AP WORKSHEET 03DEF: Gases Summary

1. Write mathematical expressions for the following gas laws. You should define all symbols and state any constant conditions. (10)

   (a) Boyle's

   (b) Charles's

   (c) Avogadro's

   (d) Gay-Lussac's

   (e) Combined

   (f) Ideal

2. In gas law problems, the temperature should always be in what unit? (1)

3. State a value of the gas law constant (R), include units. (1)

4. The gas laws can also be expressed graphically. Sketch the following plots for an ideal gas.

   (a) V versus T, with p and n constant. At what value does the line you have drawn intercept the x-axis? (3)

   (b) P versus V, with T and n constant. (2)

5. What pressure, in torr, would a sample of Xenon exert if it were compressed from 4001 mL to 3002 mL at constant temperature, given that initially the pressure was 750.1 atm? (2)

6. An almost empty aerosol can has an internal pressure of 1.030 atm when the temperature is 25.00 °C. What would be the pressure in the can if it were placed into an incinerator for disposal, which would have the effect of raising the temperature inside the can to 1500. °C? Why is the incineration of aerosol cans not recommended? (3)

7. In an industrial process, 200. L of a gas at 91.0 kPa and 21.0 °C is compressed into a vessel that has a volume of 15.2 L and heated to 420. °C. What is its final pressure? (3)

8. Calculate the pressure inside a tube, given that the tube's volume is 5.0 L, its temperature is 23 °C, and it contains 0.010 mg of hydrogen gas. (3)

9. Calculate the molar volume (volume of 1.0 mole) of an ideal gas at 1.0 atm and 25 °C? (1)

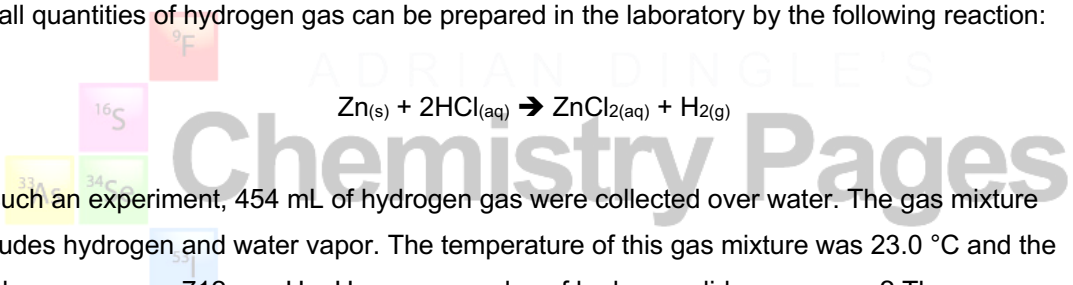
10. Re-write the ideal gas equation to make molar mass the subject of the equation. (2)

11. This questions deals with gas mixtures.

    (a) Write an equation for total pressure of a mixture of three gases, A, B, and C, in terms of the partial pressures of the gases. (2)

    (b) Write an equation for the total pressure of a mixture of three gases in terms of the total number of moles of gas. (2)

12. Small quantities of hydrogen gas can be prepared in the laboratory by the following reaction:



$$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}$$

    In such an experiment, 454 mL of hydrogen gas were collected over water. The gas mixture includes hydrogen and water vapor. The temperature of this gas mixture was 23.0 °C and the total pressure was 712 mm Hg. How many moles of hydrogen did you prepare? The vapor pressure of water at 23.0°C is 19.8 mm Hg. (4)

13. In a given period of time, 0.21 moles of a gas of molar mass = 26 g mol^{-1} effuses. *Without doing a calculation*, relatively how many moles of NH_3 would effuse in the same period of time? Explain. (2)

14. *Without doing a calculation*, comment on the relative molar mass of a vapor that would effuse at a rate equal to 70.6 % of the rate of a gas with a molar mass = 17.0 g mol^{-1}. (2)

15. *Without doing a calculation*, compare the u_{rms} of radon gas at 35.0 °C and 299 K. Explain. (3)