Chem WS Name _____

1. Write dissociation equations for the following when they are dissolved in water.
   a. HF
   b. $SrBr_2$
   c. $MgBr_2$
   d. NH_4Cl
   e. $NaNO_3$
   f. $Al_2(SO_4)_3$
2. Classify the following as strong, weak or nonelectrolyte.
   a. CH_3CH_2OH
   b. $C_{12}H_{22}O_{11}$ (sugar)
   c. HCl
   d. NH_3
   e. C_6H_{12}
3. Calculate the molarity of the following solutions.
   a. 49.73 g H_2SO_4 in enough water to make 500 mL of solution.
   b. 4.739 g $RuCl_3$ in enough water to make 1.00 L of solution.
   c. 5.035 g $FeCl_3$ in enough water to make 250 mL of solution.
4. Calculate the concentrations of each of the ions in the following solutions.
   a. 0.25 M Na_3PO_4
   b. 0.15 M $Al_2(SO_4)_3$
   c. 0.87 M Na_2CO_3
5. Describe how you would prepare the following solutions.
   a. 100 mL of 1 M NaCl
   b. 250 mL of 1.0 M Na_2SO_4
   c.1.5 L of 0.5 M $K_2Cr_2O_7$.
6. Describe how you would prepare the following solutions:
   a. 500 mL of 1.0 M H_2SO_4 from 17.8 M H_2SO_4.
   b. 1.5 L of 0.25 M $KMnO_4$ from 1.0 M stock solution.
   c. 1.0 L of 0.15 M $KBrO_3$ from solid $KBrO_3$.
7. A standard solution of KHP($C_8H_5O_4K$) was made by dissolving 3.697 g of KHP in enough water to make 100.0 mL of solution. Calculate the concentration.
8. How many moles of KHP are contained in 30.00 mL of the solution in problem 7?
9. How many milliliters of 0.136 M NaOH are required to react with the H_2SO_4 in 10 mL of a 0.202 M solution? The reaction of the two is
   $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$
10. Complete and balance the following reactions:
   a. $NaCl(aq) + HgNO_3(aq) \rightarrow$
   b. $Ca(OH)_2(aq) + Na_2CO_3(aq) \rightarrow$
   c. $Na_2S(aq) + FeCl_3(aq) \rightarrow$
11. How would you separate the following by selective precipitation?
   Ba^{2+}, Pb^{2+}, Fe^{2+}
12. Write molecular, complete ionic and net ionic equations for the following reactions.
   a. aqueous sodium sulfide reacts with aqueous copper(II) nitrate.
   b. aqueous hydrogen fluoride reacts with aqueous potassium hydroxide.
13. Calculate the mass of $CaSO_4$ produced when 10 mL of 6.0 M H_2SO_4 is added to 100 mL of 0.52 M $Ca(NO_3)_2$.
14. Calculate the mass of Al_2S_3 produced when 100 mL of 0.50 M $AlCl_3$ is added to 100 mL of 0.50 M Na_2S.
15. What is the percentage of iron in an ore sample if a 0.9973 g sample dissolved in acid produces 0.8314 g of $Fe(OH)_3$ precipitate when treated with excess KOH?

16. A sample containing only sodium chloride and potassium chloride is dissolved and treated with excess $AgNO_3$. A 0.9341 g sample of the salt mixture gave 2.0321 g of AgCl. Calculate the percentage of chloride in the sample.
17. How many mL of 1.50 M NaOH is required to neutralize 275 mL of 0.5 M H_2SO_4?
18. What is the molarity of a solution of HCl if it requires 29.31 mL of a 0.0923 M NaOH solution to reach a phenolphthalein endpoint for the titration of a 10.0 mL aliquot of the HCl solution?
19. Determine the oxidation number for Mn in each of the following:
    a. $KMnO_4$
    b. $LiMnO_2$
    c. MnO_2
    d. K_2MnCl_4
    e. Mn_2O_7
20. A titration is done using 0.1302 M NaOH to determine the molecular weight of an acid. The acid contains one acidic hydrogen per molecule. If 1.863 g of the acid require 70.11 mL of the NaOH solution what is the molecular weight of the acid?
26. Determine the oxidation number for each atom in the following compounds or ions:
    a. H_3O^+
    b. P_4O_{10}
    c. S_8
    d. H_2CO
    e. NH_4ClO_4
27. Balance the following oxidation reduction reactions. Which species in each is the oxidizing agent? Which is the reducing agent?

a. $P_4 + Cl_2 \rightarrow PCl_5$

    b. $Sn^{2+} + Cu^{2+} \rightarrow Sn^{4+} + Cu^+$

    c. $Cu + H^+ + NO_3^- \rightarrow Cu2+ + NO_2 + H_2O$

d. $Br_2 + SO_2 + H_2O \rightarrow H^+ + Br^- + SO_4^{2-}$

e. $H_2SO_4 + HBr \rightarrow SO_2 + Br_2 + H_2O$

28. Balance the following in basic solution:

a. $P_4 \rightarrow PH_3 + HPO_3^{2-}$

    b. $Cl_2 + OH- \rightarrow Cl + ClO_3^-$

    c. $Zn + NO_3- \rightarrow Zn2+ + NH_3$

29. Iron(II) can be determined by redox titration with a cerium (IV) solution. The oxidation reduction reaction is

$$Fe^{2+} + Ce^{4+} \rightarrow Fe^{3+} + Ce^{3+}$$

What is the concentration of Fe^{2+} if it requires 21.35 mL of 0.3136 M Ce^{4+} to titrate a 10.00 mL aliquot to the endpoint?