Moles - Volume of a Gas Relationship

STP

- One mole of any gas at Standard Temperature and Pressure occupies 22.4 Liters of space
  - 0°C and 1 atmosphere of pressure

1 mole of gas = 22.4 L

$\frac{1\text{ mol}}{22.4\text{ L}}$ or $\frac{22.4\text{ L}}{1\text{ mol}}$

Examples

1. How many (moles) (unknown) of gas occupy 100.0 L of carbon dioxide (given) gas at standard temperature & pressure? (will be written as STP from now on.)

$$100.0\text{ L } CO_2 \left| \frac{1\text{ mol}}{22.4\text{ L}} \right. = 4.464285714 = 4.464\text{ mol } CO_2$$

2. How many (liters) (unknown) of dinitrogen monoxide are in .940 moles (given) at STP?

$$.940\text{ mol } N_2O \left| \frac{22.4\text{ L}}{1\text{ mol}} \right. = 21.056 = 21.1\text{ L } N_2O$$

don't forget, it's diatomic - $H_2\ O_2\ N_2\ Cl_2\ Br_2\ I_2\ F_2$

3. How many (moles) (unknown) of gas occupy 10.00 L of Oxygen (given) at STP?

$$10.00\text{ L } O_2 \left| \frac{1\text{ mol}}{22.4\text{ L}} \right. = .4464285714 = .4464\text{ mol } O_2$$

4. What is the (volume) (unknown), in liters, of 6.75×10^2 moles (given) of chlorine gas at STP?

$$6.75 \times 10^2\text{ mol } Cl_2 \left| \frac{22.4\text{ L}}{1\text{ mol}} \right. = 15120 = 15100\text{ L } Cl_2$$