CH40S Aqueous Reactions Review

1. Indicate if the following compounds are soluble or not. If they are not soluble, write the formula for the compound.
    a. Barium hydroxide
    b. Aluminum nitrate
    c. Magnesium phosphate
    d. Copper(II) chloride
    e. Tin (II) sulphate
    f. Lithium carbonate

2. Write the complete set of reactions (molecular, ionic, and net ionic) for the following reactions:
    a. Ammonium sulphate and barium carbonate
    b. Sodium hydroxide and nickel(II) chloride
    c. Strontium hydroxide and calcium iodide
    d. Aluminum nitrate and magnesium sulphate
    e. Ammonium phosphate and calcium chloride

3. Compare and contrast how ionic and covalent compounds dissolve in water.

4. define and give an example of the following:
    a. Weak electrolyte
    b. Strong electrolyte
    c. Non-electrolyte

5. Determine the concentrations of the anions and cations produced in the following solutions (assume all are soluble):
    a. 0.15M sodium sulfate
    b. 3.2M Lead(IV) nitrate
    c. 0.025M Barium hydroxide
    d. 1.5M ammonium phosphate

6. Give three properties of acids and bases.

7. Write balanced neutralization reactions between the following acids and bases:
    a. Sodium hydroxide and hydrochloric acid
    b. Magnesium hydroxide and phosphoric acid
    c. Lithium hydroxide and acetic acid
    d. Carbonic acid and aluminum hydroxide

8. What is the concentration of a sodium hydroxide solution when 30.0mL of 0.5M hydrochloric acid are needed to neutralize 50.0mL of the base?

9. What is the concentration of acetic acid in vinegar when 52.5mL of 0.48M sodium hydroxide are needed to neutralize 17mL of the vinegar solution?

10. What volume of 0.00250M phosphoric acid is needed to neutralize 22mL of 0.00530M calcium hydroxide?

11. Calculate the volume of 2.2M sulphuric acid needed to neutralize a solution made with 2.45g of sodium hydroxide.

12. What mass of solid barium hydroxide is needed to neutralize 75.0mL of 0.25M phosphoric acid?

13. Find the molar mass of an unknown monoprotic acid HA if it takes 25.00mL of 0.175M sodium hydroxide to neutralize 0.900g of the unknown acid.

14. For each of the following reactions, determine the substance oxidized, the substance reduced, the oxidizing agent and the reducing agent.
    a. $P + HNO_3 + H_2O \rightarrow H_3PO_4 + NO$
    b. $Al + CuSO_4 \rightarrow Al_2(SO_4)_3 + Cu$
    c. $K_2Cr_2O_7 + H_20 + S \rightarrow SO_2 + KOH + Cr_2O_3$
    d. $HNO_3 + SO_2 + H_2O \rightarrow H_2SO_4 + NO$

15. Balance the redox reactions in question #14.

16. Balance the following redox reactions:
    a. $HNO_2 + I^- \rightarrow NO + I_2$ (in acidic solution)
    b. $MnO_4^- + H_2O_2 \rightarrow Mn^{2+} + O_2$ (in acidic solution)
    c. $CuS + NO_3^- \rightarrow Cu^{2+} + NO_2 + S$ (in acidic solution)
    d. $MnO_2 + ClO_3^- \rightarrow MnO_4^{2-} + Cl^-$ (in basic solution)
    e. $N_2O_4 + Br^- \rightarrow NO_2^- + BrO_3^-$ (in basic solution)
    f. $CrO_2^- + ClO^- \rightarrow CrO_4^{2-} + Cl^-$ (in basic solution)