

Avagadro's Hypothesis: Equal volume of gases at the same temperature and pressure have the same number of molecules (moles).

Molar Volume
22.4 Liters/ mole @ STP

$$\frac{1.0 \text{ L}}{22.4 \frac{\text{L}}{\text{mole}}} = .0446 \text{ mole}$$

Ideal Gas Law:

1.0 liters of gas at 1.0 atm and 273 K has how many moles.

$$n = .0446 \text{ mole} \quad n = \frac{PV}{RT} = \frac{(1 \text{ atm})(1.0 \text{ L})}{(.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}})(273 \text{ K})}$$

What is the mass of the gas if it is Argon?

$$\frac{.0446 \text{ mole} \quad | \quad 39.95 \text{ g}}{\text{mole}} = 1.78 \text{ g}$$

$$P V = n R T$$

Diagram illustrating the units for the variables in the ideal gas law equation $P V = n R T$:

- P (Pressure) is measured in $\text{kg} \cdot \text{m}^{-2} \cdot \text{s}^{-2}$.
- V (Volume) is measured in m^3 .
- n (moles) is measured in mol .
- R (Gas Constant) is measured in $\frac{\text{J}}{\text{mol} \cdot \text{K}}$.
- T (Temp.) is measured in K .

The value of the Gas Constant R is given as:

$$8.314 \frac{\text{J} \cdot \text{K}^{-1} \cdot \text{mol}^{-1}}{\text{mol} \cdot \text{K}}$$

