

because they follow from distinctly defined and independent lines of reasoning. The three criticisms can be summed up in three distinct arguments, all three demanding our special and exhaustive study. These three arguments may be summarised as follows:—

*First.* The atomic view is a hypothesis resting upon the fact that substances combine in fixed and fixed multiple proportions, and upon the further observation that bodies both in the solid and liquid state show different properties in different directions of space. But as to the nature of the differences of the elements the atomic view gives no information; it simply asserts these differences, assumes them as physical constants, and tries to describe them by number and measurement.

The atomic view is therefore at best only a provisional basis, a convenient resting-place,<sup>1</sup> similar to that which Newton found in physical astronomy, and on which has been established the astronomical view of nature.

*Second.* The atomic view in its present development gives us no insight into the nature of those forces on which depend the formation or destruction of chemical compounds. It neglects the study of chemical affinity. This must be conducted on different lines of observation and reasoning.<sup>2</sup>

<sup>1</sup> As these and other points referred to here will be taken up and fully treated in future chapters of this work, I abstain from giving exhaustive references, limiting myself to such writings as will give the reader a general idea of the various attempts which have been made to go beyond or behind the Atomic View of Nature or to supplement it by other views.

Very suggestive in the first instance is Lord Kelvin's address to the mathematical and physical section of the British Association in 1884, reprinted in the first volume of his 'Popular Lectures and Addresses,' p. 218, &c., "Steps towards a Kinetic Theory of Matter."

<sup>2</sup> In respect of this the Introduction to the first edition of Lothar Meyer's 'Modern Theories in Chem-