

What pressure is exerted
by 9.152 g CH_4 in a
2.198 L container at
26.7 °C ?

$$PV = nRT \rightarrow P = \frac{nRT}{V}$$

$$\begin{aligned} \text{MWT}_{\text{CH}_4} &= 1(12.01) + 4(1.008) \\ &= 12.01 + 4.032 \\ &= 16.042 \end{aligned}$$

$$9.152 \text{ g CH}_4 \left(\frac{1 \text{ mol CH}_4}{16.042 \text{ g CH}_4} \right) = 0.5705 \text{ mol}$$

$$\begin{aligned} P &= \frac{(0.5705 \text{ mol})(0.08206 \frac{\text{L atm}}{\text{K mol}})(299.85 \text{ K})}{2.198 \text{ L}} \\ &= 6.387 \text{ atm} \end{aligned}$$

$$PV = nRT$$

Pressure $P = \frac{nRT}{V}$

Volume $V = \frac{nRT}{P}$

Temp $T = \frac{PV}{nR}$

mol $n = \frac{PV}{RT}$

What is the density of O_2 gas when the temp is $21.6^\circ C$ and the pressure is 3.419 atm ?

$$d = \frac{m}{V} = \frac{4.523 \text{ g}}{1 \text{ L}} = 4.523 \frac{\text{g}}{\text{L}}$$

$$n = \frac{PV}{RT} = \frac{(3.419 \text{ atm})(1 \text{ L})}{(0.08206 \frac{\text{L atm}}{\text{K mol}})(294.75 \text{ K})}$$
$$= 0.14136 \text{ mol}$$

$$0.14136 \text{ mol } O_2 \left(\frac{32.00 \text{ g } O_2}{1 \text{ mol } O_2} \right) = 4.523 \text{ g } O_2$$

An unknown gas has a density of $1.859 \frac{g}{L}$ when the temp is $50.0^\circ C$ and the pressure is 1.120 atm . What is the molecular weight of this gas?

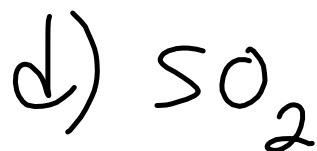
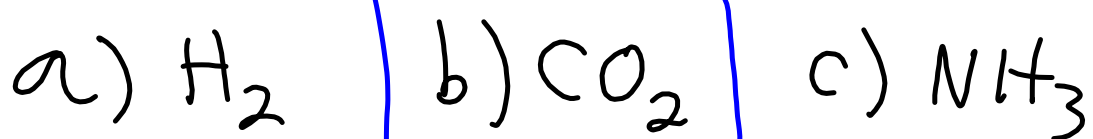
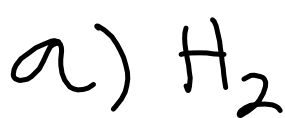
$$MWT = \frac{M}{n} = \frac{1.859 g}{0.042236 \text{ mol}} = 44.01 \frac{g}{\text{mol}}$$

$$d = \frac{M}{V} \xrightarrow{\text{solve}} M = d \cdot V$$

$$m = (1.859 \frac{g}{L})(1L) = 1.859 g$$

$$n = \frac{PV}{RT} = \frac{(1.120 \text{ atm})(1L)}{(0.08206 \frac{L \cdot \text{atm}}{K \cdot \text{mol}})(323.15 K)} = 0.042236 \text{ mol}$$

The gas in the previous problem is one of the following. Which is it?



$$2(1.008) = 2.016$$

$$1(12.01) + 2(16.00) = 12.01 + 32.00 \\ = 44.01 \quad \checkmark$$

$$1(14.01) + 3(1.008) = 14.01 + 3.024 \\ = 17.034$$

$$1(32.07) + 2(16.00) = 32.07 + 32.00 \\ = 64.07$$

$$1(12.01) + 4(1.008) = 12.01 + 4.032 \\ = 16.042$$

Dalton's Law of Partial Pressures

$$P_{\text{TOTAL}} = P_1 + P_2 + \dots$$

$$P = \frac{nRT}{V}$$

$$P_1 = \frac{n_1 RT}{V}$$

$$P_2 = \frac{n_2 RT}{V}$$

⋮

$$P_{\text{TOTAL}} = \frac{n_{\text{TOTAL}} RT}{V}$$

$$n_{\text{TOTAL}} = n_1 + n_2 + \dots$$

What pressure is exerted
by gas mixture containing
7.189 g CH₄ and 9.961 g O₂
in a 6.131 L container
at 28.9 °C ?