

magnesia species, remain undissolved. The thick jelly of silica and alumina is removed with water, and the crystalline minerals lying at the bottom can then be dried and examined. By arresting the solution at different stages the different minerals may be isolated. This process is admirably adapted for collecting the pyroxene of pyroxenic rocks.⁴⁵

ii. *Chemical Analysis*

The determination of the chemical composition of rocks by detailed analysis in the wet way, demands an acquaintance with practical chemistry which comparatively few geologists possess, and is consequently for the most part left in the hands of chemists, who are not geologists. But as some theoretical questions in geology involve a considerable knowledge of chemical processes, so a satisfactory analysis of rocks is best performed by one who understands the nature of the geological problems on which such an analysis may be expected to throw light. As a rule, detailed chemical analysis lies out of the sphere of a geologist's work: yet the wider his knowledge of chemical laws and methods the better. He should at least be able to employ with accuracy the simpler processes of chemical research.

Treatment with Acid.—The geologist's accoutrements for the field should include a small bottle of powdered citric acid, or one with a mineral acid, and provided with a glass stopper prolonged downward into a point. Dilute hydrochloric acid has been commonly employed; but H. C. Bolton proposed in 1877 the use of organic acids in place of the usual mineral acids. Citric acid is particularly serviceable for the purpose, and has the advantage over the mineral acids that it can be carried in powder, and a strong solution of it in water can be made in such quantity and at such time as may be required. A little of the powder placed with the point of a knife on a surface of limestone and moistened with a drop of water will give the proper reaction.⁴⁶

When a drop of acid gives effervescence upon a surface of rock, the reaction is caused by the liberation of bubbles

⁴⁵ Fouqué and Michel-Lévy, op. cit. p. 116.

⁴⁶ Ann. New York Acad. Sci. i. (1879) p. 1. Chem. News, xxxvi. xxxvii., xxxviii., xliii.