

of heat in these cases may be some crushing of the crust or ascent of heated matter from underneath, which does not, however, produce volcanic phenomena.

1. **Chemical Action.**—Every spring, even the clearest and most sparkling, contains dissolved gases, also solid matter abstracted from the soils and rocks which it has traversed. The gases include those absorbed by rain from the atmosphere (p. 581), also carbon-dioxide supplied by decomposing organic matter in the soil, sulphuretted hydrogen, and marsh-gas or other hydrocarbon derived from decompositions within the crust. The solid constituents consist partly of organic, but chiefly of mineral matter. Where spring-water has been derived from an area covered with ordinary humus, organic matter is always present in it. Organic acids are abstracted from the soil by descending water, and these, before they are oxidized into carbonic acid, are effective in decomposing minerals and forming soluble salts (p. 584). The mineral matter of spring-water consists principally of carbonates of calcium, magnesium, and sodium, sulphates of calcium and sodium, and chloride of sodium, with minute traces of silica, phosphates, nitrates, etc. The nature and amount of mineral impregnation depend, on the one hand, upon the chemical energy of the water, and on the other, upon the composition of the rocks.

Various sources of augmentation of its chemical energy are available for subterranean water. (1) The abundant organic matter in the soil partially abstracts oxygen from the water, but supplies organic acids, especially carbonic acid. In so far as the water carries down from the soil any oxidizable organic substance, its action must be to reduce oxides (p. 584). Ordinary vegetable soil possesses the power of removing from permeating water potash, silica, phos-