**Honors Chemistry II: Product Prediction**

**Synthesis Reactions**

1. **A metal + a Nonmetal = Binary Salt**
2. **Metallic Oxides + H2O = Bases (metallic hydroxides)**
3. **Nonmetallic Oxides + Water = Acids (the nonmetal retains its oxidation #)**
4. **Metallic Oxides + Nonmetallic Oxides = Salts**

**Decomposition Reactions**

1. **Metallic Carbonates decompose into metallic oxides & carbon dioxide**
2. **Metallic Chlorates decompose into metallic chlorides & oxygen**
3. **Ammonium carbonate decomposes into Ammonia, Water, and CO2**
4. **Sulfurous Acid decomposes into sulfur dioxide and water**
5. **Carbonic Acid decomposes into carbon dioxide and water**
6. **A binary compound may decompose to produce two elements**
7. **Hydrogen peroxide breaks into water and oxygen**
8. **Ammonium hydroxide decomposes into ammonia and water**
9. **Metallic bicarbonates decompose into metallic oxides, CO2, and H2O**

**Single Replacement Reactions**

**Activity Series for Metals:**

***MOST* Li Ca Na Mg Al Zn Fe Pb H2 Cu Ag Pt *LEAST***

**Activity Series for Nonmetals:**

***MOST* F2 Cl2 Br2 I2 *LEAST***

1. **Active Metals replace less reactive metals**
2. **Active metals replace hydrogen in water**
3. **Active metals replace hydrogen in acids**
4. **Active metals replace less active nonmetals**

**Double Replacement Reactions**

1. **Formation of a precipitate occurs (see solubility rules sheet)**
2. **Formation of a gas occurs:**
   1. **Any sulfide + any acid form H2S (g) and a salt**
   2. **Any carbonate + any acid from CO2, H2O, and a salt**
   3. **Any sulfite + any acid form SO2, H2O, and a salt**
   4. **Any ammonium salt + any soluble strong hydroxide react upon heating to form NH3, H2O, and a salt**
3. **Formation of a molecular species occurs:**
   1. **Acids react with Bases to form salts and water**
   2. **Acid anhydrides react with basic anhydrides to produce salts**