SOLIDS, LIQUIDS AND GASES

Three States of Matter

Matter exists in three different states or phases: solid, liquids and gases or vapors.

- A **solid** has a definite shape and volume,
- A **liquid** has a definite volume but no definite shape and
- A **gas** has neither a definite volume nor shape.

These thre hese changes o **freeze** and ice ca can **evaporat**e or dry up.

Sometimes, solids go directly to a gas stage such as in a carbon dioxide fire extinguisher where solid CO_2 becomes CO_2 vapor. This is called **sublimation**.

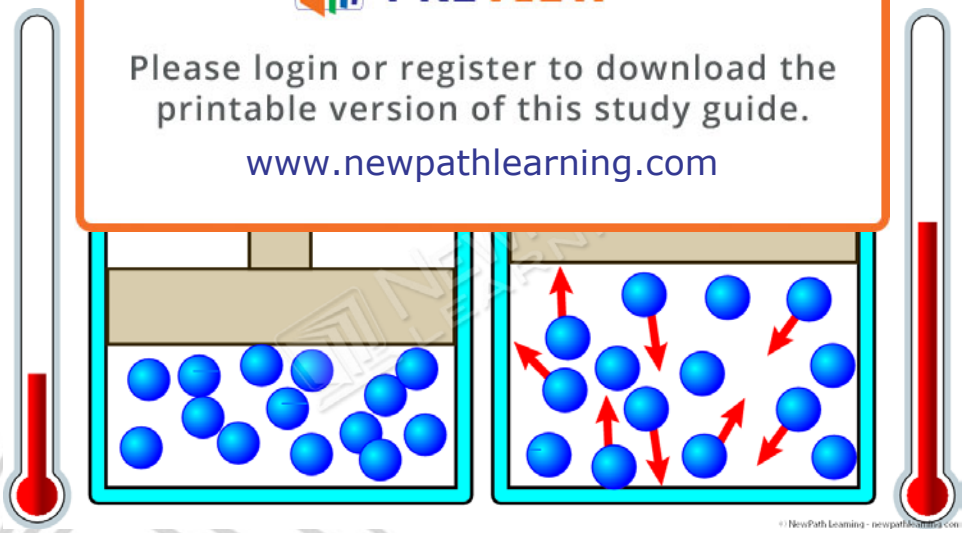
Lesson Checkpoint:
Describe the physical changes possible in the three states of matter.

Behaviors of Gases

Gases or vapors are influenced by three factors: **temperature**, **volume** and **pressure**. The behavior of a gas is directly related to the effect of these factors on the gas. Temperature affects the speed at which the gas particles move. An increase in temperature causes more movement in the particles and a decrease makes them slow down.

In a hot air balloon the flame heats the air, and as the temperature goes up so does the volume of the gas. As its volume increases, some of the air leaves through the bottom of the balloon. This lowers the density of the air in the balloon and allows the balloon to rise.

In an opposite manner, if you wanted to convert a vapor to a liquid you would lower its temperature, decrease its volume and bring the particles closer together as they are in a liquid. This is **Charles's Law**.

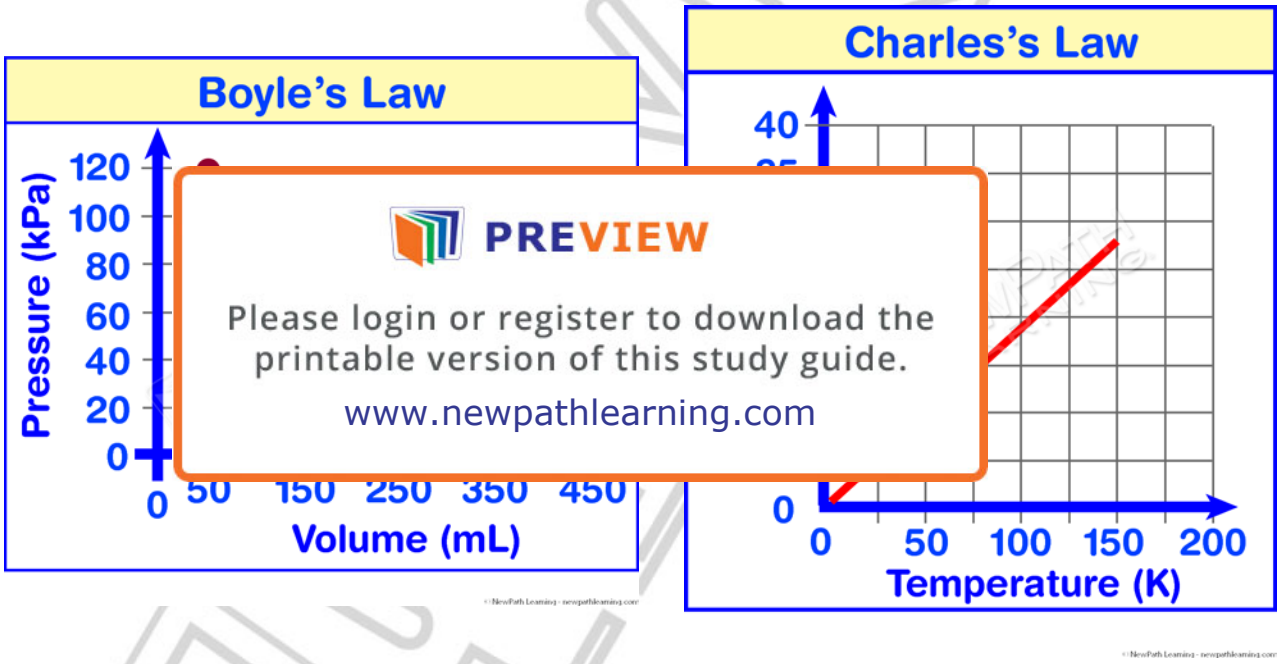


Boyle's Law

On the other hand, according to Boyle's Law, the pressure of a gas is inversely related to its volume. What this means is that as the pressure on a gas goes up and thus its gas particles are brought closer together, its volume goes down.

In an opposite manner, as the pressure on a gas decreases, its particles spread out and the volume increases.

These laws can be represented graphically. Check the graphs shown below.



Lesson Checkpoint:
What are the three factors that affect the behavior of gases?