



CHEMICAL REACTIONS AND EQUATIONS

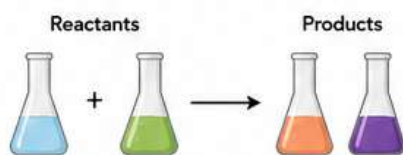
PART 1 – INTRODUCTION TO DECOMPOSITION REACTION

Key Concepts, Definitions, Examples & Facts at a Glance

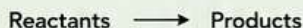


1 WHAT IS A CHEMICAL REACTION?

- A chemical reaction is a process in which one or more substances (reactants) change into new substances (products) with different properties.
- It involves breaking of old chemical bonds and formation of new ones.
- Represented by a chemical equation.

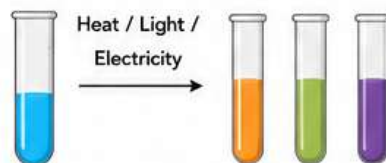


General form:



2 WHAT IS A DECOMPOSITION REACTION?

- A decomposition reaction is a chemical reaction in which a single compound breaks down into two or more simpler substances.
- It requires energy in the form of heat, light or electricity.



General form:



(One compound) (Two or more substances)

3 TYPES OF DECOMPOSITION REACTIONS

Based on the source of energy:

- Thermal Decomposition – Heat is supplied.
- Photochemical Decomposition – Light is supplied.
- Electrolytic Decomposition – Electricity is supplied.
- Decomposition by other methods – e.g., mechanical, catalyst (rare).



Heat



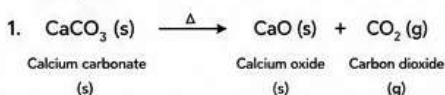
Light



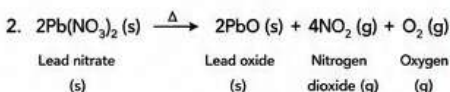
Electricity

4 THERMAL DECOMPOSITION REACTION

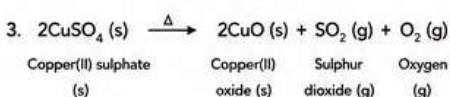
- A reaction in which a compound breaks down into simpler substances on heating.
- Most common type of decomposition.
- Examples:



(On heating)



(On heating)

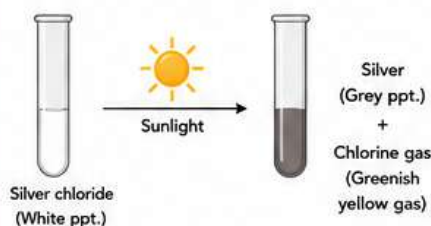
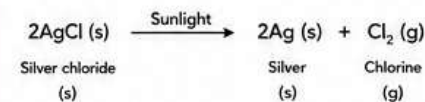


(On heating)

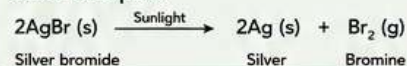
Δ represents heat

5 PHOTOCHEMICAL DECOMPOSITION REACTION

- A reaction in which a compound breaks down into simpler substances on exposure to light.
- Usually observed in compounds of silver halides.
- Example:

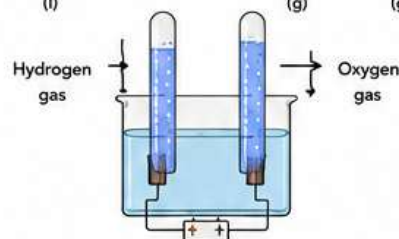
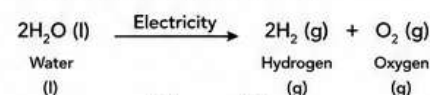


Other examples:



6 ELECTROLYTIC DECOMPOSITION REACTION

- A reaction in which a compound breaks down into simpler substances by the passage of electric current.
- Usually applied to ionic compounds in molten state or in aqueous solution.
- Example (Electrolysis of water):



Other examples: Electrolysis of molten NaCl, CuSO_4 solution, etc.

QUICK FORMULAS / POINTS

- General equation of decomposition:
 $AB \longrightarrow A + B$
- Energy is always required to break the bond in decomposition.
- Number of atoms is conserved.
- Decomposition is the opposite of combination reaction.
- Bond breaking $\longrightarrow$ Energy absorbed
Bond making $\longrightarrow$ Energy released

TIPS / QUICK FACTS

- ✓ Heating is the most common energy source.
- ✓ Compounds of carbonates, nitrates and hydrates easily decompose on heating.
- ✓ Silver halides (AgCl , AgBr) decompose in sunlight.
- ✓ Electrolytic decomposition is used to get elements like H_2 , O_2 , Cl_2 , etc.

COMMON MISTAKES

- ✗ Writing products on the wrong side of the equation.
- ✗ Not balancing decomposition equations.
- ✗ Forgetting energy condition (heat/light/electricity).
- ✗ Ignoring physical states (s, l, g, aq).

★ KEY TAKEAWAY

A decomposition reaction occurs when one compound breaks down into two or more simpler substances by the application of heat, light or electricity. It is an important way to obtain elements and study energy changes in chemical reactions.



Remember:

Chemical reactions help us understand how substances change and form new materials. Decomposition reactions are useful in many processes such as extraction of metals, making oxygen, and even in everyday life!