

When it is kept in contact with mercury alone, it yields azote and a white powder, consisting of a mixture of calomel and corrosive sublimate.

One means of estimating the proportion of the elements was obtained from this mode of analysis, and it appeared to be 19 azote to 81 chlorine.

In such attempts as were made to decompose this substance in exhausted vessels, the tendency to explosion was such, that no estimate could be formed of its elements, from the small quantities on which it was safe to operate.

The mode of analysis on which the author places the most reliance, is that performed by means of muriatic acid. According to his view of the play of affinities in this process, ammonia is formed by the union of the azote in the compound with the hydrogen of one part of the muriatic acid, occasioning the chlorine of both to be set free; while the ammonia so formed combines with another portion of the muriatic acid, and is found in the solution as muriate of ammonia. In addition to the quantity of chlorine actually evolved in this mode of trial, it was necessary to estimate the quantity remaining dissolved in the liquid. For this purpose the sulphuric solution of indigo was employed, and the quantity of chlorine estimated by the quantity of blue colour destroyed.

From the results of two experiments, the author infers that nine grains of azote are combined with 91 of chlorine; and since this proportion accords very nearly with the supposition of one volume of azote with four equal volumes of chlorine, he regards the present as a satisfactory instance of the law of definite proportions; for the estimate obtained by the action of mercury upon the oil, differs no more than might be expected from the nature of the experiment.

Since one of azote combines with three of hydrogen to form ammonia, and three of hydrogen combine with three of chlorine in muriatic acid, the author had thought it probable that one of azote would have been found combined with three of chlorine, but is now of opinion that no strict laws of analogy are to be found from which we can form a previous judgement of such combinations; and he takes occasion to remark, that other philosophers who have presumed that azote contains oxygen, are not warranted in their inference by any laws that he has observed.

Experiments on the Production of Cold by the Evaporation of the Sulphuret of Carbon. By Alexander Marcet, M.D. F.R.S. one of the Physicians to Guy's Hospital. Read July 8, 1813. [*Phil. Trans.* 1813, p. 252.]

In a former paper which the author communicated jointly with Professor Berzelius on sulphuret of carbon, its remarkable volatility was noticed; and as it appeared likely on that account to produce a great degree of cold by evaporation, Dr. Marcet has been induced to make a course of experiments on that subject.

When the bulb of a thermometer, wrapped in fine lint, has been dipped in the sulphureous liquor, if it be simply exposed to the air it sinks to about zero of Fahrenheit's scale, although by a similar evaporation of ether the cold produced is not below 20° .

If a thermometer, coated as before, and wetted with the sulphuret, be placed in the receiver of an air-pump, a cold of 65° or 70° below 0° is easily obtained, by a vacuum which supports one fourth of an inch of mercury; and if the air-pump can exhaust as far as one eighth of an inch, the thermometer sinks to -81° or -82° in less than two minutes, even though the thermometer at the commencement of the experiment was as high as 70° above 0.

Hence the freezing of mercury is an experiment that may be performed at any time, and with no more apparatus than a common air-pump, and enough of the sulphuret to moisten the bulb of a thermometer. Since sulphuric acid has no affinity for the sulphuret, it has no effect in adding to the degree of cold produced upon the principle upon which that is employed by Mr. Leslie, excepting in so far as it removes any moisture that may be present in the air, and which in some measure impedes the process until it is converted into a hoar frost, that may be seen adherent to the bulb of the thermometer.

On a saline Substance from Mount Vesuvius. By James Smithson, Esq. F.R.S. Read July 8, 1813. [*Phil. Trans.* 1813, p. 256.]

From the strong evidence we have that a very large proportion of the world, as we now see it, has at some period been either in a state of actual combustion, or has felt the effects of heat, a high interest, says the author, attaches itself to volcanoes and their ejections, as partial instances of similar operations now going on.

In support of the igneous origin of primitive strata, it is observed, not only that no *crystal* imbedded in them contains water, but that none of the *materials* of the strata contain water in any state.

The subject of the present experiments was thrown out in a liquid state from the cone of Vesuvius about the year 1792 or 1793.

It was of a dirty white colour, with streaks of yellow and green.

When heated, it fused without any loss of weight. When fused on charcoal, it was converted into sulphuret of potash.

In water it dissolved readily, leaving particles of specular iron and oxide of copper. Muriate of platina caused a copious precipitate from the solution, from the presence of potash. Nitrate of barytes afforded an abundant precipitate of sulphate of barytes.

Sulphate of silver gave a curd-like precipitate, showing the presence of muriatic acid.

Prussiate of soda gave a red precipitate, consisting of prussiate of copper. Carbonate, or oxalate of soda or potash, occasioned no precipitation of any kind of earth; nor did any means employed detect the presence of boracic, or of any other acid, excepting the sulphuric and muriatic.