Experimental Gas Laws



Combined Gas Law

$$PV = nRT$$

$$n[mol] = \frac{m}{\mu} - \text{ quantity of substance (number of moles)}$$

$$m[g] - \text{Mass of gas}$$

$$\mu\left[\frac{g}{mol}\right] - \text{Molar Mass (molecular weight from periodic table)}$$

$$P[Pa] - \text{Pressure }; \quad V[m^3] - \text{Volume}$$

The formula also works if we switch to more convenient units : P[kPa] and V[l]

$$R \approx 8.3 \frac{J}{mol \cdot K} \text{ is called Universal Gas Constant.}$$

$$T[K] \approx T^0 C + 273.15$$

Homework

Problem 1

It is widely known that 1 mole of any gas occupies the same volume at normal conditions (atmospheric pressure, P=101kPa and room temperature T=20°C). Starting with unified gas law, find this pressure (in liters).

Problem 2

1 gram of air contains approximately 0.23 g of Oxygen (O_2), 0.755 g of Nitrogen (N_2), 0.01 g of Argon and 0.005 g of CO₂. Find the density of air at normal conditions.