

Boyle's Law

- The \_\_\_\_\_ of a fixed \_\_\_\_\_ of gas varies \_\_\_\_\_ with the \_\_\_\_\_ at constant \_\_\_\_\_.
- \_\_\_\_\_
- \_\_\_\_\_

Kinetic Theory and Boyle's Law

- \_\_\_\_\_ of a gas is caused by the \_\_\_\_\_ of the gas \_\_\_\_\_ the walls of the \_\_\_\_\_.
- If the gas is \_\_\_\_\_ to \_\_\_\_\_ the volume it had, \_\_\_\_\_ as many \_\_\_\_\_ are present in any \_\_\_\_\_.
- \* \_\_\_\_\_ as many \_\_\_\_\_ per \_\_\_\_\_ on the walls of the \_\_\_\_\_
- \* \_\_\_\_\_ of the gas will \_\_\_\_\_

Ex 1: A balloon filled with Helium has a volume of 457 mL at standard atmospheric pressure. After the balloon is released, it reaches an altitude of 6.3 km where the pressure is only 65.5 kPa. What is the volume of the balloon at this altitude?

Ex 2: Under a pressure of \_\_\_\_\_ mm Hg, a confined gas has a volume of \_\_\_\_\_ mL. If the pressure is increased until the volume is \_\_\_\_\_ mL, what is the new pressure, assuming the temperature remains constant?

## Charles's Law

- For a \_\_\_\_\_ of gas, as long as the \_\_\_\_\_ is held \_\_\_\_\_, the \_\_\_\_\_ varies \_\_\_\_\_ with the \_\_\_\_\_.
- \_\_\_\_\_
- \_\_\_\_\_

## The Kelvin Temperature Scale

- \_\_\_\_\_ zero
  - \* \_\_\_\_\_ possible \_\_\_\_\_
  - \* \_\_\_\_\_ been reached
- \_\_\_\_\_ = absolute zero
- \_\_\_\_\_ = \_\_\_\_\_
- K = \_\_\_\_\_

Ex 1: A quantity of gas occupies a volume of  $506 \text{ cm}^3$  at a temperature of  $147^\circ\text{C}$ . Assuming the pressure stays constant, at what temperature will the volume of the gas be  $604 \text{ cm}^3$ ?

## Kinetic Molecular Theory and Charles's Law

- \_\_\_\_\_ the \_\_\_\_\_ of a gas \_\_\_\_\_ the average \_\_\_\_\_ of its \_\_\_\_\_.
- \_\_\_\_\_ moving molecules
  - \* strike the walls of the \_\_\_\_\_
  - \* strike the walls of the \_\_\_\_\_ with \_\_\_\_\_
- From \_\_\_\_\_ law we derive that the \_\_\_\_\_ would have to \_\_\_\_\_ if the \_\_\_\_\_ is \_\_\_\_\_ so that \_\_\_\_\_ would remain \_\_\_\_\_.

## The Chemistry Quiz

CR1. \_\_\_\_\_ CR2. \_\_\_\_\_ 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_

1. Boyle's Law: When \_\_\_\_\_ is held constant, the pressure and volume of a gas are \_\_\_\_\_ proportional.
2. Mathematically, Boyle's law is stated  $PV = \underline{\hspace{2cm}}$  or  $P_1V_1 = \underline{\hspace{2cm}}$ .
3. At a pressure of 405 kPa, the volume of a gas is 6.00 cm<sup>3</sup>. Assuming the temperature remains constant, at what pressure will the new volume be 4.00 cm<sup>3</sup>?
4. A volume of gas at 1.10 atm was measured at 326 cm<sup>3</sup>. What will be the volume if the pressure is adjusted to 1.90 atm?
5. If 36.5 m<sup>3</sup> of a gas are collected at a pressure of 755 mm Hg, what volume will the gas occupy if the pressure is changed to 632 mm Hg?

6. Charles's Law: When \_\_\_\_\_ is held constant, the volume and temperature of a gas are \_\_\_\_\_ proportional.
7. Mathematically, Charles's Law is stated:  $\frac{V}{T} = \text{_____}$  or  $\frac{V_1}{T_1} = \text{_____}$ .
8. The \_\_\_\_\_ temperature scale must be used in all gas law problems.
9. At 189 K, a sample of gas has a volume of 32.0 cm<sup>3</sup>. What volume does the gas occupy at 242 K?
10. The gas in a balloon occupies 2.25 L at 298 K. At what temperature will the balloon expand to 3.50 L?
11. A sample of gas has a volume of 852 mL at 25°C. What Celsius temperature is necessary for the gas to have a volume of 945 mL?

Complete each of the following showing all work and circling your final answer on all problems.

1. To change a temperature expressed in degrees Celsius to a temperature on the Kelvin scale, what must be done to the Celsius temperature?

Why must we use the Kelvin scale in gas law problems?

2. The volume of a sample of gas is 2.00 L when the temperature is 11.0 °C. While the pressure remains constant, the temperature is changed to a new value, which causes the volume to become 3.00 L. What was the temperature changed to?

This is an example of \_\_\_\_\_'s Law.

3. The volume occupied by a sample of gas is 480 mL when the pressure is 115 kPa. What pressure must be applied to the gas to make its volume become 650 mL?

This is an example of \_\_\_\_\_'s Law.

4. The volume occupied by a sample of gas is 240.0 mL when the pressure is 1.20 atm. What volume, at constant temperature, will the gas occupy when the pressure is decreased to 0.860 atm?

5. The volume of a sample of gas is 25.0 mL when the temperature is 270 K. If the temperature is changed to 30.0 °C, what will be the new volume occupied by the gas assuming that the pressure remains constant?
6. When the volume of a sample of gas is divided by the temperature of the gas, the result is 1.33 mL/K. The temperature of the gas is changed to a new value, which happens to be 411 K while the pressure is kept constant. What volume does the sample of gas occupy at 411 K?
7. When the pressure exerted by a sample of gas is multiplied by the volume occupied by the sample, the result of this multiplication is  $1.60 \times 10^5$  mm Hg·mL. The pressure exerted by the sample changes to a new value, which happens to be 750 mm Hg. What volume will the sample occupy at this pressure, assuming that temperature remains constant?