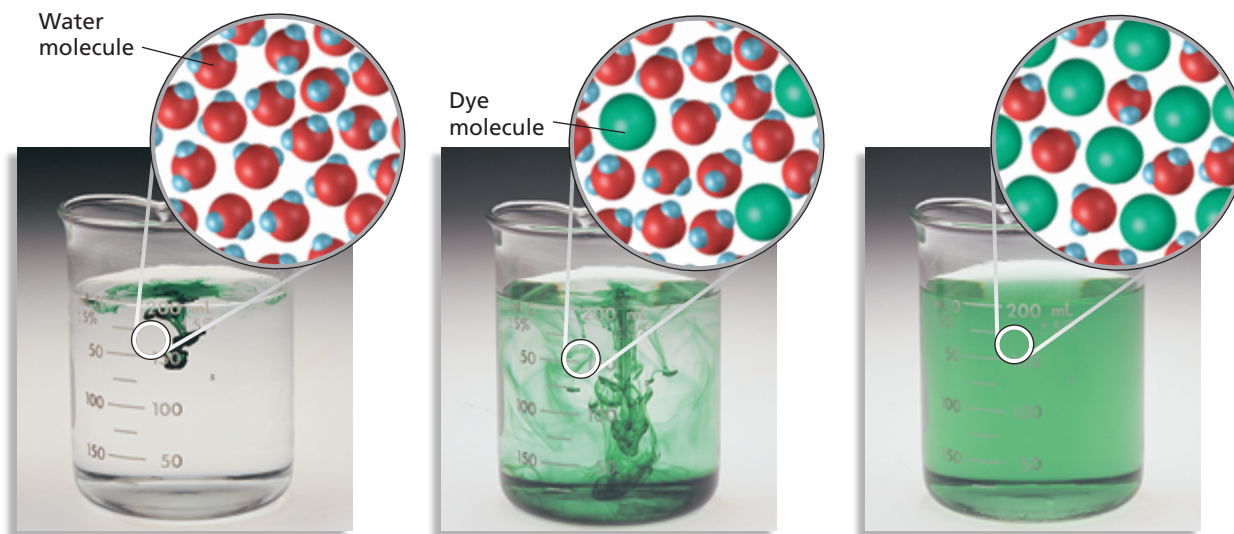


**FIGURE 4** Solids and liquids of different densities are shown. The densest materials are at the bottom. The least dense are at the top. (Dyes have been added to the liquids to make the layers more visible.)

**FIGURE 5** Like gases, the two liquids in this beaker diffuse over time. The green liquid food coloring from the drop will eventually form a uniform solution with the water.



## Relatively High Density

At normal atmospheric pressure, most substances are hundreds of times denser in a liquid state than in a gaseous state. This higher density is a result of the close arrangement of liquid particles. Most substances are only slightly less dense (about 10%) in a liquid state than in a solid state, however. Water is one of the few substances that becomes less dense when it solidifies, as will be discussed further in Section 5.

At the same temperature and pressure, different liquids can differ greatly in density. **Figure 4** shows some liquids and solids with different densities. The densities differ to such an extent that the liquids form layers.

## Relative Incompressibility

When liquid water at 20°C is compressed by a pressure of 1000 atm, its volume decreases by only 4%. Such behavior is typical of all liquids and is similar to the behavior of solids. In contrast, a gas under a pressure of 1000 atm would have only about 1/1000 of its volume at normal atmospheric pressure. Liquids are much less compressible than gases because liquid particles are more closely packed together. Like gases, liquids can transmit pressure equally in all directions.

## Ability to Diffuse

As described in Section 1, gases diffuse and mix with other gas particles. Liquids also diffuse and mix with other liquids, as shown in **Figure 5**. Any liquid gradually diffuses throughout any other liquid in which it can dissolve. The constant, random motion of particles causes diffusion in liquids, as it does in gases. Yet diffusion is much slower in liquids than in gases because liquid particles are closer together. Also, the attractive forces between the particles of a liquid slow their movement. As the temperature of a liquid is increased, diffusion occurs more rapidly. The reason is that the average kinetic energy, and therefore the average speed of the particles, is increased.