1.) A 20.83 g sample of a gas occupies 4.167 L at 79.97 kPa at 30.0 °C. What is its molecular mass?

$$MM = \frac{g\,R\,T}{P\,V}$$

$$79.97\ kPa \times \frac{1\ atm}{101.3\ kPa} = 0.7894\ atm$$

$$30.0\ ^\circ C + 273 = 303\ K$$

$$MM = \frac{(20.83\ g)\,(0.0821\ L\ atm/mole\ K)\,(303\ K)}{(0.7894\ atm)\,(4.167\ L)}$$

$$MM = 158\ g/mole$$

2.) Determine the number of moles of Kr contained in a 3.25 liter gas tank at 5.80 atm and 25.5 °C. If the gas is oxygen instead of krypton, will the answer be the same? Why or why not?

$$25.5\ ^\circ C + 273 = 298.5\ K$$

$$PV = nRT$$

$$(5.80\ atm)\,(3.25\ L) = n\,(0.0821\ L\ atm/mole\ K)\,(298.5\ K)$$

$$18.85 = 24.50685\ n$$

$$0.769\ moles = n$$

Number of moles of each gas would be equal because the numbers used for P, V, R, and T would be the same.

3.) Determine the number of grams of CO_2 in a 450.6 mL tank at 1.80 atm and -50.5 °C. Determine the number of grams of oxygen that the same container will contain under the same temperature and pressure.

450.6 mL = 0.4506 L -50.5 °C + 273 = 222.5 K

$PV = nRT$

$(1.80)(0.4506) = n(0.0821)(222.5)$

$0.81108 = 18.26725\ n$

$0.0444 \text{ moles} = n$

$$\frac{0.0444 \text{ moles}}{1} \left| \frac{44.0 \text{ g}}{1 \text{ mole}} \right. = 1.95 \text{ g } CO_2$$

$$\frac{0.0444 \text{ moles}}{1} \left| \frac{32.0 \text{ g}}{1 \text{ mole}} \right. = 1.42 \text{ g } O_2$$

4.) A sample of gas is put into a container that has a movable piston. Initially the volume is 4.00 liters when the pressure is 600. mm Hg and the temperature is 50.0°C. What will be the new volume if the pressure and temperature (in °C) are both tripled?

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

triple pressure = 1800 mm Hg

triple temperature = 150 °C

$$\frac{(600.\ \text{mmHg})(4.00\ \text{L})}{323\ \text{K}} = \frac{(1800\ \text{mmHg})\ V_2}{423\ \text{K}}$$

$581400\ V = 1015200$

$V_2 = 1.75$ L

5.) A mixture of 3 gases (composed of Ne, He, and O_2) exerts a total pressure of 990. torr. If there are 10.0 moles each of He & Ne, and there is 4.00 moles of O_2, what is the partial pressure exerted by the O_2 gas?

$$P_{O_2} = \frac{4.00 \text{ moles}}{24.0 \text{ moles}} \cdot 990. \text{ torr} = \boxed{165 \text{ torr}}$$