Conversions:

Pascal (Pa)	1 kPa = 1000 Pa
Atmosphere (atm)	1 kPa = 0.009869 atm
Torr	1 kPa = 7.501 torr
Atm (Earth)	101.3 kPa = 1 atm

1 mL = 1 cm^3

Name: _____

$$\frac{V_1}{T_1}=\frac{V_2}{T_2} \;;\; \frac{T_1}{V_1}=\frac{T_2}{V_2} \;;\; \frac{n_1}{V_1}=\frac{n_2}{V_2} \;;\; \frac{V_1}{n_1}=\frac{V_2}{n_2}$$

$$P_1V_1 = P_2V_2 \quad ; \quad P_T = P_1 + P_2 + P_3$$

1. On the surface of a distant planet, the atmospheric pressure there is calculated to be 485 cm Hg. ***What is this value expressed in "EARTH" atmospheres (atm)*** ?

$$\frac{485\ cm\ Hg}{} \times \frac{10\ mmHg}{1\ cmHg} \times \frac{1\ torr}{1\ mmHg} \times \frac{1\ kpa}{7.501\ torr} \times \frac{1\ atm}{101.325\ kpa} = 6.38\ atm$$

2. A mixture of 82.5 grams of hydrogen gas and 278.2 grams of helium gas has a total pressure of 560. kPa. ***What is the partial pressure of each gas in kilopascals*** ?

3. If a sample of gas occupies a volume of 832 cm^3 at a temperature of -43.6^O C, ***what volume would the gas occupy*** at the temperature of 175^O C? The pressure and amount of gas do not change.

$$-43.6\ ^0C + 273 = 229.4\ K \quad ; \quad 175 + 273 = 448\ K$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2} \quad ; \quad V_2 = \frac{(T_2)V_1}{T_1}$$

$$V_2 = \frac{(448\ K)(832\ cm^3)}{229.4\ K} = 1625\ cm^3$$

4. If a sample of gas has a volume of 598 cm^3 when the pressure is 350. kPa, ***what is its pressure*** when the volume is 133.0 cm^3? Temperature and amount of gas remain constant.

5. A sample of oxygen gas is collected over water at 25^{O} C. The pressure of the inside the system was (where the gas was collected) 0.987 atm. ***What is the partial pressure of the oxygen gas***? (Vapor pressure of water at 25^{O} C = 23.756 torr)

$\frac{0.987\ atm}{} \times \frac{101.325\ kPa}{1\ atm} \times \frac{7.501\ torr}{1\ kpa} = 750.12\ torr$	$\frac{23.756\ torr}{} \times \frac{1\ kpa}{7.501\ torr} \times \frac{1\ atm}{101.325\ kPa} = 0.03126\ torr$
$P_T = P_{O_2} + P_{H_2O}$	$P_T = P_{O_2} + P_{H_2O}$
$P_{O_2} = P_T - P_{H_2O}$	$P_{O_2} = P_T - P_{H_2O}$
726.364 torr = 750.12 torr – 23.756 torr	**0.956 atm** = 0.987 atm – 0.03126 atm

6. A balloon has an initial volume of the gas at 50.0 liters and the gas had an initial mass of 10.7 grams. ***Calculate the number of moles*** for helium gas remaining when the volume of the gas is changed to 500. milliliters.

7. A mixture of three gases are in a 13.5 liter container. 23.4% of nitrogen gas, 42.8% of krypton, and 33.8% of carbon dioxide gas has a total pressure of 4330 torr. ***What is the partial pressure of each gas in atmospheres*** ?

$$N_2 = 23.4\ \% = 0.234\ ;\ Kr = 42.8\ \% = 0.428\ ;\ CO_2 = 33.8\ \% = 0.338$$

$$\frac{4300\ torr}{} \times \frac{1\ kPa}{7.501\ torr} \times \frac{1\ atm}{101.325\ kPa} = 5.66\ atm$$

$$N_2 = (0.234)(5.66\ atm) = 1.32\ atm$$

$$Kr = (0.428)(5.66\ atm) = 2.42\ atm$$

$$CO_2 = (0.338)(5.66\ atm) = 1.91\ atm$$

8. If a sample of gas occupies a volume of 52.4 mL at a temperature of 223.6^{O} C, ***what temperature would the gas occupy*** with a final volume of 0.133 liters? The pressure and amount of gas do not change.