later date, appeared similarly averse to admit the physical existence of atoms in the older sense, and warned chemists against the introduction of unnecessary and unproven hypotheses. Even Gerhardt, as late as 1856, opposed the idea that chemical formulæ could express the actual constitution of substances: they were merely a convenient symbolism, a kind of alphabet, by which reactions between different elements or compounds could be conveniently described, and the proportional weights of the constituents or the products could be ascertained.[1] Accordingly, it was also maintained that formulæ could be written in very different ways, expressive of the different processes and reactions which had in special cases to be considered.[2]

Although, therefore, chemical research was governed all through the century by the atomic view of matter, it does

he says: "The word atom, which can never be used without involving much that is purely hypothetical, is often *intended* to be used to express a simple fact. . . . There can be no doubt that the words definite proportions, equivalents, primes, &c., which did and do express fully all the *facts* of what is usually called the atomic theory in chemistry, were dismissed because they were not expressive enough, and did not say all that was in the mind of him who used the word atom in their stead; they did not express the hypothesis as well as the fact." He then enlarges on the necessity of the atomic view, and expresses his preference for the form which Boscovich had given to it over "the more usual notion," as according to the latter "matter consists of atoms and intervening space," whilst with the former "matter is everywhere present, and there is no intervening space unoccupied by it." (ibid., pp. 290, 291). It is evidently the objection to action at a distance, uncommunicated action, which is implied in the ordinary atomic view of matter, that makes Faraday jealous of the term atom. This objection was quite foreign to the chemists abroad who in the middle of the century elaborated the atomic view of matter and nature; it belongs to a different direction of thought, which will occupy us in a later chapter.

[1] In his 'Traité de Chimie organique,' which he brought out as a continuation of the French edition of Berzelius's 'Treatise of Inorganic Chemistry' in the years 1853 to 1856. See Kopp, 'Entwickelung der Chemie,' pp. 747, 796, 800, 809, 819, 834.

[2] Even the combining weight or equivalent of an element, that datum upon which—since Richter and Dalton—the whole system of chemistry has been built up, was