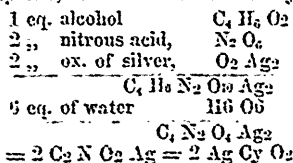


and that in this process exactly the reverse occurs of what happens in the formation of the solid chloride of cyanogen.

Cyanic acid as obtained by this method, has a very transient existence. A few minutes after its preparation, it enters into a sort of ebullition and then suddenly solidifies into a white porcelain-like solid, perfectly insoluble in water, and which has again the same percentage composition as cyanic and cyanuric acid, from both of which it differs. It is another polymeric modification of the same molecular group, and is called cyanelide, or insoluble cyanuric acid. In what manner, however, the molecules are arranged in this compound it would be difficult to say, inasmuch as cyanelide is a most indifferent substance, producing no kind of combination, and yielding as the sole products of decomposition, cyanic or cyanuric acid.

But the list of polymeric compounds is not completed by cyanelide. There is still another—perhaps the most interesting of all—to which I have to call your attention for a few moments, and which, as you will see directly, is produced by a perfectly different process. Under the name of Howards and Brugnatelli's fulminating compounds, two salts have long been known, which are produced by the action of nitrous acid upon alcohol, in the presence of mercury or of silver. These substances, as indicated by their name, are explosive in the extreme. Their composition was utterly unknown about 25 years ago, when Liebig, at that time still under the guidance of Gay Lussac, embarked in their investigation. The result of the celebrated inquiry of these two philosophers, in which Liebig's name appeared for the first time before the scientific world, was, that these substances are closely related to the cyanates and cyanurates, that, in fact, the fulminating silver has exactly the same percentage composition as cyanate and cyanurate of silver. But let us first see how this substance is produced. This beaker contains a saturated solution of nitrate of silver in alcohol; into this solution pass the vapour of nitrous acid. As it is disengaged by the action of nitric acid upon arsenious acid, you observe that it becomes turbid most instantaneously. The white crystalline powder which separates is fulminate of silver. The reaction is easily intelligible. Let us add together the elements of one equivalent of alcohol, two of nitrous acid, and two of protoxide of silver; thus by subtracting six equivalents of water, we arrive at a formula which, when divided by two, coincides with that of cyanate of silver:



The experiment which I have shown you will illustrate the formation of this compound. In practice, however, both the silver and mercury salts are obtained in a somewhat different manner. In this case the nitrous acid is furnished by the action of the nitric acid upon a portion of the alcohol. Fulminate of mercury, for instance, is made by dissolving one part of mercury in twelve parts of nitric acid (of sp. gr. 1.36) and adding this solution in a retort to eleven parts of spirits of wine (of 80 per cent). The heat of a water bath is sufficient to cause a most violent reaction, the details of which you will better understand after I have treated of alcohol. Suffice it to say that a portion of the alcohol is more or less oxidized, a variety of volatile products being formed, which are collected in the receiver.

The nitric acid, reduced to the state of nitrous, acts upon the remainder of the alcohol, and thus produces the salt. Both fulminate of silver and of mercury, but especially the latter, are used in the manufacture of percussion caps. The preparations of these salts has to be performed with the greatest precautions. The fearful catastrophe at Apothecaries' Hall, which caused the untimely end of Mr. Hennell, is still fresh in the memory of many.