Molar Volume

The volume (L) of 1 mol of an ideal (normal) gas

Ideal gas law

$$P \cdot V = n \cdot R \cdot T$$

n = mol R = Ideal gas constant

T = Abs. T (K) $\left(0.0821 \frac{L \cdot atm}{mol \cdot K}\right)$

Calculate Molar Volume $\left(\frac{V}{n}\right)$

$$\frac{P \cdot V}{P} = \frac{n \cdot R \cdot T}{P}$$

$$\frac{V}{n} = \frac{n \cdot R \cdot T}{P\,n}$$

$$\frac{V}{n}_{\text{Molar Vol.}} = \frac{R \cdot T}{P} = \frac{0.0821 \frac{L \cdot atm}{mol \cdot K} \cdot 273 K}{1 atm}$$

$$\frac{V}{n} = 22.4 L/mol \left(\text{Molar Vol}\right)$$

Converting Ideal Gases to and from mol

Molar Volume

$1 mol_A = 22.4 L_A$

$42.6 L\ CO_2 \rightarrow mol\ CO_2$

$(1 mol\ CO_2 = 22.4 L\ CO_2)$

$$42.6 \cancel{L\ CO_2} \left| \frac{1 mol\ CO_2}{22.4 \cancel{L\ CO_2}} \right.$$

$$= 1.90 mol\ CO_2$$

$0.83 mol\ CO_2 \rightarrow L_{CO_2}$

$$0.83 \cancel{mol\ CO_2} \left| \frac{22.4 L\ CO_2}{1 \cancel{mol\ CO_2}} \right.$$

$$= 18.6 L\ CO_2$$