ABSTRACTS.

GENERAL AND INORGANIC CHEMISTRY.

The Force-function in Crystals. A. EINHORN.

The first part of the paper, which appears at present, restricts itself to the consideration of the Tesseral, Tetragonal, and Rhombic systems.

By means of a well founded assumption in regard to the stress-distribution in crystals of the above systems, the conditions of equilibrium are deduced which further require that the boundary of the configuration shall be either plane or spherical. It also appears that the statical conditions of the agency which causes crystallization are the same as those so well investigated for gravitation and electricity.

The paper is divided into three chapters. The first chapter treats of the "Foundation of the Assumption." The assumption is that the stress upon any particle can only be transmitted in six lines of direction respectively at right angles, in pairs, to the three crystallographic axes. It is a consequence of the internal structure which is shown to be analogous to that of an ordinary pile of cannon balls, by means of the cleavage properties, the external form and the inertia relations of crystals.

The second chapter—"Derivation of the Force Function"—applies the three general differential-equilibrium equations of an elastic solid subject to internal forces, to the stated stress-distribution. In order to effect this it was necessary to deduce some peculiarities of the force-function in a system of uniform density in equilibrium and subject to internal forces when referred to the three principal axes of inertia through the mass centre. The character of the attracting agency here becomes evident.

The third chapter relates to the "Determination of the Boundary." Under this heading the nature of the boundary is determined, and is shown to be either plane or spherical. By the application of Green's theorem it also becomes clear that inasmuch as the statical conditions of the crystallizing agent are now understood, the force-functions derived in the preceding chapter can be independently deduced, without aid of the assumption, from any one of the primitive forms of the systems under consideration.—(*Proc. Royal Soc.*, 38, *235*.) THE AUTHOR.

The Oxides of Nitrogen.—W. RAMSAY and J. T. CUNDALL.

An inquiry into the nature of the product obtained by the action of strong nitric acid upon arsenious anhydride. The indigo-blue liquid produced in this case by condensing the resulting fumes is generally supposed to be N_2O_3; and it is stated that it unites with O directly to form N_2O_4.

The authors used nitric acid of 1.5, assisted in some cases by sulphuric acid, dried the vapors by passage through P_2O_5, condensed them in a mixture of ice and hydrochloric acid and collected in weighed bulbs which were then sealed. In the analyses of these products the bulbs were broken in a measuring tube over mercury in presence of sulphuric acid and the resulting NO was measured.

The authors conclude that the liquid contains N_2O_3 mixed with N_2O_4 and NO_2, but that when the water given off by the reaction is absorped by sulphuric acid present in the mixture, no N_2O_3 is formed, but a red liquid containing N_2O_4 and NO_2. N_2O_3 does not exist in the state of gas, being dissociated at moderate temperatures, and pure, liquid N_2O_3, if it exist at all unmixed with the oxides above mentioned, is possible only at very low temperatures. The passage of NO through the red liquid produces N_2O_3 to a limited extent. depending upon temperature. (*Jour. Chem. Soc.*, **269**, *187*.) A. A. B.

On the Clarification of Water by Alum. P. T. AUSTEN and F. WILBUR.

A series of experiments made under the Geological Survey of New Jersey. The quantity of alum used by Jeuner (*Mon. Sci.*, 1865, p. 1007), viz., 04 grm. per litre or 23.3 grms. per U. S. gallon was excessive. The proportion can be reduced to 2—2.5 g. p. g. or ½ oz. to 100 gallons of water. The proportion varies with the water, of course; the experiments were made with the city water of Brunswick, N. J. No alumina could be detected by ammonia in the filtrate after precipitation. An analysis of the precipitate yielded C 16.50 %, H. 2.02 ; N. 0.77 ; Ash, 59.28, the latter containing much Si. and Al., but little Fe or $P_2\ 0_5$.

Treatment with alum renders the water easy to filter through paper, etc., which, ordinarily, it is not. Cotton wool is recommendedas a filtering medium.

The theory of the precipitation is that Al goes down as basic sulphate, while $K_2 SO_4$ remains in solution. The proportion of alum left in solution, if any, is absolutely harmless. Alum is given medicinally, in doses of 30 grains, four times a day. The question of the removal of the germs of disease by alum will be the subject of a future investigation by the authors. (*Chem. News*, **51**, *241.*)

A. A. B.

Action of Sulphur Chloride on Silver Cyanide. R. SCHNEIDER.

Silver chloride is formed by this reaction, together with a mixture of dicyanmonosulphide and dicyantrisulphide which can be most easily separated by careful sublimation. These bodies, the author infers, come from the decomposition of the unstable dicyandisulphide. The trisulphide is colorless, easily changed to a yellow, insoluble modification. It is decomposed by water and alcohol. On distilling in a retort, a yellow powder free from sulphur and having the composition C_9N_{12} is left. This may be looked upon as tricyanuramid $N_3 (CN)_3$. This assumption is supported by experiments conducted by Reed, under the direction of E. v Meyer, which are appended to the above article. (*Jour. prakt. Chem.*, **32**, *187.*)

F. P. V.

Sodium Fulminate. A. EHRENBERG.

Fulminating mercury is reduced by sodium amalgam and the resulting liquid allowed to evaporate slowly over quicklime and concentrated sulphuric acid. Bright colorless crystals are gotten, which explode easily when dry. The crystals have the composition $C_2N_2O_2Na+H_2O$. The two molecules are lost by long standing over sulphuric acid. A sodium-mercury fulminate is formed when only half the amount of sodium amalgam necessary for the removal of the mercury is added or by dissolving fulminating mercury in sodium fulminate. By electrolysis the sodium fulminate was decomposed into base and acid, the latter suffering oxidation. Similar products—ammonia, carbonic and hydrocyanic acids—are gotten by oxidation with hydrogen peroxide. (*Jour. prakt. Chem.*, **32**, *230.*)

F. P. V.

On the Solubility of Iodine in Fatty Oils. G. Greul.

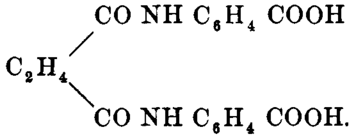
The solubility of iodine in fatty oils is comparable in quantity to its solubility in chloroform, ether and carbon disulphide. Heat and trituration assist solution. The solution in castor oil is brown and viscous, and contains 20 per cent. of iodine. Those with olive and almond oils are thinner and brownish red. The castor oil solution is miscible with strong alcohol. (*Archiv. d. Pharm.*, **223**, 431.)

A. A. B.

ORGANIC CHEMISTRY.

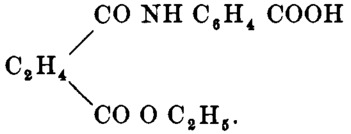
On Amidobenzoic Acid Derivatives of Succinic, Sebacylic, and Phthalic Acids. G. Pellizzari.

If 10 grms. amidobenzoic acid be heated under return cooler for two days with 20 c. c. succinic acid ether, and 10 c. c. of alcohol, a white crystalline powder is gradually deposited, and the solution still contains an easily crystallizable compound. The solution is evaporated, and the product crystallized from alcohol. The compound least soluble in alcohol separates first in the shape of a white crystalline meal, which melts at about 300° C. with decomposition. On analysis, this compound was found to be succinyldibenzamic acid.



$$\mathrm{C_2H_4}\begin{cases}\mathrm{CO\ NH\ C_6H_4\ COOH}\\ \mathrm{CO\ NH\ C_6H_4\ COOH.}\end{cases}$$

The compound more easily soluble in alcohol was found to be benzamsuccinic acid ether.



$$\mathrm{C_2H_4}\begin{cases}\mathrm{CO\ NH\ C_6H_4\ COOH}\\ \mathrm{CO\ O\ C_2H_5.}\end{cases}$$

It crystallizes from hot water in lustrous leaflets, melting at 174° C. These treated with ammonia gave two compounds, viz.: benzamsuccinamide and benzamsuccinanilide.

Benzamsuccinic acid ether, on being saponified with barium hy-

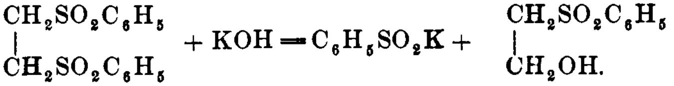
-drate, splits up as the barium salt decomposed is with HCl, into benzamsuccinic acid, colorless prisms, melting at 222–223° C. On melting, this substance loses 1 mol. of water, and changes into succinylamidobenzoic acid.

Sebacylic acid ether, notwithstanding its larger percentage of carbon, reacts with amidobenzoic acid in the same way as the ethers of the lower homologues. The following two compounds were thus obtained : sebacyldibenzamic acid and benzamsebacylic acid ether.

When phthalic acid ether reacts on amidobenzoic acid, no alcohol should be used as it would interfere with the reaction. From the reaction product benzene separates two crystalline compounds, viz.: phthalamidobenzoic acid and phthalamidobenzoic acid ether.
(*Ber. d. chem. Ges., 1885, 214.*) J. H. S., Jr.

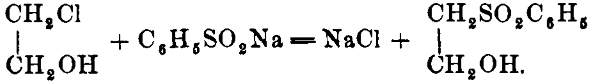
On the Formation of Sulphons from Alkyl-sulphonated Acids of the Series $C_nH_{2n}O_2$. R. Otto.

If ethylendiphenylsulphon be heated with dilute KOH it is split up into a sulphin salt ($SO_2C_6H_5$), and a substance which may be taken for phenylsulphonethylalcohol, according to the following reaction :



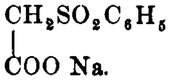
$$\begin{array}{l}CH_2SO_2C_6H_5\\ |\\ CH_2SO_2C_6H_5\end{array} + KOH = C_6H_5SO_2K + \begin{array}{l}CH_2SO_2C_6H_5\\ |\\ CH_2OH.\end{array}$$

Ethylenchlorhydrin and sodium benzol sulphinate act similarly.



$$\begin{array}{l}CH_2Cl\\ |\\ CH_2OH\end{array} + C_6H_5SO_2Na = NaCl + \begin{array}{l}CH_2SO_2C_6H_5\\ |\\ CH_2OH.\end{array}$$

On oxidizing phenylsulphonethylalcohol with a mixture of $K_2Cr_2O_7$ and H_2SO_4, an acid possessing the characteristics of phenylsulphonacetic acid is found, having the formula :

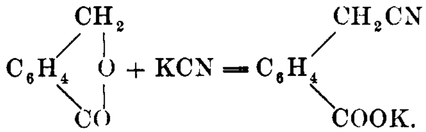


$$\begin{array}{l}CH_2SO_2C_6H_5\\ |\\ COO\ Na.\end{array}$$

(*Ber. d. chem. Ges., 1885, 154.*) J. H. S., Jr.

On the Action of Potassium Cyanide on Phthalid. W. Wislicenus.

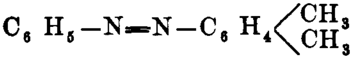
If equal parts of phthalid and KCN be heated in the oil bath to 180–185° C., the mixture assumes a dark color, and, after three or four hours, the fluid solidifies. When cold, the product dissolves in water, yielding a dark red color. If now enough acid be added to just produce a coloration, in a short time a dark-colored impurity is precipitated, and, on the further addition of acid to the filtered solution, a yellow, semi-crystalline precipitate is thrown down. This precipitate contains N, and possesses the characteristics of an acid. It dissolves in caustic and carbonated alkalies, with a slight evolution of CO_2. It is easily soluble in alcohol, ether, benzene, and chloroform, but is insoluble in water. This acid melts under decomposition at 116° C., and has the constitution $C_9H_7O_2N$. Yield, 95 per cent. of the phthalid used. This compound may be looked upon as benzylcyanide-o-carbo- acid, and is formed according to the following equation :



On boiling this with an excess of KOH, ammonia is given off, and on acidifying the clear solution, a precipitate of little leaflets (which are soluble in carbonated alkalies) is formed. The precipitate is easily soluble in hot water and alcohol, more difficultly soluble in ether, and insoluble in benzene and chloroform. From the analysis the following formula is derived : $C_9H_8O_4$, etc. (*Ber. d. chem. Ges.*, *1885*, *172.*)

J. H. S., Jr.

Dimethylazobenzol as an Indicator in Alkalimetry. B. Fischer and O. Philipp.

Indicators for the end-reaction of an acid which yield an appearance of color rather than a decoloration are limited, in practice, to the well known ones, litmus and methyl-orange. The latter has the advantage of permitting titration in presence of free CO_2, but its color-change, from orange to pink, is scarcely sharp enough for the color-sense of all analysts. The occurrence also of different chemical substances in trade, under the name of methyl-orange, has led to confusion and dissatisfaction in the use of this indicator. The authors propose the use of the free base, Dimethylamidoazobenzol,  $C_6H_5-N{=}N-C_6H_4\begin{cases}CH_3\\CH_3\end{cases}$ instead of methyl-orange, which is the corresponding sulpho-acid. The base is easily prepared in a state of purity and changes from lemon-yellow to pink in passing from alkaline to acid reaction. To prepare the indicator the authors dissolve 1 mol. of anilin in 2 mols. of HCl (25 per cent.), and to the cooled and dilute solution add 1 mol. of sodium nitrite in water. This solution is poured into a solution of 1 mol. of dimethylanilin in 15 grms. HCl, and after standing, so much sodium acetate (about 30 grms.) is added as will cause it to smell plainly of acetic acid. The resulting crystals are purified by recrystallization from alcohol. In practice an alcoholic solution, 1:200 is used as an indicator. It is entirely unaffected by presence of free CO_2. With HCl it yields even a more brilliant red than with H_2SO_4. Experiments with filter paper saturated with the solution as a substitute for litmus paper was unsatisfactory, but plates of plaster of Paris (Gypsplaten) similarly treated yielded good results.* (*Archiv. d. Pharm.*, **223**, 11–434). A. A. B.

On the Formation of p-Toluyl-p-methylimisatin from Dichloracetic Acid and p-Toluidin. C. Duisberg.

By the action of p-toluidin on dichloracetic acid, P. J. Myer obtained p-toluyl-p-methylimisatin, which he believed to be formed according to the following reaction :

$$2C_7H_9N + C_2H_2Cl_2O_2 = C_{16}H_{14}N_2O + 2HCl + H_2O + H_2.$$

Led by certain theoretical reasons the author has found that in the above reaction no hydrogen is given off, and, at the same time, he discovered the presence of an intermediate product of the formula $C_{16}H_{16}N_2O$, which is oxidized by the oxygen of the air into p-toluylen-p-methylimisatin.

p-toluylamido-p-methyloxindol.

Obtained by the action of p-toluidin on dichloracetic acid in the cold, by the following reaction :

$$2C_7H_7N + C_2H_2Cl_2O = C_{16}H_{16}N_2O + 2HCl + H_2.$$

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* It is well to remember, in this connection, that calcined plaster generally contains free lime.—B.

Easily soluble in hot alcohol, ether, chloroform, carbon disulphide, and benzene. Less soluble in petroleum, naphtha, and water. Crystallizes from alcohol in small white needles, which melt at 166–167° C.

Diacetyl-p-toluylamido-p-methyloxindol.

In order to determine the number of imide- or hydrol-groups contained in the intermediary compound, it was heated for several hours in a current of hydrogen, with acetic anhydride. The product was crystallized from alcohol, and obtained in the shape of pretty, silken-white needles, which, on analysis, were found to be the above-named compound.

Nitroso-p-toluylamido-p-methyloxindol.

Small light yellow needles, melting at a temperature over 222° C., with decomposition.

Acetyl-p-toluyl-p-methylpseudoimisatin.

Highly red-colored lustrous crystals, which melt at 121–122° C., to a blood red liquid. Insoluble in water and alkalies, but readily soluble in the usual solvents.

Acetyl-p-methylpseudoisatin.

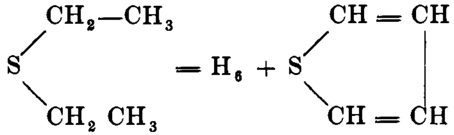
Lemon colored needles, melting at 172° C. Dissolves with difficulty in water; absolute alcohol, ether, carbon disulphide, but easily soluble in chloroform, benzene, etc. (*Ber. d. chem. Ges.*, *1885*, *190.*)

J. H. S., Jr.

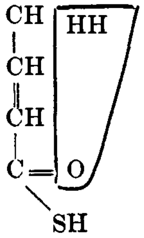
Synthesis of Thiophen. V. Meyer.

Tbekulé found that on passing the vapor of ethylsulphide through red hot tubes that thiophen was formed. This reaction, as well as others, had been observed by the author but were not made public, as none of them seemed to be satisfactory methods. Notwithstanding this he describes the following experiments.

Dr. A. Calm tried to verify the thiophen formula, by the above reaction,



and in fact obtained a fluid which gave the indophenin reaction to perfection. Dr. Nahnsen tried a whole series of thiophen syntheses. At first he passed ethylen or illuminating gas over pyrites. Benzin vapor in lieu of ethylen gave the same result. More interesting was the action of crotonic acid on phosphorous sulphide.



$= H_2O + C_4H_4S.$

Normal butyric acid behaved in the same manner.

Isobutyric acid treated with phosphorus sulphide acted totally different, giving no trace of thiophen. Ordinary valerianic acid, treated in the same way, also gave thiophen.

Nahnsen also succeeded in producing thiophen from paraldehyde and ether by heating them with phosphorus sulphide. (*Ber. d. chem. Ges.*, *1885*, *217.*) J. H. S., Jr.

Oxidation of Oleic Acid by Potassium Permanganate in Alkaline Solution.

A. Soytzeff.

The acid obtained by this oxidation melts at 136.5° C., and has the formula $C_{18}H_{36}O_4$. It is identical with dioxystearic acid, the melting point of which is, by the author's determination, 136.5°—137° C. and not 126° C. as given by Overbeek. (*Jour. prakt. Chem.*, **31**, *541.*) F. P. V.

Oxidation of Phenol by Means of Nitrobenzol.

M. Siegfried.

Nitrobenzol is shaken in the cold with a solution of phenol in 24 per cent. sodium hydroxide. Sodium oxalate is formed, also carbon dioxide. The nitrobenzol is reduced to azobenzol, and at the same time a resin, soluble in sodium hydroxide, is formed. (*Jour. prakt. Chem.*, **31**, *542.*) F. P. V.

Cyananiline and some of its Derivatives (preliminary notice).

A. Senf.

Nitrous acid acts upon cyananiline suspended in ether or glacial acetic acid, giving a crystalline compound, $C_{14}H_{15}N_5O_5$ which, heated by itself or with water, gives isocyanphenyl. Prolonged treatment with nitrous acid gives a compound which yield paranitroanilin when boiled with sodium hydroxide. Phenyl isocyanate forms with cyananiline, diphenylurea; methyliodide causes the formation of dimethylanilin salt in abundance. (*Jour. prakt. Chem.*, **31**, *543*.) F. P. V.

Allylsulphuric Acid and some of its Salts. F. SZYMANSKI.

The action of sulphuric acid upon allyl alcohol and the best conditions for forming allylsulphuric acid are examined in this paper. Modes of preparation and analyses are also given of the salts it forms with the principal metals. A light oil, smelling like leeks, was gotten by the dry distillation of these salts. That the allyl, and not the propyl radical was present in the above derivatives is also shown by experiments. (*Annalen*, **230**, *45*.) F. P. V.

The Sugar in *Symphoricarpus Racemosa.* HERRMANN & TOLLENS.

The crystalline mass gotten from the juice on purification resembled dextrose and was quite free from ash. The analysis corresponded with $C_6H_{12}O_6+H_2O$. Melting begins at 90° and is complete at 145°, as with dextrose hydrate. The reducing power corresponds to that of dextrose.

Toward phenylhydrazin the action was the same as that of dextrose. So, too, with the specific rotatory power. There was no sugar present capable of inversion. In fermenting it shows itself identical with dextrose, also in its action toward iodine and soda. The sugar then is dextrose. Besides this, there is in the juice a sugar polarizing to the left. (*Annalen*, **230**, *50*.)
F. P. V.

ANALYTICAL CHEMISTRY.

Test for Chlorides in the presence of Bromides and Iodides. L. DE KONINCK.

Objections are mentioned to the method of testing based upon the formation of chromyl chloride. The following method is recommended. Precipitate the mixed halogens with silver nitrate, digest the precipitate, cold, with 4–5 vols. of a 10–15 per cent. solution of ammonium sesquicarbonate, filter, and add to the filtrate a drop of potassium bromide solution. A precipitate of silver bromide is given if a chloride was present. A slight cloudiness is always seen, but this need not interfere with the test as traces of chloride give a distinct precipitate. If iodates are present they must be reduced to iodides, with sulphurous acid. If cyanides, then the precipitate must be heated until the cyanide is destroyed, the residue reduced with zinc, etc. Sulphur compounds have no effect (*Zeit. anal. Chem.*, **24**, *376.*) F. P. V.

A New Method of Determining Chlorine Volumetrically. E. BOHLIG.

This method depends upon the great insolubility of silver oxalate, and its almost instantaneous interchange with metallic chlorides in neutral solutions. The solution of the chloride is first boiled a few seconds with basic magnesium carbonate and filtered; an aliquot part of the filtrate is then taken, and, after cooling, shaken with silver oxalate. After standing, it is filtered, concentrated sulphuric acid is added to half of it, and it is then titrated with chameleon solution. Where organic substances are present the silver oxalate is precipitated with calcium chloride and ammonia and the washed calcium oxalate titrated. (*Zeit. anal. Chem.*, **24**, *408.*) F. P. V.

Bottles for Reagents Sensitive to Light. A. GAWALOOSKI.

According to the researches of Jawin and Masson the blue, yellow, brown, or black glass, in ordinary use for this purpose, is incapable of absorbing the chemically active rays. The recommendation is made to use bottles of amber glass, prepared with green, blue, and violet layers, as in flask glass. (*Zeit. anal. Chem.*, **24**, *409.*) F. P. V.

A Quick Method for the Estimation of Phosphoric Acid in Fertilizers.—J. S. Wells.

A modification of Joule's citric acid process. Two solutions are made, viz.: (*A.*) 1,400 c. c. ammonia of 0.92, 900 grms. citric acid, 500 c. c. water. (*B.*) A strong solution of magnesium citrate. For total acid, 1 grm. of the fertilizer is fused with 3–4 grms. of sodium carbonate and 3–4 grms. of sodium nitrate ; the product is dissolved in nitric acid and to the filtered solution is added so much of solution A that no precipitate shall form, when it is made alkaline with ammonia. After standing half an hour and removal of any silica that may have separated, the solution is precipitated with solution B and the product is washed, dried and weighed. For soluble acid, 1 grm. of the substance is treated with water in the usual way and then precipitated with solution B, after addition of A and excess of ammonia. Insoluble acid is determined in the residue after treating with ammonium citrate in the usual process for extraction of reverted acid by fusion with soda, etc., as in the estimation of total acid. Reverted acid is determined by difference, experience having shown that it can not be accurately estimated in the ammonium citrate solution. Should silica and magnesia occur together, it is best to remove the former in the usual way before proceeding as directed. The results agree fairly with those obtained by the molybdate method. (*J. Chem. Soc.*, **269**, *185.*) A. A. B.

A New Test for Titanic Acid. R. Fresenius.

The yellow liquid, obtained by the action of aqueous sulphurous acid on zinc-clippings, or on granulated zinc, is mixed with a solution of titanic acid containing 1.5 m. g. of the acid to 1 c. c. The color is changed immediately to an intense red, becoming reddish yellow, then yellow, and, finally, disappearing. The rapidity of this change depends upon the amount of free acid present. Ether is not colored when shaken with this red liquid. If titanic acid is present in only one-tenth of the above quantity, or less, only a yellow coloring is observed. (*Zeit. anal. Chem.*, **24**, *410.*) F. P. V.

Determination of Tin in Tin Slags. R. Fresenius and E. Hintz.

A full scheme of analysis is given for separating tin from the metals commonly occurring with it, viz.: antimony, arsenic, molybdenum, tungsten, lead, iron, aluminium, chromium, etc. (*Zeit. anal. Chem.*, **24**, *412.*) F. P. V.

Toughened Filtered Paper.—E. H. Francis.

Immersion of ordinary filted paper in nitric acid of 1.42 and subsequent washing with water, imparts the toughness of parchment paper without greatly impairing the original porosity. The prepared paper has ten times the tensile strength of ordinary filter paper, and may be used with the pump without a platinum cone. The paper decreases in size and weight under treatment with acid, and also loses mineral matter. It retains no nitrogen. Filters intended for use with the pump may be conveniently prepared by dipping the apex only in acid. (*J. Chem. Soc.*, **269**, *184.*) A. A. B.

On the Use of Sulphuric Acid in place of Nitric Acid to Oxidize Sulphides, etc. E. Divers and T. Shimidzu.

The advantages of sulphuric acid over nitric acid are that it acts gently so that the acid may all be added at once to the powdered substance ; that no free sulphur is separated ; that many of the metals, *e. g.*, As, Sb, Se, and Te, are ready for immediate treatment without reduction of their oxides ; that the fumes ($S\ O_2$ and traces of sulphuric acid) are less objectionable and that there is great economy of time and reagents. Ferrous sulphate is converted into the corresponding ferrous salt by sulphuric acid. Mercuric sulphide (vermilion) is attacked only by boiling sulphuric acid. (*Chem. News*, **51**, *193.*) A. A. B.

Remarks on the Methods of Indigo Testing. C. Rawson.

The author maintains that Rau's modification of Fritsche's method (This journal, VI.), yields pure indigotin, but takes no account of indigo red or indirubin. For estimation of both ingredients he suggests the following method: One grm. of indigo, partly ground into a paste with water, is introduced into a 40 oz. flask with 500–600 c. c. of lime water. The flask has a perforated stopper, carrying funnel, inlet and exit tubes. A current of H or coal-gas is passed through the flask, and the flask is heated to 80° C ; 200–250° c. c. of a solution of sodium "hyposulphite "* are then introduced and the mixture, which soon takes a yellow tint, is boiled for half an hour. After

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* *Hydrosulphite* prepared by action of zinc upon sodium bisulphite.

the suspended matters have settled, 500 c. c. are withdrawn and the remaining liquid is measured. Air is drawn through the 500 c. c. for 20 minutes in order to oxidize the hyposulphite and indigo white. HCl is then added to dissolve Ca CO_3 and the precipitate is collected on a weighed filter, dried at 105° C and weighed. From the mixture of indigotin and indirubin thus obtained, the latter is estimated by extraction with alcohol. Indigotin is estimated by difference.

The author also discusses the permanganate method and suggests modifications which reduce the errors incident to that method. (*Chem. News*, **51**, *255*.) A. A. B.

INDUSTRIAL CHEMISTRY.

Recent Results with regard to By-products obtained in Coking Coal in the Simon-Carves Ovens. W. Smith.

Results previously obtained with these ovens in the hands of the author have shown them to be poor in benzenes and carbolic acid, but very rich in naphthalene and anthracene. Analyses of tars from similar ovens recently erected and worked at somewhat higher temperatures and with different coal, show closer resemblance to coal gas tars, the benzene and carbolic acid being more abundant. The experience of coal distillers tends towards the conclusion that increase of benzene follows increased temperatures, and that the ideal conditions for obtaining a maximum yield of aromatics are a bright red heat applied externally to a closed vessel containing the coal or other crude material in as thin a layer as possible. The author inclines to the theory of K. E. Schulze, namely, that the primary products of the dry distillation of coal, obtained at temperatures relatively low, are phenols which split up at higher temperatures, yielding hydrocarbons and water. He adds also the suggestion that, in contact with red hot carbon, simple reduction of phenols into carbonic oxide and hydrocarbons may occur. The low yield of phenols with excess of paraffines obtained in distilling shale or cannel coal in the Scotch paraffine industry seem to contradict the theory of Schulze, but it may be in this case that the very low temperatures employed are too low for the production of phenols. Concerning the existence of Victor Meyer's thiophen in benzenes, the author finds it to vary in proportion to the temperature at which the benzenes are produced. Benzenes obtained from naphthas obtained in the paraffin industry are destitute of thiophen, while those of the Simon-Carves process contain an abundance of it. It may be possible, therefore, by accurate control of the heat, to operate at temperatures which will in great part prevent the product of thiophen. (*Chem. News*, **51**, *253.*) A. A. B.

The Illuminating Power of Methane.—L. T. Wright.

Marsh gas was prepared by the process of Gladstone and Tribe, with a slight modification of the apparatus which secured more perfect retention of the vapor of methyliodide. A Loudon argand burner with six inch chimney, and with a metal cap for controlling the air supply, was used. Photometric tests gave 5.2 and 5.15 candles per cubic foot per hour. The flame was slightly yellowish in its luminous portions, and could be made to smoke copiously by limiting the supply of air. Results are given also to illustrate the increased candle power obtained from a given volume of ordinary coal gas when the air supply is properly limited by use of the adjustable cap. (*Jour. Chem. Soc.*, **269**, *200.*) A. A. B.

Illuminating Power of Hydrocarbons.—P. F. Frankland.

In continuation of experiments (the results of which relating to ethylene and benzene have already been published) the author has determined the illuminating power of ethane and propane using as before a "Referee's" burner and calculating the results to a consumption of 5 cubic feet per hour. The results show: That the illuminating power of ethane is 35 candles or half that of ethylene and the illuminating power of propane is 54 candles. In the paraffine series, excluding methane, the illuminating power appears to be proportional to the carbon atoms in the molecule. It remains to be seen whether this law will hold good with the higher members of the series. (*Jour. Chem. Soc.*, **269**, *235.*) A. A. B.

Note on Methylene Chloriodide.—J. Sakurai.

In a recent paper the author has referred to this substance as a by-product in a reaction which yielded it in quantity too small for full examination. He now prepares it by a simpler method, viz.: by the cautious addition of iodine monochloride to methylene iodide, and subsequent distillation, etc.

It is a yellowish liquid, becoming reddish by exposure to light. Density, 2,444. V.D.$=88.14$; theory for CH_2ClI, 88.24. Analysis shows Cl, 20.05%; I, 72.07%; theory, 20.11 and 71.95. The agreement of these figures with the results previously obtained confirms the author's views as to the structure of a new series of organo-metallic bodies, containing methylene, which he has recently described. (*Jour. Chem. Soc.*, **269**, *198.*) A. A. B.

Artificial Asbestos or French Chalk, for packing and closing leakages. J. C. Levoir.

For packing in steam boilers, cylinders, stuffing boxes, etc., the author recommends alternate layers of hemp and absorbent paper, saturated respectively with calcium and magnesium chloride and with sodium silicate. A precipitate is formed on the surfaces of contact which effectually fills the pores of the fibrous material. Asbestos acts as a strong grinding material on all moving parts, but a stuffing box filled on the above plan has worked for three years without grinding the piston-rod. A mixture of oleic acid, red lead, quicklime and linseed powder is recommended for the screw threads of steam pipes. Packings of the kinds described are effective only under pressure, not with a vacuum. (*Chem. News*, **51**, *217.*) A. A. B.

Abstracts of American Patents Relating to Chemistry.

(From the Official Gazette of the U. S. Patent Office).

July 7th, 1885.

321,452.—Bleaching wood pulp and other fibrous material. G. H. Pond.

The material is bleached by the generation of oxygen in contact with it, in a bath of metallic oxides in water.

321,459.—Artificial stone or marble. W. H. Stearns, Jr.

Consists of sand or fragmentary stone material and Portland cement, united by cementitious compound, consisting of acetic acid, terra-japonica, manganese borate, carbonate of ammonia, Glaubers salt and balsam.

321,465.—Process of refining petroleum. J. H. Tiemann.

Directly after the treatment with acid, of the distillates, an anhydrous alkali, alkaline earth, etc., is added to avoid washing.

321,589.—Manufacture of hydraulic cement. J. Dimelow.

321,636.—Apparatus for drying fusible salts. R. S. Penniman.

321,661.—Apparatus for the manufacture of carbon bisulphide. E. R. Taylor.

321,662.—Apparatus for the manufacture of carbon bisulphide. E. R. Taylor.

321,771.—Apparatus for the manufacture of carbon bisulphide. E. R. Taylor.

321,868.—Apparatus for manufacturing gas from saw dust. G. Walker.

Brief.—Wood sawdust is fed to and conveyed through retorts by spiral screw conveyors, and the granular charcoal is conducted from the retorts to a tight movable chamber by a screw conveyor. The gas resulting from the distillation is conducted to a condenser.

321,870.—Apparatus for washing and scrubbing coal gas. F. Weck.

321,925.—Process of distilling lactic acid. C. N. Waite.

Lactic acid is distilled and purified by the aid of free steam.

July 21st. 1885.

322,458.—Apparatus for producing ammoniacal gas. C. B. Lee.

322,557.—Compound for purifying iron and steel. W. H. Purdy.

Consists of red lead and cinnabar, with sand and water.

332,608.—Method of and apparatus for generating gas. C. W. Isbell and W. H. Taylor.

Brief.—Water gas is made, carbureted in the take-off pipe, and fixed in a separate body of incandescent fuel. Steam is passed up through one body of incandescent fuel, and the resulting products of decomposition down through another body of fuel in the same generator, and the resulting water gas is carbureted by a volume of oil vapor, which has previously been made and stored at the time the air blast is entering the fuel, the oil being vaporized by hot products of combustion brought in contact with a vaporizer in the take-off pipe. The carbureted water gas is fixed by passage down through a separate body of incandescent fuel, which is blown up and heated independently of the body of fuel, in which gas is generated.

322,782.—Apparatus for the manufacture of white lead. H. G. Blyth.

322,802.—Process of making the compound termed "Kerite." A. G. Day.

The process consists in first mixing together cotton seed oil and coal tar or bitumen, and afterward adding linseed oil and sulphide of antimony or other sulphide, with or without the addition of sulphur.

July 28th, 1885.

322,940.—Manufacture of iodoform, bromoform and chloroform. T. Kempf.

The corresponding halogen compounds of the alkalies or alkaline earths are subjected to electrolysis in the presence of alcohol, aldehyde or acetone with the aid of heat, and with or without the addition of carbonic acid.

322,996.—Manufacture of leathery compound. S. P. M. Tasker.

Fibrous material mixed with gelatine is treated with tannic acid.

323,016.—Waterproof composition for felt, paper, etc. O. Zinreck.

Consists of acetate of alumina, acetate of lead and albumen.

323,222.—Process of extracting gold, silver and copper from their ores. J. W. Simpson.

The ore is treated with a solution of potassium cyanide, ammonium carbonate, and sodium chloride, and the metals are precipitated from the resulting solution.

August 4th, 1885.

323,402.—Compound for waterproofing boots, shoes, etc. J. B. Dupret.

Consists of tar, tallow or stearine, beeswax, and turpentine with alumina, or salts of alumina.

323,426.—Metallic compound. F. Kavanaugh.

This is a process for making journal bearings by melting zinc, tin, copper, lead and cast iron, with a flux of sal-ammoniac, silica and borax.

323,431.—Apparatus for purification of water. A. R. Leeds.

Water and air, both under pressure, are passed through a closed chamber containing filtering material.

323,499.—Apparatus for the manufacture of white lead. S. D. Cornell.

323,514.—Manufacture of methylene blue by electrolysis. W. Massert.

Methylene blue and other homologous colors containing sulphur, are produced from paraamido derivatives of primary, secondary and tertiary amines, and from the hydrazo-compounds of the latter by electrolysis in acidulated solution and in the presence of such substances, as under the action of the electric current, separate out sulphur on the positive pole.

323,660.—Process of manufacturing illuminating gas. C. M. Gearing.

The products of combustion of liquid fuel, together with a current of steam, air and a hydrocarbon are simultaneously injected into highly heated retorts.

323,662.—Composition for Bengal lights. C. Gerhard.

Consists of strontium nitrate and chlorate, potassium chlorate, powdered glass and flour, with an alcoholic solution of a resinous substance.

323,680.—Filter bed. E. Holden.

A plate provided with minute tapering holes, having their smaller ends presented to the flow of the liquid.

323,694.—Method of and apparatus for treating semi-liquid substances with purifying or other liquids. E. Langen.

323,754.—Condensed peptonized milk. W. H. Thew.

August 11th, 1885.

323,959.—Process of preparing the charge for spelter furnaces. E. Phillips and T. Jones.

The zinc ore is mixed with lime, or flour and flux, and formed into a cylindrical retort charge having a central longitudinal flue. These cylinders are then placed in zinc retorts and subjected to external heat.

324,018.—Lubricating compound. G. P. French.

Consists of petroleum, sal-soda, potash, borax, cream of tartar, parafin wax, bay or green wax, unctuous oil and plumbago.

324,048.—Condensing peptonized milk. W. H. Thew.

Milk is heated to about 55° C., and pancreatic liquid is added. The product is then sufficiently heated to destroy the ferment, and condensed.

324,049.—Condensed peptonized milk with cocoa. W. H. Thew.

324,050.—Condensed peptonized milk with coffee. W. H. Thew.

324,103.—Process of making a fertilizer from tank waters. C. Gibson.

The tank waters of slaughter houses, etc., are mixed with an acid sulphate of an alkali, aluminous cake, or aluminium sulphate, and boiled down to expel excess of water. The resulting mass is agitated with a carbonate, oxide or hydrate of an alkali or alkaline earth and ground.

324,112.—Manufacture of beton. H. A. Hudson.

324,137.—Apparatus for continuous bleaching. W. Mather.

324,177.—Carburetor. W. F. Singer.

324,179.—Process of generating hydrogen gas. B. Sloper.

Adds an alkaline carbonate to the acid water, acting upon iron or zinc.

324,200.—Manufacture of white lead. W. H. Wetherill.

The tan bark usually used around the pots in the Dutch method, is replaced by ground or fibrous spent licorice.

324,236.—Mixed paint. R. W. Davis.

Consists of shell marl, oil and oxide of zinc.

August 18th, 1885.

324,471.—Extraction of sodium phosphate from slags. L. Imperatori.

The phosphatic material is smelted with potassium or sodium sulphate and carbon, and the product is treated with carbonic acid.

324,505.—Process of refining or preparing copper for casting. W. R. Walton.

Carbon, mixed with the zinc oxide or carbonate, is added on the surface of the copper as it melts.

324,522.—Process of manufacturing beer or ale. A. W. Billings.

The process consists in mashing raw grain, to remove the starch without extracting the oils, adding diastase, and combining the mash thus made with mash made from malt and treating the two together as usual.

324,523.—Apparatus for the manufacture of beer. A. W. Billings.

324,560.—Polariscope. W. G. King.

324,615.—Manufacture of coloring matter from alpha-naphthol and dinitronaphthol. L. Vignon.

Alpha-naphthol is treated with sulphuric acid of 66° B, until a liquid product is obtained, then pure ice is added to cool and dilute the solution, after which nitric acid of 40° B, is added, the temperature being kept below 30° C. The solution is then heated to nearly 40° C, then cooled to 12-15° C, and filtered. The precipitate is redissolved and treated with potassium carbonate, in solution, to produce a precipitate, which is pressed and dried.

324,630.—Coloring matter from phenylhydrazine. H. Ziegler.

324,658.—Electric process of smelting ore, for the production of alloys, bronzes and metallic compounds. E. H. Cowles and A. H. Cowles.

324,659.—Process of electric smelting, for obtaining aluminium. E. H. Cowles, C. F. Mabery and A. H. Cowles.

Aluminium ore is mixed with broken carbon and a metal. The ore is then reduced by electricity, so that the aluminium forms an alloy with the metal, after which the metals are separated.

324,685.—Apparatus for generating hydrocarbon gas. J. Hanlon.

324,750.—Filtering paper. E. W. Carter.

Loose cut thread or other fibre is mixed in the pulp to strengthen the paper.

324,761.—Process of making syrup and beer from maize. A. E. Feroe.

324,790.—Process of manufacturing iron or steel. J. L. Y. Sarda.

The iron is heated to a red or white heat, and immersed in a bath of nitric acid and soda, after which it is reheated, remelted, rolled, etc.

August 25th, 1885.

324,809.—Apparatus for generating illuminating gas. R. Boeklen and J. D. Averell.

324,822.—Process of making beer. L. Ernst.

324,878.—Rosin oil. D. J. Ogilvy.

Rosin oil is treated with an alkaline salt of sodium or potassium, to neutralize the resinous acids.

324,908.—Apparatus for converting iron into steel. P. L. Weimer.

325,119.—Method of vulcanizing rubber. F. W. Seabury.

The rubber is subjected to the action of steam under pressure and high heat. in a vulcanizing chamber.

September 8th, 1885.

325,683.—Application of chloride of lime to bleaching purposes. G. Lunge.

The action of the chloride of lime is hastened by the use of acetic or formic acid.

325,766.—Apparatus for generating illuminating gas. R. M. Potter and R. Boeklen.

Brief.—The bed of fuel is raised to a high heat by an air blast, and the fixing chamber at the top of the furnace is heated by the products of combustion. Then the blast of the blower is shut off, fresh gas coal is supplied to the bed of fuel, the exhauster is started, and a small supply of air thereby drawn into the fuel and gas from the generator. A small supply of steam is also admitted to the fuel, and the gases distilled from the coal and resulting from the decomposition of steam and air are enriched with hydrocarbon oil or gas generated in retorts in the furnace walls. The mixture of gas and vapors is converted into a fixed gas in a fixing chamber and in a separate superheater, should the latter be required. A fuel hopper provided with valves, an inclined grate and rakers, and a sealed chamber for ash and spent fuel at the lower end of the grate, provide for charging and cleaning the generator during the manufacture of gas.

325,771.—Apparatus for producing ammonia. C. A. Schneider.

325,827.—Manufacture of violet dye stuffs. F. Fischer.

Diethylaniline is treated with perchlormethylmercaptan.

325,828.—Violet methyl dyestuff. F. Fischer.

326,066.—Process of making hydrates of barium and strontium. W. G. Strype.

A solution of a sulphide of barium or strontium is subjected to the action of currents of air in the presence of an oxide of iron.

September 15th, 1885.

326,088.—Method of rendering cloth, wood, paper, etc., waterproof. N. A. Alexanderson.

The materials are impregnated with a solution of a basic salt of aluminium, prepared by adding an equivalent quantity of the hydrates or carbonates of the alkali, or of the alkaline earths to a neutral salt of aluminium. If necessary, tartaric or citric acid may also be added.

326,220.—Manufacture of compounds of india rubber, gutta percha and like materials. A. H. Huth.

Earth wax and gums, or resins, are fused until all volatile matters are expelled. They are then cooled, pulverized and mixed with indiarubber, etc.

326,221.—Art of purifying water. J. W. Hyatt.

326,281.—Saccharine compound. C. Fahlberg.

A mixture of starch or grape sugar and benzoic sulfinide.

326,317.—Manufacture of artificial stone or marble. S. Mixer.

326,423.—Process of purifying ammonia soda. H. Gaskell, Jr.

The sodium bicarbonate is heated in an atmosphere of carbonic acid, to expel the ammonia, without decomposing the bicarbonate.

326,467.—Drying oil. P. A. Wittmack.

A mixture of petroleum, rosin or rosin oil, linseed oil, cotton seed oil and binoxide of manganese.

326,479.—Disinfectant. F. J. Cromwell.

Consists of caustic soda, water, sulphate of iron, gum camphor, oil of tar, and pulverized charcoal, molded in solid cakes.

326,488.—Apparatus for the manufacture of illuminating gas. F. Egner.

Brief.—Gas is generated in a furnace by the combustion of a mixture of bituminous coal (about two-thirds), and coke (about one-third), caused by the admission of air, and by the decomposition of steam, as much steam being admitted as is consistent with combustion of the fuel, and the resulting gases are drawn off by an exhauster, which also serves to draw air into the fuel chamber. At the same time a rich gas is generated in a bench of retorts from coal or oil, and is drawn off through the hydraulic main by the same exhauster used to draw off the furnace gas, whereby the hydrogen and carbonic oxide from the furnace, and the carbureted hydrogen from the retorts are intimately mixed together.

September 22, 1885.

326,657.—Process of manufacturing permanganates.—T. Kempf.

Permanganates are prepared by treating the solutions of manganates electrolytically.

326,715.—Process of manufacturing and distilling alcohol and hydrocarbons, and of rectifying and ageing liquors.—D. D. Cattanach.

326,716.—Apparatus for the manufacture and distillation of alcohol, hydrocarbons and acetic acid, and for ageing and refining liquors.—D. D. Cattanach.

326,760.—Process of extracting copper from its ores.—E. Marchese.

September 29th, 1885.

326,959.—Apparatus for making gas. W. P. Elliott.

327,023.—Preservative for milk. S. Sanborn.

Consists of sugar, salt, potassium nitrate, sodium carbonate, sodium hyposulphite and calcium sulphite.

327,034.—Apparatus for the manufacture of starch. F. P. Stiker.

327,035.—Art of manufacturing starch. F. P. Stiker.

The grain is steeped under pressure, so as to soften it, without disintegrating it.

W. R.