

they called them, together with fire, elements or primary matter. They cannot now be so regarded from a chemical point of view, because each of them has been separated into still more simple substances; nor from a physical standpoint, because, as will soon be shown, most substances may exist in any one of these states.

§ 16. Characteristics of each of these states.

Experiment 1. Provide two vessels, a cubical dish and a goblet, each having a capacity of about 200^{ccm}. Also provide 200^{ccm} of sand, 200^{ccm} of water, and a cubical block of wood containing 200^{ccm}. Grasp the block, and place it in the cubical vessel. Attempt to do the same thing with the water. Why can you not grasp the water? Pour a portion of the water into the cubical vessel. When you move a portion of the block, the whole block moves. When you pour a portion of the water into the cubical vessel, the whole does not necessarily go. Why is this? Why is it that we can dip a cupful of water out of a pailful, without raising the whole? Pour all the water into the goblet. The water adapts itself to the shape of the goblet, and the vessel is filled. Attempt to place the block of wood in the goblet. What difference in phenomena do you observe? Why this difference? Pour the sand from vessel to vessel. It adapts itself to the shape of each vessel. Why? Drop the block of wood on a table. Pour water on the table. How does a liquid behave when there is no vessel to confine it?

Experiment 2. Throw small particles of sawdust into the goblet of water; you can thus render perceptible any motion of the water in the goblet, just as, by throwing blocks of wood on the smooth surface of a river, you can discover the motion of the river. Notice the ease with which the particles move about, rise, and sink. As they become quiet, slightly jar the vessel, or tap it with the end of a pencil, and notice the ease with which disturbance is produced throughout the liquid. Now rap the side of the block with a hammer, and observe how immovable are the particles of wood.

Our experiments teach us that *the molecules of solids are not easily moved out of their places; consequently, solid masses form such a firmly connected whole that their shape is not easily changed, and a movement of one part causes a movement of the whole.* On the other hand, *the molecules of liquids have scarcely any fixedness of position, but easily slip between and around one*