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CBSE 10 Chemistry – Notes

Chapter 1: Chemical Reactions and Equations

Chemical reaction

A chemical reaction is a process in which one or more substances, called reactants, are converted into new substances, called products.

Example: $2Mg + O_2 \rightarrow 2MgO$

Indicators of a chemical reaction

A chemical reaction may be indicated by:

- Change in colour – e.g., iron turns reddish-brown due to rusting.
- Evolution of gas – e.g., zinc reacts with dilute HCl to release hydrogen gas.
- Change in temperature – heat may be released or absorbed.
- Formation of precipitate – an insoluble solid is formed.
- Change in state – e.g., gas may form from a liquid or solid.

Chemical equations

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

Example: $H_2 + Cl_2 \rightarrow 2HCl$

Balanced chemical equation

A chemical equation is balanced when the number of atoms of each element is the same on both sides of the equation.

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

Why equations must be balanced

- To satisfy the law of conservation of mass.
- To show the correct ratio in which reactants combine and products are formed.

Types of chemical reactions

1.Combination reaction

Two or more substances combine to form a single product.

$$A + B \rightarrow AB$$

Example: $CaO + H_2O \rightarrow Ca(OH)_2$

2.Decomposition reaction

A single compound breaks down into simpler substances by the help of heat, light and electricity.

$$AB \rightarrow A + B$$

Example:

$CaCO_3 \rightarrow CaO + CO_2$

$2AgCl \rightarrow 2Ag + Cl_2$

$\boxed{2H_2O \rightarrow 2H_2 + O_2}$

3. Displacement reaction

A more reactive element displaces a less reactive element from its compound. It is based on reactivity series of metals.

$$A + BC \rightarrow AC + B$$

Example: $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

Most Reactive
K
Na
Ca
Mg
Al
Zn
Fe
Sn
Pb
[H]
Cu
Hg
Ag
Au
Least Reactive

4. Double displacement reaction

Two compounds exchange ions to form new compounds.

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

Example: $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$

a) Precipitation reaction

A type of double displacement reaction in which an insoluble solid called precipitate is formed.

Example: $AgNO_3 + NaCl \rightarrow AgCl \downarrow + NaNO_3$

b) Neutralization reaction

An acid reacts with a base to form salt and water.

Example: $HCl + NaOH \rightarrow NaCl + H_2O$

5. Redox reaction

A reaction involving both oxidation and reduction.

- Oxidation: addition of oxygen or removal of hydrogen.
- Reduction: removal of oxygen or addition of hydrogen.

Example: $CuO + H_2 \rightarrow Cu + H_2O$

Oxidizing agent: Substance that provides oxygen or removes hydrogen

Reducing agent: Substance that removes oxygen or provides hydrogen

Effects of oxidation reactions in everyday life

Corrosion

Corrosion is the gradual destruction of metals by reaction with air, moisture, or other substances.

Example: Rusting of iron, $4Fe + 3O_2 + xH_2O \rightarrow 2Fe_2O_3 \cdot xH_2O$

Prevention of corrosion

- Painting
- Oiling or greasing
- Galvanization
- Alloying

Rancidity

Rancidity is the oxidation of fats and oils, leading to an unpleasant smell and taste.

Prevention:

- Store food in airtight containers.
- Keep food away from light and heat.
- Add antioxidants.
- Use nitrogen gas in food packaging.

Exothermic and endothermic reactions

Exothermic reaction	**Endothermic reaction**
Releases heat	Absorbs heat
Example: combustion of methane	Example: decomposition of calcium carbonate

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Exothermic reaction	**Endothermic reaction**
$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O + heat$	$CaCO_3 \rightarrow CaO + CO_2$

Colour Changes to Remember (Very Important)

Reaction	**Observation**
Mg burns	Silvery metal → White ash
Cu + O_2	Reddish brown → Black
AgCl in sunlight	White → Grey
AgBr in sunlight	Cream → Grey
$CuSO_4$ + Zn	Blue → Colourless
$CuSO_4$ + Fe	Blue → Green
$FeSO_4$ on heating	Green → Brown
$Pb(NO_3)_2$ on heating	Brown fumes evolved
Na_2SO_4 + $BaCl_2$	White precipitate

Reactions Most Frequently Asked in CBSE Board Exams ⋆⋆⋆

1. $2Mg + O_2 \rightarrow 2MgO$
2. $CaO + H_2O \rightarrow Ca(OH)_2$
3. $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 \downarrow + 2NaCl$
4. $AgNO_3 + NaCl \rightarrow AgCl \downarrow + NaNO_3$
5. $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$
6. $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$
7. $4Fe + 3O_2 + xH_2O \rightarrow 2Fe_2O_3 \cdot xH_2O$