UNIT B: Gas Laws - Review Booklet

1) At a pressure of 95.0 kPa a sample of gas has a volume of 415.0 mL. What is the volume of the gas at 110 kPa?

$$V_{2} = \frac{P_{1}V_{1}}{P_{2}} = \frac{(95.0 \text{ kPa})(415.0 \text{ mL})}{(110 \text{ kPa})} = \frac{358 \text{ mL}}{100 \text{ kPa}}$$

Name:

2) A sample of oxygen has a volume of 15. 0L at 125 kPa. What will the volume of the oxygen gas be at a pressure of 75 kPa? $P_1V_1 = P_2V_2$

$$V_{2} = \frac{P_{1}V_{1}}{P_{2}} = \frac{(125kP_{a})(15.0L)}{(75kP_{a})} = 125L$$

3) A sample of gas has a volume of 1.73 L at a pressure of 860 mmHg. What must the pressure be on this sample for the volume to change to 2.40 L?

$$P_{1}V_{1} = P_{2}V_{2}$$

$$P_{2} = \frac{P_{1}V_{1}}{V_{2}} = \frac{(860 \text{ mmH}_{2})(1.73\text{ L})}{(2.40)} = \frac{620 \text{ mmH}_{2}}{(2.40)}$$

4) A sample of oxygen has a volume of 315ml at STP. What is the volume of the gas at 35°C?

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$$\frac{V_{1}}{T_{1}} = \frac{V_{2}}{T_{2}} \quad V_{2} = \frac{V_{1}T_{2}}{T_{1}} = \frac{(315 \text{ mL})(308 \text{ K})}{(273.15 \text{ K})} = \frac{3.6 \times 10^{2} \text{ L}}{(273.15 \text{ K})} = \frac{3.6 \times 10^{2} \text{ L}}{(273.15 \text{ K})}$$

5) At 23°C, a sample of hydrogen gas has a volume of 29.00 L. To what temperature must this gas be heated to change the volume to 64.00 L?

$$T_{2} = T_{1}V_{2} = (296 \text{ K})(64.00\text{ L}) = 653 \text{ K}$$

$$V_{1} = 29.00 \text{ L} \quad [6.5 \times 10^{2} \text{ K}]$$

6) 27.5 L of chlorine gas at 109 kPa and 23°C is changed to 84.0kPa and 40.0°C. What is the new volume?

$$V_{1} = \frac{P_{1}V_{1}T_{2}}{T_{1}P_{2}} = (109)(275)(313.2)$$

$$= (296)(84.0)$$

$$= (38L)$$

7) A gas sample has a volume of 35.0 L at 790 mmHg and 22.0°c, What is the volume at STP-(745 mmHg)?

$$V_{2} = P_{1}V_{1}T_{2} = (790)(35.0)(273.15) = 33.7L$$

$$T_{1}P_{2} = (295.15)(760.00) = 33.7L$$

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8) A sample of fluorine gas with a volume of 45.0 L at STP is changed to 117 kPa and 30.0°C. What is the new volume of the gas?

Find the molar mass of the following molecules:

$$V_{2} = \frac{P_{1}V_{1}T_{2}}{T_{1}P_{2}} = (101.325)(45.0)(303.15)$$

$$(2.13.15)(117)$$

$$= (43.3L)$$

$$M = (14.0) + 3(16.00) = 62.01 \text{ g/mol}$$

$$M = 2(26.98) + 3(32.07) + 12(16)$$

$$= \frac{342.17 \text{ g/mol}}{1242.17 \text{ g/mol}}$$

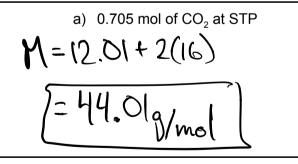
$$M = 2(14.01) + 12(10) + 2(16) = 60.06 \text{ g/mol}$$

$$M = 3(14.01) + 12(1.01) + 30.97 + 4(160)$$

$$= 303.27 \text{ g/mol}$$

10) Find the molar mass of the following molecules:

9)



11) Calculate the number of moles of the following:

a) 0.115 kg of Cus

$$n = \frac{m}{M} = \frac{115q}{95.629} = 1.20md$$

b)
$$18.4 \text{ mol of Ni}(OH)_2$$

 $M = 58.69 + 2(16) + 2(1.01)$
 $I = 92.71g/mol$

b) 4046 mg of Au at STP

$$N = M = \frac{4.046g}{196.97g} = 0.02054md$$

12) Calculate the volume of 28.897 g of butane gas C_4H_{10} at 21.000°C and 134.000 kPa?

$$PV=nRT \qquad V = nRT = (0.497mc)(8.314)(294.150K)$$

$$n = \frac{M}{M} = \frac{28.897a}{58.149mol}$$

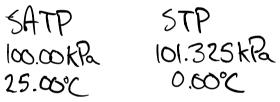
$$I3) \text{ What is the molar mass of } 0.475 \text{ g of an ideal gas that has a volume of } 450 \text{ ml at } 175 \text{ kPa and } 15.0^{\circ}\text{C}.$$

$$PV=nRT \qquad n = \frac{PV}{RT} = (175kFa)(0.450L) = 0.0329 \text{ mol} \qquad M = \frac{m}{n} = \frac{0.475a}{0.0329 \text{ mol}}$$

$$I = 14.5 \text{ g/mol}$$

14) Explain how you change Celsius to Kelvin.

15) Explain the difference between SATP and STP.



16) Describe the difference between real and ideal gases

Real Gases	Ideal Gases	
-each molecule has volume	- move in straight lines.	
- elastic collisions	- Volume can be "O"	
- each molecule has mass.		
	- no LDFs (attractive for	res

17) Explain the Kinetic Molecular Theory and its applications to this unit.

* Every thing is made of molecules * Molecules are always moving * These are forces of attraction and repulsion Gas Laws are directly influenced by the KHT. We use ideal gases to see the effect of changes opplied to a system.