

§ 29. Sulphuric Acid—History, Occurrence, and Preparation

So far as our knowledge goes, the ancients were acquainted with only one acid, namely, vinegar or acetic acid; but G. F. Rodwell¹ thought it probable that sulphuric acid was known to them. Jabir Ibn Hayyan, in his *The Invention of Verity or Perfection*, an Arabian work supposed to have been written in the eighth century, refers to the production of *dissolving water* by distilling nitre with vitriol; and to the formation of a spirit by distilling alum. The twelfth-century translation of Geber's *De investigatione magisterii* refers to a spirit which can be expelled from alum by heat, and which possess solvent powers. According to F. Hoefel, Abou Bekr al Rhases, a tenth-century writer of Persian origin, referred, *en termes obscurs et ambigus*, to an oil which was obtained by the dry distillation of *atrament* or ferrous sulphate. The residue was *crocus ferri* or ferric oxide; the oil could have been no other than sulphuric acid. Indeed, the fuming acid has been manufactured by that very process. In the twelfth century, Albertus Magnus, in his *Compositum de compositis*, obtained what he called *spiritus vitrioli romani* by the dry distillation of Roman alum. He said: *Sulphur philosophorum* is not common sulphur, but rather the spirit of Roman vitriol; and it is obtained by the distillation of vitriol. In his *De rebus metallicis et mineralibus*, Albertus Magnus used the word vitriol for the first time for ferrous sulphate—*viride atramentum, quod a quibusdem vitreolum vocatur*. About the same time, Vincent de Beauvais, in his *Speculum naturalis*, alluded to a *solutiva corporum* which was prepared in a similar manner, and which must have been sulphuric acid. Towards the end of the sixteenth century, A. Libavius referred to an acid as the *spiritus aluminosum*, and he showed that it is the same acid as *oleum vitrioli* obtained by the weathering of pyrites, and as *spiritus vitrioli per campanum* obtained by burning sulphur under a bell-jar. At the beginning of the seventeenth century, Augustus Sala described the preparation of *spiritus vitrioli* by the dry distillation of iron or copper vitriol, and by burning sulphur in moist vessels accessible to air. Shortly afterwards the preparation of the acid was also described by N. Lemery, E. R. Seehl, and by J. C. Bernhardt. The seventeenth-century pseudonymous writer Basil Valentine described the preparation of *olea vitrioli* by the dry distillation of a mixture of ferrous sulphate and sand, and of *oleum sulphuris* by burning sulphur with nitre, but he regarded these two acids as different substances—*vide supra*, sulphur trioxide. He said that by gradually heating copper and ferrous sulphates in a luted retort, there collects in the receiver first a white spirit which is *mercurius philosophorum*, and then a red spirit which is *sulphur philosophorum*. J. R. Glauber also refers to the preparation of corrosive oil of vitriol; and H. Cardan, to the oil obtained by distilling *chalcante* or *misy*—the former is supposed to be partially oxidized pyrites, and the latter, an ochre impregnated with copperas. J. Kunckel showed that the *mercurius philosophorum* or *spiritus vitrioli* differs from *sulphur philosophorum*, *oleum vitrioli*, or *ros vitrioli* only in being associated with different proportions of water. R. Boyle also said that the acids obtained from vitriol and from burning sulphur are identical. The properties of the acid were described by W. Gould, R. Boyle, H. Cavendish, H. Boerhaave, and C. J. Geoffroy.

The phlogistian's view that sulphuric acid is dephlogisticated sulphur has been discussed in connection with sulphur. The phlogistians regarded sulphuric acid as an elementary substance. This hypothesis seemed to be supported by R. Boyle's observation that sulphur is produced by heating sulphuric acid with turpentine; and by J. H. and C. J. Gravenhorst's observation that sulphur is produced when a vegetable decoction putrefies in the presence of sodium sulphate. R. Kirwan supposed that sulphur was phlogisticated sulphuric acid, and his analysis gave 59 per cent. of sulphuric acid, and 41 per cent. of phlogiston, although R. Boyle, and J. Mayow had previously stated that sulphur must be regarded as a constituent of sulphuric acid. In 1772, and 1777, A. L. Lavoisier showed that sulphuric acid is a hydrated oxide of sulphur, and its composition was established by the analyses