

insert the stem of a tobacco pipe, so that it fits accurately. Mix some oil of vitriol (sulphuric acid) and water; about one part of the former to four of the latter. Pour the mixture on the metal, cork the bottle tight with the prepared cork, and after the lapse of a minute apply a light to the extremity of the pipe. The gas issuing from it will take fire. It is hydrogen, and is obtained by the decomposition of the water. Take a *small* try phial and collect some of the gas by holding it over the pipe; bring it immediately to the flame of a candle—an explosion will take place and water be formed, the phial becoming dim with water.

NOTE 9.—*Descent of the sap in Vegetables.*—If two fluids of different densities be separated by an animal membrane, after a short time, portions of either fluid will pass through the membrane, and mix with the other fluid; this operation will go on until their densities are uniform. If, therefore, we take a long glass tube, either straight or bent, tie round one extremity a portion of the intestine of an ox, sheep, or pig, and pour a quantity of brine into the open end of the tube; then plunge the whole into a short tube or glass, containing a small quantity of pure water, we shall observe the fluid in the long tube rise many inches above its former height; the water in the glass vessel will diminish, but taste strongly of salt. The operation will go on until the fluid in both vessels attains the same density. Here we have an example of what takes place in the vegetable fabric. The porous substance of the leaves and bark, represents the porous animal membrane,—the glass of water, the sap in the newer wood and the water in the soil,—the long tube in which the fluid rises, the stalks, branches, and bark of trees, commencing in the roots, going on through the newer wood, the leaves, and the inner bark, to the roots again. The brine represents the dense sap produced by the evaporation from the leaves and bark. It is evident that the operation of diffusion is continually going on after the water has entered at the roots; it goes on more rapidly as the sap ascends; its rapidity is greatly increased after the sap has been thickened by the great evaporation from the surfaces of the leaves. The pressure of the atmosphere, owing to this evaporation, together with capillary attraction, keeps up a constant supply of pure water, derived from the soil.

NOTE 10.—*Water from leaves of Vegetables.*—Enclose a leaf, while still attached to the tree, in a dry bottle; close the mouth