

atom or complex was termed a molecule, and it was assumed that molecules, or smallest individual particles of chemical substances, might be made up of one or more atoms of the same or of different substances. Avogadro was able in this way to explain how a certain number of molecules of hydrogen—each made up of two atoms—combine with an equal number of molecules of chlorine; these being likewise composed of two atoms of chlorine, in order to form an equal number of molecules of hydrochloric acid, each of these consisting of two atoms—*viz.*, one of chlorine and one of hydrogen. This view, which Ampère likewise adopted, did not recommend itself to chemists for many years; not indeed till, about the year 1840, several eminent chemists—notably Laurent—were independently led to consider chemical compounds as formed by what is termed substitution instead of simple combination.¹ For, according to Avogadro's view, the for-

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ture. They then found that these quantities stood very nearly in inverse proportions to the atomic or combining numbers. They at the same time pointed out the uncertainty which—in consequence of the law of fixed multiple proportions—existed regarding the smallest figure which was to determine the combining weights; they chose those numbers which brought out clearly the physical regularity and coincidence which they had discovered; and they expressed their result in the rule that the atoms of all elementary bodies have the same capacity for heat. Whereas Berzelius ignored the theoretical discussions of Avogadro and Ampère, he hailed the experimental data of Dulong and Petit as most useful in helping to fix correctly the real equivalent numbers, a task to which,

as the fundamental requisite of all chemistry, he devoted so much time and labour. It must, however, be noted that the law of Dulong and Petit, now universally accepted as a fundamental fact in the atomic theory, is, as little as the laws of Boyle, Charles, and Gay-Lussac, rigidly correct: it obtains within certain limits. The experiments of Dulong and Petit were extended to compounds by F. Neumann in 1831. The connection of the specific heat or thermal capacity of compounds and that of their constituents was fully investigated by Regnault. A statement of the difficulties and anomalies which still exist will be found in L. Meyer's 'Die Atome und ihre Eigenschaften' (p. 73, &c.)

¹ A very important influence in contributing to the gradual recog-