AP Chemistry Units 1-6 Review

1. How many atoms are in 40.0 grams of Cr?
2. How many grams are in $1.80 * 10^{25}$ molecules of CO?
3. What are the moles of each ion are in 4.0 moles of $Mg_3(PO_4)_2$?
4. The molar mass of a compound with an empirical formula of C_2H_5 is 58.14g/mol. What is the name and formula of:
   a. the compound b. its alcohol c. its carboxylic acid d. its alkene e. its 3 amines
5. If Chlorine has two isotopes, Ga-35 and Ga-37 which one is more abundant and why?
6. For Na-23 what is the
   a. mass # b. atomic # c. # of protons d. # of neutrons e. # of electrons
7. What is the common monatomic ion charge for
   a. I A metals b. II A metals c. Zn & Cd d. Ag e. Al
8. What are the common ion charges for
   a. Fe b. Pb c. Cu d. Hg e. Cr f. Co g. Sn
9. What is the percent composition of the two elements in tetraphosphorus decoxide?
10. Name the following:
    a. $(NH_4)_2CO_3$ b. $Zn(ClO_3)_2$ c. $NaMnO_4$ d. K_2CrO_4 e. HNO_2 f. HBr g. $Cu_3(PO_4)_2$
11. Write formulas for the following:
    a. chloric acid b. cobalt (II) iodate c. mercury (I) iodide d. iron (II) silicate
12. A hydrate of Barium chloride is 14.75% water by mass. What is the formula of it?
13. 33.2 g of lead(II) nitrate reacts with 5.843 g of sodium chloride. What is the mass of precipitate made in this reaction?
14. What are the oxidation numbers almost always for the following in compounds:
    a. F b. H c. O
15. What are the oxidation numbers of each element in the following compounds:
    a. CO_2 b. $Na_2Cr_2O_7$ c. $KMnO_4$ d. CH_4 e. N_2O_4
16. What are the acid base net ionic equations for the following: (ALL SOLNS aq)
17. HBr & LiOH b. HCl & CH_3NH_2 c. $HClO_2$ + LiOH d. $(CH_3)_2NH$ & $HClO_4$
18. What are the precipitation net ionic equations for the following: (ALL SOLNS aq)
19. KI & $Pb(NO_3)_2$ b. Na_2SO_4 & $SrCl_2$ c. $Zn(C_2H_3O_2)_2$ & NaOH d. Li_2S & CuCl
20. What are the gas forming net ionic equations for the following: (ALL SOLNS aq)
    a. HBr & $NaHCO_3$ b. HCl & Li_2CO_3
21. What mass of precipitate is made when 20.0 mL of a 1.00 M $CaCl_2$ reacts with 20.0 mL of a 2.00 M $AgNO_3$?
22. What volume of a 18.00 M H_2SO_4 is needed to make 500.0 mL of a 1.00 M H_2SO_4?

23. $Co\ (s) + MnO_4^{-1} \rightarrow Co^{+2} + Mn^{+2}$
   a. Balance the redox reaction in acidic solution
   b. Identify the oxidizing and reducing agents
24. What volume of a 0.200 M potassium permanganate is needed to react completely with 10.0 g of Cr?
25. What is required for a collision to be good? (be specific)
26. How does increasing temperature increase the rate of a reaction? (two fold effect)
27. What must be plotted to obtain a straight line for a
   a. zero order reaction b. 2nd order reaction c. first order reaction
28. What kind of plot gives a straight line with the activation energy found in the slope?
29. Hydrogen peroxide in basic solution oxidizes iodide ions to iodine. The proposed mechanism for this reaction is
   $H_2O_2\ (aq) + I^-\ (aq) \rightarrow HOI\ (aq) + OH^-\ (aq)$ (slow)
   $HOI\ (aq) + I^- \rightarrow I_2\ (aq) + OH^-\ (aq)$ (fast)
   Write the overall reaction. Write the rate law consistent with this proposed mechanism.
30. If 25.0 g of solid KCN is reacted with excess hydrochloric acid, how many mL of hydrogen cyanide gas at 35°C and 752 mmHg are made? $KCN\ (s) + H^+ \rightarrow HCN\ (g) + K^+$
31. 4.0 moles of each H_2 and I_2 are placed in a 1.0L container at a certain temperature. The H_2 and I_2 react according to the following equation: $H_2\ (g) + I_2\ (g) \leftrightarrow 2HI\ (g) + heat$ T= 520°C
   If 0.063 mol of H_2 remains when equilibrium is reached what is the Kc value? The Kp value? What is the total pressure in the container at equilibrium? Which way will the reaction shift if one removes some I_2? Some HI? If Temperature is increased? If the volume is decreased?
32. Kc = $1.79 * 10^{11}$ at 500K for the following: $2I\ (g) \leftrightarrow I_2\ (g) + heat$
   If a 2.0 L container at 500K contains 0.0010mol of I_2 and $2.0*10^{-10}$ mol I, is the reaction at equilibrium and if not which way will it shift to reach equilibrium?
33. Tell whether each of the following is acidic, basic or neutral and give the reason why:
   a. $NaNO_3$ b. NH_4Br c. LiCN d. K_2SO_3 e. $Co(ClO_4)_3$ f. SrS g. CH_3NH_3Cl
34. HNO_2 is a weak acid with a Ka =$6.0 * 10^{-4}$?
   a. What is the pH of 1.00L of a 0.500M solution?
   b. What is the pH when 0.250 L of a 0.500M NaOH is added to the weak acid solution?
   c. What is the pH when 0.500 L of a 0.500M NaOH is added to the weak acid solution?
   d. What is the pH when 1.00L of a 0.500 M NaOH is added to the weak acid solution?
35. If 500.0mL of a 1.00M NaCN is mixed with 200.0mL of a 2.00 M HCN, what is the pH of the solution if the Ka of HCN= $5.8 * 10^{-10}$? Why will the pH always be basic instead of acidic?
36. Calculate the molar solubility in moles per liter of copper (II) hydroxide in each of the following solutions. Ksp of copper (II) hydroxide is 2.2×10^{-20}.
   a. Pure water
   b. 0.050 M sodium hydroxide solution
   c. 0.0400 M copper (II) nitrate solution