CHEMICAL REACTIONS & EQUATIONS

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by

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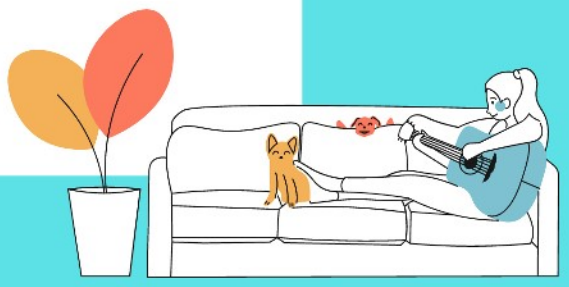

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Chemical reaction:

The process in which new substances with new properties are formed from one or more substances is called Chemical Reaction.

Examples -

- Rusting of Iron
- Burning of wood
- Formation of Curd
- Respiration etc.

Following observations help to determine whether a chemical reaction has taken place:

1) Change in state
2) Change in colour
3) Evolution of a gas
4) Change in temperature

Reactant: The substances which take part in chemical reaction.

Product: The substances which are formed in a chemical reaction.

Chemical Equation:

- Symbolic representation of a chemical reaction is said to be **Chemical equation.**
- It involves uses of symbol of elements or chemical formula of reactant and product with mention of physical state.

- The necessary conditions such as temperature, pressure or any catalyst should be written on arrow between reactant and products.

- Example :

  Magnesium is burnt into air to form magnesium oxide can be represented as

$$Mg + O_2 \rightarrow MgO$$

Important Note

Physical state of the reactant and products are mentioned to make chemical reaction more informative.

Example we use (g) for gas, (l) for liquid, (s) for solid and (aq) for aqueous. Thus is good for chemical reactions and equations notes

Balancing Chemical Equation:

Chemical reactions and equations notes also include the mean to balance the equations by several methods. They are:

Law of Conservation of Mass -

- Mass can neither be created nor be destroyed in a chemical reaction. Thus remains conserved.

- So number of elements involved in product side will be same as reactant side.

$$H_2 + O_2 \longrightarrow H_2O$$

- In this Chemical equation number of H atoms in reactant side is 2 and that of product side is also 2. Number of O atoms in reactant side is 2 but that of product side is 1.

- To balance this equation, we have to use hit and trial method.

$$2H_2 + O_2 \longrightarrow 2H_2O$$

- Now the number of atoms in reactant side is equal to that of product side.
  Thus, balanced.

Types of Chemical Reactions

There are several types of chemical reaction based on different factors -

Based on Chemical Change:

There are total 8 types of Chemical reactions -

1) Combination Reaction - The reaction in which two or more substances combine to form a new single substance.

$$C + O_2 \longrightarrow CO_2$$

2) Decomposition reaction - The reaction in which a single substance decomposes to give two or more substances.

$$Nacl \longrightarrow Na + Cl$$

Decomposition reactions can be of three types -

i) Thermal Decomposition - When a decomposition reaction is carried out by heating.

$$CaCO_3 \longrightarrow CaO + CO_2$$

ii) Electrolytic Decomposition - When decomposition is carried out by passing electricity.

$$2H_2O + \text{electric current} \longrightarrow 2H_2 + O_2$$

iii) Photolytic Decomposition - When decomposition is carried out in presence of sunlight.

$$2AgCl + \text{sunlight} \longrightarrow 2Ag\,(s) + Cl_2$$

3) Displacement Reaction – The chemical Reaction in which an element displaces another element from its solution.

$$Fe + CuSO_4 \longrightarrow FeSO_4 + Cu$$

4) Double Displacement Reaction – The reaction in which two different atoms or group of atoms are mutually exchanged.

$$Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4 + 2NaCl$$

5) Precipitation reaction - The reaction which involves formation of precipitate (insoluble substance) is known as precipitation reaction.

$$Pb(NO_3)_2 + 2KI \longrightarrow 2KNO_3 + PbI_2$$

6) Oxidation reaction - The reaction in which substance gains oxygen or loses hydrogen is called as oxidation reaction.

$$2Cu + O_2 + Heat \longrightarrow 2CuO$$

7) Reduction reaction - The reaction in which substance gains hydrogen or loses oxygen is called as reduction reaction.

$$C + 2H_2 \longrightarrow CH_4$$

8) Oxidation - Reduction reaction (Redox reaction) - The reaction in which one reactant gets oxidized and the other reactant gets reduced is called as oxidation-reduction reaction or redox reaction. In this reaction, simultaneous oxidation and reduction reactions take place.

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

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

Classification of chemical reactions based on energy change:

The classification of reactions is the prime part of chemical reactions and equations notes:

Exothermic Reactions -

Reaction in which heat is released along with formation of products.

$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O + Heat$$

Endothermic reactions -

The reactions which require energy in the form of heat, light or electricity to break reactants are called endothermic reactions.

$$2Pb(NO_3)_2 + Heat \longrightarrow 2PbO + 4NO_2 + O_2$$

Effects of Oxidation in Daily Life -

1) Corrosion (जंग लगना) -

When a metal is exposed to substances such as moisture, acid etc. for some time, a layer of hydrated oxide is formed which weakens the metal and hence metal is said to be corrode

Rusting of iron, black coating on silver and green coating on copper are examples of corrosion.

Corrosion can be prevented by galvanization, electroplating or painting.

Corrosion of Iron

Corrosion of Copper

2) Rancidity (किसी फ्रूट या सब्जी का सड़ जाना) -

The oxidation of fats and oils when exposed to air is known as rancidity. It leads to bad smell and bad taste of food.

Methods to Prevent Rancidity

- By adding antioxidants
- Keeping food in airtight containers
- Replacing air by nitrogen
- Refrigeration

CONGRATS BUDDY!!! YOU DID IT.
PROUD OF YOU... BRING IN THAT HUG.

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