Unit 4 – Chapter 4 **Name _____**

End of chapter practice problems **Period _____**

1. Calculate the molarity of the following solutions:

    a) 49.73 g H_2SO_4 in enough water to make 500 mL of solution.

    b) 5.035 g $FeCl_3$ in enough water to make 250 mL of solution.

2. Calculate the molarity of the following solutions:

    a) 21.18 g of $Fe(NO_3)_3$ in 1 L of water.

    b) 72.06 g of $BaCl_2$ in 500 mL of water.

3. Calculate the concentrations of each of the ions in the following solutions:

    a) 0.25 *M* Na_3PO_4

    b) 0.87 *M* Na_2CO_3

4. Describe how you would prepare the following solutions:

    a) 1 L of 1.5 *M* $KMnO_4$

    b) 250 mL of 0.2 *M* $AgNO_3$

5. 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 $KBrO_3$

6. 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 KHP concentration.

7. A stock solution of sodium hydroxide is prepared by dissolving 120.0 g of NaOH in 500.0 mL of water. What is the molarity of the stock solution?

8. How many milliliters of 0.50 *M* $Ca(OH)_2$ are required to react with the HCl in 30 mL of a 0.12 *M* solution? The reaction of interest is:

$$2\ HCl + Ca(OH)_2 \rightarrow CaCl_2 + 2\ H_20$$

9. Balance the following reactions:

   a) $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$

   b) $Mg_3N_2 + H_2O \rightarrow MgO + NH_3$

10. Complete and balance the following reactions:

   a) $NaCl_{(aq)} + Hg_2(NO_3)_{2(aq)} \rightarrow$

   b) $Ca(OH)_{2(aq)} + Na_2CO_{3(aq)} \rightarrow$

11. Write the 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 to give water and aqueous potassium fluoride.

12. What mass of $CaCO_3$ is produced when 250 mL of 6.0 *M* Na_2CO_3 is added to 750 mL of 1.0 *M* CaF_2?

13. What volume of 0.1379 *M* HCl is required to neutralize 10.0 mL of 0.2789 *M* NaOH solution?

14. How many mL of 1.50 *M* NaOH is required to neutralize 275 mL of 0.5 *M* H_2SO_4?

15. Complete and balance each acid-base equation (assume complete neutralization):

    a) $H_3PO_4 + Mg(OH)_2 \rightarrow$

    b) $HC_2H_3O_2 + Ba(OH)_2 \rightarrow$

16. What volume of 0.2 *M* NaOH is required to neutralize 50 mL of 0.1 *M* H_2SO_3?

17. A 30.0 mL sample of an unknown basic solution is neutralized after the addition of 12.0 mL of a 0.15 *M* HCl solution. What is the molarity of the monoprotic base?

18. Balance the following oxidation-reduction reactions. Identify the oxidizing and agents.

    a) $Sn^{2+} + Cu^{2+} \rightarrow Sn^{4+} + Cu^{+}$

    b) $Br_2 + SO_2 + H_2O \rightarrow H^{+} Br^{-} + SO_4^{2-}$

19. Balance the following oxidation-reduction reactions taking place in acid solution:

    a) $H_3AsO_4 + Zn \rightarrow AsH_3 + Zn^{2+}$

    b) $Cr_2O_7^{2-} + Cl^{-} \rightarrow Cr^{3+} Cl_2$

20. Balance the following oxidation-reduction reactions taking place in basic solution:

    a) $HXeO_4^{-} + Pb \rightarrow Xe + HPbO_2^{-}$

    b) $Co(OH)_3 + Sn \rightarrow Co(OH)_2 + HSnO_2^{-}$