AP Chemistry – Splendid Problems – 45

Name _____Per ___

1. For the reaction $H_2 + 2ICl \leftrightarrow I_2 + 2HCl$ there is 0.430M H_2, 0.440M ICl initially with no products. At equilibrium there is 0.128M HCl. Calculate the value of K_c.

2. For the reaction $2ClF_3 \leftrightarrow Cl_2 + 3F2$ the value of K_c is 0.0129. At equilibrium there is 0.109M ClF_3, and 0.120M F_2. What is the equilibrium concentration of Cl_2?

3. For the reaction $2NO_2 \leftrightarrow NO_3 + NO$ the value of K_c is 0.807. If a reaction mixture has 0.343M NO_2, 0.0833M NO_3, and 0.330M NO, what is the value of Q and which way does the reaction need to proceed to reach equilibrium?

4. For the reaction $2N_2O_{(g)} + 3O_{2(g)} \leftrightarrow 2N_2O_{4(g)}$ the value of K_c is 7.44 and the temperature is 420.K. What is the value of K_p?

5. The characteristic odor of pineapple is due to ethyl butyrate, a compound containing carbon, hydrogen and oxygen. Combustion of 2.78 mg of ethyl butyrate produces 6.32 mg of CO_2 and 2.58 mg of H_2O. What is the empirical formula of the compound?

6. How many grams of solute are present in 50.0 mL of 0.850M potassium dichromate?

7. If 2.50 g of ammonium sulfate is dissolved in enough water to form 250. mL of solution, what is the molarity of the solution?

8. How many milliliters of 0.387M copper(II) sulfate contain 1.00 g of solute?

9. The rays of the sun associated with tanning and burning are called UV-A, 320 – 380 nm wavelength, and UV-B, 290 – 320 nm wavelength. (a) What is the frequency of 320 nm light?

(b) How much energy would a mole of 320 nm photons have?

(c) Which is more energetic UV-A or UV-B?

10. For the following non-metal elements: oxygen, phosphorus, tellurium, and iodine (a) which pair would form the most polar single bond? Explain.

(b) Which pair would form the longest single bond? Explain.

(c) Write a Lewis dot structure for a pair that would form a compound in a 1:2 ratio.

11. An unknown gas effuses under constant pressure conditions. It requires 105 s for 1.00 L of the gas to effuse. Under identical experimental conditions it required 31.0 s for 1.00 L of oxygen gas to effuse. What is the molar mass of the unknown gas?

12. Phosphorus has a concentration of 0.07 ppm by mass in seawater. In the ocean it exists in the form of the phosphate ion. Calculate the molar concentration of the phosphate ion in seawater.

13. If a reaction is not spontaneous at -25$^{\circ C}$ and the entropy change for the reaction is 95 J/K, what is the minimum value of the enthalpy of the reaction?