put forward by him in papers published in 1853 and 1854, when wollastonite was referred to a polysilicic acid with $11SiO_2$, and pyroxene to one with $14SiO_2$, or perhaps some simple multiple of these numbers, with an equivalent volume, probably not less than 460. In such compounds the degree of complexity of the molecule is shown by the relation to space of the chemical equivalent, or, in other words, by its volume. To arrive at a term of comparison for this relation in species of various and unknown degrees of complexity, the author deduces for each silicate the mean equivalent weight of its atomic unit, corresponding to an atom of NaCl; for which purpose H_2O and CaO are divided by two; SiO_2 by four, and Al_2O_3 by six. The mean unit-weight thus deduced from any arbitrary chemical formula, when divided by the specific gravity of the species gives the volume of the unit, which serves to show for different species the relative condensation of the molecule. The hardness and the chemical relations of species will be found to vary with the unit-volume, as is shown in the tables given below.

The various relations just described may be illustrated by an example. The simplest atomic formula representing the chemical elements of meionite and zoisite (which have the same centesimal composition) is $(ca.al_2.si_3)\ o_6$; the small letters representing atoms and $o = 8$. This gives an equivalent weight of 107, which, divided by six, shows the mean weight (P) of the unit or oxyd-atom in these species to be 17.83. Dividing this latter number by 2.7, the specific gravity of meionite (water=1.0), we have for the volume of the oxyd-atom in this species, $V = 6.60$. Dividing by 3.4, the specific gravity of zoisite, we find that $V = 5.24$. The true formulas and equivalent weights of these two complex silicates must be deduced from a comparison of their specific gravities with those of other species whose equivalent weights are otherwise determined. Meanwhile it will be seen that the species zoisite, having the lower value of V, or the more condensed molecule, differs from the less dense meionite in its greater hardness and its superior resistance to acids. Mineralogy affords many examples of the principles here illustrated.

From the complex constitution thus assigned to silicates it follows that the comparatively simple ratios generally deduced for the silica and the various bases are, in many cases, but approx-