Types of Chemical Reactions

1.) Synthesis – A + B → AB

*** What to look for → starts with 2 elements that combine.

Ex. 1 – $C_{(s)} + O_{2\,(g)}$ →

Ex. 2 – $H_{2\,(g)} + Cl_{2\,(g)}$ →

Ex. 3 - $Sb_{(s)} + Br_{2\,(l)}$ →

2.) Decomposition – AB → A + B

*** What to look for → starts with one compound.

Ex. 1 - $Ag_2O_{(s)}$ →

Ex. 2 - $HgO_{(s)}$ →

Ex. 3 - $NO_{(s)}$ →

3.) Single Replacement – A + BX → B + AX or Y + BX → X + BY

(metals replace metals and non-metals replace non-metals)

*** What to look for → starts with one element and one compound.

Ex. 1 - $CuCl_{2\,(aq)} + Fe_{(s)}$ →

Ex. 2 - $Cl_{2\,(aq)} + KI_{(aq)}$ →

Ex. 3 - $AgNO_{3\,(aq)} + Cu_{(s)}$ →

What do you get from this reaction? BE CAREFUL. SOMETHING IS UP!!!!!

$Ag_{(s)} + Cu(NO_3)_{2\,(aq)}$ →

- You need to use the activity series on your periodic table to see if reactions will happen or not!

- The element doing the replacing needs to be higher on the activity series than the element it replaces or the reaction will not occur.

$Cu_{(s)} + FeCl_{2\,(aq)}$ →

$Cl_{2\ (aq)}$ + $KI_{(aq)}$ →

$CuI_{2\ (aq)}$ + $Br_{2\ (g)}$ →

4.) Double Replacement – AX + BY → AY + BX

*** What to look for → starts with two compounds.

Ex. 1 - $AgNO_{3\ (aq)}$ + $NaCl_{(aq)}$ →

Ex. 2 - $NaCl_{(aq)}$ + $H_2SO_{4\ (aq)}$ →

Ex. 3 - $Ba(NO_3)_{2\ (aq)}$ + $Na_2SO_{4\ (aq)}$ →

- Like a single replacement reaction, how do we know if the reaction will occur? For double replacement reactions to occur a **solid, gas or water MUST be made!!!!!**

- How do you know what states to put for each chemical?

- know some gases – H N O F Cl Br I

- know some liquids – H_2O

- use solubility table on back of periodic table.

- find negative ion

- find metal

- it is soluble if they meet at an "aq" symbol

- it has a low solubility if they meet at an "s"

Neutralization is a special type of double replacement.

*** What to look for → starts with an acid and a base.

Acids start with H and bases end with OH

Ex. 1 - $HCl_{(aq)}$ + $NaOH_{(aq)}$ →

Ex. 2 - $H_2SO_{4\ (aq)}$ + $KOH_{(aq)}$ →

Ex. 3 - $H_3PO_{4\ (aq)}$ + $Ba(OH)_{2\ (aq)}$ →

5.) Combustion – is a rapid reaction with oxygen – $C_xH_y + O_2 \rightarrow CO_2 + H_2O$

*** What to look for → starts with hydrocarbon and oxygen.

Ex. 1 - $C_5H_{12\,(l)} + O_{2\,(g)} \rightarrow$

Ex. 2 - $C_5H_{12}O_{2\,(s)} + O_{2\,(g)} \rightarrow$

***__Note__ – if the hydrocarbon contains sulphur, SO_2 is also produced.

Ex. 3 - $C_5H_{12}S_{\,(s)} + 9\,O_{2\,(g)} \rightarrow 5\,CO_{2\,(g)} + 6\,H_2O_{\,(g)} + SO_{2\,(g)}$

6.) Miscellaneous – a reaction that doesn't fit any of the above types.

Ex. 1 - $CaSO_4 \cdot 2H_2O_{\,(s)} + 2\,SO_{3\,(g)} \rightarrow CaSO_{4\,(s)} + 2\,H_2SO_{4\,(aq)}$

Ex. 2 - $Ca_3(PO_4)_{2\,(aq)} + 3\,SiO_{2\,(s)} + 5\,C_{\,(aq)} \rightarrow 3\,CaSiO_{3\,(s)} + 5\,CO_{\,(l)} + 2\,P_{\,(s)}$