Efficiency after ten days' filtration :

Unfiltered water	4032 organisms per c.c.
Filtered water	8
Reduction	4024
Eq. to	99.8 %

SUMMARY.

From the foregoing experiments it will be seen, first, that these filters are capable of yielding a good supply of water and will run for a long while without clogging, and second, that the water filtered through them is practically free from micro-organisms, which is a point of great importance.

ABSTRACTS.

GENERAL AND INORGANIC CHEMISTRY.

Heat of the Alloys of Lead and Tin. W. Spring.

The author thought that by studying the specific heat of these alloys within limits of temperature, and comparing the results with the heat of their constituents some light would be thrown upon the constitution of the alloys. Eleven alloys were examined, viz.:

$PbSn$; Pb_2Sn ; Pb_3Sn ; Pb_4Sn ; Pb_5Sn ; Pb_6Sn ;
$PbSn_2$; $PbSn_3$; $PbSn_4$; $PbSn_5$; $PbSn_6$.

The specific heat was measured from 360° to 100°., and from 10° to 10°

The mean specific heat of lead was found from 16° to 292°$_2$ to be $C_{Pb}=0.02761+0.00002086\,t+0.00000001746_{t\,2}$. For tin from 20° to 197° it was found to be $C_{Sn}=0.05032+0.00003646_{t}+0.00000006343_{t_2}$.

The author finds that the heat observed is considerably above the heat calculated, and that the specific heat of the alloys is equal to the mean specific heat of their constituents. This shows that the liquid alloys behave like simple mechanical mixtures. From a certain temperature there is produced in the mass still solid a molecular work that has the effect of simplifying the molecules of the constituents, although producing new molecules, including molecules of each metal. This effect is produced slowly at first, but increases to a maximum; at that the temperature remains stationary and the alloy melts. Soon the molecular work becomes slower, the temperature increases, and the simplification of the molecules ceases. Finally, at a certain temperature, varying for each alloy, all molecular simplification ceases.

In the cooling of the alloy the same phenomena occur, but in the reverse order. (*Bul. Soc. Chim.*, **46**, 255.) M. L.

Reaction between the Ferric Salts and Oxalic Acid under the Influence of Heat. G. LEMOINE.

The author has found that ferric chloride and oxalic acid in aqueous solution are mutually decomposed by heat in the dark.

$$Fe_2Cl_3 + C_2O_3HO = Fe_2Cl_2 + HCl + C_2O_4.$$

With the nitrate of iron the decomposition is similar, but more complicated, as nitric oxide is evolved in addition to carbon dioxide.

$$3(Fe_2O_33NO_5) + 3(C_2O_3HO) = 3C_2O_4 + NO_2 + 3\,(Fe_2O_3,2NO_5HO).\ ^*$$

The author has studied the influence of temperature upon the reaction; above 50° it is accelerated by the increase of heat, being null at 50°; the speed of the reaction at 100° becomes less with time. P being equivalent quantities of the reagent, t the time, y the amount already decomposed at the end of t, the formula becomes

$$\frac{dy}{dt} = (p-y)\,K\,;\,\log\,(1 - \frac{y}{P} = -ct.$$

Dilution, instead of making the reaction slower, as it should if the water exerted no chemical action, increases the rapidity of the reaction; an excess of water decomposing ferric chloride the oxalic

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* O = 8.

acid exerts its action more readily. An excess of the ferric reagent has no effect; but the increase of oxalic acid in solution is marked by an increase in the activity of the decomposition for an amount of oxalic acid answering to a ferric dioxalate. For a greater excess of reagent, the addition is marked by a decrease in the activity of the reaction. The author had in view the comparing of the effects of heat with those of light already described. (*Comptes. Rend., 1883, 2d semestre.*) (*Bul. Soc. Chim.*, **46,** *289.*) M. L.

Preparation of a Calcium Sulphide with Violet Phosphorescence. A. VERNUEIL.

The author has remarked that the special violet phosphorescence of the so-called Canton's phosphorous is due to a trace of a bismuth sulphide. He describes the preparation of this substance as follows: 20 grms. of lime from the calcinations of a dense calcareous matter, the shell of *Hypopus vulgaris,* for example, are finely pulverized and mixed with 6 grms. of sulphur and 2 of starch. The mixture is incorporated with 8 c.c. of a solution of 0.050 bismuth subnitrate, 100 of alcohol and a few drops of HCl. After evaporation of the alcohol the mixture is heated for 20 minutes in a covered crucible at a bright cherry red. The product, pulverized again, is heated a second time for 15 minutes. Chemically pure calcium sulphide is not phosphorescent. (*Bul. Soc. Chim.*, **46,** *302.*)

M. L.

Combinations of Hydrogen Phosphide with Chloral Hydrate. J. DE GIRARD.

Eight grms. PH_4I are dissolved in a solution of 16 grms. of chloral hydrate in 14 grms. of ether. By evaporation, a crystalline body melting at 117-119° is obtained. These crystals lose water and are transformed into dichloralphosphine $[P\ (Cl_3—CHOH)_2]_2 + H_2O$, melting at 142°. This body is insoluble in water. Hydrate of butylchloral gives, under the same conditions, a non-crystallizable body. With acetyl chloride the hydrate of dichloralphosphine gives crystals of $[P\ (CCl_3—CHOCO_2—CH_3)]_2 + H_2O$. Dichloralphosphine acts also on propionic anhydride. (*Comptes. Rend., 102-113.*) M. L.

Volumetric Separation of Tin and Antimony. H. GIRAUD.

In presence of a large quantity of HCl antimonic chloride sets free I from HI according to the formula

$$SbCl_5 + 2HI = 2HCl + SbCl_3 + 2I.$$

Stannic chloride does not produce this reaction.

The two metals being separated from other metals are treated with HCl and $KClO_3$. A portion of the solution is treated with KI and HCl; the liquid is then treated by CS_2, which removes free iodine. The solution is then titrated by sodium hyphosulphite. Two atoms of I correspond to one atom of antimony. (*Bul. Soc. Chim.*, **46**, *504.*) M. L.

Standardizing Iodine Solutions. W. KALMAN.

A measured volume of the solution of iodine is treated with H_2S until decolorized and the hydriodic acid titrated with $\frac{n}{10}$ Na OH, methyl orange being used as an indicator. Advantages are claimed over the usual method. (*Ber. d. Chem. Gesell*, **19**, *728.*)

R. W. M.

ORGANIC CHEMISTRY.

Action of Heat on Acetones. P. BARBIER & L. ROUX.

From the mode of formation of these bodies they seem to present a great resistance to heat. The authors have studied the influence of high temperature upon and the laws governing the decomposition of the following acetones, viz.:

1. Dimethylcarbonyl $(CH_3)_2 = CO$; 2. Benzophenone $(C_6H_5)_2 = CO$; 3. Acetophenone $C_6H_5 . CH_3 . CO$.

The vapors were passed into a copper tube, 1 metre long and heated to about 1000°; the gases and other products were collected.

1. Dimethylcarbonyl. The action of heat yields a tarry body containing naphthaline and a great deal of gas, without formation of water.

$$2\ [(CH_3)_2 = CO] = 2\ CO + 2\ CH_4 + C_2H_4$$

The hydrogen obtained comes from a secondary reaction.

$$n\ C_2H_4 = (C_2H_2)n + n\ H_2$$

2. Benzophenone. The tarry bodies obtained yielded benzol boiling at 80°–85° ; diphenyl boiling at 250°, melting at 75° ; a great deal of undecomposed benzophenone; paradiphenylbenzol boiling at 400°, and melting at about 205° ; rosin-like products boiling above 450°.

The gases are of carbonic oxide and hydrogen.

$$2\ [(C_6H_5)_2 = CO] = 2\ CO + C_6H_6 + (C_6H_5)_2C_6 + H_4$$

3. Acetophenone. This acetone, which includes a methylic and a phenylic groups gives the products of each group notwithstanding that some toluol is yielded.

The tarry products are formed of : Benzol boiling at 80–85° ; a small amount of toluol ; some undecomposed acetophenone ; diphenyl melting at 70° ; paradiphenyl benzol melting at 205°, and a small quantity of a rosin-like body.

The conclusion is that a red heat determines the separation of the carbonyl group intact and that the hydrocarbon groups are copulated or are decomposed into the usual products of their decomposition by heat. (*Bul. Soc. Chim.*, **46**, *268.*) M. L.

Reactions of the Aqueous Solution of Dipropylamine with Metallic Salts. C. Vincent.

The metals in general are precipitated. The following are the results : Magnesium, in neutral or acid solutions, white, insol. in exc.; glycinium, white, insol. in exc.; aluminium, white, sol. in exc.; zirconium, white, insol. in exc.; iron (minimum), greenish, insol. in exc.; iron (maximum), ochre like, insol. in exc.; chrome (sesquioxide), green, hydrate, insol. in exc.; manganese, in neutral or acid solutions, white, insol., coloring rapidly in the air; cobalt, blue, insol. in exc.; nickel, apple green, insol. in exc.; uranium, (sesquioxide), yellow, insol. in exc.; zinc, white, insol. in exc.; cadmium, white, insol. in exc.; tin (protoxide), white, insol. in exc.; tin (bioxide), white, sol. in exc.; antimony (minimum), white, insol. in exc.; antimony (maximum), white, insol. in exc.; bismuth, white, insol. in exc.; lead, white, insol. in exc.; copper (maximum), light blue, insol. in exc.; mercury (minimum), black, insol. in exc.; mercury (maximum), yellowish, of a sub-salt, then bright yellow with exc.; mercury (bichloride), white, sol. in exc., then immediately bright yellow; silver, gray, very sol. in exc. (silver chloride is slightly soluble in the alkaline reagent); palladium (minimum), chamois color, insol. in exc.; gold, light yellow, quickly becoming dark violet blue, with slight exc., then dissolving in larger exc. to yellow solution; platinum, no precipitate. (*Bul. Soc. Chim.*, **46,** *287.*) M. L.

On Few Immediate Principles of the Bitter Orange. C. TANRET.

The author treats the orange peel with alcohol at 60°; evaporates the alcohol, and treats the residue with chloroform. The chloroform solutions and the portion insoluble in chloroform yield, after suitable treatment, the following bodies :

1. Hesperic acid, soluble in chloroform, sparingly soluble in cold alcohol, giving with Na_2O, K_2O and CO uncrystallizable salts. It does not combine with NH_3. Its composition is $C_{44}H_{28}O_{14}$.

2. An uncrystallizable acid, called by the author "aurantiamaric," insoluble in cold water, seemingly a product of decomposition of hesperidine. The formula is $C_{20}H_{12}O_8$.

3. An uncrystallizable, acid, rosin-like body, very bitter.

4. A glucoside, slightly bitter, which, after dehydratation, has the composition of hesperidine, but somewhat different properties. Compositions, $C_{44}H_{26}O_{24}$, $5H_2O_2$.

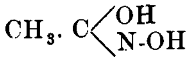
5. A bitter glucoside soluble in water and alcohol, insoluble in ether and chloroform. It is uncrystallizable and has nearly the same composition as hesperidine.

6. Hesperidine. This glucoside has already been described by Tieman and Will. (*Bul. Soc. Chim.*, **46,** *500.*) M. L.

Constitution of the Nitro-Compounds of the Fatty Series. P. ALEXEYEFF.

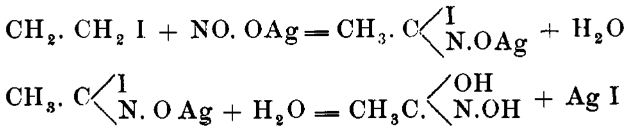
According to Kissel, nitroethane is acetohydroamic acid $(CH_3 CO) HN. OH$.

The author, who had at first accepted this view, now thinks that nitroethane must be regarded as an isonitrosoethyl alcohol.



$$\mathrm{CH_3.\,C}\begin{matrix}\diagup \mathrm{OH} \\ \diagdown \mathrm{N\text{-}OH}\end{matrix}$$

Its formation can be explained as follows:



$$\mathrm{CH_2.\,CH_2\,I + NO.\,OAg = CH_3.\,C}\begin{matrix}\diagup \mathrm{I} \\ \diagdown \mathrm{N.OAg}\end{matrix} + \mathrm{H_2O}$$

$$\mathrm{CH_3.\,C}\begin{matrix}\diagup \mathrm{I} \\ \diagdown \mathrm{N.\,O\,Ag}\end{matrix} + \mathrm{H_2O = CH_3C.}\begin{matrix}\diagup \mathrm{OH} \\ \diagdown \mathrm{N.OH}\end{matrix} + \mathrm{Ag\,I}$$

(*Bul. Soc. Chim.*, **46**, *266.*) M. L.

A Physical Property of α-triphenylguanidine. H. Giraud.

This body, prepared from diphenylsulphourea and aniline, melts at 143°, and remains in surfusion. If, while melted, it is cooled rapidly the viscidity increases, and in time the substance becomes solid without appearance of crystallization. This solid body, heated slowly, becomes soft, melts without having a definite melting point, and finally passes to the crystalline state. This transformation is instantaneous at 160°. On contact with a liquid it becomes opaque and falls into powder. The better the solvent employed the more sudden the action. (*Bul. Soc. Chim.*, **46**, *506.*) M. L.

Transformations Produced in Suint Waters. A. Buisine.

The quantity of carbonate of potash in these waters varies with the age and the concentrations of the liquids. The author attributes these changes to the work of living organisms. The fatty acids eliminated by the sheep are not present as potassium salts, but as more complex forms that are destroyed by the action of the ferment. If the waters are concentrated the fermentation stops at the formation of volatile fatty acids, under the influence of an anaerobic ferment ; but if the solution is dilute and in the contact with air an aerobic ferment operates and the chemical action is more energetic, the fatty acids being converted into water and CO_2. (*Bul. Soc. Chim.*, **46**, *497.*) M. L.

Investigations on the Composition of Carotin, its Chemical Nature and Formula. A. ARNAUD.

Carotin oxidizes in the air, especially when in solution. Fresh carotin is free from oxygen and forms an iodine salt, $C_{26}H_{38}I_2$. Its formula is $C_{26}H_{38}$. It crystallizes in rhombic prisms with metallic lustre, appearing blue by reflected light and orange red by transmitted light. It gives a blue color with sulphuric acid. Huseman's carotin was an oxidation product. (*Comptes. Rend.*, **102**, *1119.*) R. W. M.

ABSTRACTS

RELATING TO FATS AND ALLIED SUBSTANCES.

By R. W. MOORE.

Determination of Glycerol Produced by the Saponification of Fatty Oils. A. H. ALLEN.

Ten grams of the oil are treated with 4 grams KOH in 25 c.c. of water in a bottle securely closed with a rubber stopper and heated on the water-bath until saponified. The soap is decomposed and the glycerol determined in half the liquid by Benedekt's method. (*Analyst*, **11**, *52.*)

New Method for Analysis of Milk. M. A. ADAMS.

Five c.c. of milk are run into a 30 c.c. beaker and absorbed by a tared coil of blotting paper. The amount of milk taken up is then determined by again weighing the beaker. The paper coil, resting dry end downward, is then dried and exhausted in a Soxhlet apparatus. The fat is obtained by driving off the ether and weighing the residue, and the solids not fat by again weighing the coil. The fat in this way is completely extracted, and the solids not fat dry without difficulty. Owing to the more perfect drying, the solids not fat are always lower and the fat somewhat higher. The total is somewhat lower than in other methods. The coils are made of white "demy blotting," 2½ in. wide and 22 in. long. (*Analyst*, **10**, *46.*)

Determination of Milk Sugar in Milk. C. W. STEPHENS.

A six or eight per cent. solution of milk is treated directly with Fehling's solution and the sugar determined either volumetrically or gravimetrically. (*Analyst*, **10**, *32*.)

Determination of Rosin in Soaps and Fats. A. GRITTNER and J. SZILASI.

The method of Gladding is only applicable in the case of soaps when they contain no free fatty acids. In this case the soap is dissolved in 80 % alcohol, neutralized with ammonia and precipitated with calcium nitrate. Stearic and palmitic acids are thrown down as calcium salts, while a part of the oleic acid remains in solution with the rosin. The oleic acid is separated as a silver salt from the rosin by means of ether. (*Chem. Ztg.*, **10**, *325*.)

On the Determination of the Specific Gravity of Butter and Tallow at 100°. WOLCKENHAAR.

The author has tested the butter areometer for determining the specific gravity of butter, and has found that the figures given vary from those given by a Westphal balance. Six experiments on butter with the Westphal balance gave from .901 to .904 ; with the areometer .867 to .869. The specific gravity of tallow by the balance was .893 to .894 ; by the areometer .860.

This occasioned a series of experiments by Koenig (*Repert. Anal. Chem.*, **5**, *278*), which show that the data given by the areometer agree with those of a Westphal balance adjusted with water at 15°. (*Repert. anal. Chem.*, **5**, *236*.)

Use of Acetic Acid in Milk Analysis. W. JOHNSTONE.

The author claims that the use of acetic acid does not affect the accuracy of the analysis. Milk sugar is not decomposed by prolonged heating at 100° or for 30 minutes at 108°. The fat at first increases, but subsequently decreases in weight, due to loss of insoluble acids. (*Analyst*, **11**, *32*.)

Oxidation of Pure Myristic Acid with Nitric Acid. H. NORDLINGER.

The acid was heated in a retort with nitric acid (Sp. gr. 1. 3) until the mass became homogeneous and no more red vapors were given off. The products of oxidation were adipic, succinic, suberic and oxalic acids; also glutamic, pimetic and carbonic acids. (*Ber.*, **19**, *1893.*)

Preparation of Soap. F. EICHBAUM.

To prepare a curd soap from strongly smelling fish fats, 400 kilos of the fat are warmed with 25 kilos crude palm oil and 250 kilos of 12° lye. The whole is then boiled carefully with more 15° lye until clear and 20° lye is added. 50 kilos of rosin are then added and 40 kilos of 20° lye, and the whole is boiled until combination is complete, when the soap is salted out. The dark under-lye is drawn off, and some clear under-lye from curd soap added. The whole is then boiled again until free from foam. (*Seifenfabrikant, 1886, 104.*)

Purification of Mineral Oil with Sulphurous Acid. FAHLBAUM.

The oil is gently distilled with anhydrous sulphurous acid, whereby the color is destroyed and the sulphur compounds decomposed with liberation of H_2S. (*Ding. Pol. Jour.*, **261**, 447.)

Action of Potash on Resin. E. J. MILLS.

The resin is treated with an excess of standard alcoholic potash, well shaken and allowed to stand for eighteen hours, when the excess of potash is titrated back with hydrochloric acid, using phenol phthalein as an indicator. The author gives a number of figures on different resins. (*Jour. Soc. Chem. Ind.*, **5**, *221.*)

Cottonseed Oil. JAMES LONGMORE.

This paper describes a new process for refining the crude oil, which is claimed to be more economical. (*Jour. Soc. Chem. Ind.*, **5**, *200.*)

Abstracts of American Patents Relating to Chemistry.

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

July 20th, 1886.

345,714.—Composition for the manufacture of soap. W. J. Menzies.

Consists of granulated potassium-sodium hydroxide.

345,715.—Manufacture of soap by the cold process. W. J. Menzies.

345,753.—Process of photographic printing. R. B. West.

The paper is prepared with potassium bichromate and mercuric chloride. The print is then treated with a bath composed of gallic acid, pyrogallol, ferrous sulphate, sodium hyposulphite, ammonia alum and potassium bitartrate. After this the print is subjected to a bath composed of bromine, potassium bromide and water. Finally it is subjected to the action of a bath consisting of potassium nitrate and lead nitrate.

345,805.—Process for the manufacture of terro-metallic paving stones, etc· L. Promoli.

Brick powder or sand is added to clay and formed into bricks, which are burnt.

345,810.—Manufacture of sugar. F. Schwengers.

Molasses or sugar syrups are dissolved in methyl alcohol or in a mixture of ethyl and methyl alcohol, and the salts of the molasses are separated by the addition of an alcoholic solution of oxalic acid.

345,827.—Process of tanning hides. J. S. Billwiller.

The prepared hides are first treated with a solution of aluminium sulphate, then with a solution of sodium bicarbonate, and finally with tannic acid.

345,847.—Composition for plastering, filling, wall ornaments, etc. W. Horstmann.

Consists of whiting, water, dextrin, boiled linseed oil, and a drier.

345,872.—Method of bleaching animal fats and oils.. W. B. Allbright.

Oils are treated at ordinary temperatures with fullers' earth.

345,901.—Naphthol-black color compound. M. Hoffman and A. Weinberg.

345,926.—Method of preparing starch from grain. J. C. Schuman.

345,927.—Method of preparing starch from grain. J. C. Schuman.

345,938.—Process of photographic printing. R. B. West.

Paper is sensitized with potassium bichromate and mercuric chloride. The print is developed with a solution containing pyrogallol, gallic acid, a soluble ferrous salt and sodium hyposulphite, and then bleached with a solution of calcium hypochlorite and phosphoric acid. Finally it is toned with a solution of lead nitrite and mercuric chloride.

345,968.—Retort for calcining bone black. A. C. Harrison.

345,980.—Process of treating natural gas, to convert it into illuminating gas. J. McKay.

346,022.—Sulphonated purple dye-stuff from benzyldiphenylamine. H. Bull.

The condensation product of tetramethyldiamidobenzophenone and benzyldiphenylamine.

346,024.—Fertilizer. H. H. Colquitt.

Consists of the raw kernels of cottonseed combined with phosphorite rock or calcium phosphate. W. R.