

volcanic emanations, and of ammonia (which is in part composed of nitrogen) in lava, favours greatly the notion of air as well as water being deoxidated in the interior of the earth.*

It has been alleged by Professor Bischoff that the slight specific gravity of the metals of the alkalies is fatal to Davy's hypothesis, for if the mean density of the earth, as determined by astronomers, surpass that of all kinds of rocks, these metals cannot exist, at least not in great quantities in the interior of the earth.† But Dr. Daubeny has shown, that if we take the united specific gravity of potassium, sodium, silicon, iron, and all the materials which, when united with oxygen, constitute ordinary lava, and then compare their weight with lava of equal bulk, the difference is not very material, the specific gravity of the lava only exceeding by about one fourth that of the unoxidized metals. Besides, at great depths, the metallic bases of the earths and alkalies may very probably be rendered heavier by pressure.‡

To conclude this part of our inquiry, there appears no sound objection to the doctrine, that chemical changes going on at various depths in the earth, may be the cause of volcanic action, and that the contact of water with the unoxidized metals of the earths and alkalies may give rise to the heat required. The hydrogen evolved during the process of saturation may, on coming afterwards in contact with the heated metallic oxides, reduce them again to metals; and this circle of action may be one of the principal means by which internal heat, and the stability of the volcanic energy, are preserved.

Cause of volcanic eruptions.—The most probable causes of a volcanic outburst at the surface have been in a great degree anticipated in the preceding speculations on the liquefaction of rocks and the generation of gases. When a minute hole is bored in a tube filled with gas condensed into a liquid, the whole becomes instantly aëriform, or, as some writers have expressed it, “flashes into vapour,” and often bursts the tube. Such an experiment may represent the mode in which gaseous matter may rush through a rent in the rocks, and continue to escape for days or weeks through a small orifice, with an explosive power sufficient to reduce every substance which opposes its passage into small fragments or even dust. Lava may be propelled upwards at the same time, and ejected in the form of scoriæ. In some places, where the fluid lava lies at the bottom of a deep fissure, communicating on the one hand with the surface, and on the other with a cavern in which a considerable body of vapour has been formed, there may be an efflux of lava, followed by the escape of gas. Eruptions often commence and close with the discharge of vapour; and, when this is the case, the next outburst may be expected to take place by the same vent, for the

* See Daubeny, Encyc. Metrop. Part 40.

† Jam. Ed. New Phil. Journ., No. li. p. 31.

‡ See Daubeny's Reply to Bischoff, Jam. Ed. New Phil. Journ., No. lii. p. 291.; and note in No. liii. p. 158.