amber, when moderately heated, were attracted as acids to the positive side; but when these bodies were ignited so as to admit a dense smoky flame, the carbonaceous matter was drawn, like that of other resinous bodies and camphor, to the negative ball.

The majority of these instances, says the author, serve well to illustrate the inherent electrical states of different species of matter, and give a further proof of the identity of common and voltaic electricity, and especially the attraction of the fumes of the phosphoric and benzoic acids to one side, and of the fumes produced by the combustion of potassium and camphor to the other.

But there are some phenomena that did not turn out as might have been expected. The combustion of carburetted hydrogen, for instance, gives rise to the production of water and of carbonic acid; but its flame is attracted by the negative surface. It is conceived, however, that this direction may be given to the flame by its carbonaceous contents rather than by the products of its combustion.

Mr. Brande is of opinion that these experiments may suggest a fair explanation of the phenomena presented by those bodies that are termed unipolar by Mr. Erman, because when connected with one or other extremity of the voltaic battery, they transmit the influence of only one species of electricity. The flame, for instance, of oil or of wax must be considered as consisting chiefly of these bodies in a state of vapour; and as their natural electricity is positive, they will have no tendency to destroy that of a positive pole with which they are connected, and the gold leaves of an electrometer will continue to diverge; but when they are applied to a negative pole, their inherent positive electricity will neutralize that of the battery to which they are united, and the gold leaves will in consequence collapse.

An Account of some new Experiments on the fluoric Compounds; with some Observations on other Objects of Chemical Inquiry. By Sir H. Davy, *LL.D. F.R.S. V.P.R.I.* Read February 13, 1814. [*Phil. Trans.* 1814, *p.* 62.]

Since the date of those attempts of the author to decompose fluorine, of which an account has already been printed in our Transactions, and from which he inferred that pure liquid fluoric acid consisted of hydrogen united to a base which he had not then been able to procure in a separate form, but which is detached from the hydrogen by various metals, he has made many experiments that in his opinion tend to confirm this idea, though all his attempts to effect the actual decomposition have been unsuccessful.

Fluate of lead, which, according to the author's view of its constitution, consists of lead united to the peculiar fluoric principle, is not decomposed by dry ammonia; but by liquid ammonia it yields oxide of lead, in consequence of the decomposition of water which gives oxygen to the lead, and hydrogen to the acid which now enters into the composition of fluate of ammonia.

So also silicated fluate of ammonia, or fluoborate of ammonia, when acted upon by chlorine, yield no silica, or boracic acid, unless in consequence of the presence of moisture; but they form muriate of ammonia, and either silicated fluoric or fluoboric gas.

When charcoal was ignited in either of these gases no decomposition was effected, but only a disengagement of a little inflammable gas from the charcoal. Neither was liquid fluoric acid decomposed by charcoal heated to whiteness in a tube of platina.

According to the author's experiments on the decomposition of fluor spar by sulphuric acid, the sulphate of lime which remains after complete decomposition weighs more than the spar decomposed in the proportion of 175 to 100. But in order to obtain this result, it is necessary to collect the very purest white Derbyshire fluor, and to distil repeatedly to dryness, after the addition of fresh acid at each repetition. By computing upon the eighth result, and supposing the number representing calcium to be 40, that for fluorine is estimated to be 34·2.

By forming fluate of potash from a known quantity of subcarbonate, the number obtained for fluorine appeared to be about 32·6.

From these experiments, and others made on the quantity of fluate of potash obtained from hydrate of potash, the author infers that the number representing fluorine may be estimated at about 33.

Two cubical inches of ammoniacal gas, weighing 36 grains, were found to combine with one of silicated fluoric gas, which were found to weigh 110·7, the number for which is thence inferred to be 98·4; and it is presumed to consist of two parts fluorine, and one of silicious basis.

The author has made many experiments with the hope of determining the quantity of oxygen in silica, but has not succeeded to his satisfaction. However, since one part of silica requires more than three times its weight of potassium to decompose it, this seems to show that silica cannot contain much less than half its weight of oxygen. But he has not been able to obtain its basis in a separate state so as to ascertain its exact nature.

Sir Humphry Davy has at various times made many experiments to endeavour to detect oxygen in chlorine, in conformity to the opinion still maintained by many persons, that this is one of its elements, but without success. Sulphuret of lead when acted upon by chlorine, gave the muriates of sulphur and of lead, and not sulphate of lead, as might possibly be expected. Neither is muriate of lead decomposed by sulphureous acid gas, which might be expected to take oxygen if any were present.

It appears, on the whole, to the author impossible to give stronger evidence of chlorine being undecompounded. In his estimation it ranks with gold, silver, hydrogen, or oxygen. He admits that persons may doubt whether these are elements, but thinks it not philosophical to doubt whether it has yet been decompounded.

In reply to some arguments lately advanced by Professor Berzelius in favour of the presence of oxygen in chlorine, deduced from the

laws of multiple proportions, Sir Humphry Davy observes, that the fact is, that the oxygen which Professor Berzelius supposes to be in the chlorine is combined with the metals; and that with respect to any regularities among multiple proportions, there is no general law observable. Azote, for instance, combines with three volumes of hydrogen. When combined with oxygen it may be united to $\frac{1}{2}$, 1, 2, or $1\frac{1}{2}$ of the same body, and in combination with chlorine it unites with four volumes.

The author combats the notion of oxygen being considered as the principle of acidity, and contends that hydrogen enters into the composition of nearly as many acids as oxygen; that chlorine and fluorine are merely bodies of the same class, which like oxygen combine with great energy, but do not owe these properties to the presence of any oxygen contained in them.

Some Experiments and Observations on a new Substance which becomes a violet-coloured Gas by Heat. By Sir Humphry Davy, *Knt. LL.D. F.R.S.* Read January 20, 1814. [*Phil. Trans.* 1814, *p.* 74.]

The discovery now announced to the Society was made about two years since by M. Courtois, a manufacturer of saltpetre at Paris. It is procured from the ashes of sea-weeds: after the extraction of the carbonate of soda, the addition of strong sulphuric acid extricates this substance in the form of a violet vapour, which condenses in crystals, that have the colour and lustre of plumbago. The colour of its vapour has occasioned the French chemists to give it the name of iode, from *ἰώδης, violaceous.*

Specimens of this substance were given to MM. Desormes and Clement, who have given a memoir upon it to the Imperial Institute, describing its principal properties. Its specific gravity is said to be about 4. It volatilizes at a temperature rather below that of boiling water. It combines with phosphorus, with sulphur, with metals, metallic oxides, and with alkalies, forming with ammonia a detonating compound. It dissolves in alcohol, or ether; and with hydrogen it forms a compound very similar to muriatic acid gas, but which M. Gay-Lussac, in a memoir read to the Institute, shows to be a peculiar acid, distinct from the muriatic: and he compares the body itself to oxymuriatic acid or chlorine; for, like that body, it may either be supposed simple, or thought to contain oxygen.

Sir Humphry Davy's first trial was, whether muriate of silver could be formed from it; and he found that the precipitate occasioned by it from nitrate of silver differed from the muriate in being yellow when first formed, and red when fused by a moderate heat. This compound was decomposed by fused hydrate of potash, or solution of potash, and gave an oxide of silver, the oxygen of which is ascribed by the author to the presence of water. This compound of iode and silver was also formed by direct action of the purple vapour on silver leaf, and was found to be red and fusible as in the former experiment.

Potassium heated in the vapour, burns slowly with a pale blue