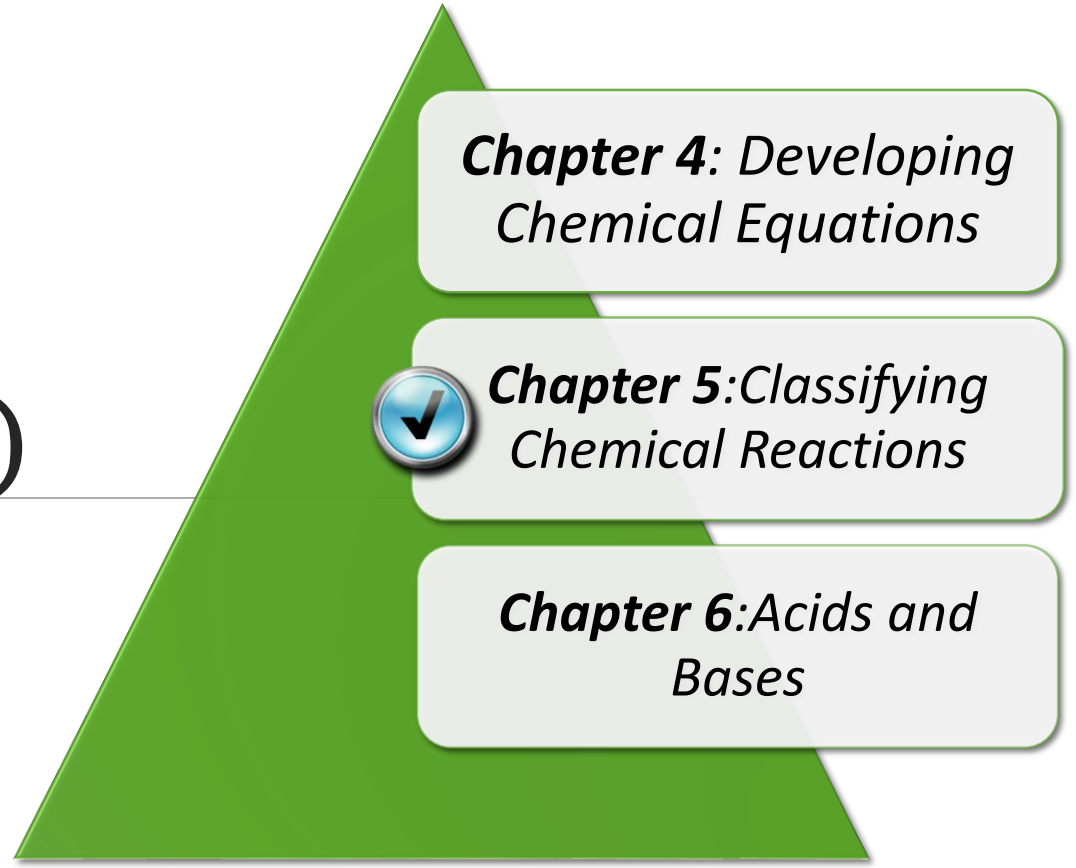
Unit 1: Chemistry (5.2)

SNC2DP



Remember . . .

There are five main types of chemical reactions:

1) Synthesis Reaction 

2) Decomposition Reaction 

3) Single Displacement Reaction

4) Double Displacement reaction

5) Combustion reaction

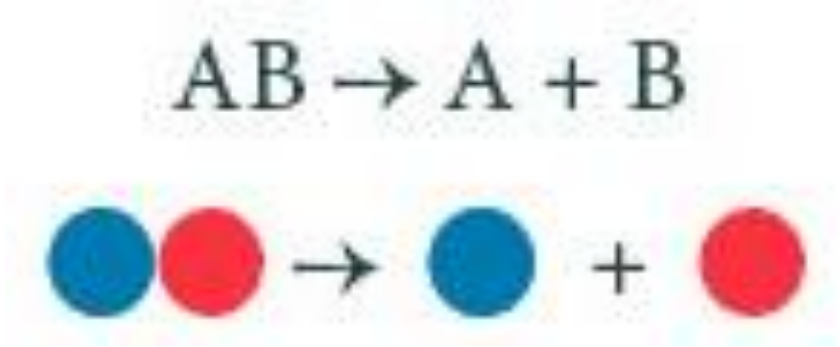
Recap: Synthesis Reaction . . .

A ***synthesis reaction*** is a chemical reaction in which two or more reactants combine to produce a new product.

$$A + B \rightarrow AB$$

Recap: Decomposition Reaction . . .

A ***decomposition reaction*** is a chemical reaction in which a compound breaks down (decomposes) into two or more simpler compounds or elements.



Single Displacement Reaction

Single displacement reaction:

A + BC → AC + B

Where **A** is a **metal**

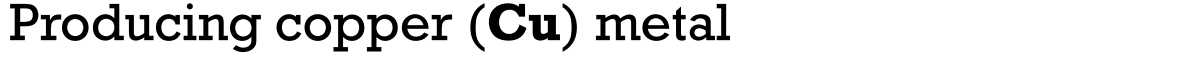
A + BC → BA + C

Where **A** is a **non-metal**

Examples of Single Displacement Reaction

Displacing silver (**Ag**) from silver nitrate (**$AgNO_3$**)

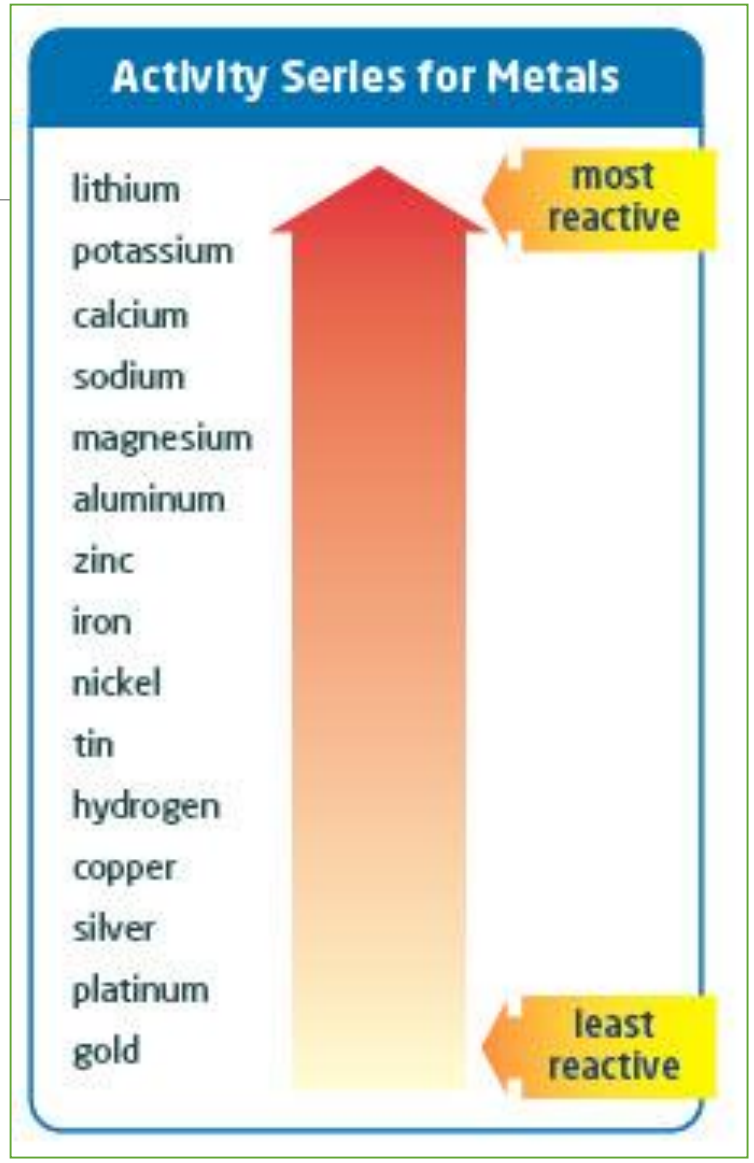
Producing copper (**Cu**) metal



Activity Series

Activity series is a list of elements organized according to their chemical reactivity.

Metals higher up on the activity series list will replace metals lower on the list during a ***single displacement reaction****.*



Solving a Single Displacement Reaction

Rules for solving a single displacement reaction:

1. Determine which element is the metal and which is the non-metal. Reference the activity series. *(only switch the metal elements if it is higher on the activity series).*

2. Combine the singe metal with the non metal and do the cross over method.

3. Write the skeletal equation.

4. Write a balanced chemical equation. *(make sure to double check that both the reactants and products are balanced)*

Complete the following chemical reaction:

$SnCl_4\ (aq) + Al\ (s) \longrightarrow$

Let's Practice!

Complete and balance the following single displacement reactions. Make sure to refer to the activity series.

1) CuF_2 (aq) + Mg (s)

2) Cu (s) + HCl (aq)

3) $Au(NO_3)_3$ (aq) + Ag (s)

4) Al (s) + Fe_2O_3

Double Displacement Reaction

Double displacement reaction:

$$AB + CD \rightarrow AD + CB$$

Double Displacement Reaction

$$AB + CD \rightarrow AD + CB$$

$$2AgNO_3(aq) + K_2CrO_4(aq) \longrightarrow Ag_2CrO_4(s) + 2KNO_3(aq)$$

Double Displacement Reaction

Sulfur dioxide (**SO_2**) is used to preserve the colour of dried fruit. A ***double displacement reaction*** followed by a ***decomposition reaction*** releases the sulfur dioxide gas required for the process.

The ***double replacement reaction***

$$\mathbf{Na_2SO_3(aq) + 2HCl(aq) \longrightarrow 2NaCl\,(aq) + H_2SO_3(aq)}$$

The **decomposition reaction**

$$\mathbf{H_2SO_3(aq) \longrightarrow H_2O(l) + SO_2(g)}$$

Solving a Double Displacement Reaction

Rules for solving a double displacement reaction:

1. Do the reverse cross-over method to determine the charge of each element. *(reference the periodic table as well).*

2. Switch the non-metals and metals with one another (cations and anions) and write the skeletal equation.

3. Write the skeletal equation.

4. Write a balanced chemical equation.

Complete the following chemical reaction:

Let's Practice!

Complete and balance the following double displacement reactions.

1) $SrCl_2$ (aq) + $Pb(NO_3)_2$ (aq)

2) $AlCl_3$ (aq) + $CuNO_3$ (aq)

3) KCl (aq) + $AgNO_3$ (aq)

4) CaI_2 (aq) + Na_2CO_3(aq)

SUMMARY

Reaction Type	General Chemical Equation	Example	Characteristics
Synthesis	$A + B \rightarrow AB$ 	$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$	Two reactants join to form a single compound.
Decomposition	$AB \rightarrow A + B$ 	$2C_7H_5N_3O_6(s) \rightarrow 3N_2(g) + 5H_2O(g) + 7CO(g) + 7C(s)$	A single compound breaks apart into two or more products.
Single displacement	$A + BC \rightarrow AC + B$ $A + BC \rightarrow BA + C$ 	$2Al(s) + 3CuCl_2(aq) \rightarrow 2AlCl_3(aq) + 3Cu(s)$ (metal displacement) $F_2(g) + 2NaI(s) \rightarrow I_2(s) + 2NaF(s)$ (non-metal displacement)	A reactive element takes the place of a less reactive element in a compound.
Double displacement (precipitate)	$AB + CD \rightarrow AD + BC$ 	$NaCl(aq) + AgNO_3(aq) \rightarrow AgCl(s) + NaNO_3(aq)$	Two ionic compounds in a solution switch ions and form two new compounds, including a precipitate.

HOMEWORK

- Complete the worksheets given in class.
- p. 198 # 2, 3, 5, 6 & 8