On fulminating gold

M. Figuier

To cite this article: M. Figuier (1844) On fulminating gold, Philosophical Magazine, 25:167, 393-394, DOI: [10.1080/14786444408645021](https://doi.org/10.1080/14786444408645021)

To link to this article: <http://dx.doi.org/10.1080/14786444408645021>

Published online: 30 Apr 2009.

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powder is confirmed by the existence of a corresponding compound, which contains precisely twice as much stannic acid, and which of course is a bistannate of protoxide of gold.

This was prepared and analysed by Berzelius, and was found to consist of

		By expt
Six equivalents of peroxide of tin . . .	5610 or 68·45	68·46
One protoxide of gold .	2586	31·55
	<u>100·</u>	<u>100·</u>

Ann. de Ch. et de Phys., Juillet 1844.

ON FULMINATING GOLD. BY M. FIGUIER.

The author remarks, that there exist two different theories with respect to the constitution of fulminating gold; Proust, Berthollet and some other chemists having considered it as a pure and simple combination of ammonia and oxide of gold. M. Dumas, on the other hand, in a work published in 1830, has stated the opinion that this substance is a compound of one equivalent of azoturet of gold and two equivalents of ammonia; the azoturet of gold acting as an acid towards the ammonia.

M. Figuier is of opinion, that the theory of Proust and Berthollet is more in harmony with the facts of the case; protoxide of gold yields, like the auric acid, a detonating compound with ammonia; and we must then admit, adopting the opinion of M. Dumas, a new and corresponding azoturet of gold; hitherto, however, no compound whatever of azote and gold has been obtained.

Added to this, the fulminating compounds of gold at present known possess exactly the colour of the oxides which furnished them; the fulminating gold containing the protoxide, like the oxide itself, has a violet-blue colour; the fulminating gold, obtained by putting ammonia in contact with teroxide of gold precipitated by nitric acid from the aurate of potash, is, like the oxide itself, of an olive colour; lastly, that which is obtained by treating chloride of gold with ammonia is yellow, like the hydrated teroxide, separated cold by potash from a dilute solution of the chloride of gold, or like the same oxide precipitated by a weak acid from aurate of potash. The identity of colour of the oxides of gold, and their corresponding fulminating compounds, leads to the opinion that the oxide of gold enters in these compounds without altering its nature, and that they are all simple saline combinations of ammonia, in which the oxides act as acids.

M. Figuier insists principally on the fact, that the analyses of fulminating gold, containing auric acid, performed by M. Dumas, agree perfectly with this mode of regarding these compounds.

M. Dumas found the composition of fulminating gold prepared with auric acid to be $(\text{Au}^2\text{Az}) + \text{AzH}^3 + \text{H}^3\text{O}^3$; it is evident, however, that it may be stated more simply thus, $\text{Au}^2\text{O}^3 + 2(\text{AzH}^3)$, that is to say, as representing a sub-aurate of ammonia. Moreover fulminating gold, obtained with the chloride and ammonia, yielded M. Dumas by analysis,

Gold 74 in 100

Azote 9.5 in 100

These numbers are represented by the formula $\text{Au}^2\text{O}^3 + 2(\text{AzH}^3) + \text{HO}$, which represents the preceding compound as hydrated, and which requires

Gold 75 in 100

Azote 10 in 100

It can scarcely be doubted that this compound contains water.

To the above statements M. Figuier has made the following additions, which we translate at length :—

If to these considerations it be added, that the theory of M. Dumas was proposed at the period in which electro-chemical opinions were in highest favour, and that thus circumstanced he was guided especially by the analogy of the composition then attributed to the amalgam of ammonium (considered as a combination of azoturet of potassium and ammonia); and if it also be remarked, that analysis sufficiently agrees with this point of view, we shall probably be led to think that the ancient opinion of Proust and Berthollet is still the more probable one.

I am, however, continues M. Figuier, far from believing that these are the last words which will arise on this occasion. On all occasions, when the true nature of a compound containing ammonia is discussed, too much attention and reserve cannot be exerted. Some chemists will be tempted to see combinations of amide in these various kinds of fulminating gold, others may discover compounds obtained by the substitution of oxide of gold for the hydrogen of the ammonia; but I am of opinion that we ought not to be too much pre-occupied with these questions, which will be naturally resolved, with many others, when we possess more certain knowledge of the constitution of ammoniacal compounds.—*Ann. de Ch. et de Phys.*, Juillet 1844.

ON THE TEROXIDE OF GOLD. BY M. FIGUIER.

Analysis of the Protoxide of Gold.—After trying various modes of analysis, such as reducing the oxide by hydrogen, and decomposition by hydrochloric acid, the author ascertained that the mere action of heat on this oxide was the most exact and ready method of analysis. Having determined by previous trial the accuracy of this process in analysing the tritoxide of gold, the author repeatedly found the number indicated by theory within the first place of decimals, and this, moreover, confirms the accuracy of the atomic weight of gold as determined by Berzelius. The following is the simple method of analysis adopted :—an indeterminate quantity of the oxide, but amounting to nearly 15 grains, was put into a very narrow glass tube, one end of which was blown into a bulb. Allowance was made by calculation for the small quantity of air contained in the tube, and as its capacity never exceeded about 1.5 cubic inch, it will be seen that the error resulting from the uncertainty of the temperature will entirely disappear on account of the smallness of the quantity of the air. The