Problem 4

$$2\,NaN_{3(s)} \longrightarrow 3\,N_{2(g)} + 2\,Na_{(s)}$$

$V = 57.0\ L$ $\qquad PV = nRT$

$P = 1.04\ atm$

$T = 16^{\circ}C + 273 = 289\ K$

$$\frac{(1.04\ atm)(57.0\ L)}{\left(0.08206\ \frac{atm \cdot L}{mol \cdot K}\right)(289\ K)} = 2.49\ mol\ N_2$$

$$2.49\ mol\ N_2 \left| \frac{2\ mol\ NaN_3}{3\ mol\ N_2} \right| = 1.66\ mol\ NaN_3$$

$65\ g/mol$

$$1.66\ mol\ NaN_3 \left| \frac{65\ g\ NaN_3}{1\ mol\ NaN_3} \right| = 108\ g\ NaN_3$$

Problem 5

$$V_{rms} = \sqrt{\frac{3RT}{Mwt}}$$ ← molecular weight

$Mwt\ N_2 = 28\ g/mol$

$0.028\ kg/mol$ $\qquad V_{rms} = \sqrt{\frac{3(8.31\ J/mol\ K)(289\ K)}{0.028\ kg/mol}}$ $\qquad \frac{kg}{}$

How do the units work for V_{rms}??

$$J = \frac{k\ m^2}{s^2}$$

This is how.

$$\frac{m}{s} = \sqrt{\frac{\frac{kg\ m^2}{s^2}}{mol\ k}\ (k)}{\frac{kg}{mol}}$$

Problem 8

effusion

rate of effusion $\propto V_{rms}$

rate of effusion $\propto \frac{1}{\sqrt{M}}$ ← molecular weight

H_2 = 2 g/mol	$\frac{1}{\sqrt{2}}$ =	(0.70) #
Ne = 20 g/mol	$\frac{1}{\sqrt{20}}$ =	0.22
O_2 = 32 g/mol	$\frac{1}{\sqrt{32}}$ =	0.17
Ar = 39 g/mol	$\frac{1}{\sqrt{39}}$ =	0.16 #

make sure you plt these in kg!!
(but this is general trend)

Problem 9

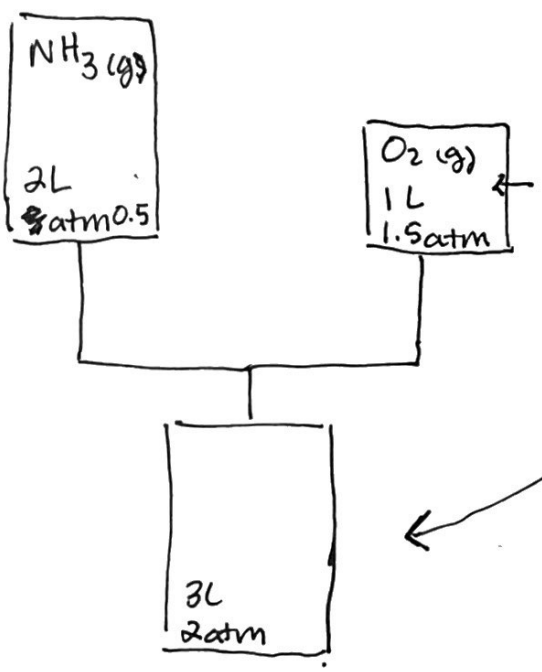
ratio of effusion of CO_2
- no temp given

mass of CO_2 = 44 g

0.044 kg $\frac{1}{\sqrt{0.044}}$ to $\frac{1}{\sqrt{0.002}}$ 3.3 to 1

Problem 11

$$4NH_{3(g)} + 5\,O_{2(g)} \longrightarrow 4NO_{(g)} + 6\,H_2O_{(g)}$$



$P_{total} = P_A + P_B$

$P_{tot} = P_{NH_3} + P_{O_2}$

~~2atm & 0.5atm + 1.5atm~~

$PV = nRT$

$P_1V_1 = P_2V_2$

$\frac{2}{3}$ ~~1 · 0.5~~ $\frac{1}{3}$ ~~1.5 atm~~

NH_3

$(0.5\,atm)(2L) = (P_2)(3\,L)$

$\frac{(0.5\,atm)(2L)}{(3L)} = P_{2NH_3}$

O_2

$(1.5\,atm)(1\,L) = (P_2)(3L)$

$\frac{(1.5atm)(1L)}{(3L)} = P_{O_2}$

Problem 11 (continued)

→ $P_{NH_3} = 0.333_{atm}$ $P_{tot} = 0.333_{atm} + 0.5\ atm$

$P_{O_2} = 0.5 atm$ $P_{tot} = 0.833 atm$

$PV = nRT$

$P = \frac{n}{}$

$$\frac{0.333\ atm\ NH_3}{} \left| \frac{4\ mol\ NO_{(g)}}{4\ mol\ NH_{3(g)}} \right. = P_{NO} = 0.333\ atm$$

$$\frac{0.5\ atm\ O_2}{} \left| \frac{4\ mol\ NO_{(g)}}{5\ mol\ O_{2\ (g)}} \right. = P_{NO} = 0.333 atm$$

$\boxed{P_{NO} = 0.333\ atm}$