# CHEMICAL REACTIONS AND EQUATIONS

### **LEARNING OBJECTIVES:**

- ♦ Definition of a chemical change
- ♦ Characteristics of a chemical change& Examples
- ♦ Classification of chemical changes
- Chemical combination and Chemical decomposition
- ♦ Chemical displacement and Chemical double decomposition
- Photo chemical changes and Chemical Reactions
- ♦ Combustion & Electrolysis

#### **Real life Applications:**

- $\Phi$  A plants applie a chemical reaction called Photo synthesis to convert  $CO_2$  and water into wood and Oxygen.It is one of the most common everyday chemical reaction and also one of the most important since how plants produce wood for themselves and Animals and convert  $CO_2$  and  $O_2$ .
- $\Phi$  Aerobic cellular is the opposite process of synthesis in that energy molecules are combined with the oxygen. We breath to release energy needed by ourcells plus  $CO_2$  and water. Energy used by cell is chemical energy in the form **ATP**.
- Φ Hear is the overal equation Aerobic cellular respiration energy time is strike, burn a candle, build fire or light a grill, you see the combustion reaction.
  - > Burning of paper is a chemical change.
  - > Burning of wood is a chemical change.
  - > Milk is converted in to curd.
- **Definition of a chemical change:** A change in which new substances are formed and which cannot be reversed by reversing the conditions is called a chemical change.
- **Characteristics of a chemical change:** New substances are formed and identity of the original substance is lost.

Properties of the substance before and after the change are different. Original properties disappear and new properties are observed. Change is brought permanently and change is irreversible.

**Examples of a chemical change:** Burning of paper is a chemical change. Burning of wood is a chemical change.

Rusting of iron is a chemical change. Burning of magnesium ribbon is a chemical change. Souring of milk is a chemical change.

Chemical changes are classified into four types: They are:

- 1) Chemical combination
- 2) Chemical decomposition
- 3) Chemical displacement
- 4) Chemical double decomposition

#### 1. Chemical combination:

<u>Definition:</u> The chemical change in which two or more elements or compounds combine to form a new substance is called **"Chemical Combination"**.

<u>Chemical Equation:</u> 1. Sulphur + Oxygen → Sulphur dioxide

$$S + O_2 \rightarrow SO_2$$

2. Calcium Oxide + Water → Calcium hydroxide

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

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# **Activity: Experiment:**

Apparatus: Beaker, glass - rod.

Chemicals: Calcium oxide (quick lime), Water.

Procedure: Take a samll quantity of Calium oxide in a beaker and pour water till it is wet. Stir with a

galss - rod.

Observation: Touch the wall of the beaker. It will be warm. Quick lime dissoves in water forming

slaked lime.

Conclusion: The reactants, guck lime and water are compounds. Their properties are different.

These substances combine to form a new substance slaked lime (Calcium hydroxide). This new substace is also a compound. This new substace has new

properties differing form those of the two compounds.

# **Equation:** $CaO + H_2O \rightarrow Ca(OH)_2$

i) Two elements react to form a new product.

**Example:** Magnesium and oxygen combine, when heated, to form magnesium oxide:

2Mg(s) +  $O_2(g)$  Combination 2MgO(s)

Magnesium Oxygen Magnesium oxide

ii) Two compounds react to form a new product.

**Example:** Calcium oxide (lime or quicklime) reacts vigorously with water to form calcium hydroxide (slaked lime):

Calcium oxide Water (Lime or Quicklime) Calcium hydroxide (Slaked lime)

iii) An element react with a compound to form a new product.

**Example:** Carbon monoxide reacts with oxygen to form carbon dioxide:

In this reaction, carbon monoxide compound reacts with oxygen element to form a new compound, carbon dioxide. So, this is a combination reaction.

#### 2. Chemical decomposition:

**<u>Definition:</u>** The chemical change in which a compound splits into two or more substances which may be either elements or compounds is called, **"chemical decomposition"**.

Chemical Equation: Sodium Nitrate  $\rightarrow$  Sodium Nitrite + Oxygen  $\uparrow$ 

$$2NaNO_3 \rightarrow 2NaNO_2 + O_2 \uparrow$$

### **Activity: Experiment:**

Apparatus: Hard glass test-tube, holder, spirit - lamp

Chemicals: Sodium Nitrate.

Procedure: Take a small quantity of sodium nitrate in a hard glass test - tube and hold it over the

spirit - lamp with a test - tube hodler and heat it.

Observation: Hold a burning splinter near the mouth of the test - tube and the splineter burns brightly

showing that the evolving gas is Oxygen.

Conclusion: Sodium nitrate is a compound. On heating, it gives out sodium nitrite and oxygen.

Sodium nitrite is a compound and Oxygen is an element.

**Chemical Equation**: Sodium Nitrate → Sodium Nitrite + Oxygen ↑

$$2NaNO_3 \rightarrow 2NaNO_2 + O_2 \uparrow$$

## A compound decomposes into two elements

**Example:** When electric current is passed through acidified water, it decomposes to give hydrogen gas and oxygen gas. This reaction can be represented as:

$$2H_2O(I)$$
  $\xrightarrow{\text{Heat}}$   $2H_2(g)$  +  $O_2(g)$  Water Hydrogen Oxygen

### A chemical compound decomposes into two compounds.

**Example 1.** When calcium carbonate is heated, it decomposes to give calcium oxide and carbon dioxide :

$$CaCO_3(s)$$
  $\xrightarrow{Heat}$   $CaO(s)$  +  $CO_2(g)$  Calcium carbonate (Limestone) Calcium oxide (Lime)

# 3. Chemical displacement:

<u>Definition:</u> The reaction in which an element displaces another element from its compound and occupies its place forming a new compound is called chemical displacement.

Equation: Copper Sulphate + Iron 
$$\rightarrow$$
 Ferrous Sulphate + Copper

$$CuSO_4 + Fe \rightarrow FeSO_4 + Cu$$

# Activity: Experiment:

*Apparatus:* Beaker

Chemicals: Copper sulphate, a shining iron nail.

Procedure: Take copper sulphate powder in a beaker and add water so to make sulphate solution.

Place the iron nail in the solution. Observe after sometime what happens in the

beaker.

Observation: Red deposit is formed on the iron nail. The blue solution turns light green in colour.

Conclusion: The copper atom in copper sulphate molecule is displaced by iron atom and occupies

its palce. So Ferrous sulphate is formed in the solution. So the original blue solution turns light green. The displaced copper form copper sulphate deposits on the iron

ation

nail. The deposit is red in colour.

**Chemical Equation:** Copper Sulphate + Iron → Ferrous Sulphate + Copper

$$CuSO_4 + Fe \rightarrow FeSO_4 + Cu$$

#### 4. Chemical double decomposition:

<u>Definition:</u> When solutions of two salts are mixed, there will be a mutual exchange of radicals resulting in the formation of two new compounds. Such chemical reactins are called <u>"Chemical</u> double decomposition".

Equation: Potassium / iodide + Lead / Nitrate → Lead / iodide ↓ + Potassium / Nitrate

$$2K/I + Pb/(NO_3)_2 \rightarrow Pb I_2 \downarrow 2K NO_3$$

#### **Activity: Experiment:**

Apparatus: Two test tubes.

Chemicals: Silver nitrate, Sodium chloride, Water.

Procedure: By taking a small qunatity of silver nitrate in a test - tube and adding sufficient water

perpare silver nitrate solution. Likewise prepare sodium chloride solution by taking a small quantity of sodium chloride in another test - tube and adding sufficeint water.

Add silver nitrate solution gradually to the sodium chloride solution.

**Observation:** Formation of curd - like precipitate in the test - tube containing sodium chloride. **Conclusion:** Silver nitrate and Sodium chloride ar two different compounds. During chemical

reaction the constituents of the compounds get mutually exchanges. As a rersult

chloride is formed as a precipitate and soidum nitrate as a solution.

<u>Chemical Equation:</u> Potassium / iodide + Lead / Nitrate  $\rightarrow$  Lead / iodide  $\downarrow$  + Potassium / Nitrate  $2K/I + Pb/(NO_3)_2 \rightarrow Pb~I_2 \downarrow 2K~NO_3$ 

# TEACHING TASK

Sing	le correct answer type questions					
1)	The reaction between magnesium and oxyg	en is.				
	A) Endothermic B) Exothermic	C) Reversible	D) None			
2)	Example for physical change.					
	A)Formation of snow B)Rusting of Iron	,	D)Curdling of milk			
3)	One compound change in to so many comp		<b>-</b> >			
4)	A)Decomposition B)Thermal dissociation	, -	D)Combustion			
4)	A change will come along with chemical characteristics A)Composition B)Colour	_	D)All			
5)	In atmosphere sulphurdioxide react with mo	,	,			
٥)	A)Chemical combination	B)Chemicaldecompos				
	C)Chemical displacement	D)Chemical double d				
	,	4 I A				
6)	$2 A \ell (OH)_{3(s)} \xrightarrow{D} A \ell_2 O_{3(s)} + 3 H_2 O_{(g)}$	10119				
	Which of the following statements is true for the above reaction?					
	A) A compound decomposes to form two elements.					
	B) A compound decomposes to form two new					
	C) A compound decomposes to form two compounds and elements.  D) A compound decomposes to form another compound and an element.					
7)	The combination reactions may involve in the	1 . / / /	mont.			
٠,		compounds with another	er compound.			
		ll the above.	•			
8)	Which of the following reactions illustrates a c		etween an element and a			
	compound?					
	A) $2HgO_{(s)} \xrightarrow{\Delta} 2Hg_{(\ell)} + O_2(g)$ B) 2	$2KI + C\ell_{2(g)} \longrightarrow 2KC\ell$	$\mathcal{L}_{(\mathrm{aq})} + \mathrm{I}_{2(\mathrm{s})}$			
	C) $2CO_{(g)} + O_{2(g)} \longrightarrow 2CO_{2(g)}$ D) B	oth 2 and 3				
9)	$2Pb_3O_{4(s)} \xrightarrow{  \  \   } 6PbO_{(s)} + O_{2(g)}$ illustrates a:					
,	A) Chemical combination B) Chemical decombination					
	C) Chemical displacement D) Chemic	cal double decompositi	on			
10)	What happens if Zinc strip dipped in $\ensuremath{\textit{CuSO}_4}$	solution?				
	A)Combination B)Double decomposition	, .	D)Displacement			
11)	A reaction is which two soluble compounds in					
40\	A)Neutralisation B)Precipitation	C)Combination	D)All			
12)	Some metals can not displace hydrogen fro					
	A)Those metals are more electropositive that B)those metals are less electropositive than					
	C)both A & B	D) None				
13)	Which of the following reaction takes place a	•				
-,	A) Endothermic reaction B) Exothermic re	•	D) None			
14)	Fe + CuSO <sub>4</sub> $\longrightarrow$ FeSO <sub>4</sub> + Cu Which of th	•	,			
. 1)	A) Copper displaces iron B) Sulphu	_	.5 45575 10404011:			

C) Iron displaces copper

D) Copper displaces sulphur

#### II. Multi Correct Choice Type:

- This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which **ONE or MORE** is correct. Choose the correct options
- 15) Which one of the following is not a permanent change?

A) Melting of ice

B) Magnetisation of iron

C) Powdering of sugar

D) Glowing of bulb

#### III. **Reasoning Type:**

- This section contains certain number of questions. Each question contains Statement 1(Assertion) and Statement – 2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct Choose the correct option.
- Statement  $I: C(s) + O_2(g) \xrightarrow{\Delta} CO_2(g)$  is an example of analysis. 16)

Statement II: When a compound decomposes into two elements, the reaction is called analysis..

- 1. Both Statements are true, Statement II is the correct explanation of Statement I.
- 2.Both Statements are true, Statement II is not correct explanation of Statement I.
- 3. Statement I is true, Statement II is false.
- 4. Statement I is false, Statement II is true.

#### IV. **Matrix Match Type:**

This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in **Column-I** have to be matched with statements (p, q, r, s) in **Column–II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4\*4 matrix should be as follows:

#### 17) Column-I

# Column-II

a)

- c)

2) Ca(OH), PbO + O,

d)

- $AI_{2}O_{3} + 3H_{2}O$
- AI(OH)
- $Ca(OH)_2 + H_2$

#### V. Comprehension Type:

A change in which new substances are formed and which cannot be reversed by reversing the conditions is called a chemical change. In a chemical change new substances are formed and identity of the original substance is lost. Properties of the substance before and after the change are different. Original properties disappear and new properties are observed. Change is brought permanently and change is irreversible.

18) A+B AB represents a chemical combination. Which of the following is/are an example of chemical combination?

A) 
$$2 \text{KI}_{(aq)} + C \ell_{2(g)} \longrightarrow 2 \text{KC} \ell_{(aq)} + C u_{(s)}$$

B) 
$$CaO_{(s)} + H_2O_{(\ell)} \longrightarrow Ca(OH)_{2(s)}$$

C) 
$$CuSO_{4(aq)} + Fe_{(s)} \longrightarrow FeSO_{4(aq)} + Cu_{(s)}$$

D) 
$$HgO \xrightarrow{\Delta} 2Hg + O_2$$

19) i) 
$$AgNO_3(aq) + NaCI(aq) \rightarrow P + Q$$
 ii)  $PC \ell_5(s) \xrightarrow{Heat} R + S$ 

ii) 
$$PC \ell_5(s) \xrightarrow{Reat} R+$$

AgC/ A)

NaNO<sub>3</sub>

PCI<sub>3</sub>

- NaNO<sub>3</sub> PCI<sub>2</sub> B)  $CI_2$ AgC/ PCI<sub>3</sub> NaNO<sub>3</sub> C) AgC/  $CI_2$ D) PCI<sub>2</sub> NaNO<sub>2</sub> AgC/ CI,
- $A \xrightarrow{\Delta} A \ell_2 O_{3(s)} + C$ 20)
  - A)  $A \rightarrow A\ell(OH)_3$ ,  $C \rightarrow H_2O$
- B)  $A \rightarrow 2A\ell(OH)_3$ ,  $C \rightarrow 3H_2O$
- B)  $A \rightarrow 2A\ell(OH)_4$ ,  $C \rightarrow 2H_2O$  D)  $A \rightarrow A\ell(OH)_3$ ,  $C \rightarrow 4H_2O$

# LEARNER'S TASK

# BEGINNERS (Level - I)

# **Single Correct Choice Type:**

- When two or more elements or compounds react chemically to form one new product only, then the reaction which takes place is called
  - A) Chemical decomposition
- B) Chemical combination
- C) Chemical displacement
- D) Chemical double decomposition
- 2. Which of the following statements is/are true for the given chemical reaction?

$$2H_2(g) + O_2(g) \longrightarrow 2H_2O(g)$$

- A) Hydrogen burns in oxygen to form water.
- B) Two elements combine to form a single compound.
- C) The formation of water from hydrogen and oxygen is a combination reaction.
- D) All the above.
- $2SO_2(g) + O_2(g) \longrightarrow 2SO_2(g)$ 3.

Which of the following statements is/are true for the above reaction?

- A) In this reaction a compound reacts with an element to form a new compound.
- B) It is a combination reaction.
- C) The new product formed is sulphur trioxide.

- D) All the above
- When electric current is passed through molten sodium chloride, it decomposes to give sodium 4. metal and chlorine gas:

Which of the following is true for the above reaction?

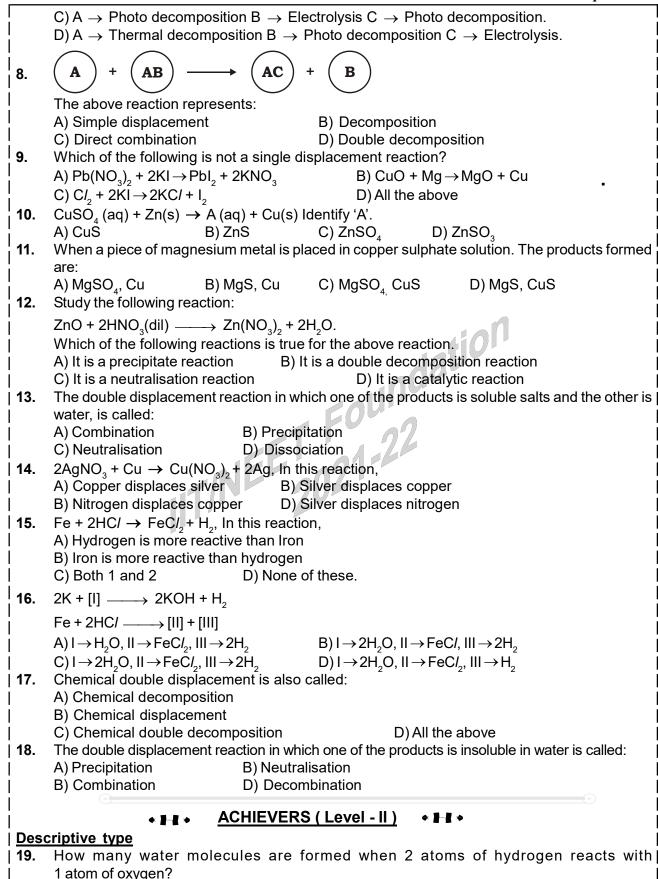
- A) It is a electrolytic combination.
- B) It is a chemical decomposition of a compound to form two compounds.
- C) It is also called electrolysis of molten sodium chloride.
- D) The above reaction is used to obtain molten sodium chloride.
- Choose the decreasing order of the metals pertaining to their chemical reactivity. 5.
  - A) Na > Ca > K > Pb > A/ > Zn > Fe > Mg > [H] > Cu>Hg > Ag
  - B) K > Na > Ca > Mg > A/ > Zn > Fe > Pb > [H] > Cu>Hg > Ag
  - C) Fe > K > Pb > A/ > Fe > Zn > Hg > Ag > [H] > Ca > Cu>Hg
  - D) Cu>Hg > Na > Ca > Mg > A/ > Zn > Fe > Pb > [H] > K > Ag
- 6.  $A \rightarrow NH3 + C$ 
  - $A) A \rightarrow PCI_3 B \rightarrow CI_2$
- B) A  $\rightarrow$  NH<sub>4</sub>C/(s), C  $\rightarrow$  HC/

C) A, C  $\rightarrow$  HC/

- D) A  $\rightarrow$  PC $I_5$ , C  $\rightarrow$  NH<sub>4</sub>CI
- Decomposition reaction brought about by heating is called \_\_\_\_ 7.
  - Decomposition reaction brought about by light is called
  - Decomposition reaction brought about by electricity is called
  - A) A  $\rightarrow$  Electrolysis  $\rightarrow$  B  $\rightarrow$  Photo decomposition C  $\rightarrow$  Thermal decomposition.
  - B) A  $\rightarrow$  Photo decomposition B  $\rightarrow$  Thermal decomposition C  $\rightarrow$  Electrolysis.

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In chemical double displacement reaction how many compounds react to each other?

21. Explain the types of chemical reactions with examples?

# EXPLORERS (Level - III)

## **Multi Correct Choice Type:**

- ◆ This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which ONE or MORE is correct. Choose the correct options
- 22. Which of the following is an example for chemical decomposition reaction?

A) 
$$CO + O_2 \longrightarrow 2CO_2$$

B) 
$$2HgO \longrightarrow 2Hg + O_2$$

C) 
$$Pb(NO_3)_2 \longrightarrow 2PbO + 4NO_2 + O_2$$

D) 
$$CaO + H_2O \longrightarrow Ca(OH)_2$$

- **23.** The reaction in which a chemical compound decomposes or splits up into two or more simpler substances is called:
  - A) Direct combination

- B) Simple displacement
- C) Decomposition reaction
- D) Double decomposition
- **24.**  $(A^+ B^-) + (C^+ D^-) \rightarrow (A^+ D^-) + (C^+ B^-)$  represents:
  - A) Chemical displacement

- B) Chemical double displacement reaction.
- C) Chemical double decomposition reaction. D) Chemical combination.
- 25. Which of the following is/are precipitation reactions?

A) 
$$NaC\ell(aq) + AgNO_3(aq) \longrightarrow AgC\ell(s) + NaNO_3(aq)$$

B) 
$$CuSO_4(aq) + 2NaOH(aq) \longrightarrow Cu(OH)_2(s) + Na_2SO_4(aq)$$

C) 
$$2A\ell(OH)_3(s) \xrightarrow{\Delta} A\ell_2O_3(s) + 3H_2O(compound)$$

D) 
$$\stackrel{\text{2Pb}(NO_3)_2}{\text{(Compound)}}$$
 (s)  $\stackrel{\Delta}{\longrightarrow}$   $\stackrel{\text{2PbO}(s)}{\text{(Compound)}}$   $\stackrel{\text{4NO}_2(g)}{\text{(Compound)}}$   $\stackrel{\text{Clement)}}{\text{(Element)}}$ 

#### **Reasoning Type:**

- ◆ This section contains certain number of questions. Each question contains Statement 1 (Assertion) and Statement – 2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct Choose the correct option.
- **26.** Statement I: A chemical change can be called a chemical reaction.

Statement II: Re-orientation of the participating atoms take place with absorption or liberation of energy.

- 1. Both Statements are true, Statement II is the correct explanation of Statement I.
- 2.Both Statements are true, Statement II is not correct explanation of Statement I.
- 3. Statement I is true, Statement II is false. 4. Statement I is false, Statement II is true.
- **27.** Statement I: When more reactive metal displaces less reactive metal from its aqueous salt solution, the chemical reaction is called chemical combination.
  - Statement II: A chemical reaction, in which two compounds in their aqueous solution react by exchanging their radicals, is called chemical double-decomposition.
    - 1.Both Statements are true, Statement II is the correct explanation of Statement I.
    - 2.Both Statements are true, Statement II is not correct explanation of Statement I.
    - 3. Statement I is true, Statement II is false.
    - 4. Statement I is false, Statement II is true.

#### **Matrix Match Type:**

*♦* This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in **Column-I** have to be matched

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with statements (p, q, r, s) in **Column-II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4\*4 matrix should be as follows:

#### 28. Column-I

#### Column-II

- CO2 + H2O a)
- $P_{y}O_{z} + 3H_{y}O$ b)
- CaO + H<sub>2</sub>O c)
- $K_2O + H_2O$

- 1) HCO<sub>2</sub>
- 2) 2KOH
- 3) Ca(OH)
- H<sub>2</sub>CO<sub>3</sub> 4) 5) 2H<sub>2</sub>PO<sub>4</sub>

#### 29. Column-I

- a)  $NaCI(aq) + AgNO_3(aq) \rightarrow AgCI(s) + NaNO_3(aq)$
- b)  $NH_4OH(aq)+HCI(aq) \rightarrow NH_4CI(aq)+H_2O(I)$
- c)  $2KI(aq)+CI_2(g) \rightarrow 2KCI(aq)+I_2(s)$
- d) CuSO<sub>4</sub> + Fe

#### Column-II

- 1) Neutralisation reaction
- Chemical displacement.
- 3) Precipitation reactions
- 4) FeSO<sub>4</sub> + Cu
- 5) FeSO<sub>4</sub> + Cu

#### 30. Column-I

#### Column-II

- a) CuSO<sub>4</sub> + Fe
- b)
- H<sub>2</sub>SO<sub>4</sub> + 2KOH c)
- NH,OH + HCI d)
- KI + CI
- 1)  $NH_{A}CI + H_{2}O$  $K_2SO_4 + 2H_2O$ 2)
- 3) KCI + I<sub>2</sub>
- FeSO, + Cu 4)

# Comprehension Type:

This section contains paragraph. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct. Choose the correct option.

When more reactive metal displaces less reactive metal from its aqueous salt solution, the chemical reaction is called chemical displacement. A chemical reaction, in which two compounds in their aqueous solution react by exchanging their radicals, is called chemical double-decomposition or chemical double-displacement.

31. A teacher performed the following experiment. He took a strip of lead metal and placed in a solution of copper chloride. Which of the following is the correct equation for the above reaction?

A) 
$$Cu_2CI + Pb \longrightarrow PbCI_2 + 2Cu$$

B) 
$$CuSO_4 + Pb \longrightarrow PbSO_4 + Cu$$

C) 
$$CuCl_2 + Pb \longrightarrow PbCl_2 + Cu$$

D) 
$$Cu_2Cl_2 + 2Pb \longrightarrow PbCl_2 + Cu$$

- When hydrogen sulphide gas is passed through copper sulphate solution, then a black 32. precipitate of copper sulphide is formed along with sulphuric acid solution It is an example of:
  - A) A displacement reaction between two compounds.
  - B) A double displacement reaction between a compound and an element.
  - C) A double decomposition reaction between two compounds.
  - D) A combination between an element and a compound.
- 33. A teacher performed the following experiment in the class.

He took ammonium hydroxide solution and added to aluminium chloride solution. what is the conclusion from the above experiment?

- A) A black precipitate of aluminium hydroxide is formed.
- B) A white ppt of aluminium hydroxide is formed along with ammonium chloride solution.
- C) A red precipitate of aluminium hydroxide alone is formed.
- D) A white precipitate ammonium chloride is formed.

- **(B)** When more reactive metal displace less reactive metal from aqueous salt solution, the chemical reaction is called **chemical displacement**.
- **34.** Which of the following is not a single displacement reaction?
  - A)  $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$
- B) CuO + Mg $\rightarrow$  MgO + Cu
- C)  $CI_2 + 2KI \rightarrow 2KCI + I_2$
- D) Mg + 2HC $I \rightarrow$  MgC $I_2$  + H<sub>2</sub>

- **35.** A +  $2AI \longrightarrow B + 2Fe$ 
  - A) A  $\longrightarrow$  2Fe<sub>3</sub>O<sub>3</sub>, B  $\longrightarrow$  A $I_2$ O<sub>3</sub>
- B)  $A \longrightarrow Fe_2O_3$ ,  $B \longrightarrow 2AI_2O_3$
- C)  $A \longrightarrow Fe_2O_3$ ,  $B \longrightarrow AI_2O_3$
- D) A  $\longrightarrow$  2Fe<sub>2</sub>O<sub>3</sub>, B  $\longrightarrow$  2AI<sub>2</sub>O<sub>3</sub>

## **KEY**

## $\Phi\Phi$ TEACHING TASK :

- 1-B 2-A 3-A 4-D 5-A 6-B 7-D 8-C 9-B 10-D 11-B
- 12-C 13-A 14-C 15-A,D 16-D 17-3,2,1,4 18-B 19-A 20-B

# $\Phi\Phi$ LEARNER'STASK:

## ☐ BEGINNERS:

- 1-B 2-D 3-D 4-B 5-B 6-B 7-D 8-A 9-A 10-C 11-A
- 12-C 13-C 14-A 15-B 16-A 17-D 18-A

#### ☐ EXPLORERS:

22-B,C	23-B,C,D	24-A,B,C	25-A,C,D	26-A	27-D	28-4,5,3,2
29-3,1,2,4	30-4,3,2,1	31-C	32-B	33-B	34-E	35-C

# **<u>§§</u>** PHOTO CHEMICAL CHANGE:

#### PHOTO CHEMICAL REACTION:

<u>Defination:</u> The reaction which proceed with absorption of light energy are called photochemical reaction.

Ex: **1.** Plants Produce glucose and oxygen from carbondioxide gas and water in the presents of chlorophyll, only in the presence of sunlight.

Equation:  $6CO_2(g) + 6H_2O(l) \xrightarrow{Chlorophyll} C_6H_{12}O_6(s) + 6O_2(g)$ 

2. When equal volumes of hydrogen gas and chlorine gas are mixed together in darkness, practically no reaction takes place. However, if the above mixture is exposed to diffused daylight, the gases react slowly to form HCl gas. But when the above mixture is expossed to direct sunlight, a violent explosion takes place with a blinding flash forming hydrochloric acid gas.

Equation:  $H_{2(g)} + Cl_{2(g)} \xrightarrow{Sunlight} 2HCl_{(aq)} + \Delta T$ 

#### **88** Combustion:

**Def:** 1. The process of burning is know as combustion.

**2.** Rapid chemical combination with  $o_{\gamma}$  involving the production of heat.

Ex: When magnesium ribbon 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. The procut formed is magnesium oxide.

Equation:  $2Mg + O_2 \xrightarrow{heat} 2MgO + energy$ 

**Electrolysis:** Electrical energy can be used to produce chemical reaction in solution. Some liquids allow current to pass through them. So they are called liquid conductors of electrolytes. When VI- CLASS

current is passed through an electrolyte chemical reaction take palce.

- An important chemical reaction that takes place in an eletrolyte due to passage of current is chemical decomposition. What is meant by chemical decomposition? It is the splitting of molecules into their respective atoms (or) ions.
- For example we can split water molecules into Oxygen ions and Hydrogen ions by 2. passing current through water.
- Sodium chloride moleculs can be split into sodium ions and chlorine ions. This proces of spliting chemical compounds into their constituent elements using electric current is called electolysis.

Definiation: The Process in which electric currents (or) electrical energy is used to produce chemical decomposition splitting the compounds into their constituent elements (or) molecules into ions is called electrolysis. The solution through which current is passed is called electrolyte.

Electrolysis of copper Sulphate: (CuSO<sub>4</sub>): Electric current can be passed through copper sulphate solution and copper sulphate molecules can be split into copper ions (Cu<sup>++</sup>) and sulphate ions.

$$CuSO_4 \rightarrow Cu^{++} + SO_4^{--}$$

# TEACHING TASK

MCQ'	s with only one answer is correct
1	When calcium carbonate is heater

calcium carbonate is heated it's produces

A) Ca, C and O<sub>2</sub> B) CaC, and O, C) CaO and CO, D) Ca and CO,

2. When Hydrogen peroxide is heated it produces

> A) H<sub>2</sub> and O<sub>2</sub> B) H<sub>2</sub>O and O

C) H<sub>2</sub>O and O<sub>2</sub>

C) 2KNO<sub>2</sub> + O<sub>2</sub>

D) None.

D) None

decomposition of 2KNO<sub>3</sub> gives 3. B) KNO, + O,

A) KNO + O<sub>3</sub>  $Zn + 2Hcl \rightarrow$ 

A)  $Zncl + H_2$ 

4.

B) **Zncl**<sub>2</sub> only

C)  $Zncl_2 + H_2$  D) None

The chemical raction in which a substace decomposes into two (or) more substanas known 5.

A) Combination

B) decomposition

C) displacement

D)double decomposition.

6.  $Zn + 2Hcl \rightarrow Zncl_2 + H_2$ 

A) combination

B) decomposition

C) displacement

D)double decomposition.

۱7. Sodium hydroxide (NaOH) reacts with hydrochloric acid (Hcl) to produce salt (Nacl) and water. This represents

A) combination

B) decomposition

C) displacement

D)double decomposition.

In the manfacture of sulphric acid (H<sub>2</sub>SO<sub>4</sub>) the sulphur trioxide (SO<sub>3</sub>) gas is dissoved in water. 8. The chemical change represents

A) Combination

B) decomposition

C) displacement

D)double decomposition.

9. The exmaples of decomposition

A)  $2Mg + O_2 \rightarrow 2MgO$ 

B)  $CuCO_3 \rightarrow CuO + CO_2$ 

C)  $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ 

D)  $Bacl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2Nacl$ 

Which of the following is NOT a Chemical Change? 10.

A) Conveerting water into steam

B) Making curd from milk

C) Rusting of iron

D) Burning of coal

Rusting of iron is a Chemical Change because 11.

- A) it is a temporary change
- C) a new substanceis fomed
- B) it is a slow reaction
- D) upon cleaning the original substance is recovered
- 12. Which of the following is NOT a Chemical Changes?
  - A) A banana turning brown
- B) Moulding a piece of gold into a ring

C) Curdling of milk

D) Baking of cake

- 13.  $Mg + H_2SO_4 \rightarrow ?$ 
  - A)  $MgSO_4 + H_2O$
- B)  $MgO + H_2$
- C)  $MgSO_4 + H_2$
- D)  $MgSO_4 + O_2$
- 14. Decomposition of hydrogen peroxide to water and oxygen is
  - A) Physical Change

B) Reversible Change

C) Chemical Change

D) None of these

## II. MCQ's with more than one option is correct:

- This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which **ONE or MORE** is correct. Choose the correct options
- 15. Give examples of decomposition reactions
  - A)  $CuCO_3 \rightarrow CuO + CO_2$

 $\mathsf{B}) \; \mathbf{S} + \mathbf{O}_2 \to \mathbf{SO}_2$ 

- C)  $2HgO \rightarrow 2Hg + O_2$
- D)  $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
- 16. Types of chemical changes are
  - A) 4
- B) 5

- C) A and B
- D) A only.

- **17**. Classification of chemical chagnes
  - A) chemical combination

- B) Chemical decomperi
- C) Chemical triple composition
- D) A and B

### III. Match the following:

This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column-I have to be matched with statements (p, q, r, s) in **Column-II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4\*4 matrix should be as follows:

#### 18. Chmical action

## Type of Chemical Change

- 1. Sending of electric current into acideified warter
- a) Double decomposition
- 2.Burning of magnesium wire in air
- b) Decomposition
- 3. Palcing magnesium wire in dilute
- c) Combination

hydrochloric acid

- d) Displacement
- 4. Adding Sodium sulphate solution to barium chloride salution
- B) 1 c, 2 b, 3 d, 4 a
- A) 1 b, 2 c, 3 d, 4 a C) 1 - c, 2 - d, 3 - a, 4 - b
- D) 1 d, 2 d, 3 b, 4 a

#### IV. Odd one out and give your reason for your answer:

19. Chemical decomposition, Chemical combination, Chemical raction, Chemical displacement

### V. Correct the Sentences if it is wrong. Otherwise rewrite the sentence

- 20. The chemical reaction in which a substance decmposes into two or more new substances is called composition.
- 21. In the reaction of combination two elements or two compounds may participate.

VI- CLASS

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#### VI. Fill in the blanks: 22. Sulpher + Oxygen → ..... 23. Copper Carbonate (CuCO<sub>3</sub>) → ......+ ......+ 24. Silver Nitrate Ag $NO_3$ + NaCl $\rightarrow$ ...... + ..... **LEARNER'S TASK** BEGINNERS(Level - I) MCQ's with only one answer is correct: .....+ $H_2SO_4 \rightarrow CuSO_4 + H_2O$ 1. A) CuO C) Cu D) CuSO<sub>4</sub>. 5H<sub>2</sub>O 2. Which of the following equation is NOT balanced correctly A) $NaHSO_4 + NaOH \rightarrow Na_2SO_4 + H_2O$ B) $2NaOH + (NH_4)_2SO_4 \rightarrow Na_2SO_4 + 3NH_2 + H_2O$ C) $6NH_4OH + Al_2(SO_4)_3 \rightarrow 2Al(OH)_3 + 3(NH_4)_2SO_4$ D) $MgSO_4 + 2HNO_3 \rightarrow Mg(NO_3)_2 + H_2SO_4$ E)None Lime water is a solution of 3. B) CaCl<sub>2</sub> in water C) Nacl in water A) Ca(OH), in a water D)NaoH in water. $CaCO_3 + 2HCl \rightarrow \dots + H_2O + CO_2$ 4. C) CaCl<sub>2</sub> B) *CaH*<sub>2</sub>*O* A) $Ca_2Cl$ D) $CaCO_2$ 5. Burning of sulphur in air is A) Physical change B) chemical change C) Temporary change D) None. The number of oxygen atoms in $Pb(NO_3)_2$ in 6. A) 2 B) 3 C) 5 D) 6 7. Which of the following is formed when potassium reacts with oxygen? A) KO B) K<sub>2</sub>O C) KO<sub>2</sub> D) 2KO<sub>3</sub> 8. Potassium iodide + lead nitrate → A) Potassism lead + iodine nitrate B) Potassium nitrate + lead iodide D) Potassium nitrate + Water + iodine C) Hydrochloric acid + iodine 9. $AgNO_3 + NaCl \rightarrow AgCl \downarrow + NaNO_3$ above reaction is an example fo A) chemical combination B) chemical decomposition C) chemical displacement D) chemical double decomposition 10. The reaction which proceed with absorption of light energy or called ..... A) Chemical reaction B) Photo Chemical reaction C) Photo chemical Change D) None ACHIEVERS (Level - II) **Descriptive type questions** 11. Define the photo chemical reaction with examples? 12. Define the combustion reaction with examples? 13. Define the Electrolysis? Write the difference between the photo chemical reaction and combustion reaction?

#### **EXPLORERS (Level - III)** 4 H B

# MCQ's with more than one option is correct:

- This section contains multiple choice questions. Each question has 4 choices (A), (B), (C),(D), out of which **ONE or MORE** is correct. Choose the correct options
- 15. Give example of combination are
  - A)  $2Mg + O_2 \rightarrow 2Mgo$

B)  $S + O_2 \rightarrow SO_2$ 

C)  $2HI \rightarrow H_2 + I_2$ 

- D)  $Zn + 2HCl \rightarrow Zncl_2 + H_2$
- CuCO<sub>3</sub> decomposes to give 16.
  - A) CaO and CO<sub>2</sub>
- B) CuO and CO<sub>2</sub>
- C) 2CuO + CO<sub>2</sub>
- D) B only.

# Match the following:

This section contains Matrix-Match Type questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in **Column-I** have to be matched with statements (p, q, r, s) in **Column–II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4\*4 matrix should be as follows:

#### 17. Nature of the reaction

- 1. Combination
- 2. decomposition
- 3. displacement
- 4. double decomposition
- A) 1 b, 2 a, 3 c, 4 d
- C) 1 a, 2 b, 3 d, 4 c

## **Balance Reaction**

- a)  $ZnCO_3 \rightarrow ZnO + CO_2$
- b)  $2SO_2 + O_2 \rightarrow 2SO_3$
- c)  $Bacl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2Nacl$
- d)  $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
- B) 1 b, 2 a, 3 d, 4 c
- D) 1 c, 2 b, 3 d, 4 a.

# **Comprehension Type:**

This section contains paragraph. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (A) , (B) ,(C) and (D) out of which **ONLY ONE i**s correct. Choose the correct option.

#### Combustion:

- Def: 1. The process of burning is know as combustion.
  - 2. Rapid chemical combination with  $o_2$  involving the production of heat.
- 18. The products formed in the combustion reaction.
  - A)CO,H<sub>2</sub>
- B)CO2,H2O
- C)CO<sub>2</sub>,H<sub>2</sub>
- D)H<sub>2</sub>O,CO
- 19. In partially combustion reaction the main product is
  - A)CO
- B)CO
- C)H<sub>3</sub>
- D)H<sub>o</sub>O

#### **KEY**

# $\Phi\Phi$ TEACHING TASK :

- 1-C 2-C 3-C 4-C 5-B 6-C 7-D 8-A 9-B 10-A 11-B
- 17-A,B 12-B 13-C 14-C 15-A,C 16-A,C 18-A 19-Chemical 24-AgCl,NaNO<sub>3</sub>
- 20-T 21-T 22-SO<sub>2</sub> 23-CuO,CO<sub>2</sub> reaction,

## $\Phi\Phi$ LEARNER'STASK :

- □ BEGINNERS:
  - 1-A 2-E 4-C 5-B 7-B 3-A 6-D 8-B 9-D 10-B
- **EXPLORERS:** 
  - 15-A,B 16-B,C 17-B 18-B 19-A