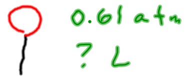
IF problems

I	F
3.00L	? L
1.20 atm	.61 atm

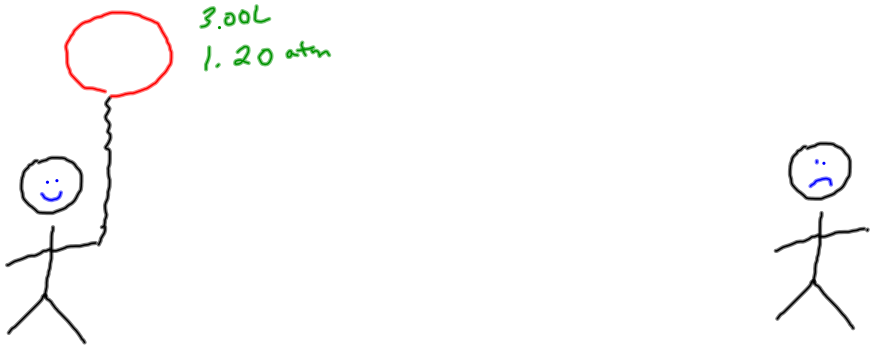
P↓ V↑

$$\frac{P_1V_1}{\cancel{n_1}\cancel{T_1}} = \frac{P_2V_2}{\cancel{n_2}\cancel{T_2}}$$

$$\frac{P_1V_1}{P_2} = V_2$$



$$3.00\text{L} \times \frac{1.20\ \cancel{\text{atm}}}{.61\ \cancel{\text{atm}}} = 5.9\text{L}$$



34.6 g of CO_2 are placed in a container at 89.0°C and 3.28 atm. If 21.2 g of CO_2 leak out of the container and the temperature drops to -13.9°C, what will the new pressure in the container be?

	I	F		
	I	F		
	34.6 g CO_2	13.4 g CO_2	n↓ P↓	
362.2 K	89.0°C	-13.9°C	259.3K	T↓ P↓
	3.28 atm	?		

$$3.28\ \text{atm} \times \frac{13.4\text{g } CO_2}{34.6\text{g } CO_2} \times \frac{259.3\text{K}}{362.2\text{K}} = .909\ \text{atm}$$

$$\frac{P_1\cancel{V_1}}{n_1T_1} = \frac{P_2\cancel{V_2}}{n_2T_2}$$

$$\frac{P\,n_2T_2}{n_1T_1} = P_2$$

Ideal Gas Law

$PV = nRT$

↑ universal gas const

$.08206 \ \frac{L \cdot atm}{K \cdot mol}$

What is the volume of a container if 56.9 g of oxygen at 45.9°C can be put in the container at a pressure of 643 Torr?

$PV = nRT$

$$V = \frac{nRT}{P} = \frac{\left(\frac{56.9}{31.9988} \text{ mol}\right)(R)(319.1\ K)}{\left(\frac{643}{760} \text{ atm}\right)} = 55.0\ L$$

$45.9 + 273.15 = 319.1$

$56.9\ g\ O_2 \times \frac{1\ mol}{31.9988\ g} =$

$643\ Torr \times \frac{1\ atm}{760\ Torr} =$

Gas Density

$$PV = nRT$$

$$\frac{P}{RT} = \frac{n}{V} \leftarrow \frac{g}{MM}$$

$$\frac{P}{RT} = \frac{\frac{g}{MM}}{V}$$

$$\frac{P \cdot MM}{RT} = \text{density}$$

If a gas has a density of 3.62 g/L at 2.00 atm and 23^{o}C, what is the molar mass of the gas?

Graham's Law

$T \propto KE$ .... 2 gases @ same T ... same KE

$$\frac{1}{2} m_1 v_1^2 = \frac{1}{2} m_2 v_2^2$$

$$\frac{m_1}{m_2} = \frac{v_2^2}{v_1^2} \qquad \frac{\sqrt{m_1}}{\sqrt{m_2}} = \frac{v_2}{v_1}$$

diffusion

effusion

$$\frac{\sqrt{MM_1}}{\sqrt{MM_2}} = \frac{rate_2}{rate_1} = \frac{\left(\frac{d_2}{t_2}\right)}{\left(\frac{d_1}{t_1}\right)} = \frac{d_2}{t_2} \cdot \frac{t_1}{d_1}$$

If it takes 3 minutes and 18 seconds for hydrogen to escape from a container through a small opening, and it takes another gas 18 minutes and 3 seconds to escape under the same conditions, what is the molar mass of the second gas?

The Peterson problem