"heat of formation,"* it will be noticed that this classification does not accord with the older classification, in which the metals were arranged in order of the facility with which they decompose water and acids with disengagement of hydrogen. From this list it is inferred, that the "heat of formation" of hydrochloric acid, is exceeded by that of the chlorides of lead, copper, mercury and silver. Hence, hydrochloric acid gas ought to be decomposed by all these metals. Lead readily decomposes it ; mercury does the same in a sealed tube at 400°, but a dissociation takes place. Copper and silver decompose it under certain conditions. Sulphides, bromides and iodides still further confirm the theory.

On the Reciprocal Displacements between Oxygen, Sulphur, and the Halogens combined with Hydrogen, BERTHELOT.—The mutual replacements between oxygen, chlorine, bromine and iodine, united either to metals or metalloids, are regulated by their heat of combination. From an accompanying table it is noted that :

I. Chlorine should displace bromine and iodine, and bromine should displace iodine.

II. Chlorine and bromine should displace sulphur in H_2S.

III. Iodine should displace sulphur in H_2S in solution, but sulphur should decompose gaseous hydroiodic acid.

IV. Oxygen should displace sulphur in H_2S.

V. The thermic theory indicates that an equilibrium ought to exist between chlorine and oxygen.

VI. Oxygen should displace bromine in hydrobromic acid.

VII. Oxygen should displace iodine in hydroiodic acid.

Experiments completely confirm the theory with actual facts.

Idem, No. 8.

Preparation of Malonic Acid, E. GRIMAUX and J. TSCHERNIAC.—Cyanacetic acid is first obtained by dissolving 250 gms of chloracetic acid in 500 gms of water, and saturating the solution with anhydrous carbonate of soda ; to this solution is added a hot solution of 200 gms cyanide of potassium in 200 gms of water, and after cooling, this is saturated with sulphuric acid. Ether is then added, and the solution, distilled on a water bath, leaves a syruppy residue of cyanacetic acid. To convert this into a malonic acid, it is treated on a water bath in a flask with hydrochloric acid, a suitable

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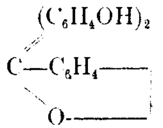
* Annuaire du Bureau des Longitudes, pour 1879, p. 540.

condensor being provided, and a current of dry hydrochloric acid gas being run into the flask. The contents of the flask, after being distilled to dryness, are dissolved in ether, and the ethereal solution, distilled, leaves crystals of malonic acid. By this process 34 per cent. is obtained from the quantity originally taken.

On the Formation of Aurine, PH. DE CLERMONT and J. FROMMEL.—Aurine is made by the authors in accordance with the following equation:

$$CO_2 + 3C_6H_5OH = 2H_2O + C_{19}H_{14}O_3.$$

Experiments made, proved that neither carbonic oxide nor carbonic anhydride enter into this combination directly. It was, however, proved that nascent CO_2, from CO and O, furnished a large quantity of aurine, and the following expanded formula was assigned to it:



$$\begin{array}{l}\quad(C_6H_4OH)_2\\ C—C_6H_4—\\ \quad O—\end{array}$$

On the Role of Auxiliary Acids in Etherification, BERTHELOT.—This article, which is not suitable for abstraction, consists of a discussion, both from a chemical and a thermic point of view, of the action of sulphuric, hydrochloric and nitric acids, in bringing about the formation of ethers.

On Certain Catalytic Phenomena caused by Viscosity, A. GUYARD.—Viscosity, like porosity, modifies certain chemical reactions. That this is true, is proved especially when glycerine is added to solutions of salts of the metals. It prevents the precipitation of chromium from a solution of chloride of sesquioxide, by ammonia; and of ferric hydrate, by the same reagent. In some cases, the addition of a small quantity of acid, not enough to neutralize the alkali, will induce the ordinary reaction. Frequently the same result is reached by dilution with water. A great variety of reactions may be mentioned, whose anomaly can only be explained on the supposition that they are produced by viscosity. There is, then, a very close connection between this physical property and chemical forces. Unsuccessful attempts have been made to apply these facts to chemical analysis.

Idem, No. 9.

On the Combinations of Hydrogen Phosphide with Cuprous Chloride, and its Determination in Gaseous Mixtures, J. RIBAN.—Hydrogen phosphide combines with cuprous chloride, dissolved in hydrochloric acid, forming several compounds, one of which is of definite composition, and well crystallized. This is made by passing hydrogen phosphide gas (made by heating phosphorus with milk of lime, and subsequently washing with hydrochloric acid), into an artificially cooled solution of cuprous chloride. Long, colorless needles are formed, which correspond to the formula $\left.\begin{matrix}Cu_2''\\H_6\end{matrix}\right\}P_2Cl_2$. This is called chloride of cuproso-diphosphonium. An excess of hydrogen phosphide passed into the solution of cuprous chloride, as above, causes the precipitate, at first formed, to dissolve. This solution of hydrogen phosphide gas in cuprous chloride, is recommended as a convenient source of this gas. It may at any time be set free, by heating and washing the gas to remove hydrochloric acid. This gas is not inflammable, but it is advisable to fill the apparatus with CO_2, or hydrogen gas, before performing the experiment. This fact of absorption of hydrogen phosphide, is utilized by the elaboration of a method by which this gas can be quantitatively determined with great accuracy.

Bromide of Tetrallylammonium and Triallylamine, H. GROSHEINTZ.—Bromide of tetrallylammonium can be prepared in a large quantity, in a comparatively short time, by passing a current of ammonia gas into an alcoholic solution of bromide of allyl. The crystalline mass that is soon deposited, may be purified by solution in absolute ethereal alcohol and subsequent evaporation. Triallylamine may be readily prepared, by distilling rapidly, in the presence of a large excess of recently melted potash, the crude bromide of tetrallylammonium obtained above. The distillate separates, into two layers, the upper being triallylamine, and the lower, a saturated aqueous solution of the same. Triallylamine, thus prepared, is an oily liquid, lighter than water, very alkaline, and possessing a very disagreeable, penetrating odor.

On a New Ferment of Urea, P. MIQUEL.—New evidence of the presence of the *torula ammoniacale* in the air, has been collected since the publication of the last paper.* The author has discovered in sewage, another organism which also has the power of changing urea into carbonate of ammonia. This *bacillus* has nearly the same physiological function as the microscopical organism above-mentioned.

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* Bull. Soc. Chim., **29**, 387.

Idem, No. 10.

Note on an Ammoniacal Oxyferrocyanide of Copper, A. Guyard.—Ammoniacal sulphate of copper is precipitated by ferrocyanide of potassium, and this precipitate, after being washed, is spread upon a porcelain plate, and heated. Between 150° and 170° it loses cyanogen and ammonia, and absorbs oyxgen, acquiring a rich violet color. This ammoniacal oxyferrocyanide of copper, heated to 200°, suffers another change, forming another oxyferrocyanide, more highly oxidized than the first. At 250° it undergoes still another change, and becomes green. These bodies are quite stable, and attempts have been made to apply them to practical use in dyeing, but thus far without success.

On a Special Law Applicable to Metallic Ferrocyanides, A. Guyard.—Those metallic hydrates that form soluble salts, can be divided into two groups with reference to ammonic hydrate :

I. Those oxides soluble in ammonia or the ammoniacal ammonia salts, and, hence, soluble in ammoniacal ammonic tartrate, and in which ferrocyanide of potassium produces a precipitate.

II. Those oxides insoluble, or very slightly soluble, in ammoniacal ammonia salts, but, on the contrary, soluble in ammoniacal ammonic tartrate.

In the latter, the ferrocyanides are perfectly soluble in ammoniacal tartrate of ammonia. The elements are arranged in a table according to this law.

Idem, No. 11.

On the Action of Ammonia Salts upon Some Metallic Sulphides, and the Application of these Facts to Analysis, Ph. De Clermont.—Sulphides of bismuth, cadmium, copper or platinum, are not changed by being boiled with a solution of an ammoniacal salt. Mono and bisulphide of mercury are not changed. Trisulphide of antimony is completely decomposed into volatile sulphide of ammonia and chloride of antimony. Bisulphide of tin changes to stannic acid. Monosulphide of tin reacts in a similar manner, being changed into protoxide. Those metals which, in an acid solution, are not precipitated by hydrogen sulphide, but which ammonic sulphhydrate changes either into sulphides or insoluble oxides, are especially acted upon by ammoniacal salts. Sulphide of manganese changes to soluble chloride ; sulphide of iron to protochloride. Sulphides of nickel and cobalt change slowly to chlorides ; sulphide of zinc resists still more the action of chloride of ammonium, but is dissolved by prolonged boiling. It is a well-known fact, that alumina and oxide of chromium, precipitated by ammonic sulphhydrate, are insoluble in ammonia salts. From these facts, a method of separation of these metals has been devised.

Observations on Sulphurous Baths, PH. DE CLERMONT and J. FROMMEL.—It is possible, according to recent observations, that the efficacy of some mineral springs may be, to a certain extent, proportional to the electric currents developed in them. Monosulphides produce stronger currents than polysulphides. Some physicians have had better success by substituting the former for the latter. Experiments proved that the quantity of hydrogen sulphide disengaged by the polysulphides, was, to that disengaged by the protosulphides, as 2 to 1. The polysulphide being less efficacious, from a medical point of view, and its electro-motive force being less, it is reasonable to conclude that the quantity of hydrogen sulphide that a water contains, is not proportional either to its therapeutic action, or to the intensity of the electric current.

On Scandium, P. T. CLEVE.—The mineral gadolinite contains only a very small quantity, probably not over 0.02 per cent. of oxide of scandium. Keilhanite contains about 0.04 per cent. of the oxide.

Idem, No. 12.

Preparation of Methyl Formic Ether and Pure Methyl Alcohol, CH. BARDY and L. BORDET.—The method described yields methyl formic ether in large quantities, and is comparatively easy of execution. Into a flask containing formate of soda, dried at 130–140°, is poured, agitating briskly, a mixture of methyl alcohol and aqueous hydrochloric acid; the three bodies being in about equivalent proportions, with slight excess of methyl alcohol. After distillation, the distillate is treated with carbonate of soda, and rectified several times. The formate of methyl thus formed is perfectly pure, and boils at 32°. Pure methyl alcohol can be made from this, by distilling with caustic soda, with certain precautions. The formate of soda, which remains after distillation, can be used for a second purification of methyl alcohol. Lime may replace soda in the above operations.

Pseudo-uric Acid, E. GRIMAUX.—Equal parts of uranile and urea are heated for some hours to 180°; the mixture is treated with boiling water, and upon cooling, pseudo-urate of ammonia separates. To these crystals, dissolved in soda, carbonic anhydride is added, which gives a precipitate of pseudo-urate of sodium. Hydrochloric acid produces in the aqueous solution of this salt, a white precipitate of pseudo-uric acid ($C_5H_6N_4O_4$). If pseudo-uric acid is treated with sulphuric acid at 150°, the molecule is decomposed into ammonic sulphate, carbonic anhydride, and a yellow substance, proved to be xanthinine. This reaction takes place in accordance with the reaction:

$$C_5H_6N_4O_4 + H_2SO_4 = C_4H_3N_3O_2 + CO_2 + SO_4HNH_4.$$

On a New Method of Making Glycocol by Means of Nitracetic Ether, DE FORCRAND.—Bromacetic ether is acted upon by nitrate of silver, as follows:

$$C_4H_4(C_4H_2[HBr]O_4) + AgNO_4 = AgBr + C_4H_4(C_4H_2[NO_4H]O_4).$$

The nitracetic ether is then separated by fractional distillation, and purified. The product is reduced with hydrochloric acid and tin, and the tin precepitated with hydrogen sulphide. From the filtrate, chlorhydrate of glycocol separates out. The reaction is:

$$C_4H_4(C_4H_2[NO_4H]O_4) + 3H_2 = C_4H_4(C_4H_2[NH_3]O_4) + 2H_2O_2.$$

Chlorhydrate of glycocol is treated with moist oxide of silver, and the crystals of glycocollate of silver obtained after filtration and dessication, are dissolved and treated with hydrogen sulphide, thus setting the glycocol free.

On the Action of Ethylene upon Benzine in the Presence of Chloride of Aluminum, M. BALSOHN.—By the long continued action of benzine on ethylene and chloride of aluminum, and fractional distillation, the bodies obtained were ethyl benzine, boiling at 135–137°; diethyl benzine, boiling at 179–185°; and triethyl benzine, boiling at 214–218°. Bodies having a still higher boiling point are also produced in small quantities.

On the Active Principle of Insect Powder, G. DAL SIE.—The author has paid special attention to pyrethrum, from Dalmatia, and has determined the active principle to be an acid, supposed to exist free, as it can be easily volatilized. It contains also an oily acid, having an aromatic odor, and a resinous substance similar to a glucoside.