CBSE Class 10 Science Notes Chapter 1 Chemical Reactions and Equations

Chemical Reaction

A chemical reaction is defined as a process by which 2 or more substance react with each other to form new substance.

Chemical Reaction take place when there is:

- Change in state
- Change in colour
- Evaluation of a gas
- Change in temperature

Chemical Equation

A Chemical Equation is a symbolic representation of a chemical reaction in the form of symbols and formulae where reactants are written on left hand side with a plus sign between them and product are written on right hand side with a plus sign between them.

For Eg: The burning of Magnesium in air is written as:

Magnesium + Oxygen $\longrightarrow$ Magnesium oxide

(Reactants) (Product)

Writing a Chemical Equations

The above word equations can be written in shorter way by using the chemical formulae as shown below:

$Mg + O_2 \longrightarrow MgO$

Balanced Chemical Equation

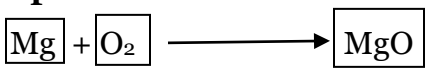
A chemical equation is said to be balanced when the number of atom of each element is equal on both the side of the equation i.e

Number of atom of an element on reactant side = Number of atom of element on product side

How to balance a Chemical Equation

The above equation is not balanced. Let's try to balance it.

Step 1: First write the chemical equation and draw box around each formula.



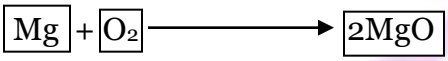
Step 2: List the number of atoms of different elements present in the equation as shown in the table below.

Element	No. of atoms in reactants (LHS)	No. of atoms in products (RHS)
Mg	1	1
O	2	1

Step 3: As we can see that the Mg atoms are balanced on both side but Oxygen atoms are different. So, to balance the equation atom;

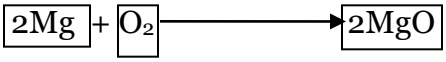
Atom of Oxygen	In reactants (LHS)	In products (RHS)
Intial	2	1
To balance	2	1×2

Now, the equation becomes;



Step 4: As we see that, Mg atoms are still not balanced. To equalise the number of Mg atoms;

Atom of Mg	In reactants (LHS)	In products (RHS)
Intial	1	2
To balance	1×2	2



Now, the equation is above chemical equation is completely balanced as the number of atoms in reactant and products are equal.

Type of Chemical Reactions

1) **Combination Reaction:** When two or more substance combine to form a new single substance then it is called as combination reaction.

   Examples:

a) Formation of slaked lime from quick lime

$$CaO(s) + H_2O(l) \longrightarrow Ca(OH)_2\,(aq) + \text{Heat}$$

(Quick Lime) (Slaked lime)

b) Burning of coal

$$C(s) + O_2(g) \longrightarrow CO_2(g)$$

c) Formation of water

$$2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$$

2) **Exothermic Reaction:** Reaction in which heat is evolved is called exothermic reaction. Examples:

a) Burning of natural gas

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2\,H_2O(g)$$

b) Respiration reaction

$$C_6H_{12}O_6(aq) + 6O_2(aq) \longrightarrow 6CO_2(aq) + 6H_2O(l) + \text{Energy}$$

3) **Decomposition Reaction:** When a substance decomposes to give two or more substance then it is known as decomposition reaction.

a) $2FeSO_4(s) \xrightarrow{Heat} Fe_2O_3(s) + SO_2(g) + SO_3(g)$

b) $CaCO_3(s) \xrightarrow{Heat} CaO(s) + CO_2(g)$

c) $2Pb(NO_3)_2(s) \xrightarrow{Heat} 2PbO(s) + 4NO_2(g) + O_2$

4) **Displacement Reaction:** When an element displaces another element from its compound, a displacement reaction occurs.

$$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$$

$$Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$$

$$Pb(s) + CuCl_2(aq) \longrightarrow PbCl_2(aq) + Cu(s)$$

5) **Double Displacement Reaction:** When two different atoms or group of atoms are exchanged in a chemical reaction then it is called as a double displacement reaction.

$$Na_2SO_4(aq) + BaCl_2(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$$

6) **Oxidation Reaction:** When the gain of oxygen or loss of hydrogen atom take place then it is known as oxidation reaction.

$$2Cu + O_2 \xrightarrow{Heat} 2CuO$$

7) **Reduction Reaction:** When the loss of oxygen or gain of hydrogen atom take place

then it is known as oxidation reaction.

$$CuO + H_2 \xrightarrow{Heat} Cu + H_2O$$

8) **Redox Reaction:** Reaction in which oxidation and reduction take place simultaneously is known as Redox reaction.

$$ZnO + C \longrightarrow Zn + CO$$

$$MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$$

Corrosion

When a metal is attacked by substances around it such as moisture, acid etc, it is said to corrode and this process is known as corrosion.

Example: Black coating on silver, Green coating on copper

Rancidity

The taste and odour of food material containing fat and oil changes when they are left exposed to air for long time. This is called Rancidity. It is caused due to oxidation of fat and oil present in food material.

It can be prevented by adding antioxidants to the food material, storing food in air tight container, using flush bag with nitrogen gas.