9. Calculate the density of CO_2 at STP.

10. A gaseous compound is 78.14% B and 21.86% H. At 27°C, 74.3 mL of the gas exerted a pressure of 1.12 atm. If the mass of the gas was 0.0934 g, what is the molecular formula?

11. What is the volume of CO_2 produced at 37.00°C and 1.00 atm when 5.60 g of glucose are used up in the reaction:

$$C_6H_{12}O_6\,(s) + 6O_2\,(g) \rightarrow 6CO_2\,(g) + 6H_2O\,(l)$$

12. If 34.6 L of N_2 was produced at 75°C and 760. mmHg, how many grams of NaN_3 were used in the reaction:

$$2NaN_3\,(s) \rightarrow 2Na\,(s) + 3N_2\,(g)$$

16. A 2.14 L sample of HCl gas at 2.61 atm and 28ºC is completely dissolved in 668 mL of water to form hydrochloric acid solution. Calculate the molarity of the acid solution assuming no change in volume.

17. Carbon dioxide inside a submarine cabin has a volume of 2.4 x 10^5 L and a pressure of 7.9 x 10^{-3} atm at 312 K. A solution of LiOH with negligible volume was introduced. Eventually the pressure fell to 1.2 x 10^{-3} atm. How many grams of lithium carbonate are formed by this process?

$$2LiOH\ (aq) + CO_2\ (g) \rightarrow Li_2CO_3\ (aq) + H_2O\ (l)$$

18. If you have 5.0 L of C_4H_{10} and 25.0 L of O_2, how many liters of CO_2 can form at 50℃ and 1.25 atm?

$$2C_4H_{10}\ (g) + 13O_2\ (g) \rightarrow 8CO_2\ (g) + 10H_2O\ (g)$$

$$P_{N_2} = 0.780(790.\ mmHg) = 616\ mmHg$$

$$P_{Ar} = 0.009(790.\ mmHg) = 7\ mmHg$$

23. Part 1:

$$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$$

$$P_{H_2} = P_T - P_{H_2O} = (988 - 31.82)mmHg = 956\ mmHg$$

$$956\ mmHg * \frac{1\ atm}{760\ mmHg} = 1.26\ atm$$

$$T = (30 + 273.15)K = 303\ K$$

$$n_{H_2} = \frac{PV}{RT} = \frac{(1.26\ atm)(0.641\ L)}{(0.08206\ \frac{L*atm}{mol*K})(303\ K)} = 0.0325\ mol$$

$$0.0325\ mol\ H_2 * \frac{2.016\ g\ H_2}{mol\ H_2} = 0.0655\ g\ H_2$$

Part 2:

$$0.0325\ mol\ H_2 * \frac{mol\ Ca}{mol\ H_2} * \frac{40.08\ g\ Ca}{mol\ Ca} = 1.30\ g\ Ca$$

24. $P_{gas} = P_{atm} - P_{H_2O} - P_{height\ difference}$

$$P_h = 154\ mmH_2O * \frac{1\ mmHg}{13.6\ mmH_2O} = 11.3\ mmHg$$

$$P_{gas} = (743.7 - 19.5 - 11.3)mmHg = 712.9\ mmHg$$

25. $r_{CO} = 1.48\ r_X$

$$\frac{r_{CO}}{r_X} = (1.48)^2 = (\sqrt{\frac{M_X}{M_{CO}}})^2$$

$$(1.48)^2 = \frac{M_X}{28.01\ g/mol}$$

$$M_X = 61.4\ g/mol$$

26. H_2S no, there is no FON

C_6H_6 no, there is no FON

CH_3OH yes, H is attached to O.

CH_3OCH_3 no, H is not attached to FON.

$0℃ - 4.48℃ = \ -4.48$ (freezing point of soln)

49. $\Delta T_f = K_f m$

$1.05℃ = (\frac{5.12℃}{m})(m)$

$m = 0.205 \ m = \frac{0.205 \ mol \ (C_5H_4)_n}{kg \ benzene}$

$0.301 \ kg \ benzene * \frac{0.205 \ mol \ (C_5H_4)_n}{kg \ benzene} = 0.0617 \ mol \ (C_5H_4)_n$

$\frac{7.85 \ g}{0.0617 \ mol} = 127 \ g/mol$

$n = \frac{127 \ g/mol}{64.08 \ g/mol \ C_5H_4} = 2$

$(C_5H_4)_2 = C_{10}H_8$

50. $\Delta T_f = K_f m$

$5.50℃ - 5.16℃ = (\frac{5.12℃}{m})x$

$x(or \ molality) = 0.066 \ m$

$0.1000 \ kg \ benzene * \frac{0.066 \ mol \ org.}{kg \ benzene} = 0.0066 \ mol \ org.$

$\frac{0.85 \ g}{0.0066 \ mol} = 128 \ g/mol = 128 \ g/mol$

51. (Lowest fp = most particles)

$0.20 \ m \ KNO_3$

- i = 2
- $2 * 0.20 = 0.40 \ m$