

Section 1: Foundation

There are over 18 million known substances in our world. We will begin by assuming that all materials are made from elements, materials which cannot be decomposed into simpler substances. We will assume that we have identified all of these elements, and that there a very small number of them. All other pure substances, which we call compounds, are made up from these elements and can be decomposed into these elements. For example, metallic iron and gaseous oxygen are both elements and cannot be reduced into simpler substances, but iron rust, or ferrous oxide, is a compound which can be reduced to elemental iron and oxygen. The elements are not transmutable: one element cannot be converted into another. Finally, we will assume that we have demonstrated the Law of Conservation of Mass.

Law of Conservation of Mass

The total mass of all products of a chemical reaction is equal to the total mass of all reactants of that reaction.

These statements are summaries of many observations, which required a tremendous amount of experimentation to achieve and even more creative thinking to systematize as we have written them here. By making these assumptions, we can proceed directly with the experiments which led to the development of the atomic-molecular theory.

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