H.P. INTERNATIONAL SCHOOL BUDAUN

HARSHIT GUPTA

class - 10 sub- chemistry

Chemical Reactions And Chemical Equations

Change :- When the initial and final condition of any substance are different then it is said to be a change.

Types of change:- Changes may be of two types.

1. **Physical change:-** The changes in which only the physical properties of the substance get changed and no new substance is formed then such changes are said to be physical changes.

For example:- Melting of ice, Freezing of water, Getting Salt from seawater, etc.

2. **Chemical changes:-** The changes in which the composition and the chemical properties of a substance get change and one or more new substance are formed then such changes are called chemical changes.

For example:- Burning of carbon, burning of magnesium, addition of acid with base, etc.

Difference between physical and chemical changes

Physical change	Chemical change
1. In physical change the chemical composition of substance remains same	In chemical change the chemical composition of substance get changed
2. Physical changes are generally reversible	Chemical change are generally irreversible
3. The Identity and nature of initial substance remains same	Identity and nature of initial substance get changed
4. Physical changes are temporary changes	Chemical changes are permanent changes

Chemical reactions :- The change of one or more substances into the other substances having different composition and properties then such changes are called chemical changes and their representation is called a chemical reaction.

The substances which take part in the chemical reaction are called **reactants** and the substances which are formed in the chemical reaction are called **products**.

For example:-1- If hydrogen combines with oxygen to form water then we can write the chemical reaction for this statement as ;-

Hydrogen + oxygen → water

2- Carbon burns in the air(oxygen) to form carbon dioxide

carbon + oxygen → carbon dioxide

Chemical equation:- A Shorthand representation of a chemical reaction in terms of symbols and formulae of the substance involved, is called a chemical equation.

for example:- If carbon burns in the oxygen to form carbon dioxide then its chemical equation can be shown as follow-

$$C + O_2 \rightarrow CO_2$$

Similarly the statement hydrogen combines with oxygen to form water can also turn into chemical equation as-

$$2H_2 + O_2 \rightarrow 2H_2O$$

The chemical equations are also divided into two types

1. **Unbalanced chemical equations:-** When the number of each element present in the reactant side is not equal to the number of all elements present in the product side then such chemical equations are called unbalanced chemical equation.

For example:-

(chemical reaction) **Hydrogen + oxygen → water**

(chemical equation) $H_2 + O_2 \rightarrow H_2O$

Balance chemical equations:- When the number of each element present in the reactant side is equal to the number of all elements present in the product side then such chemical reactions are called balanced chemical equation.

For example:-

(chemical reaction) **Hydrogen + oxygen → water**

(chemical equation) $2H_2 + O_2 \rightarrow 2H_2O$

Balancing of a Chemical equation:- In a balanced chemical equation the number of atoms of different elements on the both sides are equal. Balancing of a chemical equation is done by hit and trial method. This method involves following steps-

- List the number of atoms of all elements present in the unbalanced reaction.
- Start balancing the compound containing more number of atoms without changing their chemical composition.
- We can increase the number of molecules on both side as required to balance the equation.
- Analyse the equation carefully after balancing each element and then proceed further.
- After balancing all the elements, count the number of atoms present on both sides.

Let us consider a reaction;

Methane burns in air(oxygen) to form carbon dioxide and water

Methane + Oxygen → carbon dioxide + water

the unbalanced chemical equation for this reaction can be written as-

$$CH_4 + O_2 \rightarrow CO_2 + H_2O$$

Now according to hit and trial method

step-1 List the number of atoms of all elements present in the unbalanced reaction

Element	Reactant side	Product side
C	1	1
H	4	2
O	2	3

step-2 Start balancing the compound containing more number of atoms without changing their chemical composition. So we will start the balancing this reaction with hydrogen by simply multiplying on product side by 2.

$$CH_4 + O_2 \rightarrow CO_2 + 2H_2O$$

now again we can check the number of atoms on both side

Element	Reactant side	Product side
C	1	1
H	4	4
O	2	4

step-3 now to balance this equation, multiply oxygen by 2 on reactant side then we get

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

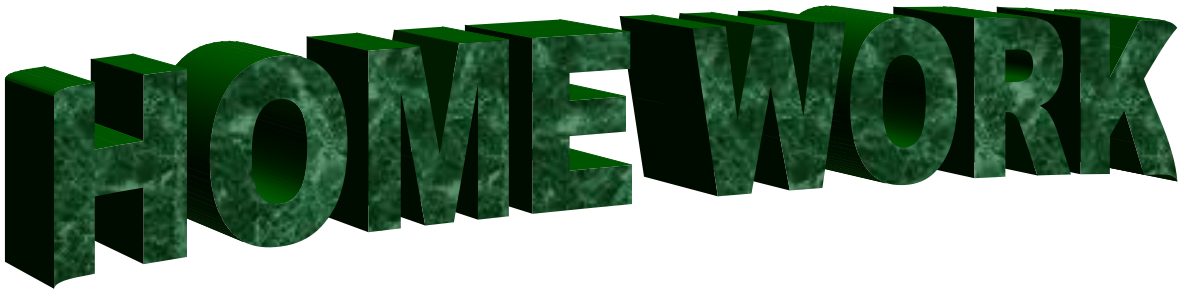
step-4 Analyse the equation carefully after balancing each element

step-5 After balancing all the elements, count the number of atoms present on both sides

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

Element	Reactant side	Product side
C	1	1
H	4	4
O	4	4

Hence, it is clear from the above table that the number of elements are same on both side. thus the above equation is a balanced chemical equation.



1. Give the examples of any five physical and five chemical changes which you have observed around you.
2. convert the following statement into balanced chemical equations.
   - Nitrogen combines with hydrogen to form ammonia.
   - Sodium carbonate on reaction with hydrochloric acid gives sodium chloride and sodium hydrogencarbonate.
   - Aluminium reacts with hydrochloric acid to give aluminium chloride and produces hydrogen gas.
   - Zinc oxide is heated with carbon to reduced into zinc metal with the libration of carbon mono oxide.
3. Balance the following chemical reaction by hit and trial method.

- Zinc reacts with silver nitrate to form the zinc nitrate and silver metal.
- Barium chloride reacts with sulphuric acid to form hydrochloric acid and the ppt of barium sulphate.

Note:- It is mandatory for all students to complete the work and home work before the next lecture of chemistry.

THANK YOU