

Chapter 1: Chemical Reactions and Equations

1. Chemical Reaction

A chemical reaction is a process in which one or more substances called reactants change into new substances called products with different physical and chemical properties.

Examples from daily life:

- Milk turning into curd
- Rusting of iron
- Fermentation of grapes
- Cooking of food
- Digestion of food in our body

2. Types of Changes in Matter

Physical Change

A physical change is a change in which only the physical properties such as shape, size, or state change and no new substance is formed.

Example: Ice → Water → Water Vapour (Chemical composition remains H₂O).

Chemical Change

A chemical change is a change in which one or more substances react to form new substances with different properties.

- Rusting of iron
- Burning of wood
- Curdling of milk
- Digestion of food

Activity 1.1 – Burning of Magnesium Ribbon

Procedure:

1. Clean a magnesium ribbon using sandpaper.
2. Hold the ribbon with tongs.
3. Burn it in a flame.
4. Collect the ash in a watch glass.

Observation:

- Magnesium burns with a dazzling white flame.
- A white powder is formed.

Result: The white powder formed is Magnesium Oxide (MgO).

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

Activity 1.2 – Reaction of Lead Nitrate and Potassium Iodide

Procedure:

5. Take lead nitrate solution in a test tube.
6. Add potassium iodide solution.

Observation: A yellow precipitate is formed.

Result: The yellow solid formed is Lead Iodide (PbI₂).

Equation: $\text{Pb}(\text{NO}_3)_2 + 2\text{KI} \rightarrow \text{PbI}_2 + 2\text{KNO}_3$

Activity 1.3 – Reaction of Zinc with Acid

Procedure:

7. Take zinc granules in a conical flask.
8. Add dilute hydrochloric acid or sulphuric acid.
9. Touch the flask carefully.

Observation:

- Bubbles of gas are produced.
- The flask becomes warm.

Result: Hydrogen gas is released and heat is produced.

Equation: $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$

Indicators of a Chemical Reaction

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

Chemical Reactions in Everyday Life

- Burning of wood – Wood burns and produces ash.
- Rusting of iron – Iron reacts with oxygen and moisture to form rust.
- Curdling of milk – Milk changes into curd due to bacterial action.
- Digestion of food – Food breaks into simpler substances producing energy.

Chapter 1: Chemical Reactions and Equations

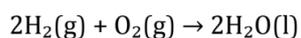
1. Chemical Reaction

A chemical reaction is a process in which one or more substances undergo chemical change to form new substances with different properties.

Example:

Hydrogen reacts with oxygen to form water.

Balanced Equation:



Reactants → Hydrogen, Oxygen

Product → Water

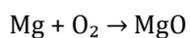
2. Chemical Equation

A chemical equation is the symbolic representation of a chemical reaction using chemical formulas.

General form:

Reactants → Products

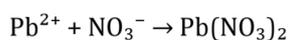
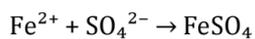
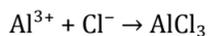
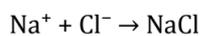
Example:



3. Writing Chemical Formula

Chemical formulas are written using valency of ions.

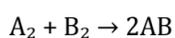
Examples:



4. Balanced Chemical Equation

A balanced chemical equation is one in which the number of atoms of each element on both sides is equal.

Example:



Why do we balance equations?

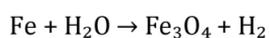
Because of the Law of Conservation of Mass.

Mass can neither be created nor destroyed.

Total mass of reactants = Total mass of products.

5. Steps to Balance Chemical Equation (Hit and Trial Method)

Example:



Step 1: Write skeletal equation

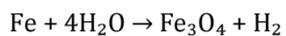
Step 2: Count atoms

Fe: 1 → 3

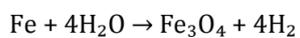
H: 2 → 2

O: 1 → 4

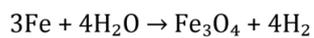
Step 3: Balance O



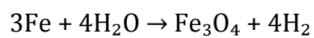
Step 4: Balance H



Step 5: Balance Fe



Final Balanced Equation:



6. Writing Physical States

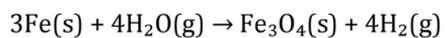
(s) solid

(l) liquid

(g) gas

(aq) aqueous solution

Example:



7. Characteristics of Chemical Reaction (FECTS Rule)

F → Formation of precipitate

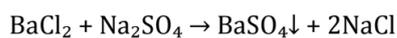
E → Evolution of gas

C → Colour change

T → Temperature change

S → Change in state

Example:



NCERT Questions

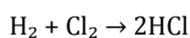
Q1. Why should a magnesium ribbon be cleaned before burning in air?

Answer:

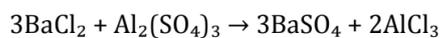
Magnesium ribbon is cleaned with sandpaper to remove magnesium oxide layer present on its surface. This oxide layer prevents magnesium from burning easily.

Q2. Write the balanced equation for the following reactions.

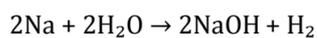
(i) Hydrogen + Chlorine → Hydrogen chloride



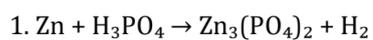
(ii) Barium chloride + Aluminium sulphate → Barium sulphate + Aluminium chloride

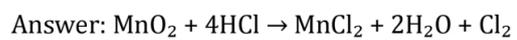
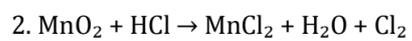


(iii) Sodium + Water → Sodium hydroxide + Hydrogen



Practice Questions





Quick Revision

Chemical reaction → formation of new substances

Chemical equation → symbolic representation

Balanced equation → equal atoms on both sides

Law used → Conservation of mass

Indicators → FEETS