5.3 - Simple Gas Laws II - Charles's Law

French physicist Jaques Charles discovered the relationship between volume of a gas and its temperature in 1767.

Basically, Charles discovered that the volume is directly proportional to the Kelvin temperature for a fixed amount of gas at constant pressure.

To change temperatures from Celcius to Kelvin we must add 273.

Ex)   What is the temperature in Kelvin of 25.0 ° C?

Any relation that is directly proportional is called linear. Therefore, if you were to plot the volumes of a gas with a constant pressure you would find the data points form a straight line.

Ex)   Describe what would happen to the volume of a gas if the temperature is doubled.

If you decrease the temperature, the volume of the gas naturally decreases.

Hypothetically, if you were to decrease the temperature all the way to absolute zero, the gas would have no volume.

Mathematically, we get the following equation for Charles's Law:

Ex)   A balloon is inflated to a volume of 2.50 L in a warm living room (24.0°C). Then it is taken outside on a very cold winter day (- 25.0°C). Assume that the quantity of gas and pressure remain constant. What will the volume of the balloon be when it is outdoors?

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