Review for Chap 4 Test (AP Chem) Name_____
Reactions in Aqueous Solutions

Topics:

1) Electrolytes vs. non-electrolytes: all soluble ionic compounds and strong acids are strong electrolytes (conduct well). Weak acids and weak bases are weak electrolytes (conduct weakly). All other covalent molecules are non-electrolytes (no conduction).
2) Know the strong acids: HI, HBr, HCl, HNO_3, H_2SO_4, $HClO_4$, [$HClO_3$]
   - All other acids are weak acids (examples: CH_3COOH [$HC_2H_3O_2$], HF, HNO_2)
   - Ammonia (NH_3) and amines (NR_3) are weak bases.
3) Precipitation Reactions:
   - Be able to use solubility rules (You only need to memorize Na^+, K^+, NH_4^+ and NO_3^-.)
   - Predict products of precipitation reactions.
   - Be able to write molecular equations and net ionic equations.
4) Acid Base Reactions
   - Arrhenius Acids (release H^+ in water) and Arrhenius Bases (release OH^- in water).
   - Brønsted Acids (proton donors) and Brønsted Bases (proton acceptors)
   - Monoprotic, diprotic and triprotic acids
   - Acid Base neutralization reactions: acid + base $\rightarrow$ salt + H_2O (Be able to predict products.)
   - Definition of a salt
5) Oxidation-Reduction Reactions
   - Identification of redox reactions (charges change because of loss and gain of electrons).
   - Determining oxidation numbers
   - Writing half reactions
   - Determining oxidizing agents and reducing agents
   - Types of Redox reactions: *Be able to predict products for all types.*
     a) Combination reactions
     b) Decomposition reactions
     c) Displacement reactions: *Use activity series or redox chart to determine if reactions occur.*
        1. Hydrogen & metal displacement
           i. Compare $E°$ values: more (+) reaction must be reduction (forward direction), more (–) reaction must be oxidation (reverse direction)
        2. Halogen displacement: follows activity series: $F_2 > Cl_2 > Br_2 > I_2$ or use $E°$ values, as above
     d) Disproportionation reactions: a special redox reaction where the same species is both oxidized and reduced.
6) Concentration of Solutions (Molarity):
   - How to make solutions from solid or by dilution of a solution ($M_iV_i = M_fV_f$).
   - Always use a volumetric flask to make solutions with precise concentrations.
7) Gravimetric Analysis Calculations
8) Acid Base Titrations: calculations, equivalence point, use of indicators
9) Redox Titrations: calculations, equivalence point, use of indicators (sometimes internal indicators)
10) Beer's Law from Brass Lab prelab

Review Practice:

In textbook: p. 156 #4.99, 4.101, 4.102, 4.109, 4.112, 4.114, 4.118, 4.121, 4.132
Optional Study Guide: p. 76 #2, 4, 5, 6, 8, 12, 13, 14, 15, 16, 22, 23, 27, 30, 33 (Study Guide pp. 76-78 #2f, 22b & 22c answers are incorrect. Corrections posted on website.)
Chapter 4 Multiple Choice Review
Predicting Products Practice on back

Predicting Products For each of the following situations, assume that a reaction takes place and write out the complete molecular equation. Also write a net ionic equation if one can be written. Then, determine if a reaction would actually take place and explain how you know.

A. Aqueous lead(II) nitrate is added to aqueous aluminum chloride

Mol. Eq:

Net Ionic Eq:

Does this reaction occur? _____ *Explain how you know.*

B. Calcium metal is added to water.

Mol. Eq:

Net Ionic Eq:

Does this reaction occur? _____ *Explain how you know.*

C. Silver wire is immersed in aqueous sulfuric acid.

Mol. Eq:

Net Ionic Eq:

Does this reaction occur? _____ *Explain how you know.*

D. Chlorine gas is bubbled through an aqueous solution of potassium fluoride.

Mol. Eq:

Net Ionic Eq:

Does this reaction occur? _____ *Explain how you know.*