Study Guide
Chapter 13

Directions: *For each of the following reactions, predict the products formed. Write equations as noted for each. All reactions contain soluble reactants and produce one precipitate.*
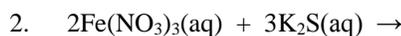
Soluble	Exceptions (are insoluble)
NO_3^-	
$C_2H_3O_2^-$, HCO_3^-, ClO_3^-	
Li^+, Na^+, K^+, Rb^+, Cs^+ & NH_4^+	
Cl^-, Br^-, I^-	Ag^+, Hg_2^{2+}, Pb^{2+}
SO_4^{2-}	Ag^+, Hg_2^{2+}, Pb^{2+}, Ca^{2+}, Sr^{2+}, & Ba^{2+}
Insoluble Compounds	**Exceptions (are soluble)**
CO_3^{2-}, PO_4^{3-}, CrO_4^{2-}, & S^{2-}	Li^+, Na^+, K^+, Rb^+, Cs^+ & NH_4^+
OH^-	Li^+, Na^+, K^+, Rb^+, Cs^+ & NH_4^+ & Ba^{2+}
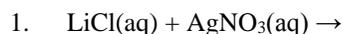
1. $LiCl(aq) + AgNO_3(aq) \rightarrow$

Molecular Equation:

Complete Ionic Equation:

Net Ionic Equation:

2. $2Fe(NO_3)_3(aq) + 3K_2S(aq) \rightarrow$

Molecular Equation:

Complete Ionic Equation:

Net Ionic Equation:

Directions: *Complete the following in the space provided.*

3. Physical properties of a solution that depend on the quantity of the solute particles present, but not the kind or identity of the particles, are called _____ properties.

4. Describe:

   a. Vapor pressure reduction: _____

   b. Boiling point elevation: _____

   c. Freezing point depression: _____

   d. van't Hoff factor: _____

   e. Osmotic pressure: _____

5. Why does $Al(ClO_4)_3$ have a lower vapor pressure than $Ca(ClO_4)_2$? _____

   _____

   a. Which would have a lower boiling point? _____

   b. Which would have a lower freezing point? _____

6. How would the change in freezing point depression compare between a non-electrolyte like sucrose and the electrolyte $KClO_4$? _____

7. Which would have a higher freezing point? _____ aqueous glucose (0.60 m)   or _____ aqueous FeI_3 (0.24 m)

8. Which would have a lower freezing point?   _____ pure H_2O or _____ aqueous KF (0.50 m)

9. A sample of potassium chlorate (15.0 g) is dissolved in 201 g of water at 70 °C, with precautions taken to avoid evaporation of any water. The solution is cooled to 30.0 °C and no precipitate is observed. This solution is

   _____.

10. A sample of potassium nitrate (49.0 g) is dissolved in 101 g of water at 100 °C, with precautions taken to avoid
    evaporation of any water. The solution is cooled to 30.0 °C and a small amount of precipitate is observed. This solution
    is _____.

11. Calculate the freezing point of a solution containing 5.0 g KCl and 550.0 g water. (K_f = 1.86 °C/m) (-0.45 °C)

12. Benzene (C_6H_6) is a non-polar solvent. If 48.1 g of methane (CH_4) is dissolved in 750. g of benzene, what will the boiling
    point of the solution be? [K_b for benzene = 2.53 °C/m & $BP_{benzene}$ = 80.1 °C] (90.2 °C)

13. A solution containing 20.0 g of an unknown liquid and 110.0 g water has a freezing point of -1.32 °C. Given K_f = 1.86
    °C/m for water, the molar mass of the unknown liquid is _____g/mol. (256 g/mol)