

ABSTRACTS.

ORGANIC CHEMISTRY.

Action of Nitric Acid on Pentamethylbenzene. M. GOTTSCHALK.

Tetramethylbenzene $C_6H_4(CH_3)_4$ ·COOH is formed when pentamethylbenzene is oxidized with dilute nitric acid. It melts at 165° , and crystallizes from alcohol in colorless needles. The barium salt $(C_{11}H_{13}O_2)_2Ba + H_2O$ crystallizes in scales or in radiated tufts of needles, and is readily soluble in water and alcohol. The barium salt distilled with lime yield prelnitene.

By the action of fuming nitric acid upon pentamethylbenzene, dinitroprelnitene is obtained.

Dibromtetramethylbenzene is obtained by the action of bromine on a mixture of pentamethylbenzene and silver nitrate. It crystallizes in fine, long needles, melting at 202° . According to the melting point, it is probably dibromdural. (*Ber. d. Chem. Ges.*, **20**, 3286.)

W. R.

Empirical Formula of Cholic Acid. P. LATSCHINOW.

In a former paper (*Ber.*, **20**, 1043) the author proposed the formula $C_{25}H_{42}O_5$ for cholic acid. Mylius (*Ber.*, **20**, 1968) made a series of analysis in support of the older formula of Strecker, $C_{24}H_{40}O_5$. The author, therefore, made a reexamination of this acid, and arrived at the following conclusions:

Anhydrous cholic acid undoubtedly has the composition: $C_{25}H_{42}O_5$. It cannot be obtained in the crystalline state by any means.

Crystalline cholic acid exists in two modifications: alcoholate and hydrate, which are well characterized.

The alcoholate has the composition, $C_{25}H_{42}O_5 + \frac{1}{2}H_2O + \frac{1}{2}C_2H_6O$ (or other body in place of alcohol). On drying it readily gives up the alcohol, but not the water, and when dried at 105° to 120° it has the composition, $C_{25}H_{42}O_5 + \frac{1}{2}H_2O$. Cholic acid does not give up this $\frac{1}{2}$ molecule of water at 145° , nor when it is dissolved in a solvent with which it combines, *e.g.*, phenol. Only

with the decomposition at 160° is this water given off, water of constitution being given off at the same time, and the anhydride formed. The melting point of this modification is 195° .

The hydrate has the composition: $C_{25}H_{42}O_5 + H_2O$; it loses water with difficulty on drying; at 130° only $\frac{3}{4}$ of the water are given off, and then it has the composition: $C_{25}H_{42}O_5 + \frac{1}{4}H_2O$. This last water is only lost on decomposition, which takes place sooner than in the first modification, namely, at 145° . The melting point of the hydrated acid is at $125-140^{\circ}$, that of the dried acid at $160-180^{\circ}$.

The salts of cholic acid with mineral bases, like the acid itself, persistently retain water of crystallization, and some of the base, which explains the lower percentage of carbon, and the higher percentage of metal found, as compared with the theoretical. The salts of some of the organic bases do not possess this property, and therefore the aniline and toluidine salts give theoretical percentages on analysis. (*Ber. d. Chem. Ges.* **20**, 3274.) W. R.

Reducing Substance Occurring in Raw Beet Sugar. E. O. V. LIPPMANN.

In the examination of an ethereal extract of beet sugar, the author detected the presence of catechol *o*-dioxymethylene. It reduces Fehling's solution on heating, producing the colorations, varying from green to red, so often observed in the examination of beet juices with Fehling's solution. From Soldaini's solution it does not reduce the copper, and the author therefore suggests that this solution should be exclusively used in the determination of dextrose in the presence of saccharose.

In addition to this, the author also found a small quantity of an acid $C_9H_{10}O_4$, which is readily soluble in all the ordinary solvents, but was not further examined on account of its small quantity. (*Ber. d. Chem. Ges.*, **20**, 3298.) W. R.

Orthocyanophenol. V. MEYER.

The author in repeating Ahren's experiments on the conversion of *o*-amidophenol into cyanophenol by Sandmeyer's reaction did not obtain a nitrile of high melting point, but a compound which,

after crystallizing from water, melts at 97-98° and possesses the properties of salicylnitrile described by Tiemann. (*Ber. d. Chem. Ges.* **20**, 3289.) W. R.

Aromatic Lead Compounds. A. POLIS.

The author obtained lead tetraphenyl in measurable crystals. The crystals form colorless prisms, and belong to the tetragonal system. The axial ratio is $a : c = 1 : 0.3808$. For tin tetraphenyl the ratio is $a : c = 1 : 0.38935$, and for silicon tetraphenyl $a : c = 1 : 0.43969$. The three compounds are isomorphous.

Lead diphenyl bromide separates as a delicate, white powder when a solution of bromine in chloroform or carbon disulphide is gradually added to a solution of lead tetraphenyl in the same solvent. It is identical with the lead diphenyl bromide obtained by precipitating lead diphenyl nitrate with potassium bromide.

Lead diphenyl chloride, $\text{Pb}(\text{C}_6\text{H}_5)_2\text{Cl}_2$, is obtained by the action of chlorine on a solution of lead tetraphenyl in carbon disulphide. It is a white powder, which is insoluble in alcohol and ether, and sparingly soluble in chloroform, benzene and carbon disulphide. It is decomposed before fusion.

Lead diphenyl oxide, $\text{Pb}(\text{C}_6\text{H}_5)_2\text{O}$, separates as a white, pulverulent precipitate, when a solution of lead diphenyl nitrate is gradually added to boiling soda lye. It is a white, infusible powder, which does not volatilize without decomposition. It is insoluble in indifferent solvents, and in potash and soda lye. In acids it dissolves with the formation of the corresponding salts. Like tin diphenyl oxide, this oxide has no tendency to form a hydroxide.

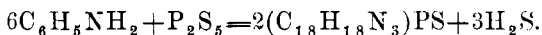
Lead diphenyl acetate, $\text{Pb}(\text{C}_6\text{H}_5)_2(\text{C}_2\text{H}_3\text{O}_2)_2 + 2\text{H}_2\text{O}$, is obtained on heating lead tetraphenyl to boiling, with glacial acetic acid. It crystallizes in colorless prisms, which are readily soluble in water containing acetic acid. In the air they become opaque, and over sulphuric acid they effloresce completely. The anhydrous salt melts at 195°.

The *formate*, $\text{Pb}(\text{C}_6\text{H}_5)_2(\text{CHO})_2 + \text{H}_2\text{O}$, in small, colorless needles, melting with decomposition above 200°; the basic *cyanide*, $\text{Pb}(\text{C}_6\text{H}_5)_2\text{OH.CN}$, is a white powder, infusible without de-

composition, and insoluble in water, alcohol and ether; the *sulphocyanide*, $\text{Pb}(\text{C}_6\text{H}_5)_2(\text{CNS})_2$, is a white powder; the *phosphate*, $[\text{Pb}(\text{C}_6\text{H}_5)_2]_3(\text{PO}_4)_2$, forms an insoluble white flocculent precipitate; the *basic carbonate*, $[\text{PbOH}(\text{C}_6\text{H}_5)_2]_2\text{CO}_3$, is a white powder; the *chromate*, $\text{Pb}(\text{C}_6\text{H}_5)_2\text{CrO}_4$, is a yellow powder, insoluble in water and alcohol; the *sulphide*, $\text{Pb}(\text{C}_6\text{H}_5)_2\text{S}$, forms small yellowish crystals, which are decomposed at $80-90^\circ$. It is difficultly soluble in alcohol and ether, but readily soluble in benzene, chloroform and carbon disulphide. (*Ber. d. Chem. Ges.*, **20**, 3331.)
W. R.

Action of Phosphorus Pentasulphide on Aniline. A. KNOP.

When phosphorus pentasulphide is heated with aniline, a violent evolution of hydrogen sulphide takes place. The product of the reaction was freed from aniline by distilling with superheated steam, and crystallized from hot alcohol. It crystallizes in monoclinic crystals, melting at 153° . The reaction takes place according to the formula



Chevrier (*Ztschr. f. Chem.*, 1868, 569) obtained an amorphous compound, having the same composition, and melting at 73° , by the action of phosphorus sulphochloride on aniline. (*Ber. d. Chem. Ges.*, **20**, 3352.)
W. R.

Tetramethyldiamidothiobenzophenone. O. BAITHER.

The author believes this compound to be identical with the thioketone obtained by Fehrmann from auramine.

A dichloro derivative $\text{C Cl}_2(\text{C}_6\text{H}_4\cdot\text{N}(\text{CH}_3)_2)_2$ is obtained when the finely pulverized thioketone is heated with an excess of benzylchloride on the water bath for 5 to 6 days. The chloride is a grayish green powder, which is decomposed and melts on heating. In concentrated sulphuric it dissolves with effervescence; concentrated hydrochloric and nitric acid cause no evolution of gas. It is soluble in glacial acetic acid and alcohol. With water it gives hydrochloric acid and tetramethyldiamidobenzophenone (Michler's ketone).

When an excess of benzoyl chloride is added to a solution of the thioketone in carbon bisulphide, an addition product $\text{CS}(\text{CH}_4\text{N}(\text{CH}_3)_2) + \text{C}_6\text{H}_5\cdot\text{COCl}$ is formed. It is soluble in glacial acetic acid and benzene. It melts at 200° . With acetyl chloride a similar compound $\text{CS}(\text{CH}_4\text{N}(\text{CH}_3)_2)_2 \text{CH}_3\text{COCl}$ is formed. It cannot be recrystallized. At 160° the compound decomposes, and melts at 200° . Heated with acetic anhydride and anhydrous sodium acetate, the thioketone yields a compound $\text{C}_{38}\text{H}_{46}\text{N}_4\text{O}_4\text{S}$, which is a greenish black powder. It begins to decompose at 120° , and melts at 155° . It is soluble in ether, alcohol, chloroform, carbon bisulphide and benzene.

By the action of aniline on the thioketone, Michler's ketone is formed. With aniline hydrochloride it yields phenylauramine. (*Ber. d. Chem. Ges.*, 20.) W. R.

Condensation Products from Paratoluidine and Paranitrobenzaldehyde. A. BISCHLER.

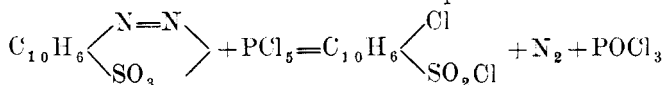
α -*Paranitrophenyldiparaamidotolylmethane* is obtained by heating 14 parts toluidine and 10 parts nitrobenzaldehyde with 16 parts concentrated hydrochloric acid and sufficient alcohol to effect complete solution. It is soluble in boiling benzene, from which after repeated crystallizations it is obtained in small, white tufts of needles, melting at 170 – 172° . On analysis these crystals were found to contain benzene of crystallization and have the formula $3\text{C}_{21}\text{H}_{21}\text{N}_3\text{O}_2 + \text{C}_6\text{H}_6$. Dried at 110 – 120° , the crystals give up the benzene without changing their form and turn yellow. The compound acts as a weak base. Its salts crystallize with difficulty and are decomposed by water. The platinumchloride, $\text{C}_{21}\text{H}_{21}\text{N}_3\text{O}_2 \cdot \text{H}_2\text{PtCl}_6$, forms yellowish crystalline grains, which are soluble in warm alcohol. An excess of pure water decomposes it with formation of the free base.

β -*Paranitrophenyldiparaamidotolylmethane* is formed when a mixture of paranitrobenzaldehyde, paratoluidine and concentrated sulphuric acid is allowed to stand for two days with occasional shaking. It crystallizes in yellow scales, melts at 126 – 127° , and is soluble in benzene, alcohol, carbon disulphide, ether and petroleum ether. Like the α -compound, it is a weak base, but its salts crystallize more readily. The hydrochloride crystallizes in small,

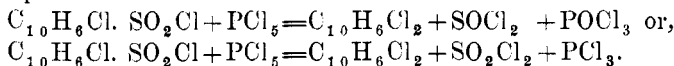
yellowish needles. It is insoluble in ether, but readily soluble in alcohol. Much water liberates the base. The platinumchloride crystallizes in yellow scales. It is insoluble in ether, but soluble in warm alcohol. (*Ber. d. Chem. Ges.*, **20**.) W. R.

The Conversion of Naphthylamine Sulpho-acids into Dichloronaphthalene. H. ERDMANN.

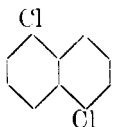
Dichloronaphthalenes are obtained by the action of phosphorus pentachloride (2 mol.), upon diazo sulpho-acids, in a proper solvent. The action of phosphorus pentachloride upon naphthalidine sulpho acid (obtained by the action of fuming sulphuric acid upon naphthylamine hydrochloride) does not begin until the mixture is heated, and then apparently takes place in two phases. At first, with a brisk, regular evolution of nitrogen, there is formed the chloride of the chlorinated sulpho-acid :



which is subsequently decomposed according to one of the following equations :



When the product is directly distilled on a gas stove, from 30-40% of the theoretical quantity of dichloronaphthalene is obtained. It is purified by several crystallizations from alcohol, and melts at 107°. As is shown by its melting point, and the finely crystallized dinitroderivative, it is identical with the dichloronaphthalene obtained by Atterberg from α -dinitronaphthalene, by Clève from nitronaphthalene sulphonic acid, and by the author and R. Kirchhoff from *o*-chlorophenylparaconic acid ; and has the constitution



Hence the naphthalidine sulpho acid is identical with Laurent's acid, and one of the acids obtained by Clève from α -naphthalene sulpho acid, and has the constitution corresponding to the above formula. (*Ber. d. Chem. Ges.* **20**, 3185.) W. R.

ANALYTICAL CHEMISTRY.

On the Volumetric Determination of Boric Acid. H. WILL.

When baryta water is added to an aqueous solution of boric acid the solution at first remains clear, then gives a heavy precipitate, which, by further additions of baryta water, gradually redissolves.

Since the point of disappearance of turbidity is very sharp, a quite accurate determination of free boric acid can be made by the use of a standardized baryta solution. The reaction taking place is analogous to the formation of borax, when boric acid solution is neutralized by sodium carbonate.

Boric Acid in Combination.

Boric acid is set free by HCl, and determined as above. A method described by C. Schwarz may be used as a control. This depends on the fact that boric acid in borax, etc., set free by HCl or HNO₃, does not alter the color of congo red, so that, from the quantity of standard acid used, the last drops of which color the congo red violet blue, the quantity of boric acid set free may be calculated. The boric acid thus set free can then be again determined by addition of baryta water, precipitation and re-solution as described. Ethyl or methyl orange serve the same purpose as congo red.

In case of a mixture of borax and free boric acid, the result will be most quickly reached by combining the method of Schwarz with this one for free boric acid, determining first the boric acid in combination, then in the same solution the total boric acid; difference giving free acid.

Determination of Chlorides in Presence of Boric Acid and Borates.

If a chloride is to be estimated in presence of free boric acid alone, the boric acid is first determined by addition of baryta water to re-solution of precipitate. If neutralization by dilute H₂SO₄ be now attempted, boric acid will be set free to react with the subsequently added AgNO₃. If, however, before neutralizing by H₂SO₄, at least as much caustic soda solution is added as will correspond to one-half the baryta water employed, and if the solution be then neutralized by dilute H₂SO₄, the determination of

chloride can be successfully and accurately made in the usual manner.

In case of much borax and little boric acid, the addition of caustic soda, before neutralizing by H_2SO_4 , may be omitted, as sufficient soda is set free by the baryta to combine with the free boric acid and prevent its reacting with the subsequently added $AgNO_3$. Owing to the slight solubility of barium borate in water, the results are slightly high.

Determination of Boric Acid in Presence of Sulphates.

This is effected by addition of baryta water in excess to the solution containing boric acid and sulphate. There result barium baborate, barium sulphate, and excess of barium hydroxide. In consequence of these, two drops of alcoholic solution of phenacetolin turn the solution a feeble yellow. It is best to add the phenacetolin directly to the solution to be titrated, and then run in sufficient baryta water to just turn the whole a feeble yellow. Normal HCl is then added, drop by drop, until the color changes first to a scarcely perceptible rose tint, then to a definite rose color.

The normal HCl used to this point is then calculated to baryta solution, and the quantity so found subtracted from the baryta solution originally added. The remainder is calculated in the usual manner to boric acid. [Results given. Discussion of process and experiments follow.] (*Archiv. der Pharm.* **14**, 1101.) D. W.

Determination of Sulphur in Oils. A. H. ALLEN.

The oil is burned in a small lamp; the products of combustion passing up a conical chimney and thence through a Liebig condenser filled with wet, broken glass. The lower portion of the condenser (which is placed vertically) is fitted with a glass stop-cock. The whole apparatus is connected with an exhaust pump, to establish sufficient draught. If the oil burns with a smoky flame, or if it clogs the wick, it should be largely diluted with purified methylated spirit. Ammonium carbonate is dissolved to saturation in the oil before lighting the lamp, or else some of the salt is suspended over the flame in a small porcelain crucible.

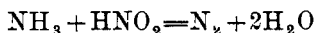
The water collecting in the Liebig condenser contains all the sulphur of the oil in the form of ammonium sulphate or sulphite,

and is run off through the stopcock.* After oxidation with bromine water the sulphur is determined as usual. An illustration accompanies this article. (*Analyst*, **13**, 43.) W. P. M.

Kjeldahl's Method for Nitrogen. R. MELDOLA and E. R. MORITZ.

The purification of the sulphuric acid employed, from all traces of nitrogen compounds, may be accomplished by adding .05 grm KNO_2 for each 10 c.c. acid and then applying heat for $2\frac{1}{2}$ hours.

This method is based upon the well known decomposition of ammonia by nitrous acid :



The nitrogen in sulphuric acid is believed to be in the form of ammonium sulphate. (*Jour. Soc. Chem. Ind.*, **7**, 63.) W. P. M.

Coal Distillation. T. WRIGHT.

A full paper giving numerous tabulated results of experiments conducted on a manufacturing scale.

It is shown that an increased temperature of distillation tends towards a destruction of the light oils intermediate between the crude naphtha and creosote. The common understanding, that elevation of temperature during distillation increases the sulphur compounds (other than H_2S), receives abundant support. The yield of ammonia is greatest at a medium temperature, diminishing as the temperature approaches either extreme.

In the discussion of this paper, Dr. Tidy expressed himself as believing that the yield of gas, per ton of coal, should be limited to 9,500 cubic feet. Pushed beyond such a yield, the resulting gas would be rich in sulphur. (*Jour. Soc. Chem. Ind.*, **7**, 59).

W. P. M.

Determination of Morphia in Opium. E. F. TESCHMACHER AND J. D. SMITH.

The authors find that no published method, within their knowledge, except their own, will give trustworthy results. Their

* This method does not differ materially from one devised and employed for the same purpose, more than a year ago, by Prof. H. B. Nason. W. P. M.

principal criticism is, that morphia is by no means insoluble in the alcohol or the water used in the several processes. *Experimental* criticism upon the following process is invited :

1. Thoroughly exhaust 200 grains of opium with warm distilled water.

2. Concentrate this watery extract to a thin syrup in a shallow dish, over a water bath, which should not boil.

3. Transfer this thin syrup to a suitable flask, which permits the use of a soft cork, using a few drops of water successively, to wash out the dish. Add to the contents of the flask 50 fluid grains of alcohol, sp. gr. about 0.82, and about 600 fluid grains of ether. Mix gently, but thoroughly, and then add some 50 fluid grains of ammonia, sp. gr. 0.935.

4. Shake the contents of the flask well to precipitate the alkaloids in arenaceous crystals, with occasional agitation during the ensuing eighteen hours.

5. Transfer the contents of the flask to a vacuum filter, and permit all the adherent liquid to be drawn away, washing out the flask with *morphiated spirit*, and continue its use till the liquid passes colorless. Now wash with *morphiated water* till this also passes colorless.

6. Now dry, slowly at first, finishing at 212 F. Transfer the dried substance to a mortar, reduce it to very fine powder, digest it thoroughly in benzene, to dissolve the narcotin and such of the opium alkaloids, other than morphia, as may be present.

7. Transfer this mixture to a vacuum filter, wash out the mortar carefully with benzene, and wash the powder thoroughly with this same benzene. This, then, will be morphia, free from other opium alkaloids and narcotin, but still containing coloring, and possibly other organic matters, to the extent of 3 to 10 per cent. Dry and weigh this powder.

8. Now ascertain, by titration of this powder with standard HCl and litmus, the percentage of crystallized morphia by weight. This acid is so made that 1000 grains by weight shall exactly neutralize 100 grains of pure morphia crystallized from water, washed with ether, and gently dried finally at 212° F.

To prepare *morphiated spirit*, digest a large excess of morphia in rectified spirits of 80 per cent. for several days, with frequent agitation. Filter for use.

For *morphiated water*, proceed as above, substituting distilled water for spirit. (*Chem. News*, 57, 93.) W. P. M.

INDUSTRIAL CHEMISTRY.

Manures.—Natural and Artificial. W. IVISON MACADAM.

A long and valuable article, filled with tabulated analyses of about all the manures known to commerce and agriculture. More or less general information is likewise given relating to the better known natural products, and illustrations accompany the details of the preparation of superphosphates. From the nature of the article an abstract is impossible. (*Jour. Soc. Chem. Ind.*; 7, 79.)

W. P. M.

Average Composition of Milk. P. VIETH.

During the past year, 12,663 samples of milk were taken directly "from the railway churns on their arrival in the dairy," and analyzed at the author's laboratory.

The yearly average stands :

Specific Gravity.....	1.0322
Fat	3.82%
Solids, not fat.....	9.12"
Total solids.....	12.94"
(<i>Analyst</i> , 13, 46.)	W. P. M.

Abstracts of American Patents Relating to Chemistry.

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

January 10th, 1888.

376,145.—Explosive derived from phenol. S. H. Enimens.
Claims the use of a new crystallized product obtained by the action of hot fuming nitric acid upon picric acid in excess.

376,189.—Production of sulphite solutions. A. Frank.
Free and combined sulphurous acid are recovered from the lyes resulting from the manufacture of cellulose by the sulphite process, by converting the sulphurous acid into a monosulphite by means of calcium or a calcium salt.

376,190.—Production of sulphite solutions. A. Frank.
Acid sulphite solutions are produced from calcium monosulphite by adding sulphuric acid or hydrogen sodium sulphate.

376,345.—Manufacture of tannin extracts. H. M. Ran.
Tannic extracts are refined and decolorized by treating with hydrosulphurous acid (H_2SO_2), and filtering.

376,351.—Apparatus for making ammonium sulphate. W. Simpkin.

376,366.—Process of obtaining potassium carbonate. F. Bruenjes.
Potassium chloride and ammonium magnesium carbonate are dissolved in water, and the resulting precipitate removed. The potassium carbonate is separated by treating the precipitate with water in which the other carbonates are less soluble.

376,392.—Production of a new red azo color. A. Mylins.
Nitro aniline is mixed with water containing sulphuric acid, and diazotized with sodium nitrite. To this is added α -naphthylamine sodium disulphonate.

376,409.—Process of making alkaline silicates and carbonates. A. Kayser.

376,410.—Process of making alkaline silicates. A. Kayser.

January 17th, 1888.

376,445.—Adhesive paste. M. W. Marsden.
A farinaceous substance is treated with strong alkali, whereby said substance is digested, and the alkali is neutralized with an ammonium salt.

376,495.—Process of condensing and preserving milk. O. von Roden.

376,496.—Apparatus for condensing and carbonating milk. O. von Roden.

January 24th, 1888.

- 376,782.**—Apparatus for ice making and refrigerating. J. B. Craft.
- 376,835.**—Apparatus for the manufacture of gas. S. T. Wellman and G. W. Goetz.
- 376,836.**—Apparatus for the manufacture of gas. S. T. Wellman and G. W. Goetz.
- 376,849.**—Manufacture of explosives. C. E. Bichel.
Sulphur and a hydrocarbon are distilled together, and to the resulting product is added potassium nitrate or equivalent oxidizing agent.
- 376,883.**—Process of obtaining sulphurous acid. E. Haenisch and M. Schroeder.
Furnace or other gases containing sulphur dioxide are passed through a spray of water to absorb the sulphur dioxide, after which the solution is heated, and the liberated gas liquefied.
- 376,905.**—Ammonia gas generator. M. Poschinger.
- 376,944.**—Manufacture of gas. W. D. Dashiell.

January 31st, 1888.

- 377,311.**—Manufacture of salicylic acid ester. C. Kolbe.
Phosgene gas is passed through a mixture of equal molecules of salicylic acid and a phenol, heated to about 170°.
- 377,343.**—Compound for safe linings, etc. J. P. Wendell.
Consists of asbestos, infusorial earth and sodium silicate.
- 377,349.**—Production of new red coloring matter. M. Ceresole.
Consists of tetramethyl-rhodamine.
- 377,350.**—Production of new red coloring matter. M. Ceresole.
Consists of tetraethyl-rhodamine.

February 7th, 1888.

- 377,406.**—Refining vegetable oils. G. W. Scollay.
The oil is treated with an ochre, which combines with the impurities of the oil. The purified oil is then separated, and the residue used as a paint.
- 377,487.**—Process of electrolyzing copper. E. S. Hayden.
- 377,564.**—Process of manufacturing water gas. F. C. Kniese.
- 377,694.**—Apparatus for the manufacture of gas. T. B. Stillman.
- 377,695.**—Process of manufacturing water gas. T. B. Stillman.
- 377,698.**—Compound for making incandescent devices. C. A. von Welsbach.
A mixture of the oxides of lanthanum and yttrium in about equal proportions.

377,699.—Compound for making incandescent devices. C. A. von Welsbach.

A mixture of the oxides of lanthanum and zirconium in about equal proportions.

377,700.—Compound for making incandescent devices. C. A. von Welsbach.

A mixture of the compounds of yttrium and zirconium in about equal proportions.

377,701.—Process of obtaining salts of cerium, etc. C. A. von Welsbach.

Compounds of the rarer metals, such as cerium, lanthanum and didymium, are prepared by heating mineral earth containing them, plunging the heated earth in water, dissolving the fragments in a mineral acid, and precipitating by oxalic acid, washing and filtering the precipitate, heating it, and afterward dissolving it in nitric acid, digesting the solution with excess of the earth, filtering, dissolving the precipitate in nitric acid, producing cerium nitrate, concentrating the filtrate and heating it with nitric acid and ammonium nitrate, then separating by fractional crystallization the ammonium double nitrates of ammonium and lanthanum, praseodymium and neodymium.

February 14th, 1888.

377,735.—Process of carburizing air. R. M. Bidelman.

Air is first passed through a carburizing chamber filled with coal saturated with hydrocarbon, and then through soap suds.

377,793.—Gas generator. A. Weyer.

377,809.—Process of separating precious metals and impurities from solutions of copper, salts, ores, matters, etc., in acids. T. Kiddie.

To the neutral solution of the material in sulphuric acid is added a hydrate of the alkalis or iron metals, to precipitate the impurities which settle together with the precious metals.

377,918.—Metallic alloy. J. Webster.

Consists of copper, 53 parts; zinc, 22.5 parts; nickel, 22 parts; tin, 5 parts; aluminium and bismuth, each, 1.5 part. W. R.