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

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

$$MW_{CH_4} = 1(12.01) + 4(1.008)$$
$$= 12.01 + 4.032$$
$$= 16.042$$

$$9.152\ g\ CH_4 \left(\frac{1\ mol\ CH_4}{16.042\ g\ CH_4}\right) = 0.5705\ mol$$

$$P = \frac{(0.5705\ mol)\left(0.08206\ \frac{L\ atm}{K\ mol}\right)(299.85\ K)}{2.198\ L}$$

$$= 6.387\ atm$$

$$PV = nRT$$

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°C and the pressure is 3.419 atm?

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

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

$$= 0.14136\ mol$$

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

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

$$MWT = \frac{m}{n} = \frac{1.859\,g}{0.042236\,mol} = 44.01\,\frac{g}{mol}$$

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

$$m = \left(1.859\,\frac{g}{\cancel{L}}\right)(1\,\cancel{L}) = 1.859\,g$$

$$n = \frac{PV}{RT} = \frac{(1.120\,\cancel{atm})(1\,\cancel{L})}{\left(0.08206\,\frac{\cancel{L}\,\cancel{atm}}{\cancel{K}\,mol}\right)(323.15\,\cancel{K})}$$

$$= 0.042236\,mol$$

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

a) H_2 **b) CO_2** c) NH_3

d) SO_2 e) CH_4

$2(1.008) = 2.016$

$1(12.01) + 2(16.00) = 12.01 + 32.00$
$= 44.01$ ✓

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

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

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

Dalton's Law of Partial Pressures

$$P_{TOTAL} = P_1 + P_2 + \cdots$$

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

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

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

$$\vdots$$

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

$$n_{TOTAL} = n_1 + n_2 + \cdots$$

What pressure is exerted by gas mixture containing 7.189 g CH_4 and 9.961 g O_2 in a 6.131 L container at 28.9 °C ?