chiefly (*a*) after an eruption has ceased and the volcano relapses into quiescence; or (*b*) after volcanic action has otherwise become extinct. Of the former phase, instances are on record at Vesuvius where an eruption has been followed by the emission of this gas so copiously from the ground as to suffocate hundreds of hares, pheasants, and partridges. Of the second phase, good examples are supplied by the ancient volcanic regions of the Eifel and Auvergne, where the gas still rises in prodigious quantities. Bischof estimated that the volume of carbonic acid evolved in the Brohl Thal amounts to 5,000,000 cubic feet, or 300 tons of gas in one day. Nitrogen, derived perhaps from the decomposition of atmospheric air dissolved in the water which penetrates into the volcanic foci, has been frequently detected among the gaseous emanations. At Santorin it was found to form from 4 to 88 per cent of the gas obtained from different fumaroles.[10] Fluorine and iodine have likewise been noticed.

With these gases and vapors are associated many substances which, sublimed by the volcanic heat or resulting from reactions among the escaping vapors, appear as Sublimates along crevices wherein they reach the air and are cooled. Besides sulphur, there are several chlorides (particularly that of sodium, and less abundantly those of potassium, iron, copper, and lead); also free sulphuric acid, sal-ammoniac, specular iron, oxide of copper, boracic acid, alum, sulphate of lime, felspars, pyroxene, and other substances. Carbonate of soda occurs in large quantities among the fumaroles of Etna. Sodium-chloride sometimes appears so abundantly that wide spaces of a volcanic cone, as well as of the newly erupted lava, are crusted with salt, which can even be profitably removed by the inhabitants of the district. Considerable quantities of chlorides, etc., may thus be buried between successive sheets of lava, and in long subsequent times may give rise to mineral springs, as has been suggested with reference to the saline waters which issue from volcanic rocks of Old Red Sandstone and Carboniferous age in Scotland.[11] The iron-chloride forms a bright yellow and reddish crust on the crater walls, as well as on loose stones on the slopes of the cone. Specular iron, from the decomposition of iron-chloride, forms abundantly as thin lamellæ

[10] Fouqué, loc. cit.

[11] Proc. Roy. Soc. Edin. ix. p. 367.