

flow causes gases to behave as liquids do. Because liquids and gases flow, they are both referred to as *fluids*.

## Low Density

The density of a gaseous substance at atmospheric pressure is about 1/1000 the density of the same substance in the liquid or solid state. The reason is that the particles are so much farther apart in the gaseous state (assumption 1).

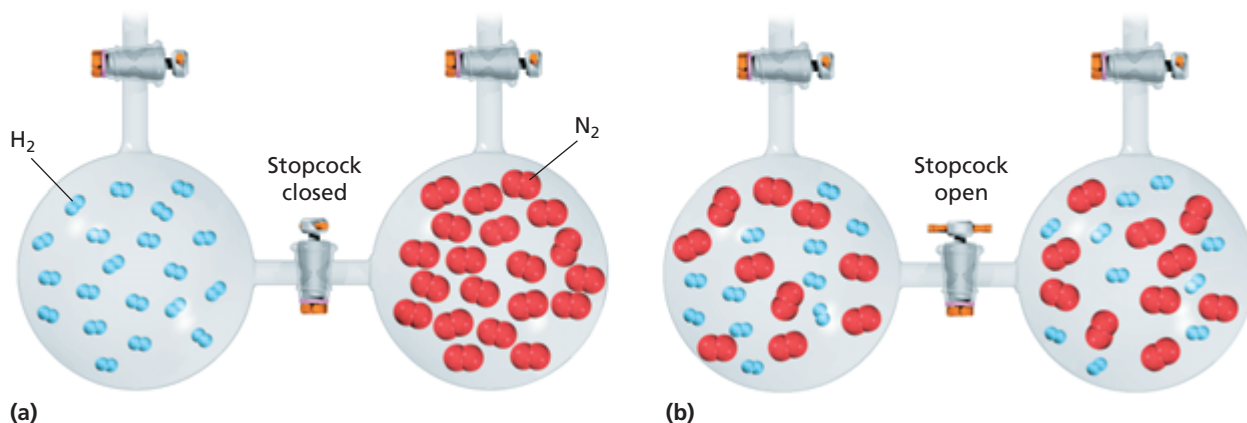
## Compressibility

During compression, the gas particles, which are initially very far apart (assumption 1), are crowded closer together. The volume of a given sample of a gas can be greatly decreased. Steel cylinders containing gases under pressure are widely used in industry. When they are full, such cylinders may contain more than 100 times as many particles of gas as nonpressurized containers of the same size could contain.

## Diffusion and Effusion

Gases spread out and mix with one another, even without being stirred. If the stopper is removed from a container of ammonia in a room, ammonia gas will mix uniformly with the air and spread throughout the room. The random and continuous motion of the ammonia molecules (assumption 3) carries them throughout the available space. *Such spontaneous mixing of the particles of two substances caused by their random motion is called diffusion.*

Gases diffuse readily into one another and mix together due to the rapid motion of the molecules and the empty space between the molecules. The gas molecules in each of the two flasks in **Figure 2a** continuously move about in separate flasks because the stopcock is closed. When the stopcock is open, the gas molecules continuously diffuse back and forth from one flask to the other through the opening in the stopcock, as shown in **Figure 2b**.



**FIGURE 2** Gases diffuse readily into one another. The space between the molecules allows different gases to mix together easily.

