

*Some Experiments on a Solid Compound of Iodine and Oxygen, and on its Chemical Agencies.* By Sir Humphry Davy, LL.D. F.R.S. Read April 20, 1815. [*Phil. Trans.* 1815, p. 203.]

The author having observed that when a compound of iodine and chlorine was poured into an alkaline solution, there occurred a precipitate of iodine combined with oxygen, inferred that iodine would in all probability decompose the gaseous compound of oxygen and chlorine; and upon trial found this presumption confirmed. For when iodine is exposed to euchlorine at the common temperatures of the atmosphere, there is an immediate action, and the formation of two compounds, an orange-coloured liquid consisting of chlorine and iodine, and a white powder composed of iodine and oxygen.

By the application of a gentle heat, the former is made to rise in vapour, and the latter then remains as a semi-transparent white solid. It has no smell, but a strong astringent sour taste. Its specific gravity is such that it sinks in strong sulphuric acid.

By heat, rather below the temperature of boiling oil, this compound is separated into its two constituents, iodine, which crystallizes on the sides of the vessel, and a gas which is found to be pure oxygen. The proportions of these products are such, that the author conceives it to consist of one portion of iodine with five doses of oxygen.

This compound has such affinity for water that it slowly deliquesces in a moist atmosphere, but remains unaltered when the atmosphere is dry. When dissolved in water, it first reddens and then destroys vegetable blues. By distillation the water rises in vapour, and by moderate heat leaves the solid substance unaltered.

The solution acts upon all metals, even upon gold and platina, and decomposes many metallic solutions, occasioning insoluble precipitates from solutions of lead or mercury, which are oxides of those metals.

It also forms compounds with all the earths that have been tried, (some of which are nearly insoluble in water,) and with alkalies it forms the same compounds that have formerly been made by other means.

This oxide also combines with acids, forming compounds which crystallize. These are intensely acid to the taste, they redden vegetable blues, and act strongly on all metals. The effects of heat upon them are various, according to the different nature of the acid with which they are combined. The nitrate and sulphate may be sublimed unaltered, but are liable to partial decomposition if too suddenly heated.

The oxalate is immediately and entirely decomposed by a gentle heat, and yields iodine and carbonic acid.

Since those acids which are obtained by the decomposition of such compounds are found to be in the state of hydrates, it is evident that water is a constituent of the crystalline products.

To the compounds of iodine, oxygen, and bases, the author formerly gave the name of oxyiodes; to the new compound of iodine

and oxygen, he now gives the name of oxyiodine; and to its compounds with water, oxyiodic acid. To this same compound M. Gay-Lussac has given the name of iodic acid, and for the salts he uses the generic term iodates; but to this the author objects, that hydriodic and chloriodic acids may each be as well entitled to the appellation of iodic acids as a generic name, and that the termination in *at* places those bodies, which he calls oxyiodes, in the common class of neutral salts, from which they differ in many respects; while the term oxyiodes expresses more definitely the nature of a combination, which has the closest analogy with the bodies termed hyperoxymuriates.

*On the Action of Acids on the Salts usually called Hyperoxymuriates, and on the Gases produced from them.* By Sir Humphry Davy, LL.D. F.R.S. Read May 4, 1815. [*Phil. Trans.* 1815, p. 214.]

M. Gay-Lussac having obtained, by the action of sulphuric acid on hyperoxymuriate of barytes, a peculiar compound, to which he gave the name of chloric acid, the author was induced to examine the action of this and other acids on the hyperoxymuriate of potash, and after various attempts, found the following process with sulphuric acid to be the best. A small quantity, not exceeding fifty or sixty grains, of the hyperoxymuriate are to be mixed with a small quantity of the acid in its concentrated state, and to be rubbed together by means of a spatula of platina till incorporated into a solid mass of a bright orange colour. This mass having been introduced into a small retort, is to be then warmed by immersion in water gradually heated, but kept below the boiling point. As the heat rises, an elastic fluid is emitted of a bright yellowish green colour. This gas may be received over mercury, on which it has no action; but it is rapidly absorbed by water. Its smell is aromatic, without any smell of chlorine. It destroys vegetable blues, without previously reddening them. By a temperature of  $212^{\circ}$  it explodes with more violence than euchlorine, expanding more, and producing more light. After the explosion the volume is found increased in the proportion of 2 to 3; two parts of the product being oxygen, and the remainder chlorine.

Phosphorus introduced into this gas occasions an explosion, and burns in the liberated gases with its usual brilliancy; but other combustible bodies have no action on the gas.

Water saturated with the gas is of a deep yellow colour; it does not taste sour, but astringent and corrosive, leaving a lasting and disagreeable impression on the tongue.

It appears to the author not impossible, that the gas to which he formerly gave the name of euchlorine, may be a mixture of the new gas with chlorine; and indeed the action of water upon euchlorine favours this idea, since it acquires the same colour from it, and leaves a residuum of chlorine; but, on the contrary, the circumstance that Dutch foil has no action upon euchlorine, seems to show that it contains no free chlorine merely intermixed, but that the whole is chemically combined.