

as really made up of an enormous number of very small particles with, comparatively speaking, very large spaces between them and these particles rushing and bounding and whirling about all the time, bumping against one another and against the walls of the vessel which contains them, thus exerting pressure upon it. This motion of the molecules is heat, and is the cause of diffusion. In a hot body the motion is very rapid, in a cool body it is less rapid, in a body at absolute zero there is no motion at all—hence, nothing can be colder (still) than absolute zero. The very essence of the theory is that matter has a sort of granular, or *discontinuous* structure.

A Molecule is the smallest quantity of a substance that can exist by itself (*i.e.*, in the free, or uncombined, state). The word “molecule” is derived from the Latin *molecula*, a little heap, because a molecule is made up of a little heap of atoms, as we shall see later on. We have molecules of elements, in which the component atoms are all alike, and molecules of compounds, in which the atoms are different.

It should be observed that the smallest quantity of oxygen, for instance, that can exist by itself (*i.e.*, in a *free* state), is two atoms, O_2 ; whereas, the smallest quantity of oxygen that can exist in *combination* is half of this, *i.e.*, one atom, O .

The molecular theory is applied also to liquids and solids.

All the molecules of any one sort of substance must be exactly alike, because any one sort of substance always has the same properties, and therefore, it cannot be molecularly coarse-grained in one sample and fine-grained in another.

Although this molecular view of matter may not seem very sensible just at first, the more we study the facts of nature the more we are convinced that this picture is true.

In order to make the theory thoroughly satisfactory, *i.e.*, have it explain the laws as completely as possible, it was necessary to make a little extension to it, and this is known by the name of the Italian who first put it forward.