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**CBSE Class 10****NCERT Solution – Basic Concepts, Notes, Summary****Chapter 1. Chemical Reactions and Equations**

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**1.1 Chemical Equations**

A **chemical reaction** is a process in which one or more substances (reactants) are converted into new substances (products).

**Indicators of a Chemical Reaction**

- Change in colour
- Change in temperature
- Evolution of gas
- Formation of precipitate
- Change in state

**Example:**

Magnesium + Oxygen  $\rightarrow$  Magnesium Oxide

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**1.1.1 Writing a Chemical Equation**

A chemical equation represents a chemical reaction using symbols and formulae.

**Word Equation**

Magnesium + Oxygen  $\rightarrow$  Magnesium Oxide

**Chemical Equation**

$\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$

**Reactants and Products**

Reactants: Substances that take part in a reaction.

Products: New substances formed after the reaction.

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**1.1.2 Balanced Chemical Equations**

According to the **Law of Conservation of Mass**, mass can neither be created nor destroyed.

Therefore, the number of atoms of each element must be equal on both sides of a chemical equation.

**Example-**

Unbalanced:

$\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$

Balanced:

$2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

**Importance** – The balanced chemical equation represents the actual chemical reaction and obeys the law of conservation of mass.

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**1.2 Types of Chemical Reactions:****1.2.1 Combination Reaction**

Two or more substances combine to form a single product.

**General Form**

$\text{A} + \text{B} \rightarrow \text{AB}$

**Example**

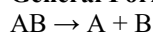
$\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$

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### 1.2.2 Decomposition Reaction

A single compound breaks down into two or more simpler substances.

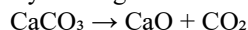
#### General Form



#### Types:

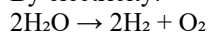
##### (a) Thermal Decomposition

By heating.



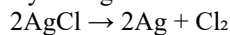
##### (b) Electrolytic Decomposition

By electricity.



##### (c) Photolytic Decomposition

By sunlight.

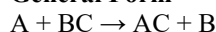


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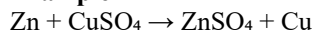
### 1.2.3 Displacement Reaction

A more reactive element displaces a less reactive element from its compound.

#### General Form



#### Example

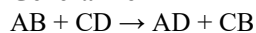


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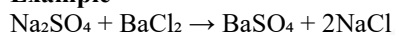
### 1.2.4 Double Displacement Reaction

Two compounds exchange ions to form two new compounds.

#### General Form



#### Example



### Precipitation Reaction

A reaction in which an insoluble solid (precipitate) is formed.  $\text{BaSO}_4$  is a white precipitate.

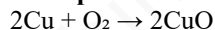
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### 1.2.5 Oxidation and Reduction

#### Oxidation

Addition of oxygen or removal of hydrogen.

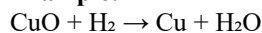
#### Example:



#### Reduction

Removal of oxygen or addition of hydrogen.

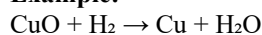
#### Example:



### Redox Reaction

A reaction in which oxidation and reduction occur simultaneously.

#### Example:



- $\text{CuO}$  is reduced.
- $\text{H}_2$  is oxidized.

### 1.3 Effects of Oxidation Reactions in Everyday Life

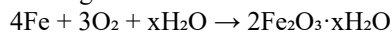
Oxidation reactions affect many substances around us and can be useful or harmful.

#### 1.3.1 Corrosion

The gradual destruction of metals due to reaction with air, moisture, or chemicals is called **corrosion**.

##### Example

Rusting of iron:



##### Prevention of Corrosion

- Painting
- Greasing
- Oiling
- Galvanization
- Alloying

##### Examples

- Rusting of iron
- Black coating on silver
- Green coating on copper

#### 1.3.2 Rancidity

The oxidation of fats and oils causing unpleasant smell and taste is called **rancidity**.

##### Examples

- Spoiled chips
- Stale butter
- Bad-smelling edible oils

##### Prevention

- Storing food in airtight containers
- Refrigeration
- Adding antioxidants
- Nitrogen flushing in food packets

##### Important Definitions:

| Term                         | Definition                                          |
|------------------------------|-----------------------------------------------------|
| Chemical Reaction            | Conversion of reactants into products               |
| Chemical Equation            | Symbolic representation of a chemical reaction      |
| Balanced Equation            | Equation with equal atoms on both sides             |
| Combination Reaction         | Two or more substances form one product             |
| Decomposition Reaction       | One compound breaks into simpler substances         |
| Displacement Reaction        | More reactive element displaces a less reactive one |
| Double Displacement Reaction | Exchange of ions between compounds                  |
| Oxidation                    | Addition of oxygen/removal of hydrogen              |
| Reduction                    | Removal of oxygen/addition of hydrogen              |
| Corrosion                    | Deterioration of metals by oxidation                |
| Rancidity                    | Oxidation of fats and oils                          |

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**Summary from NCERT**

- A complete chemical equation represents the reactants, products and their physical states symbolically.
- A chemical equation is balanced so that the numbers of atoms of each type involved in a chemical reaction are the same on the reactant and product sides of the equation. Equations must always be balanced.
- In a combination reaction two or more substances combine to form a new single substance.
- Decomposition reactions are opposite to combination reactions. In a decomposition reaction, a single substance decomposes to give two or more substances.
- Reactions in which heat is given out along with the products are called exothermic reactions.
- Reactions in which energy is absorbed are known as endothermic reactions.
- When an element displaces another element from its compound, a displacement reaction occurs.
- Two different atoms or groups of atoms (ions) are exchanged in double displacement reactions.
- Precipitation reactions produce insoluble salts.
- Reactions also involve the gain or loss of oxygen or hydrogen by substances.
- Oxidation is the gain of oxygen or loss of hydrogen. Reduction is the loss of oxygen or gain of hydrogen.