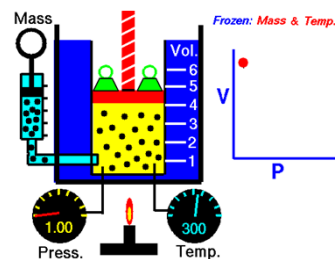


Gas Laws: Boyle's Law

Mr. Sudbury

Boyle's Law

- ▶ Boyle's Law describes the pressure volume relationship:
- ▶ The volume of a fixed mass of gas varies inversely with the pressure at constant temperature.



Boyle's Law Formula

$$P_1V_1 = P_2V_2$$

- ▶ Pressure and volume units need to be consistent.
- ▶ Temperature is a constant, therefore it is not in the formula.

Boyle's Law Practice

1. A sample of oxygen gas occupies a volume of 250 mL at 740 torr of pressure. What volume will it occupy at 800 torr of pressure?

$$P_1V_1 = P_2V_2$$

Boyle's Law Practice

2. A sample of carbon dioxide occupies a volume of 3.50 liters at 125 kPa. What pressure would the gas exert if the volume was decreased to 2.0 liters?

$$P_1V_1 = P_2V_2$$

Boyle's Law Practice

3. A 2.0 Liter container of Nitrogen had a pressure of 3.2 atm. What volume would be necessary to decrease the pressure to 1 atm?

$$P_1V_1 = P_2V_2$$

Boyle's Law Practice

- ▶ A balloon filled with He gas has a volume of 500 mL at a pressure of 1 atm. The balloon is released and reaches an altitude of 6.5 km, where the pressure is 0.5 atm. Assuming the temperature has remained the same, what volume does the gas occupy at this height.

$$P_1V_1 = P_2V_2$$

Boyles Law Practice

- ▶ A gas has a pressure of 1.26 atm and occupies a volume of 7.4 L. If the gas is compressed to a volume of 2.93 L, what will the pressure be, assuming constant temperature?

$$P_1V_1 = P_2V_2$$

Boyle's Law Practice

- ▶ A sample of Oxygen gas has a volume of 150 mL when it's pressure is 0.947 atm. What will the volume of the gas be at a pressure of 0.987 atm if the temp remains constant?

The End

- ▶ Boyles Law: the relationship between pressure and volume at a constant temperature.
- ▶ Demonstration: Peeps in a vacuum.

