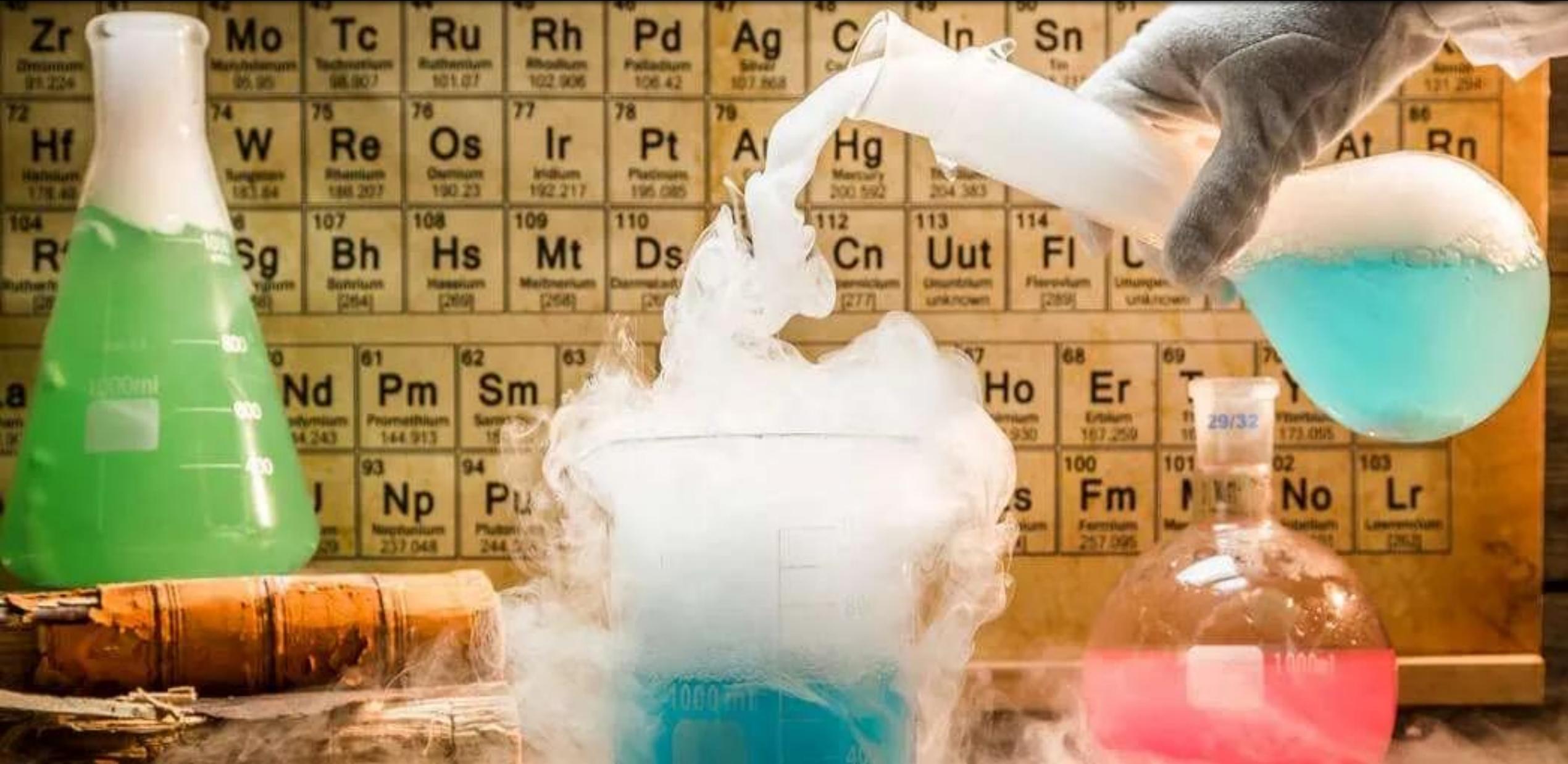


Chemical reactions and equation



Chemical reaction

- A process in which new substances are formed with new chemical or physical properties.
- **Note: Basically, only rearrangement of atoms takes place.**
- **Ex; $\text{Na} + \text{Cl}_2 \longrightarrow \text{NaCl}$**



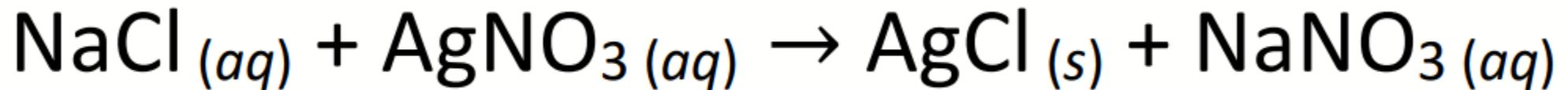
रासायनिक प्रतिक्रिया

- एक प्रक्रिया जिसमें नए रासायनिक या भौतिक गुणों के साथ नए पदार्थ बनते हैं।
- नोट: मूल रूप से, केवल परमाणुओं की पुनर्व्यवस्था होती है।
- Ex; $\text{Na} + \text{Cl}_2 \longrightarrow \text{NaCl}$



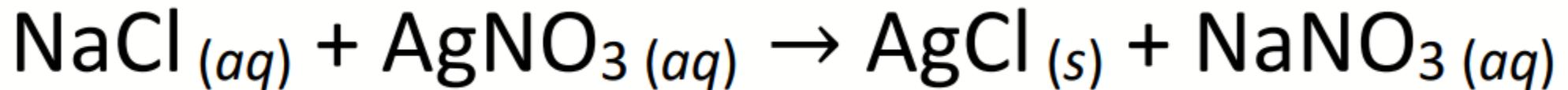
Reactants and products (अभिकारक और उत्पाद)

- **Reactants** : chemical substance which reacts or disapper during chemical reaction.
- **अभिकारक** : रासायनिक पदार्थ जो रासायनिक प्रतिक्रिया के दौरान प्रतिक्रिया करता है या अलग हो जाता है।



Reactants and products (अभिकारक और उत्पाद)

- **products** : chemical substance which are formed or appeared during chemical reaction.
- **उत्पाद**: रासायनिक पदार्थ जो रासायनिक प्रतिक्रिया के दौरान बनते हैं या दिखाई देते हैं।



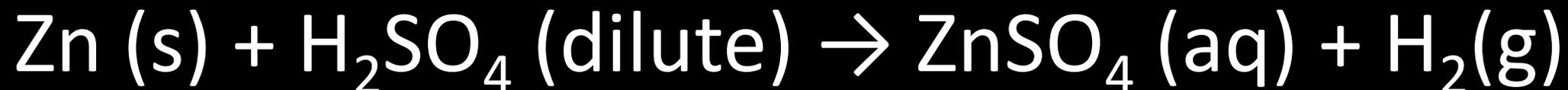
Characteristics of chemical reaction

रासायनिक प्रतिक्रिया के लक्षण

- In all chemical reactions, the transformation from reactants to products is accompanied by various characteristics, which are-
 - सभी रासायनिक प्रतिक्रियाओं में, अभिकारकों से उत्पादों में परिवर्तन विभिन्न विशेषताओं के साथ होता है, जो हैं-
- a) Evolution of a gas / गैस का विकास
 - b) Change in temperature / तापमान में परिवर्तन
 - c) Formation of a precipitate / अवक्षेप का निर्माण
 - d) Change in colour / रंग में परिवर्तन
 - e) Change of state / राज्य का परिवर्तन

Evolution of gas गैस का विकास

- When zinc metal is treated with dilute sulphuric acid, hydrogen gas is evolved. The hydrogen gas burns with a pop sound.



- When washing soda is treated with hydrochloric acid, it gives off colorless gas with lots of effervescence.



Change of colour रंग का परिवर्तन

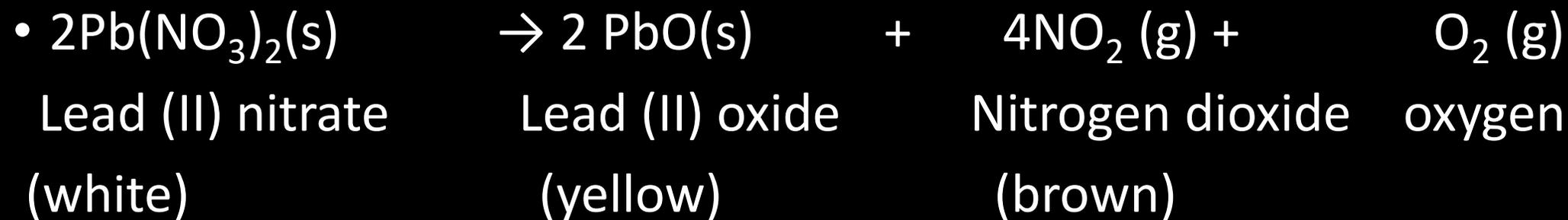
- When red lead oxide is heated strongly it forms yellow coloured lead monoxide and gives off oxygen gas.



- When copper carbonate (green) is heated strongly it leaves behind a black residue.

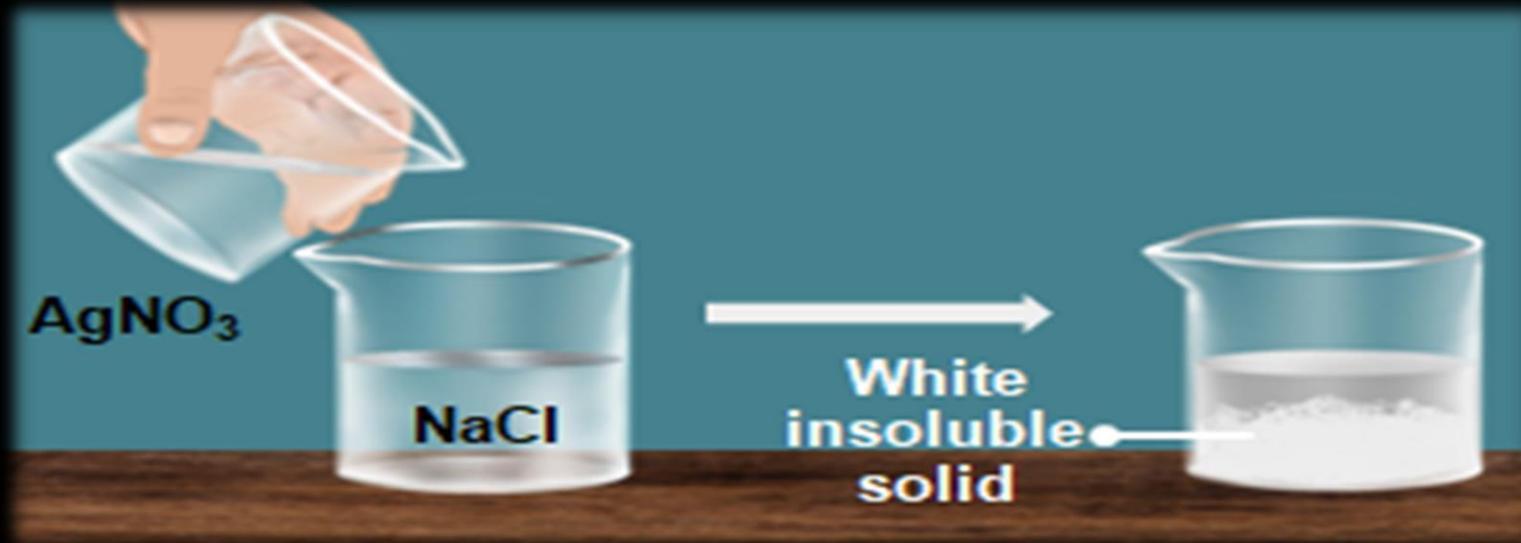
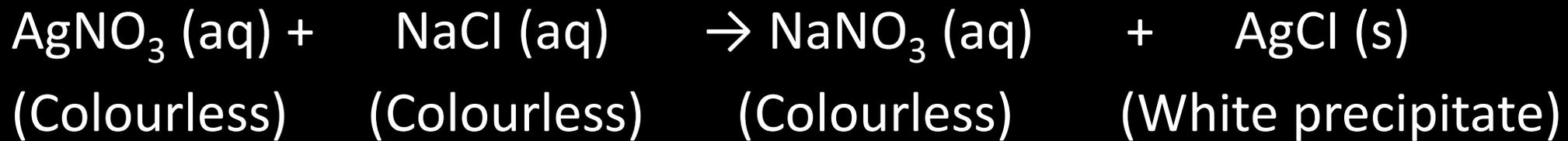


Change of colour रंग का परिवर्तन

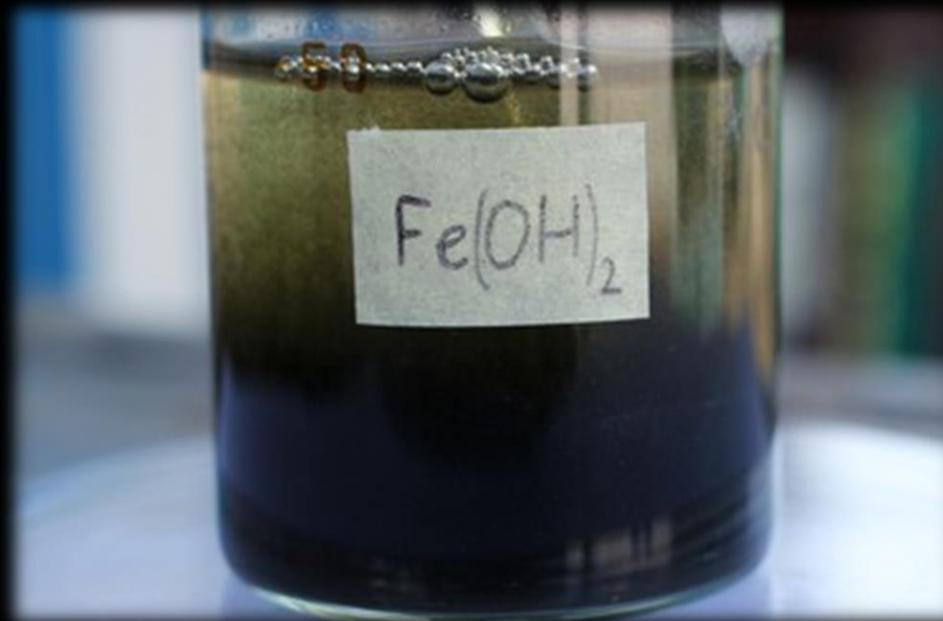
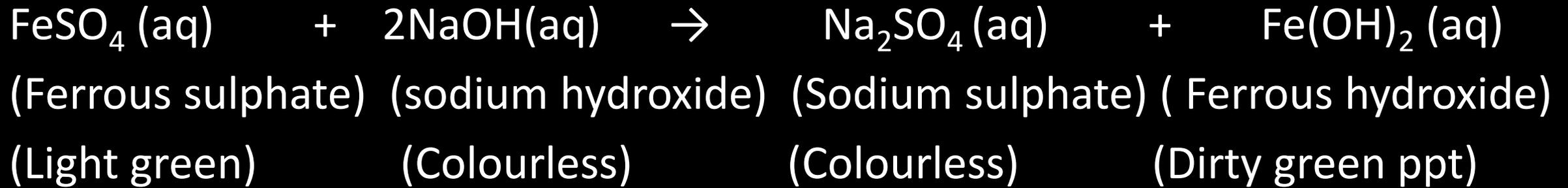


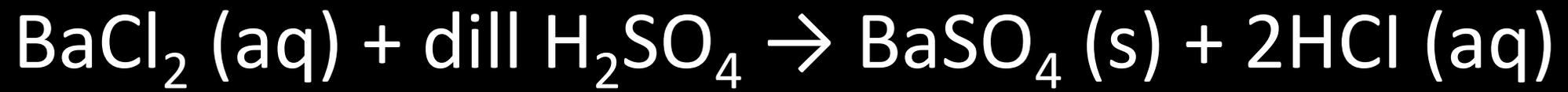
Formation of precipitate अवक्षेप का गठन

- When silver nitrate solution is mixed with a solution of sodium chloride.



- A dirty green precipitate of ferrous hydroxide is formed, when a solution of ferrous sulphate is mixed with sodium hydroxide solution.





Energy changes ऊर्जा परिवर्तन

- All chemical reactions proceed either with the absorption or release of energy.
- On the basis of energy changes, there are two types of reactions:
 1. Endothermic reaction
 2. Exothermic reaction

(A) Endothermic reaction एंडोथर्मिक प्रतिक्रिया

- A chemical reaction which is accompanied by the absorption of heat energy is called an endothermic reaction.
- एक रासायनिक प्रतिक्रिया जो ऊष्मा ऊर्जा के अवशोषण के साथ होती है, एंडोथर्मिक प्रतिक्रिया कहलाती है।



- Light energy is essential for biochemical reaction, photosynthesis, by which green plants prepare their food from carbon dioxide & water.
- जैव रासायनिक प्रतिक्रिया, प्रकाश संश्लेषण के लिए प्रकाश ऊर्जा आवश्यक है, जिसके द्वारा हरे पौधे कार्बन डाइऑक्साइड और पानी से अपना भोजन तैयार करते हैं।

(B) Exothermic reaction ऊष्माक्षेपी प्रतिक्रिया

- A chemical reaction which is accompanied by the release of heat energy is called exothermic reaction.

एक रासायनिक प्रतिक्रिया जो ऊष्मा ऊर्जा के रिलीज के साथ होती है, ऊष्माक्षेपी प्रतिक्रिया कहलाती है।

When magnesium wire is heated from its tip in a bunsen flame, it catches fire and burns with a dazzling white flame with release of heat and light energy.

जब मैग्नीशियम तार को इसकी नोक से बन्सेन की लौ में गर्म किया जाता है, तो यह आग पकड़ लेता है और गर्मी और प्रकाश ऊर्जा की रिहाई के साथ चमकदार सफेद लौ के साथ जलता है।





- When quick lime (calcium oxide) is placed in water, the water becomes very hot and sometimes starts boiling. It is because of release of heat energy during the reaction.



Calcium oxide

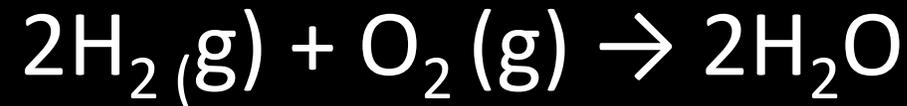
Water

Calcium hydroxide



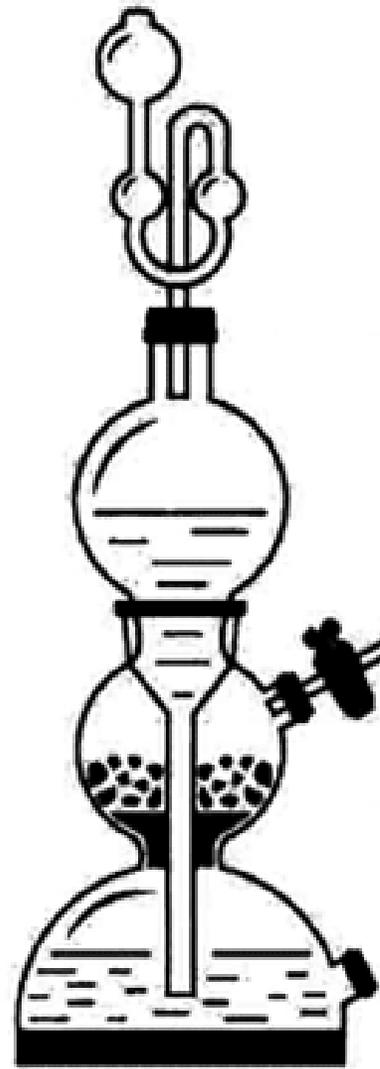
Change of state अवस्था का परिवर्तन

- Two volumes of hydrogen gas reacts with one volume of oxygen gas to form water.



or when electric current is passed through water it splits into its elements.

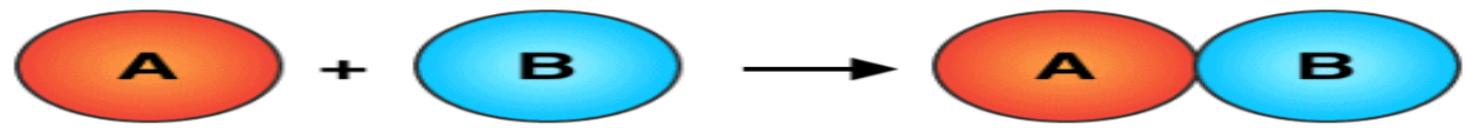
- $2\text{H}_2\text{O} \rightarrow 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$
- $\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \rightarrow \text{NH}_4\text{Cl}(\text{s})$



Types of Chemical Reaction



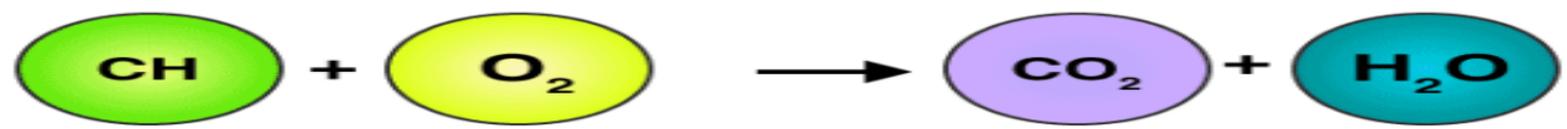
Combination reaction



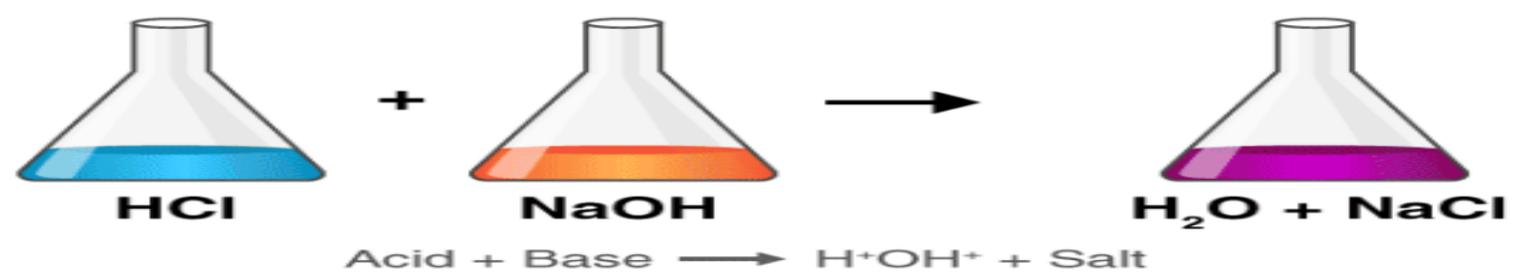
Decomposition reaction



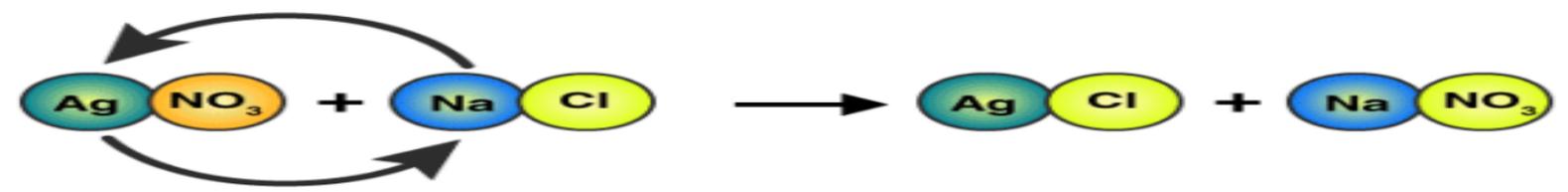
Combustion reaction



Neutralization reaction



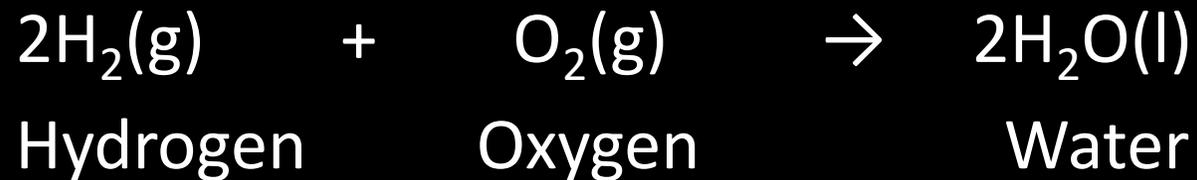
Displacement reaction



COMBINATION REACTIONS संयोजन प्रतिक्रियाएं

Those reactions in which two or more substances (reactants) combine together to form a single substance (product) are called the combination reactions.

Ex 1: Formation of water from $\text{H}_2(\text{g})$ and $\text{O}_2(\text{g})$

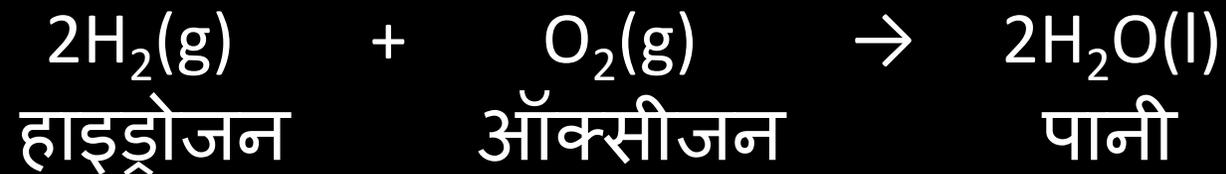


In this reaction, two substances hydrogen and oxygen (reactants) combine together to form a single substance i.e. water (product). So it is a combination reaction.

COMBINATION REACTIONS संयोजन प्रतिक्रियाएं

- वे अभिक्रियाएँ जिनमें दो या दो से अधिक पदार्थ (अभिकारक) एक साथ मिलकर एक एकल पदार्थ (उत्पाद) बनाते हैं, संयोजन प्रतिक्रिया कहलाती हैं।

उदाहरण : H₂(g) और O₂(g) से पानी का निर्माण



इस प्रतिक्रिया में, दो पदार्थ हाइड्रोजन और ऑक्सीजन (अभिकारक) एक साथ मिलकर एक ही पदार्थ यानी पानी (उत्पाद) बनाते हैं। तो यह एक संयोजन प्रतिक्रिया है।

Synthesis reaction संश्लेषण प्रतिक्रिया:

- It is a type of addition reaction in which a new substance is formed by the union of its component elements.

यह एक प्रकार की अतिरिक्त प्रतिक्रिया है जिसमें इसके घटक तत्वों के मिलन से एक नया पदार्थ बनता है।

For e.g. $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$ (Haber's Process)

Ammonia is synthesised from its components, nitrogen and hydrogen, so it is a synthetic reaction. All synthesis reactions are addition reactions

अमोनिया को इसके घटकों, नाइट्रोजन और हाइड्रोजन से संश्लेषित किया जाता है, इसलिए यह एक सिंथेटिक प्रतिक्रिया है। सभी संश्लेषण प्रतिक्रियाएं अतिरिक्त प्रतिक्रियाएं हैं

Other examples of synthesis reactions are:



(i) When two or more compounds combine to form a new compound



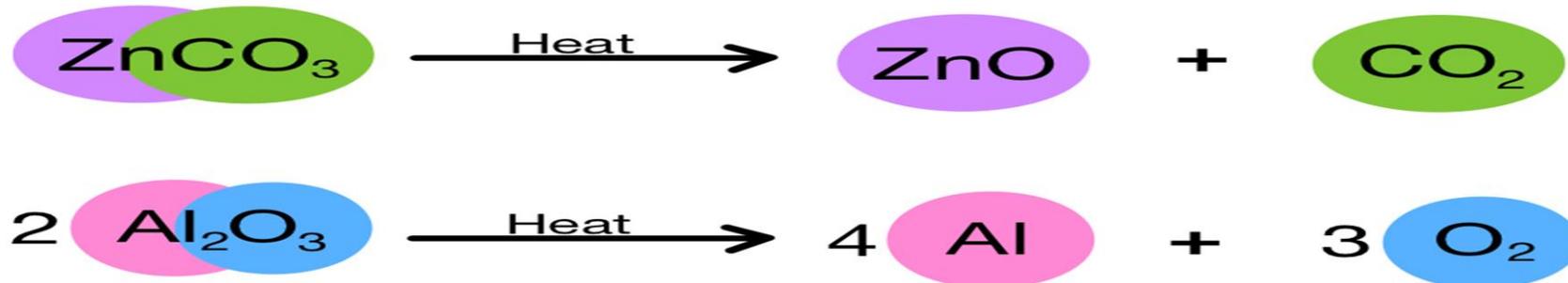
(ii) When an element and a compound combine to form a new compound.



DECOMPOSITION REACTION अपघटन प्रतिक्रियाएं:

- Those reactions in which a single substance (reactant) splits up into two or more simpler substances (products) are known as decomposition reactions.
- वे प्रतिक्रियाएं जिनमें एक एकल पदार्थ (अभिकारक) दो या अधिक सरल पदार्थों (उत्पादों) में विभाजित होता है, अपघटन प्रतिक्रियाओं के रूप में जाना जाता है।

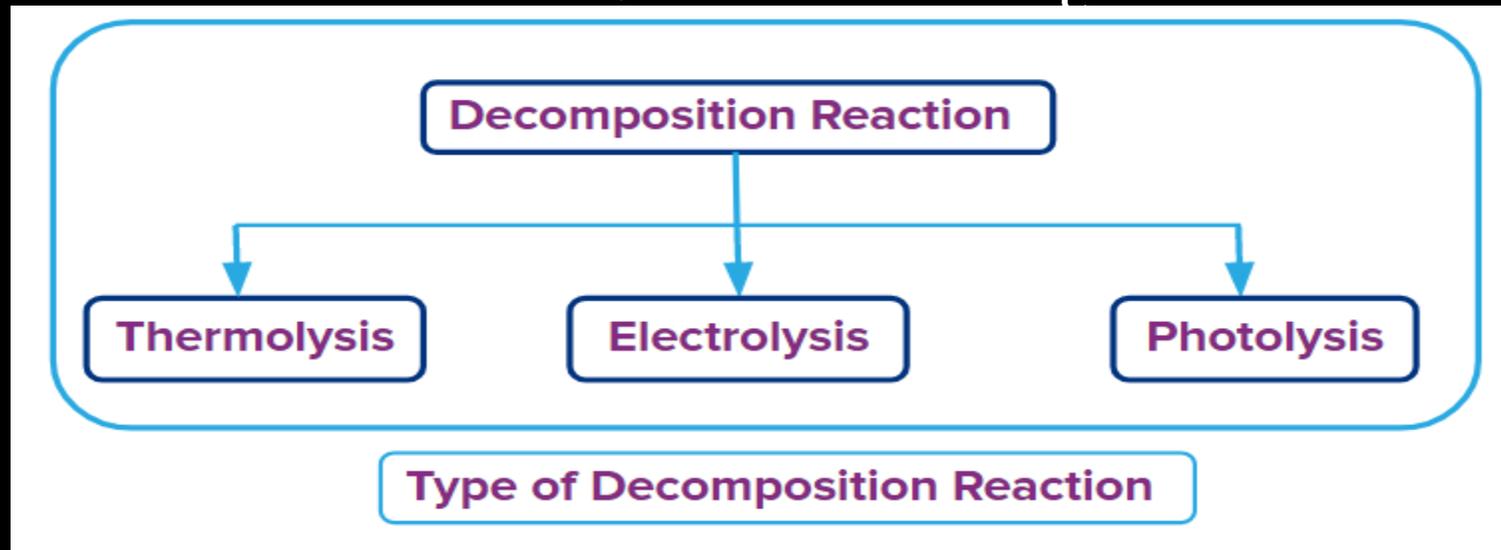
Decomposition Reaction Examples



DECOMPOSITION REACTION अपघटन प्रतिक्रियाएं:

These reactions are carried out by supplying energy in form of heat, electricity or light which breaks that substance into simpler substances. Thus decomposition reactions are classified as:

- इन प्रतिक्रियाओं को गर्मी, बिजली या प्रकाश के रूप में ऊर्जा की आपूर्ति करके किया जाता है जो उस पदार्थ को सरल पदार्थों में तोड़ देता है। इस प्रकार अपघटन प्रतिक्रियाओं को इस प्रकार वर्गीकृत किया जाता है:



- **Thermolysis or thermal decomposition reactions** (decomposition by heat).
- थर्मोलिसिस या थर्मल अपघटन प्रतिक्रियाएं (गर्मी से अपघटन)।
- **Electrolysis or electrolytic decomposition reactions** (decomposition by electricity)
- इलेक्ट्रोलिसिस या इलेक्ट्रोलाइटिक अपघटन प्रतिक्रियाएं (बिजली द्वारा अपघटन)
- **Photolysis or photodecomposition reactions** (decomposition by light).
- फोटोलिसिस या फोटोडीकंपोजिशन प्रतिक्रियाएं (प्रकाश द्वारा अपघटन)।

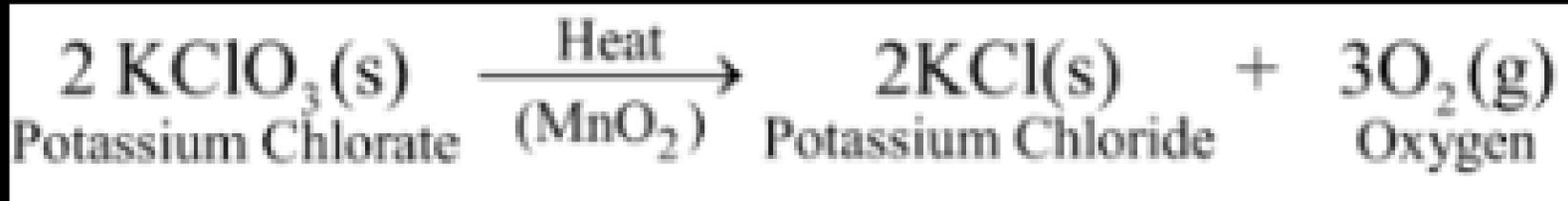
Decomposition Reaction –

- In a decomposition reaction, molecules or compounds break down into two or more than two simpler chemically new substances. For example, electrolysis of water. In the electrolysis of water, water breaks down into hydrogen and oxygen, which show completely different properties than water.



Thermal decomposition of Potassium Chlorate:

- When potassium chlorate is heated in the presence of manganese dioxide as a catalyst, it decomposes to give potassium chloride and oxygen.



- In this reaction, a single substance splits up into two simpler substances on heating. Thus, it is a thermal decomposition reaction.

Thermal Decomposition of limestone:

- When calcium carbonate (limestone) is heated, it decomposes to give calcium oxide and carbon dioxide.



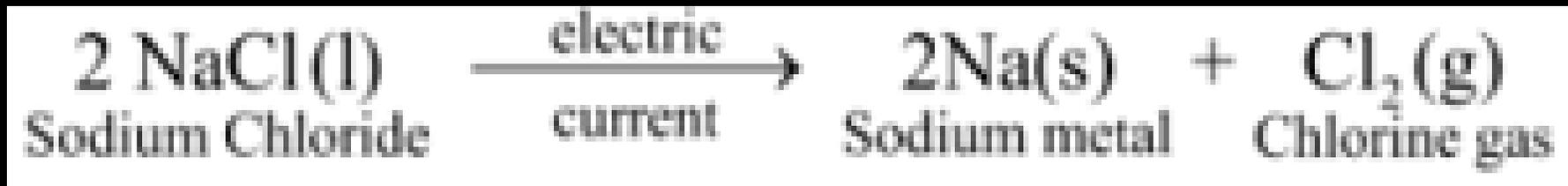
Thermal decomposition of zinc carbonate

- When zinc carbonate is heated, it decomposes to give zinc oxide and carbon dioxide gas.



Electrolytic decomposition of molten sodium chloride

- On passing electric current through molten sodium chloride, it decomposes to give sodium metal and chlorine gas :



Electrolytic decomposition of molten alumina (aluminium oxide)

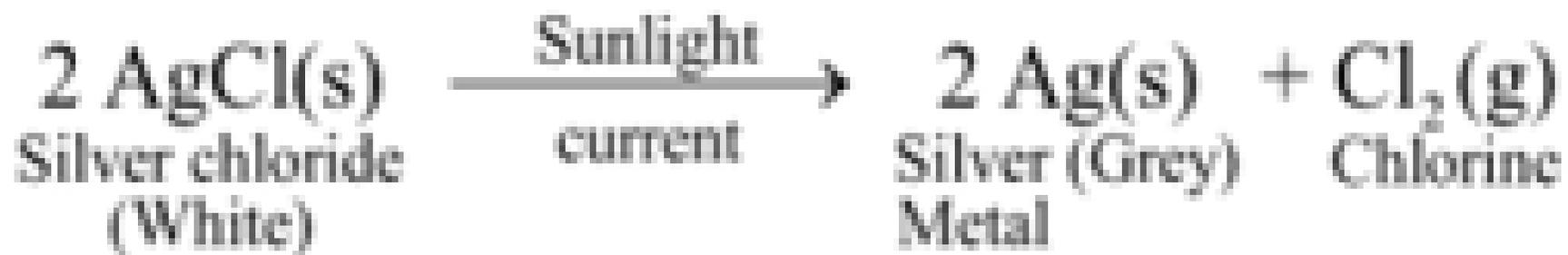
- On passing electric current through molten alumina, it decomposes to give aluminium metal and oxygen gas :



- In this reaction, on passing electric current, a single substance i.e. alumina decomposes to give two simpler substances, aluminium metal and oxygen gas, thus it is an example of electrolytic decomposition reaction.

Photo-decomposition reactions (or photolysis):

- Ex1. Photo-decomposition of silver chloride or Photolysis of silver chloride
- Experiment: Take a pinch of silver chloride on a watch glass and keep it in sunlight for some time.
- It is observed that white silver chloride turns gray due to formation of silver metal.



Photolysis of hydrogen iodide

- Hydrogen iodide decomposes in the presence of ultraviolet light into hydrogen and iodine :



Photolysis of hydrogen peroxide

- In presence of light, hydrogen peroxide decomposes into water and oxygen.



- Since hydrogen peroxide decomposes in the presence of light, that is why, hydrogen peroxide is kept in coloured bottles so as to cut off light.

Combustion Reaction

- It is an exothermic reaction that releases energy, generally in the form of heat. It is a reaction between fuel and an oxidant (generally atmospheric oxygen) that produces smoke, water and heat generally. For example, when we burn methane, it gives carbon dioxide and water.



Single Displacement Reaction

- In these reactions, more reactive metal displaces less reactive metal from its salt. In these reactions, products can be determined through reactivity series. Reactivity series is a series in which elements are arranged in decreasing order of their reactivity. It means the elements present at the top of this reactivity series are more reactive than the elements present at the bottom.
- The reaction of potassium with magnesium chloride is an example of a single displacement reaction. In this reaction, potassium displaces magnesium from its salt because potassium is more reactive than magnesium. Potassium is present at the top of the reactivity series and is the most reactive element.
- **Reaction** – $2\text{K} + \text{MgCl}_2 \rightarrow 2\text{KCl} + \text{Mg}$

Double displacement reaction

- In these reactions, two aqueous ionic compounds exchange their ions (mostly cations) and produce two new compounds. For example, potassium nitrate reacts with aluminium chloride and forms aluminium nitrate and potassium chloride.
- **Reaction** – $\text{KNO}_3 + \text{AlCl}_3 \rightleftharpoons \text{Al}(\text{NO}_3)_3 + \text{KCl}$

Redox Reaction –

Those chemical reactions in which oxidation and reduction take place simultaneously are called redox reactions. Oxidation is the addition of oxygen, while reduction is the addition of hydrogen (or removal of oxygen).

The reaction of copper oxide with hydrogen is an example of a redox reaction. In this reaction, hydrogen has undergone oxidation by gaining oxygen atoms while copper oxide has undergone reduction by removing oxygen.

- 1.Oxidation** is the addition of oxygen, whereas, **reduction** is removal of oxygen.
- 2.Oxidation** is removal of hydrogen, whereas, **reduction** is addition of hydrogen.
- 3.Oxidation** is loss of electron, whereas, **reduction** is gain of electron.
- 4.Oxidation** is increase in oxidation state, whereas, **reduction** is decrease in oxidation state.

- Oxidation and reduction are complementary to each other and one cannot take place in the absence of the other. So the oxidation and the reduction will take place simultaneously. It is obvious that, if a substance takes electrons, there must be another substance to give these electrons. The reactions, which involve oxidation and reduction are called **redox reactions**. The redox reactions can be split into two half reactions namely oxidation half reaction (where oxidation takes place) and reduction half reaction (where reduction takes place).

For example,

- Redox reaction: $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$
- Oxidation half reaction: $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^{-}$
- Reduction half reaction: $\text{Cu}^{2+} + 2\text{e}^{-} \rightarrow \text{Cu}$

OXIDIZING AGENTS AND REDUCING AGENTS

- **Oxidizing agents** are those substances, which can oxidize some other substances. To do so, it will have to gain electron (decrease in oxidation state) and hence it will be reduced. Similarly the **reducing agent** will give electrons and will be oxidised. So the substances undergoing oxidation are reducing agent and the substances undergoing reduction are oxidizing agents. In the reaction, $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$, Zn is oxidised to Zn^{2+} , so Zn is reducing agent (it is reducing Cu^{2+} to Cu) and Cu^{2+} is reduced to Cu, so Cu^{2+} is oxidizing agent (it is oxidizing Zn to Zn^{2+}).

| Oxidising agent | Effective Change | Decrease in Oxidation Number |
|--|---|------------------------------|
| KMnO ₄ in acid solution | $\text{MnO}_4^- \longrightarrow \text{Mn}^{2+}$ | 5 |
| KMnO ₄ in neutral solution | $\text{MnO}_4^- \longrightarrow \text{MnO}_2$ | 3 |
| K ₂ Cr ₂ O ₇ in acid solution | $\text{Cr}_2\text{O}_7^{2-} \longrightarrow \text{Cr}^{3+}$ | 3 |
| dilute HNO ₃ | $\text{NO}_3^- \longrightarrow \text{NO}$ | 3 |
| concentrated HNO ₃ | $\text{NO}_3^- \longrightarrow \text{NO}_2$ | 1 |
| concentrated H ₂ SO ₄ | $\text{SO}_4^{2-} \longrightarrow \text{SO}_2$ | 2 |
| manganese (IV) oxide | $\text{MnO}_2 \longrightarrow \text{Mn}^{2+}$ | 2 |
| Chlorine | $\text{Cl}_2 \longrightarrow \text{Cl}^-$ | 1 |
| chloric (I) acid | $\text{ClO}^- \longrightarrow \text{Cl}^-$ | 2 |
| KIO ₃ in dilute acid | $\text{IO}_3^- \longrightarrow \text{I}_2$ | 5 |
| KIO ₃ in concentrated acid | $\text{IO}_3^- \longrightarrow \text{I}^+$ | 4 |

| Reducing agent | Effective change | Increase in oxidation number |
|-----------------------------|---|------------------------------|
| iron (II) salts (acid) | $\text{Fe}^{2+} \longrightarrow \text{Fe}^{3+}$ | 1 |
| tin (II) salts (acid) | $\text{Sn}^{2+} \longrightarrow \text{Sn}^{4+}$ | 2 |
| ethanedioates (acid) | $\text{C}_2\text{O}_4^{2-} \longrightarrow \text{CO}_2$ | 1 |
| sulphites (acid) | $\text{SO}_3^{2-} \longrightarrow \text{SO}_4^{2-}$ | 2 |
| hydrogen sulphide | $\text{S}^{2-} \longrightarrow \text{S}$ | 2 |
| iodides (dilute acid) | $\text{I}^- \longrightarrow \text{I}_2$ | 1 |
| iodides (concentrated acid) | $\text{I}^- \longrightarrow \text{I}^+$ | 2 |
| metals, e.g. Zn | $\text{Zn} \longrightarrow \text{Zn}^{2+}$ | 2 |
| hydrogen | $\text{H}_2 \longrightarrow \text{H}^+$ | 1 |

1. Which of the following is a chemical change?

- a) Melting of ice
- b) Dissolving sugar in water
- c) Boiling water
- d) Rusting of iron

1. निम्नलिखित में से कौन सा रासायनिक परिवर्तन है?

- क) बर्फ का पिघलना
- ख) चीनी को पानी में घोलना
- ग) उबलता पानी
- घ) लोहे पर जंग लगना

2. In a chemical reaction, the substances present before the reaction starts are called:

- a) Reactants
- b) Products
- c) Catalysts
- d) Chemicals

2. किसी रासायनिक प्रतिक्रिया में प्रतिक्रिया शुरू होने से पहले मौजूद पदार्थ कहलाते हैं:

- ए) अभिकारक
- बी) उत्पाद
- ग) उत्प्रेरक
- घ) रसायन

3. In a chemical equation, the number written in front of a chemical formula represents:

- a) Atomic number
- b) Molecular mass
- c) Number of molecules
- d) Number of atoms or molecules taking part in the reaction

3. किसी रासायनिक समीकरण में, रासायनिक सूत्र के सामने लिखी संख्या दर्शाती है:

- ए) परमाणु क्रमांक
- बी) आणविक द्रव्यमान
- ग) अणुओं की संख्या
- घ) प्रतिक्रिया में भाग लेने वाले परमाणुओं या अणुओं की संख्या

4. The balanced chemical equation for the reaction between hydrogen and oxygen to form water is:



4. पानी बनाने के लिए हाइड्रोजन और ऑक्सीजन के बीच प्रतिक्रिया के लिए संतुलित रासायनिक समीकरण हैं:



5. When a magnesium ribbon is burnt in the air, the product formed is:

- a) Magnesium oxide
- b) Magnesium hydroxide
- c) Magnesium chloride
- d) Magnesium sulphate

5. जब मैग्नीशियम रिबन को हवा में जलाया जाता है, तो जो उत्पाद बनता है वह है:

- ए) मैग्नीशियम ऑक्साइड
- बी) मैग्नीशियम हाइड्रॉक्साइड
- ग) मैग्नीशियम क्लोराइड
- घ) मैग्नीशियम सल्फेट

6. The type of reaction in which two or more substances combine to form a single product is called:

- a) Decomposition reaction
- b) Double displacement reaction
- c) Combination reaction
- d) Displacement reaction

6. वह प्रकार की प्रतिक्रिया जिसमें दो या दो से अधिक पदार्थ मिलकर एक उत्पाद बनाते हैं, कहलाती है:

- ए) अपघटन प्रतिक्रिया
- बी) दोहरी विस्थापन प्रतिक्रिया
- ग) संयोजन प्रतिक्रिया
- घ) विस्थापन प्रतिक्रिया

7. What is the product obtained when copper(II) oxide is heated with hydrogen gas?

- a) Copper oxide
- b) Copper metal
- c) Copper sulphate
- d) Copper chloride

7. कॉपर (II) ऑक्साइड को हाइड्रोजन गैस के साथ गर्म करने पर क्या उत्पाद प्राप्त होता है?

- ए) कॉपर ऑक्साइड
- बी) तांबा धातु
- ग) कॉपर सल्फेट
- घ) कॉपर क्लोराइड

8. The reaction between an acid and a base to form salt and water is called:

- a) Oxidation-reduction reaction
- b) Decomposition reaction
- c) Neutralization reaction
- d) Double displacement reaction

8. नमक और पानी बनाने के लिए एसी आईडी और बेस के बीच की प्रतिक्रिया को कहा जाता है:

- ए) ऑक्सीकरण-कमी प्रतिक्रिया
- बी) अपघटन प्रतिक्रिया
- ग) उदासीनीकरण प्रतिक्रिया
- द) दोहरी विस्थापन प्रतिक्रिया

9. Which of the following statements is true regarding a decomposition reaction?

- a) A single reactant breaks down into two or more products.
- b) Two or more reactants combine to form a single product.
- c) A metal displaces another metal from its salt solution.
- d) A non-metal displaces another non-metal from its compound.

9. अपघटन अभिक्रिया के संबंध में निम्नलिखित में से कौन सा कथन सत्य है?

- अ) एक एकल अभिकारक दो या दो से अधिक उत्पादों में टूट जाता है।
- ब) दो या दो से अधिक अभिकारक मिलकर एक उत्पाद बनाते हैं।
- ग) एक धातु अपने नमक के घोल से दूसरी धातु को विस्थापित कर देती है।
- घ) एक अधातु दूसरे अधातु को उसके यौगिक से विस्थापित कर देता है।

10. The balanced chemical equation for the reaction between potassium iodide and lead nitrate to form lead iodide and potassium nitrate is:

- a) $2KI + Pb(NO_3)_2 \rightarrow KI_2 + PbNO_2$
- b) $KI + Pb(NO_2)_2 \rightarrow KI_2 + Pb(NO_3)_2$
- c) $2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$
- d) $KI + Pb(NO_3)_2 \rightarrow PbI + KNO_3$

10. लेड आयोडाइड और पोटैशियम नाइट्रेट बनाने के लिए पोटैशियम आयोडाइड और लेड नाइट्रेट के बीच प्रतिक्रिया के लिए संतुलित रासायनिक समीकरण है:

- ए) $2KI + Pb(NO_3)_2 \rightarrow KI_2 + PbNO_2$
- बी) $KI + Pb(NO_2)_2 \rightarrow KI_2 + Pb(NO_3)_2$
- ग) $2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$
- द) $KI + Pb(NO_3)_2 \rightarrow PbI + KNO_3$

11. What is the colour change observed when a blue litmus paper is dipped into a solution with a pH of 1?

- a) Blue litmus remains blue
- b) Blue litmus turns red
- c) Blue litmus turns purple
- d) Blue litmus turns green

11. जब नीले लिटमस पेपर को 1 पीएच वाले घोल में डुबोया जाता है तो रंग में क्या परिवर्तन देखा जाता है?

- a) नीला लिटमस नीला ही रहता है
- b) नीला लिटमस लाल हो जाता है
- ग) नीला लिटमस बैंगनी हो जाता है
- घ) नीला लिटमस हरा हो जाता है

12. The chemical name of the baking soda commonly used in cooking is:

- a) Sodium chloride
- b) Sodium bicarbonate
- c) Sodium carbonate
- d) Sodium hydroxide

12. आमतौर पर खाना पकाने में उपयोग किये जाने वाले बेकिंग सोडा का रासायनिक नाम है:

- ए) सोडियम क्लोराइड
- बी) सोडियम बाइकार्बोनेट
- ग) सोडियम कार्बोनेट
- घ) सोडियम हाइड्रॉक्साइड

13. What type of reaction occurs when calcium carbonate reacts with hydrochloric acid to form calcium chloride, water, and carbon dioxide?

- a) Decomposition reaction
- b) Combination reaction
- c) Double displacement reaction
- d) Displacement reaction

13. जब कैल्शियम कार्बोनेट हाइड्रोक्लोरिक एसिड के साथ प्रतिक्रिया करके कैल्शियम क्लोराइड, पानी और कार्बन डाइऑक्साइड बनाता है तो किस प्रकार की प्रतिक्रिया होती है?

- ए) अपघटन प्रतिक्रिया
- बी) संयोजन प्रतिक्रिया
- ग) दोहरी विस्थापन प्रतिक्रिया
- घ) विस्थापन प्रतिक्रिया

14. Which of the following substances does NOT undergo combustion?

- a) Methane
- b) Wood
- c) Iron
- d) LPG (Liquefied Petroleum Gas)

14. निम्नलिखित में से किस पदार्थ का दहन नहीं होता है?

- ए) मीथेन
- बी) लकड़ी
- ग) लोहा
- घ) एलपीजी (तरलीकृत पेट्रोलियम गैस)

15. The chemical formula for sulfuric acid is:

- a) H_2SO_3
- b) HCl
- c) H_2SO_4
- d) HNO_3

15. सल्फ्यूरिक अम्ल का रासायनिक सूत्र है:

- a) H_2SO_3
- b) HCl
- c) H_2SO_4
- d) HNO_3

- **ANSWER KEY**

1. **d) Rusting of iron**

2. **a) Reactants**

3. **d) Number of atoms or molecules taking part in the reaction**

4. **b) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$**

5. **a) Magnesium oxide**

6. **c) Combination reaction**

7. **b) Copper metal**

8. **c) Neutralization reaction**

9. **a) A single reactant breaks down into two or more products.**

10. **c) $2\text{KI} + \text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbI}_2 + 2\text{KNO}_3$**

11. **b) Blue litmus turns red**

12. **b) Sodium bicarbonate**

13. **c) Double displacement reaction**

14. **c) Iron**

15. **c) H_2SO_4**

THANK
YOU