Types of Chemical Reactions

Many of the reactions you will encounter in this class can be classified under 4 reaction types.

1. **Synthesis or Combination** reactions are those in which a compound is formed from simpler substances.

E.g.
$$2 \text{ Na}_{(s)} + \text{Cl}_{2(g)}$$
 -----> $2 \text{NaCl}_{(s)}$ $N_{2(g)} + O_{2(g)}$ -----> $2 \text{NO}_{(g)}$

Their general format is

$$A + B \longrightarrow AB$$

2. **Decomposition** reactions are the opposite of synthesis reactions and consist of a compound breaking down into simpler substances or smaller units.

E.g.
$$2H_{2}O_{(l)} -----> 2H_{2(g)} + O_{2(g)}$$

$$2HgO_{(g)} -----> 2Hg_{(l)} + O_{2(g)}$$

Their general format is

$$AB \longrightarrow A + B$$

3. **Single Displacement** reactions involve one element or atom taking the place of another in a compound.

E.g.
$$Zn_{(s)} \ + \ 2HCl_{(aq)} \ -----> H_{2(g)} \ + ZnCl_{2(aq)}$$

$$2Al_{(s)} \ + \ Fe_2O_{3(s)} \ -----> 2Fe_{(l)} \ + \ Al_2O_{3(l)}$$

The general format is

$$A + BC \longrightarrow AC + B$$

4. **Double Displacement** reactions are like the single displacement reaction except that compounds exchange (trade) atoms.

E.g.
$$BaCl_{2} + Na_{2}SO_{4} -----> BaSO_{4} + 2NaCl$$

$$2BiCl_{3} + 3H_{2}S -----> Bi_{2}S_{3} + 6HCl$$

The general format is

$$AB + CD \longrightarrow AD + CB$$