the process. Diffusivity consts., i.e., thermal conductivity/(sp. heat \times d), have been determined for meat in various conditions. E. B. H.

Correlation between plant characteristics and valuable properties of green fodders. E. LOWIG (Landw. Jahrb., 1932, 75, 531—567).—In red clover plants the N content of leaves is directly proportional to their diam. The reverse is the case in stems. No significant variation in the N content of leaves with leaf colour was observed, but stem-N increased with darkening colour of leaves. The crude protein content of leaves and the ratio leaf-protein : total protein increased with

the height of the plant. The crude leaf-protein also increased with leaf diam. "Straggling" types of plants have a higher protein content in leaf and stem than more compact types. With darkening leaf colour the crude protein yield increases, but the ratio leaf-protein : total protein declines. The green wt., dry wt., total yield of crude protein per plant increase, and the ratio dry wt. of leaves : total dry wt. decreases, with the no. of shoots per plant. No definite relationship exists between protein yield and % N. A. G. P.

Butter fat. Determining oils in butter.—See XII. **Rubber-seed [cake].**—See XIV. **Digestibility of grass. Grass silage as fodder. Yield of tea.**—See XVI. **Detecting BzOH etc. in foods.**—See XVIII. **Creamery wastes.**—See XXIII.

PATENTS.

Preservation of articles of food, fodder, and other organic substances. H. TALLGREN (B.P. 371,336, 14.11.30).—The articles are immersed in a brine containing HCl and possibly sugar; before consumption the acid is neutralised with NaHCO_3 . The amount of HCl used is the largest possible which does not dissolve the protein, cause a colour change, or affect the clearness of the liquid. E. B. H.

Curing meat and fish [in hermetically sealed chambers]. BRAMIGK & Co., LTD. From B. GERNHARDT (B.P. 374,611, 27.5.31 and 1.1.32).

Pasteurisers. Separators.—See I. **Coated cans.**—See X. **Chicle substitute.**—See XIV.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Chick-heart method of biological assay. I. Digitalis. E. M. HALL (Amer. J. Pharm., 1932, 104, 310—318).—For the biological assay of digitalis the heart of the 72—76-hr. chick embryo may be used as test object. The results compare well with those obtained by other methods. J. H. B.

Reactions of adaline and bromoural. L. EKKERT (Pharm. Zentr., 1932, 73, 369).—A mixture of adaline, α -naphthol (0.01—0.02 g.), and 0.2 c.c. of EtOH treated with 0.5 c.c. of conc. H_2SO_4 becomes yellow-red, changing to violet-red on warming, the colours being green and blue-green, respectively, when β -naphthol is used. Bromoural similarly gives a rose colour, changing to rose-yellow with α - and green with β -naphthol. J. W. B.

Determination of veronal and mercury tannate. A. IONESCO-MATIU and (MME.) A. POPESCO (J. Pharm. Chim., 1932, [viii], 15, 551—554).—The veronal is pptd. with HgSO_4 . The ppt. is dissolved in H_2SO_4 and HNO_3 , Na nitroprusside added in presence of a trace of KMnO_4 , and the solution titrated with 0.1N-NaCl (1 c.c. = 0.01393 g. veronal) till the turbidity disappears. The Hg tannate is determined in the above manner (1 c.c. of 0.1N-NaCl = 0.01785 g. of Hg tannate). A. L.

Content of pectic substances in tobacco. S. KASCHIRIN (U.S.S.R. State Inst. Tobacco Invest., 1931, Bull. 81, 55—58).—Raw (prepared) tobaccos of different types contain 11.31—18.62 (13.47—17.15)% of pectins, the proportion being lower for good than for poor tobaccos. For the same variety of tobacco grown in

different districts, the percentages of pectins are about the same. Little change in this respect occurs during fermentation. T. H. P.

Relation of the quality of tobacco to the total extractive matters. A. SCHMUK and M. CHMURA (U.S.S.R. Inst. Tobacco Invest., 1931, Bull. 81, 53—54).—The extractable (by H₂O or EtOH) matter in a tobacco and also the Schmuk val. of the extracted material increase as the quality of the tobacco improves. The Et₂O extract shows no such relationship. T. H. P.

Methods of determining malic, citric, and oxalic acids in tobacco. M. PIATNITZKI (U.S.S.R. State Inst. Tobacco Invest., 1931, Bull. 81, 23—43).—These acids are best determined in the liquids obtained by acidifying the tobacco and continuously extracting with Et₂O for 40 hr. Methods based on pptn. of the acids as salts are inaccurate, but yield results indicative of the character of the tobacco. Kissling's method (A., 1916, ii, 587) gives ppts. representing substantially BaC₄H₄O₅, Ba₃C₁₂H₁₀O₁₄, and CaC₂O₄, but the errors may amount to 5% and 50—70% for oxalic and citric acids, respectively, and small amounts of Ba₃C₁₂H₁₀O₁₄ pass through the filter. Determination of citric acid by conversion into pentabromoacetone by treatment with KBr and KMnO₄ gives good results. The content of citric acid (and generally those of malic and oxalic acids) falls as the quality of the tobacco improves, the proportions being: traces—4%, 3—7%, and 1—2.5% for the three acids, respectively. T. H. P.

Quantitative separation of ammonia from nicotine. V. V. ZAPOLSKI (U.S.S.R. State Inst. Tobacco Invest., 1931, Bull. 81, 87—91).—Longi's method of determining NH₃, commonly used with plant materials, is inaccurate if other volatile bases are present. With tobacco or mixtures of nicotine and NH₃, satisfactory results are obtained if the vapours from the distilled bases are passed down through a vertical tube—inserted before the condenser—containing glass wool mixed with powdered HgI₂; this retains the nicotine, so that the NH₃ may be determined by titrating the condensate. T. H. P.

Determination of potash in tobacco. E. PACHOMOV and O. KOLODZAJNAJA (U.S.S.R. State Inst. Tobacco Invest., 1931, Bull. 81, 103—111).—The cobaltinitrite method gives good results. The tobacco ash is extracted better by 10% aq. (NH₄)₂CO₃ than by HCl. The extract is evaporated and the residue freed from the excess of (NH₄)₂CO₃ and dissolved, 10% aq. Na₃Co(NO₂)₆ being used as precipitant. This procedure is 4—5 times as rapid as when HCl is used. T. H. P.

Artificial improvement of the quality of low-grade tobaccos. A. SCHMUK (U.S.S.R. State Inst. Tobacco Invest., 1931, Bull. 81, 5—18).—Low quality in tobacco is accompanied by high alkalinity of the smoke. This alkalinity is lowered and the flavour of the tobacco improved appreciably by addition to the tobacco of sugar, which probably forms acid products and so partly neutralises the basic components of the smoke and also yields furan derivatives which react with the NH₃. This treatment increases the hygroscopicity of the tobacco and renders it more liable to attack by moulds. The aroma of tobacco is improved

by admixture with lavender, verbena, pelargonium, geranium oils, etc. in small proportions. Tobacco is rendered milder by addition of wax, stearic and other fatty acids, and paraffin wax, but these impart an unpleasant flavour to the smoke. The fundamental problem in the improvement of tobacco is the diminution of the nitrogenous constituents. For the nicotine and NH₃ etc. this may be effected by physical and mechanical treatment, such as heating, treating with steam, etc., but for the proteins chemical or biochemical methods would be required. The results of a few experiments on these lines are given. T. H. P.

Reaction of tobacco smoke in relation to the quality of the tobacco. A. SCHMUK and M. KOLESNIK (U.S.S.R. State Inst. Tobacco Invest., 1931, Bull. 81, 45—51).—Alkalinity of tobacco smoke is a certain indication of poorness of quality of the tobacco. The alkalinity of tobacco increases with the proportion of nitrogenous compounds present and diminishes as the carbohydrates increase, this observation confirming the great importance of the carbohydrate : protein ratio (Schmuk val.) in estimating the quality of tobacco. T. H. P.

Nicotine content of tobacco smoke. E. I. KOVALENKO (U.S.S.R. State Inst. Tobacco Invest., 1931, Bull. 81, 77—84).—When tobacco is burned in a continuous current of air, as much as 40% of the nicotine does not appear in the smoke. Far more of the nicotine is found in the smoke if cigarettes are burned rapidly (9—10 min.), the % of the total being higher with low than with high grades of tobacco. Tobacco burned in glass tubes gives smoke containing 18—20% more nicotine in the smoke than that burned as cigarettes, but variation in the proportion of free bases in the tobacco is without influence in this direction. The nicotine content of smoke increases as the moisture in the tobacco rises to 9—11%, but subsequently decreases. T. H. P.

Nitrogenous substances of tobacco smoke. A. V. KOPERINA (U.S.S.R. State Inst. Tobacco Invest., 1931, Bull. 81, 61—75).—Pfl and Schmitt's method of determining nicotine in tobacco smoke (B., 1927, 955) is inaccurate, since picric acid ppts. also other bases, e.g., guanine, non-volatile with steam. In addition to nicotine and NH₃, tobacco smoke seems to contain purine bases. T. H. P.

Potash content of German and Spanish tobaccos. P. KÖNIG (Ernähr. Pflanze, 1932, 28, 211—212).—Analytical data and associated qualities of a no. of tobaccos are recorded. A. G. P.

Benzyl alcohol as adulterant of some essential oils, and its detection in presence of ethyl and methyl alcohols. H. LEONHARDT and R. WASICKY (Arch. Pharm., 1932, 270, 249—252).—By shaking peppermint oil, sandalwood oil, or clove oil in ligroin with CaCl₂ and examination of the distillate obtained from the solid CaCl₂ compounds, 5% of EtOH (CHI₃ reaction), MeOH, or CH₂Ph·OH (oxidation to CH₂O and PhCHO, respectively) can be detected. R. S. C.

Refrigeration. Solid CO₂ as refrigerant.—See I. **Ergot oil. Chaulmoogric acid.**—See XII. **Tobacco.**—See XVI.

PATENTS.

[Manufacture of] local anæsthetics. H. C. BRILL (U.S.P. 1,817,670, 4.8.31. Appl., 1.10.28).— β -Ethylbutylaminoethyl alcohol, or other ω -amino-alcohol carrying Me or Et and an alkyl above C_3 in the NH_2 -group, is esterified with cinnamoyl chloride. C. H.

Manufacture of liver extract for secondary anæmia. G. B. WALDEN, Assr. to E. LILLY & CO. (U.S.P. 1,813,788, 7.7.31. Appl., 10.10.30).—Animal livers or kidneys are extracted with hot, slightly acid H_2O (p_H 5–6), the extract is conc., and EtOH added to ensure a concn. of 50–75%. The ppt. is separated and may be administered alone or in combination with an Fe salt. E. H. S.

Physiological mucin preparation. S. J. FOGELSON (U.S.P. 1,829,270, 27.10.31. Appl., 18.12.30).—Mucin is extracted from animal stomach linings by dil. acid, the clear extract treated at the isoelectric point (p_H 4.5) with a neutral, H_2O -sol., org. liquid, and the ppt. of mucin is separated, washed, and converted into neutral alkali compound. E. H. S.

Treatment of tobacco. C. W. ANDREWS (U.S.P. 1,813,833, 7.7.31. Appl., 5.4.30).—Tobacco leaves are treated with hot H_2O vapour and then centrifuged. The liquid extract is boiled, allowed to separate, and the intermediate layer introduced into the dry leaves, with or without flavouring and treatment with infra-red and yellow-free light rays. E. H. S.

Storing cut tobacco. H. MÜLLER and F. MUTH (B.P. 374,367, 25.11.31. Ger., 26.11.30).

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Behaviour of phenylenediamines.—See III.

PATENTS.

Manufacture of coloured pictures. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 358,643, 7.8.30. Addn. to B.P. 333,654).—AgBr-gelatin globules, sensitised separately to red, green, and blue light, and containing corresponding dyes, are incorporated together as described in the prior patent, and used as the printing medium for the production of coloured pictures from lenticular screen films (e.g., "Kodacolor," Keller-Dorian process). The filter used in printing has violet, red, and green stripes. It is essential that the three colours in the filter, and printing layer, shall belong to spectral regions which do not overlap. J. L.

[Manufacture of] anti-halation layers for photographic plates and films. I. G. FARBENIND. A.-G. (B.P. 369,721, 17.2.31. Ger., 17.2.30).—Arylidene derivatives of quaternary salts of heterocyclic N bases carrying a reactive Me group are used in anti-halation layers; they are irreversibly decolorised during development. Suitable compounds are 2-*p*-dimethylamino-styryl-quinoline ethobromide or -benzthiazole methiodide and 2-4'-methoxy-, -3':4'-methylenedioxy-, or -3':4'-dimethoxy-styrylquinoline methosulphate. C. H.

Production of polychromatic screens. A. A. CANTON (U.S.P. 1,828,958, 27.10.31. Appl., 23.5.29).—Colour screens with very thin minute colour elements

are obtained by staining partly oxidised finely-powdered Fe particles with various dyes (primary colours, preferably sol. in Et_2O), mixing the coloured particles in the required proportion, and brushing the mixture on to the screen surface moistened with Et_2O . Microscopic coloured spots are produced on the screen; the Fe is removed magnetically. J. L.

Production of kinematograph multicolour and other films. J. E. THORNTON (B.P. 373,274, 23.2. and 27.3.31. Cf. B.P. 373,312; following abstract).—A universal master-cliché film of double width carrying the pairs of images for 2-colour photography side by side in register, is used as intermediary from all negatives to positives. One image is preferably reversed in relation to the other. Apparatus for production of the master-film is described. J. L.

Multicolour photography. TECHNICOLOR MOTION PICTURE CORP., Assees. of J. A. BALL (B.P. 373,429, 4.6.31. U.S., 14.6.30).—The image-bearing beam from the camera lens is divided by a suitable prism into two. One component is used to print the blue and red records (in bi-pack form) and the other to print the green record, suitable filters being incorporated. The red and green records are on identical emulsions. A key record may be printed in front of the green record. J. L.

Production of multicoloured photographic images. SYNCOMEX STUDIEN- & FINANZIERUNGSGES. (B.P. 373,648, 17.2.31 Ger., 17.2.30).—The 3 emulsion layers of a tri-pack (having the blue component furthest from the lens) are coated very thinly and the yellow and red components have low Ag contents. The 3 films require different development, intensification, and printing processes; the red and yellow components may be printed by reflection to increase contrast. The yellow component (blue-sensitive) may also be sensitised to red with dicyanine in order to get better definition. [Stat. ref.] J. L.

Photographic bleaching-out process. I. G. FARBENIND. A.-G. (B.P. 373,858, 13.8.31. Ger., 13.8.30).—One or more acidic substances, e.g., malic, malonic, or maleic acid, acid salts, acid esters, etc., are incorporated in the sensitive layer. The sensitiveness to light is increased and purer whites are obtained. J. L.

Multicolour kinematography and films and apparatus therefor. J. E. THORNTON (B.P. 373,186, 12.2.31).

Production of kinematograph films having images on both faces. J. E. THORNTON (B.P. 373,312, 7. and 27.3.31).

Production of partial-colour sensations for three-colour photography. I. G. FARBENIND. A.-G. (B.P. 373,332, 25.3.31. Ger., 25.3.30).

Photosensitive dyes.—See IV. Hardening gelatin.—See XV.

XXII.—EXPLOSIVES; MATCHES.

Preparation of nitrocellulose of highest nitrogen content and high solubility in ether-alcohol. F. LENZE and E. RUBENS (Z. ges. Schiess u. Sprengstoffw., 1932, 27, 114–118, 154–156).—In nitrating with a mixture of HNO_3 and P_2O_5 , variations of 10–45%

P_2O_5 have little effect on the N of the nitrocellulose, but 25% gives the highest figure. The nitration period may vary from 1 to 5 hr.; the temp. may be 0° or 20° . There was no gain by using a solution of collodion cotton in $MeNO_2$. Prior treatment of the cellulose is favourable. A product containing 14% N was obtained from linters which had been boiled for 5 hr. at 150° with $NaHSO_4$ solution. Extraction of highly nitrated products with MeOH for 12 hr. increased the N to 14.03—14.12%. In contrast to the N, the solubility in $Et_2O-EtOH$ is definitely affected by the proportion of P_2O_5 in the nitrating mixture; with 40% P_2O_5 , the nitrated product from linters was 25 times as sol. as that made from acid containing 10% P_2O_5 . Collodion cotton gave after 10 days' nitration a product of 87% solubility, and after 20 days 100% solubility; linters gave only 50—84%. The temp. of nitration affects the solubility, 2 days at $35-40^\circ$ being equiv. to 8 days at 20° . Solubility in 95% EtOH is not appreciably influenced by the various factors. Viscosity, stability, and yields of the products are discussed. W. J. W.

Chemical stability of nitroglycerin powders.

L. METZ (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 118—121, 150—153).—Granular, tubular, flake powders and cordite were submitted to the following stability tests: Abel, I-starch, Me-violet, storage at 100° , 75° , and 50° , Brunswig's, Mayrhofer's, Mayrhofer and Will's, and Hansen's, as well as to a hydrolysis test in which the powder was heated with H_2O at 85 and 100° . Results are tabulated and discussed. W. J. W.

Explosive properties of dipentaerythritol hexanitrate. W. BRÜN (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 73—76).—The compound has $d^{15} 1.63$ (cryst.), 1.613 (fused and solidified); loading d of cryst. material after pressing at 2000 and 2500 kg./sq. cm., respectively, 1.52 and 1.589, and relative d 0.938 and 0.975; explosion temp. $200-220^\circ$. The fall-hammer test at $69-71^\circ$ gave 8, 22, and 45 cm., with 5-, 2-, and 1-kg. wts., respectively; when the explosive was mixed with quartz sand, corresponding figures were 1, 4, and 7 cm. Velocity of detonation of the material pressed at 2000 kg./sq. cm., d 0.933, was 7010 m./sec., and of that pressed at 2500 kg./sq. cm., d 0.975, 7410 m./sec. When pressed at 200 kg./sq. cm. 0.5 g. of the explosive was initiated by 0.30 g. of Hg fulminate; with pressures of 250, 500, 1000, and 2000 kg./sq. cm., the corresponding amounts of PbN_6 were 0.005, 0.05, 0.26, and 0.31 g., respectively. Comparative vals. are given for pentaerythritol tetranitrate. W. J. W.

Explosive properties of dipentaerythritol hexanitrate. W. FRIEDERICH and W. BRÜN (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 125—127, 156—158).—0.5 g. of the cast explosive, pressed at 200 kg./sq. cm., was initiated by 0.38 g. of Hg fulminate; when pressed at 250 kg./sq. cm. it required 0.06 g. PbN_6 . In the Pb block, 10 g. gave a net expansion of 283 sq. cm., and in the smaller block 0.7 g. gave 18.9 sq. cm. An analysis is given of the explosion gases. The sp. vol. is 903.2 litres per 1000 g., heat of explosion 1092 kg.-cal./kg., and explosion temp. 3240° . Brisance

is calc. as 148,730. Comparative figures are given for pentaerythritol tetranitrate. W. J. W.

Theory of the pressure impulse in gases and the detonation wave. A. SCHMIDT (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 145—149).—Following a discussion on the theory of the pressure impulse in gases, the temp. compression, wave and gas velocities have been calc. and tabulated for pressures up to 3000 kg./sq. cm., and the relations between gas and wave velocities, impulse and wave velocity, and compression and gas velocity are shown graphically. W. J. W.

PATENTS.

Safety fuse for use in blasting and the like. ENSIGN-BICKFORD Co. (B.P. 374,032, 27.2.31. U.S., 28.2.30).

Stabilising nitrates.—See III.

XXIII.—SANITATION; WATER PURIFICATION.

Sludge digestion and gas collection. W. GAVETT (Sewage Works' J., 1932, 4, 277—278).—The collection of gas from digestion tanks is justified if only as a means of preventing odours, but it is capable of producing power equiv. to 15—20 h.p. per 10^6 gals. of sewage treated. C. J.

Effect of gases on sewage-sludge digestion. C. E. KEEFER and H. KRATZ (Sewage Works' J., 1932, 4, 247—251).—Known quantities of various gases were bubbled through duplicate samples of digesting sludge and the gas yields determined. In the amounts used, O_2 and CO_2 had no ill-effect on the digestion process, but N_2 and CH_4 increased the rate of digestion and the total yield of gas. C. J.

Chlorination of sewage for [biochemical] oxygen-demand reduction. L. H. ENSLOW (Sewage Works' J., 1932, 4, 252—262).—Chlorinated sewages or industrial wastes do not support biological development to the same extent as when untreated so that the biochemical O_2 demand is reduced and its absorption delayed. In this way the effect of sewage discharges can be spread over a greater length of the stream with increased possibilities of self-purification. When applied so as to leave a distinct residual, Cl_2 will reduce the biochemical O_2 demand of screened medium-strength sewage by as much as 60%. C. J.

Activated-sludge plant with brush aëration. C. M. RIDENOUR and I. G. LACY (Sewage Works' J., 1932, 4, 263—274).—A plant treating institutional sewage at an average rate of 250,000 gals. per day, using brush aëration on the lines suggested by Kessener, is described. Sufficient velocity is given to the tank contents by the brushes, without the aid of the paddles, the power required being 17.5 h.p. per 10^6 gals. Good purification can be obtained with low detention periods, but the capacity of the plant is limited by the inadequacy of the final settlement tanks, the sludge produced being slower in settling than is usually the case, probably owing to the low detention period and the character of the sewage. C. J.

Removal of [sewage] sludge from settling tanks. R. S. RANKIN (Sewage Works' J., 1932, 4, 275—276).—Sludge should be pumped from sedimentation tanks

at a low rate and frequent intervals. When discharged to sludge-digestion tanks the rate should be > 40 gals. per min. as otherwise the contents will be seriously disturbed, gas production will fluctuate, and excessive solids will pass out with the overflow. Gravity withdrawal from Imhoff tanks tends to produce a thin sludge owing to the risk of the H_2O breaking through when the valve is opened wide to start the flow. C. J.

Sewage sludge as fertiliser. J. F. SKINNER (Sewage Works' J., 1932, 4, 279—283).—Imhoff tank sludge after drying to 50—55% H_2O on drainage beds is readily disposed of at Rochester, N.Y., at \$0.5 per ton. It contains about 2% N and stimulates leaf and plant growth above ground rather than fruit. C. J.

Behaviour of gas masks towards phosgene and chlorine. J. B. NIELSEN (Z. ges. Schiess- u. Sprengstoffw., 1932, 27, 136—139, 170—173).—Adsorption of $COCl_2$ or Cl_2 may be accompanied by formation of HCl, dependent on the moisture of the charcoal or air. The charcoal may be assumed to comprise a hydrolysing layer in which the reaction between H_2O and $COCl_2$ takes place, a layer in which HCl is adsorbed, and a final layer in which $COCl_2$ is adsorbed. From an examination of these layers and the extent of their penetration the relative resistances of various types of wet and dry charcoals to $COCl_2$ and HCl have been determined and tabulated. W. J. W.

Modern measures of efficiency in water purification and sewage treatment. E. J. THERIAULT (Sewage Works' J., 1932, 4, 283—287).—The % reduction of *B. coli* in drinking water is not a sufficient indication of plant performance as it does not preclude the production of an unsatisfactory water owing to high bacterial counts under peak-load conditions. When there are 60—80 *B. coli* in 100 c.c. the usual coagulation-sedimentation-filtration systems fail and require chlorination to produce water of acceptable quality. Waters which have been polluted with sewage, although apparently satisfactory, appear to contain some toxic substance which causes intestinal trouble. In evaluating the performance of a sewage-disposal plant utilising the activated-sludge process, it is necessary to consider the O_2 demand of the raw sewage, the final effluent, and the sludge. The immediate O_2 demand of the last-named, which may be 10 mg. per litre per min., renders the determination difficult, and it is probable that anaerobic conditions exist at the bottom of all present-day clarifier tanks. C. J.

Intermittent chlorination of condenser water. C. S. BORUFF and K. E. STOLL (Ind. Eng. Chem., 1932, 24, 398—400).—Power-plant condensers supplied with river water were subject to blockage with slime consisting of the fungus *Sphaerotilus*. To prevent such growth a Cl_2 requirement of 1.5 p.p.m. was estimated, the cost of which was considerable. Intermittent chlorination for 4 min. out of each 90 min. with 1.9—4.2 p.p.m. Cl_2 according to season was found equally effective. The Cl_2 feed itself was continuous into tanks containing limestone (to increase the Cl_2 -carrying capacity) and these tanks were pumped out intermittently. No corrosion has occurred. C. I.

Relation between biochemical oxygen demand and volatile solids in the Connecticut river. W. RUDOLFS (Sewage Works' J., 1932, 4, 315—321).—Surveys of the river bottom in early summer and again in autumn revealed the presence of numerous sludge beds of varying extent and thickness. The banks nearest the source showed an increase during the summer in vol., volatile solids, biochemical O_2 demand, and org. N_2 , whilst those lower down tended to decrease, though the variation in the last-named was not very marked. The biochemical O_2 demand decreased rapidly during the first few miles and then more slowly, indicating that the residue was more resistant. The growth of the sludge beds upstream was probably due to the low flow velocities during dry weather. C. J.

Biological purification of creamery wastes. M. LEVINE (Sewage Works' J., 1932, 4, 322—329).—Owing to the rapid decomp. of lactose with the production of acids, anaerobic treatment of creamery wastes is undesirable though the effluents are frequently sterile and apparently stable. Rapid pretreatment for the removal of fat and grit, followed by treatment on trickling filters 4—6 ft. deep at a rate of 500,000 gals. per acre per day, should produce effluents which will neither interfere with septic action at the sewage works, nor, if supplemented with chlorination, do harm to a stream. C. J.

Disposal of silk mill waste at South Manchester, Conn. L. H. GEER (Sewage Works' J., 1932, 4, 330—336).—This plant deals with an average flow of 1,670,000 gals. per day from silk and paper mills and a population of 12,000 people. The sewage is given $1\frac{1}{2}$ hr. quiescent settlement and is discharged from the tanks through 80-mesh woven-wire screens which are washed clean after each discharge. The sludge is removed daily and dealt with on drainage beds. An experimental fixed-spray filter, 7 ft. deep, has proved capable of dealing with the tank effluent at rates up to 4.75×10^6 gals. per acre per day. C. J.

Gas-works liquor: Its composition and treatment. A. KEY (Gas J., 1932, 198, 83—84).—The recent increase in the use of vertical retorts has produced more liquor of a higher concn. The higher tar acids present are easy to oxidise in spite of their dark colour. On an average the O_2 absorption of sewage will be increased only by 4 by addition of spent or NH_3 liquor, which should be supplied to the sewage works at a const. rate. PhOH has no effect on the bacteria, and it is possible that NH_3 may provide the bacteria with nitrogenous food. Actual practice has shown that spent liquor is more easily oxidised than sewage, and there seems no objection to treating NH_3 liquor. The order of increasing difficulty of oxidation is: phenols, higher tar acids, thiosulphates, thiocyanates. R. N. B.

Sewage sludge as fuel.—See II. **Sewage, and city wastes, as fertilisers.**—See XVI.

PATENTS.

Apparatus for filtering and softening water. H. H. BROWNLOW (B.P. 374,117—8; 4.3.31).

Classifier.—See I. **PhOH from liquors.**—See II. **Protecting Pb.**—See X.