oxygen in the proportion of 15·4 to 23·1 (or 3 × 7·7) to form *sulphur trioxide*. If 100 be chosen as the combining number for lead, then 7·7 becomes that of oxygen, and 15·4 that of sulphur. But lead forms other compounds with oxygen, in one of which, *lead peroxide*, there are 15·4 parts of oxygen for every 100 of lead. This leads to a doubt as to which number should be chosen for the combining number of oxygen; and the difficulty increases as elements are examined which combine with other elements in a large number of different proportions. It is now the universal practice to refer the combining numbers of the elements to *1 part by weight of hydrogen*; and oxygen must be first examined. But hydrogen forms two compounds with oxygen, *water* (1:8), and *hydrogen peroxide* (1:16). Shall 8 or 16 be taken as the combining number for oxygen? The same difficulty appears when compounds are studied. For example, hydrogen combines with acetylene in two proportions forming *ethylene* (1 of hydrogen to 13 of acetylene) and *ethane* (1 of hydrogen to $6\frac{1}{2}$ of acetylene); there is thus a choice between 13 and $6\frac{1}{2}$. Up to the middle of this century, this difficulty existed and led to great confusion, as different chemists used different combining numbers and employed the same symbols* to represent them; so that the composition of the same compound was represented by different formulas. Thus, Ag_2O, AgO, and AgO_2 were all used to indicate a compound composed of silver and oxygen in the proportion of 108 to 8. It is evident that this difficulty could not have been surmounted by mere study of the proportions in which substances react.

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* *Symbols* are letters chosen to represent the combining weights of the elements. *Formulas* of compounds are obtained by combining these symbols so as to represent correctly the composition of compounds.