On account of the rapidity with which the explosion of the fulminates takes place, they are not employed for charging firearms.

A remarkable composition, containing fulminate of mercury and collodion (gun cotton dissolved in ether), together with several other explosive compounds, has however been of late prepared for this purpose by Messrs. Gersheim and Winnivarter, of Vienna, which deserves the attention of those who take an interest in matters of this kind. This mixture does not explode unless submitted to powerful percussion: it may be handled with perfect safety. The explosion, although extremely powerful, is sufficiently slow for the propulsion of the bullet. Lastly, the presence of collodion protects the other constituents from the action of moisture.

The identity of composition of the fulminates with the cyanates and cyanurates, substances from which their properties so essentially differ, has naturally attracted the attention of chemical enquirers. They have endeavoured to account for this remarkable difference in a manner similar to the mode of explanation suggested for the different deportment of cyanic and cyanuric acids. A closer examination of the several fulminic salts has also in this case elucidated the question. On adding potassa to a solution of fulminate of silver a brown precipitate of protoxide of silver is produced. It is found, however, that by no means the whole amount of silver is thus precipitated; half of it remains in solution, which on evaporation furnishes a crystalline salt, containing both silver and potassium. The simplest expression into which the analysis of this compound can be translated is the formula

$$Ag.\ K\ C_4\ N_2\ O_4 = Ag\ K\ Cy_2\ O_4.$$

Analogous compounds are formed by treating fulminate of silver by soda or baryta, the existence of which naturally leads to the assumption that fulminic acid is a bibasic acid, and that the composition of fulminate of silver itself must be represented by the formula

$$Ag_2,\ Cy_2\ O_4.$$

Chemists have not yet succeeded in preparing the hydrogen compounds corresponding to the silver salt that is free fulminic acid. If the fulminate of potassium and silver which I have just now mentioned, be treated with nitric acid, the potassium is eliminated in the form of nitrate, and replaced by hydrogen, an acid silver salt of the formula

$$Ag\ H\ Cy_2\ O_4$$

being produced. The last eq. of silver, however, cannot be removed without entirely destroying the compound, which splits into hydrocyanic acid and a variety of products not yet sufficiently examined. If fulminic acid could be separated—and its isolation after what has been experienced in the case of cyanic acid, appears by no means improbable—it would have the composition

$$H_2\ Cy_2\ O_4.$$

This formula places fulminic acid between cyanic and cyanuric acids, as shown in the following table, and satisfactorily accounts for the dissimilarity of properties exhibited by the salts of the three isomeric acids.

Cyanic acid = $H\ Cy\ O_2$ monobasic.
Fulminic ,, = $N_2\ Cy_2\ O_4$ bibasic.
Cyanuric ,, = $N_3\ Cy_3\ O_6$ tribasic.

The fact that the fulminates are produced by processes so essentially different from those used in preparing the cyanate and cyanurates, has induced some chemists to doubt the actual existence of so close a relation between these several acids. It is true neither cyanates nor cyanurates have hitherto been converted into fulminates; but experiments performed not long ago by Dr. Gladstone have proved that the decomposition of fulminates invariably gives rise to the formation of members of the cyanic series, among which sulpho-cyanide of ammonium and urea may be specially mentioned. The latter, one of the most interesting compounds of cyanic acid, will claim our particular attention in the next lecture.

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