On the Relation Existing between the Chemical Composition and the Mechanical Properties of Steels, V. DESHAYES, Eng. at Terre-Noire.—Not suitable for abstraction. An elaborate article, giving complete details in regard to this important subject.

Idem, No. 5.

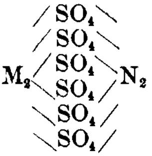
Note upon a Recent Work of M. B. Aronheim, P. SCHUTZENBERGER.

On the Chlorostannates of the Rare Earths, P. T. CLEVE. — The following have been prepared :

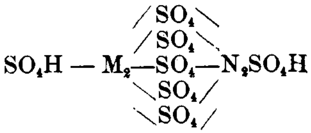
$2La_2Cl_6, 5SnCl_4, 45H_2O.$
$Ce_2Cl_6, 2SnCl_4, 18H_2O.$
$Di_2Cl_6, 2SnCl_4, 21H_2O.$
$Y_2Cl_6, 2SnCl_4, 16H_2O.$

The composition of the chlorostannates is thus shown to be perfectly analogous to that of the chloroplatinates.

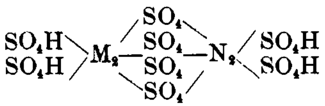
Researches upon Sulphates, A. ETARD.—Most mixed sesquisulphates can be represented by the general formula $M_2(SO_4)_6N_2$. Only one salt of the type, $2[M_2(SO_4)_3]N_2(SO_4)_3$, has been observed. According to the theory of the author, by heat the acid salt changes as follows :



Neutral Salt.



First acid salt.



Second acid salt.

Some of the salts made are :
Acid double sulphate of iron and alumina—
$[Al_2(SO_4)_6Fe_2\ SO_4H_2].$

Acid sesquisulphate of iron and chromium—
$[Cr_2(SO_4)_6Fe_2\ SO_4H_2].$

Sesquisulphate of aluminum and manganese—
$2[Al_2(SO_4)_3]Mn_2(SO_4)_3.$

On the Heat Disengaged by Combining Carbonic Oxide with Other Bodies, M. BERTHELOT.—Carbonic oxide is studied in reference to its combination with oxygen, chlorine and sulphur.

On the Specific Heat and Heat of Fusion of Gallium, BERTHELOT.—An ingot of 34 grammes was experimented with. The specific heat of liquid gallium is 0.0802; of the solid, 0.089. The heat of fusion may be determined by plunging some crystals into the melted gallium. The mass immediately crystallized, and the evolved heat was measured at 13°, and it is sensibly the same between 0° and 30°; the mean was + 19.11 units. The atomic weight, as determined by L. Boisbaudran, is 69.9, hence we have the products, $69.9 \times .0802 = 5.59$ for the liquid, and $69.9 \times .079 = 5.52$ for the solid. These numbers, it will be noticed, agree well with the determinations of aluminum and glucinum already made.

Reciprocal Displacement between Weak Acids, BERTHELOT.—Two weak acids in contact with a base, cause a decomposition, this being regulated by the partial state of decomposition of each of the two salts considered separately, which depends in turn on the proportion of water and of the corresponding acid. When a salt of such an acid comes in contact with an acid opposed to it, decomposition by water takes place in proportion as the quantity of the base existing free in the solution, is saturated by the other acid; and that to just such an extent as there is equilibrium between the two salts and the water which tends to decompose each of them. The total thermic effect is then the resultant of these two phenomena, namely: a disengagement of heat due to the combination of the acids with the free base (chemical energy), and an absorption of heat due to the decomposition produced by solution.

On the Rotatory Power of Styrolene, BERTHELOT.—Some confusion seems to result from the indiscriminate use of styrol as applied to the volatile oil, and to the purified hydrocarbon $C_{16}H_8$. Care should be exercised to distinguish this latter, which, of itself, has a definite rotatory power as styrolene.

Idem, No. 6.

On the Determination of Total Nitrogen in Fertilizers, A. RÉMONT.

Manufacture of Crystallized Chromate of Baryta, LEON BOURGEOIS.—The method consists in melting together two equivalents of chloride of barium with one equivalent of potassic chromate, and one equivalent of sodic chromate, and cooling slowly, and finally dissolving out the chlorides from the mass with hot water. The crystals of neutral chromate of baryta thus obtained, consist of right prisms with a rhombic base, and their color varies between yellow and green.

On some of the Hydrocarbons that are formed by the Action of Chloride of Methyl upon Toluene in the Presence of Chloride of Aluminum, E. ADOR and A. RILLIET.—Some of the conclusions reached, are: 1st. In reference to xylenes; these contain only a very small quantity of orthoxylene, and by the action of chloride of methyl upon benzine in the presence of chloride of aluminum, the product is almost entirely isoxylene mixed with a little paraxylene.

2d. In reference to trimethyl benzines, pseudocumene is formed on account of the presence of metaxylene, in greater proportion than mesitylene. The small quantity of paraxylene found is not sufficient of itself to account for the presence of so large a proportion of pseudocumene as is found. The absence of a third trimethyl benzine as well as of orthoxylene, as has been previously shown, points to the possible fact that these bodies are more liable to react with chloride of methyl, and to be very quickly transformed into pentamethyl and hexamethyl derivatives.

3d. In reference to tetramethyl benzines, it is noted that the unknown bodies sought were not obtained, but it is proposed to make them by other methods.

Bromocitraconic Acid, EDME BOURGOIN.—Dibromopyrotartaric acid may experience two modes of decomposition. 1st. Boiled for some time with an alkaline solution, it loses carbonic acid and forms, as M. Cahours has shown, an isomeric form of dibromobutyric acid:

$$C_{10}H_6Br_2O_8—C_2O_4=C_8H_6Br_2O_4.$$

2d. Treated in the cold with oxide of silver, it loses one molecule of hydrobromic acid, and becomes bromocitraconic acid:

$$C_{10}H_6Br_2O_8 - HBr=C_8H_5BrO_8.$$

The acid described by M. Cahours, and bromocitraconic acid, are both readily decomposed, the first parting with hydrobromic acid, and the second with carbonic acid; each then becomes the same body, namely, the bromocrotonic acid described by M. Kekulé.

On the Relative Affinities and Reciprocal Displacement of Oxygen and of the Halogen Elements, BERTHELOT.—This theory is elucidated in a very careful and complete manner. It is shown that the order of affinity and of reciprocal displacement of the halogens and oxygen, either united to metals or metalloids, can be foretold, if determinations have been made of the quantities of heat disengaged in the formation of the combinations of the metals and metalloids with oxygen and with the halogens. The demonstration depends partly upon the numerical comparison of quantities already known to science, and partly upon the determinations made by the author in regard to the heat of formation of bromides and iodides of alumina, tin, arsenic, &c. By comparing the reactions of the halogens and oxygen upon the different metals, it will be seen that the reciprocal displacements between iodine and oxygen particularly, do not depend on type or atomic formula. The quantity of heat disengaged by the combination of each metal with the element, taken in equivalent weight, is the key to the order of reciprocal displacement. If the heat disengaged in formation is known, the qualities of the reaction will be known, provided, of course, that the appropriate state of existence, solid, liquid, &c., is known, and the degree of stability or dissociation belonging to the body at each temperature.

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Abstractor, J. P. BATTERSHALL, PH. D.

I. Determination of Nitrogen in the Analysis of Agricultural Products, S. W. JOHNSON and E. H. JENKINS.

II. On a Method for the Determination of Phosphoric Acid, by the same.

The above papers are noticed elsewhere.

III. Examination of the North Carolina Uranium Minerals, F. A. GENTH.—In this paper the mineralogical and chemical character of several of the uranium minerals previously mentioned by Prof. W. C. Kerr (Am. Jour. Sc. [3], xiv, 496), is described. The minerals examined were obtained from the Flat Rock mine, Mitchell Co., N. C. The following are the results of the author's investigation:

Uranotil occurs as a pale yellow coating, surrounding the gummite. The N. C. variety is amorphous; H=2.5; Sp. g.=3.834; sol. in HCl. The analysis gave figures nearly corresponding to the formula $Ca_3(UO_2)_6Si_6O_{21}+18H_2O$.

Gummite occurs in amorphous nodular masses; H=3; Sp. g.=4.840; color, yellow to orange-red; sol. in acetic acid. The author regards the mineral as principally a calcic uranate ($CaO.2U_2O_3+6H_2O$),