Name_____ Per:_____

Gas Laws Calculations

Part I- Concepts & Conversions

1. Explain on a molecular level how the smell of popcorn (gases) cooking in a microwave can diffuse so that it is smelled in the entire room.

2. a. What is meant by the term "standard temperature and pressure" (a.k.a STP)?

   b. What are the numeric values & units associated with STP?

   c. What is meant by the term "constant"? (Example: the volume of the can remained "constant")

3. What are the 3 different scales used to measure temperature & who uses each the different scales (primarily)?

4. What are the conversion factors between: a) Celsius and Kelvin? b) Celsius and Fahrenheit?

5. Convert each of the following Celsius temperatures to Kelvin temperatures (show work).
   a. 0. °C b. 27 °C c. -50. °C d. -273 °C

6. Why do all temperatures need to be converted from Celsius to Kelvin in order to use them in the gas law calculations?

7. "Absolute Zero" (0 Kelvin) is a theoretical temperature that is impossible to achieve. What would happen to molecules at this temperature & why is this so unlikely to attain?

8. What are the different pressure measurements that exist & their conversion factors related to each other?

9. Convert each of the following into the unit specified. (Use dimensional analysis & show work).
   a. 125 mm Hg to atm b. 3.20 atm to kPa c. 5.38 kPa to Torr d. 1 atm to Torr

Part II- Calculations

(Must include: a. re-arranged formula solving for unknown b.#'s plugged in c. correct units)

1. Solve for the missing value in each of the following. (**ALL Temps must be in Kelvin**)
   a. P_1 = 350 torr, V_1 = 200 mL, P_2 = 700 torr, V_2 = ? b. P_1 = 0.75 atm, V_2 = 435 mL, P_2 = 0.48 atm, V_1 = ?

2. The pressure exerted on a 240. mL sample of hydrogen gas at constant temperature is increased from 0.428 atm to 0.724 atm. What will the final volume of the sample be?

   P_1= P_2 =

   V_1= V_2=

   T_1= T_2=

3. A sample of air has a volume of 140.0 mL at 67°C. At what temperature will its volume be 50.0 mL at constant pressure?

   P_1= P_2 =

   V_1= V_2=

   T_1= T_2=

4. At standard temperature, a gas has a volume of 275 mL. The temperature is then increased to 130 °C, and the pressure is held constant. What is the new volume?

   P_1= P_2 =

   V_1= V_2=

   T_1= T_2=

5. An empty aerosol-spray can at room temperature (20 °C) is thrown into an incinerator where the temperature reaches 500 °C. If the gas inside the empty container was initially at a pressure of 1.0 atm, what pressure did it reach inside the incinerator? Assume the gas was at constant volume and the can did not explode.

   P_1= P_2 =

   V_1= V_2=

   T_1= T_2=

6. A sample of hydrogen at 47 °C exerts a pressure of 0.329 atm. The gas is heated to 77 °C at a uniform volume. What will its new pressure be?

   P_1= P_2 =

   V_1= V_2=

   T_1= T_2=

7. The volume of a gas at 27.0 °C and 0.200 atm is 80.0 mL. What volume will the same gas sample occupy at standard conditions?

   P_1= P_2 =

   V_1= V_2=

   T_1= T_2=

8. A sample of gas at 47 °C and 1.03 atm occupies a volume of 2.20 L. What temperature would this gas occupy at 3.4 L and 0.789 atm?

   P_1= P_2 =

   V_1= V_2=

   T_1= T_2