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A. Laugier

To cite this article: A. Laugier (1805) XLVIII. Extract from a memoir of Messrs. Fourcroy and Vauquelin upon the discovery of a new inflammable and detonating substance formed by the action of nitric acid on indigo and animal matters , Philosophical Magazine Series 1, 23:91, 255-257, DOI: [10.1080/14786440508562520](https://doi.org/10.1080/14786440508562520)

To link to this article: <http://dx.doi.org/10.1080/14786440508562520>



Published online: 18 May 2009.



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the oxides, and that when the combustible substance is again separated by heat, the oxides return to their unmagnetic state. That magnetic oxides cannot be distinguished from calcined oxides by their colour. I entertain a hope, however, that this subject may be found worthy of the accurate investigation of some other member of this learned society.

XLVIII. *Extract from a Memoir of Messrs. FOURCROY and VAUQUELIN upon the Discovery of a new inflammable and detonating Substance formed by the Action of Nitric Acid on Indigo and Animal Matters. By A. LAUGIER* *.

THE application of the nitric acid to vegetable and animal matters has produced, it is well known, a multitude of important discoveries. The disengagement of a part of the azot of animal compounds, and their conversion into oxalic acid, as observed by M. Berthollet, together with the discovery of the formation of ammonia and the prussic acid by M. Fourcroy, form a brilliant æra in the history of chemical science. The changes which organic compounds suffer by the action of nitric acid, which produces nine or ten different substances, themselves compounds, are so multiplied and various, that they excite the astonishment of chemists, and induce them to regard this action of the nitric acid as a rich mine to labour in : that it is still far from exhausted will appear from the discovery of two substances, hitherto almost wholly unknown, which form the subject of this memoir.

The most remarkable of these is produced by boiling nitric acid upon animal substances or vegetables containing azote. It is of a yellow colour, has an intensely bitter taste, and is distinguished by its property of inflaming and detonating with violence when exposed to a moderate heat.

M. Haussmann, by a memoir which appeared in the *Journal de Physique* (March 1788), where he relates some experiments on indigo with the acids, seems to have seen this substance. Although he confounds it with the oxalic acid, yet its properties are pointed out by him with sufficient accuracy ; its bitterness, its yellow colour, its solubility, and its precipitation by alkalies : but its principal property

* From the *Annales de Chimie*, No. 165.

of inflammation and detonation, of course its intimate and peculiar nature, has altogether escaped him.

The substance termed by Welter the bitter principle, in which he discovered a power of detonating, seems to be the same matter: but he has attributed this peculiarity to the presence of a portion of nitrate of potash.

The most convenient mode of procuring the substance in question, is to boil four parts of nitric acid, of 18 or 20 degrees strength, upon one part of powdered indigo of Guatimala, until its colour is destroyed, while the acid becomes yellow, and till there remains on the surface only a thin layer of resinous matter, which becomes firm by cooling. This is to be removed, the solution evaporated to the consistence of honey, and the residuum dissolved in hot water, and filtered. A solution of the potash of commerce is now to be poured into the liquor, when a number of small yellow crystals of a circular shape will appear, forming the inflammable substance.

The resin which has been separated may, by the addition of a new portion of acid, be also converted into the same yellow detonating substance.

If the process be stopped before the point mentioned, we obtain, instead of the detonating substance, a matter of a yellow colour and crystallized, but more soluble in water, and subliming in the form of white needles.

This substance exhibits all the characters of benzoic acid, altered by a portion of the resin. In all probability the continuance of the process decomposes or volatilizes this acid.

The orange colour of the detonating matter; its bitter taste; its solubility in boiling water, in alcohol, and, above all, in nitric acid; the very deep blood-red colour which it acquires on the application of alkalis, and which it communicates to the precipitate from the sulphate of iron; the tenacity with which it adheres to the benzoic acid which is formed along with it by the action of the nitric acid upon indigo; and lastly, its property of detonating strongly with a clear purple light when wrapped up in a bit of paper and struck with a hammer, are characters which sufficiently distinguish this substance from every other with which we are acquainted.

The celebrated authors of this memoir have ascertained that the detonating property of the new substance depends neither on the presence of nitric acid nor on that of ammonia; for concentrated sulphuric acid disengaged from it no
acid

acid vapours, and caustic potash no ammonia. They are, on the contrary, inclined to believe that potash has some share in the effect of detonation; since acids in which this substance has been digested contain traces of salts having potash as their base. When deprived of alkali this substance is more soluble in water, and crystallizes in elongated plates of a yellow colour and bitter taste, having acid characters: these crystals, if moistened with potash, resume their detonating property. The potash seems merely to render this substance more fixed; to favour the accumulation of caloric, and to determine, consequently, the combustion of the elements which compose it; viz. of the carbon, the hydrogen, and perhaps of the azote, by means of the oxygen which it also contains.

Indigo is not the only substance which furnishes this detonating composition; the muscular fibre treated with nitric acid presents the same phenomena; and it is probable that silk, wool, and other animal and vegetable matters containing azote will also furnish it.

The labours of Messrs. Fourcroy and Vauquelin present two very interesting facts. It follows, 1. That the benzoic acid may be formed from a multitude of different substances, which we were formerly ignorant of: 2. That animal and vegetable substances containing azote, if treated with the nitric acid, which takes from them a portion of carbon, of hydrogen, and of azote, give birth to a matter supersaturated with oxygen, and possessing the property of detonation. This substance, which the authors of the memoir have examined with care, appears to them to be a super-oxygenated hydro-carburet of azote.

XLIX. *Third Communication from Mr. W. PEELE, of Cambridge. On the Production of Muriates by the Galvanic and Electric Decomposition of Water.*

SIR,

To Mr. Tilloch.

I FEEL no little satisfaction at the interest my experiments have excited, and the favourable reception they have met with from you.

I have now the pleasure to inform you, that since my last letter, dated the 4th of June, (*Phil. Mag.* vol. xxii. p. 153.) having had some leisure time upon my hands, I have dedicated as much of it as my health would permit to

Vol. 23. No. 91. Dec. 1805. R the