

Answer on Question #63832 - Chemistry - General Chemistry

Question

What is the pressure in mm Hg of 50.0 g of CO₂ gas at 21°C contained in a 250 mL vessel?

Solution:

The ideal gas law: $PV = \nu RT$

Where P – pressure in Pa

V – volume in m³

ν - Amount of substance in mol

R - The gas constant $R = 8.314 \text{ J} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}$

T – temperature in K

$$\nu(\text{CO}_2) = \frac{m}{M} = \frac{50}{44} = 1.136 \text{ (mol)}$$

$$P = \frac{\nu RT}{V} = \frac{1.136 * 8.314 * 294}{0.25 * 10^{-3}} = 1.11 * 10^7 \text{ (Pa)} = 83257 \text{ (mm Hg)}$$

Answer: P = 83257 mm Hg