Chemistry Types of Reactions

**Before moving on, here are some general rules of thumb for how to figure out what will be made (and if the reaction will occur at all):**

**1) If two elements or very simple molecules combine with each other, it’s probably a synthesis reaction. The products will probably be predictable using the octet rule to find charges.**

**2) If one compound has an arrow coming off of it, it’s probably a decomposition reaction. The products will either be a couple of very simple molecules, or some elements, or both.**

**3) If a pure element reacts with another compound it’s probably a single displacement reaction. The products will be the compounds formed when the pure element switches places with another element in the other compound.**

* Important note: these reactions will only occur if the pure element on the reactant side of the equation is higher on the activity series than the element it replaces.

**4) If two ionic compounds combine, it’s probably a double displacement reaction. Switch the cations and balance out the charges to figure out what will be made.**

* Important note: These reactions will only occur if both reactants are soluble in water and only one product is soluble in water.

**5) If something that has carbon and hydrogen reacts with oxygen, it’s probably a combustion reaction. The products will be CO2 and H2O.**

**6) If an acid and a base combine, it’s an acid-base reaction. The products will be an ionic compound and water.**

**Sample problems for types of reactions.**

1) **4** Fe + **3** O₂ 🡪 **2** Fe₂O₃

**Synthesis reaction**

2) **1** CaCO3 🡪 **1 CaO + 1 CO2**

**Decomposition reaction**

3) **2** Na + **1** CaSO4 🡪 **1 Na2SO4 + 1 Ca**

**Single displacement reaction**

4) \_\_\_\_ Pb + \_\_\_\_ Fe(NO3)3 🡪 **no reaction!**

**Though this is a single displacement reaction, lead is lower on the activity series than the iron it would replace. As a result, this reaction does not occur.**

5) **1** AlCl3(aq) + **1** (NH4)3PO4(aq) 🡪 **AlPO4(s) + 3 NH4Cl(aq)**

**Double displacement reaction**

6) **2** C3H6 + **9** O2 🡪 **6 CO2 + 6 H2O**

**Combustion reaction**

7) **2** HNO3 + **1** Ca(OH)2 🡪 **1 Ca(NO3)2 + 2 H2O**

**Acid-base reaction**