

actually the case. The lowest number according to which any substance entered into combination with any other was called the atomic weight or equivalent.

There was, so far, no necessity to look upon atomic weights as anything else than numbers fixing a proportion. The unit could be selected arbitrarily. It was not long before that element, hydrogen, which entered into compounds in the relatively smallest weight was taken as an arbitrary unit, and all other elements and compounds were tabulated according to the relative amount of their weights required to form compounds with hydrogen or with any other element—*e.g.*, oxygen—the equivalent of which with hydrogen was known.<sup>1</sup>

13.  
Equivalents.

<sup>1</sup> For many years after the enunciation of the atomic theory great uncertainty and much difference of opinion existed on this and other points. The man who did most to elaborate the edifice of which Dalton had laid the foundations, who filled in the outlines and invented the language of chemistry, was Berzelius. He proceeded inductively and gathered materials from all sides; to him are also owing the greatest number of accurate analyses, especially of inorganic substances. When he began his labours he was favourably disposed towards Dalton's hypothesis; he clearly saw its capabilities, but also that it was based only upon a happy suggestion, that it was introduced more by deductive than by inductive reasoning, and that it needed to be exhaustively tested and verified. After ten years, during which he published in Gilbert's 'Annalen' and in Thomson's 'Annals of Philosophy' many series of investigations, he was able in 1818 to publish, in his 'Essay on Chemical Proportions and on the Chemical Effects of

Electricity' (French translation, 1819; German translation, 1820), the first systematic and complete exposition of the atomic theory. The beginning of a really exact treatment of chemistry has been dated by H. Rose, the greatest analytical chemist of the century, from this year 1818—the year in which Dalton's hypothesis was proved and generally accepted. Others have dated the beginning from 1808, when Dalton published his theory; others again from 1776, when Lavoisier destroyed the older phlogiston theory and appealed to the balance; others again from Black's discovery of latent heat in 1760. In an international history of thought it is not of much interest to decide whose claims to be the founder of modern chemistry as a science are best established. Every one of these dates marks an epoch in the advance of an important and independent branch of research. Black took an important step in the foundation of physical chemistry through his introduction of the conception of the quantity