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## **Chapter 1. Chemical Reaction and Equations**



### **POINTS TO REMEMBER**

1. A chemical reaction involves a chemical change in which substances react to form new substances with entirely new properties. Substances that react or take part in the reaction are known as **reactants** and the substances formed are known as **products**.
2. During a chemical reaction, there is a breaking of bonds between atoms of the reacting molecules to give products.
3. A chemical reaction can be observed with the help of any of the following observations:
  - a. Evolution of a gas
  - b. Change in temperature
  - c. Formation of a precipitate
  - d. Change in colour
  - e. Change of state
4. **Physical change :** If a change involves change in colour or state but no new substance is formed, then it is a physical change.
5. **Chemical change :** If a change involves formation of new substances, it is a chemical change.
6. **Exothermic and endothermic reactions :** If heat is evolved during a reaction, then such a reaction is known as Exothermic reaction. If heat is absorbed from the surroundings, then such a reaction is known as endothermic reaction.
7. **Chemical equation :** The symbolic representation of a chemical reaction is called a chemical equation.
8. **Features of a chemical equation :**
  - a. The reactants are written on the left hand side with a plus sign between them.
  - b. The products are written on the right hand side with a plus sign between them.
  - c. An arrow separates the reactants from the products.

9. **Skeletal chemical equation :** A chemical equation which simply represents the symbols and formulae of reactants and products taking part in the reaction is known as skeletal chemical equation for a reaction.
- For example :** For the burning of Magnesium in the air,  $Mg + O_2 \rightarrow MgO$  is the skeletal equation.
10. **Balanced chemical equation:** A balanced equation is a chemical equation in which number of atoms of each element is equal on both sides of the equation i.e. number of atoms of an element on reactant side = number of atoms of that element on the product side.
11. As per the law of conservation of mass, the total mass of element in the products of a chemical reaction is equal to the total mass of the elements present in the reactants.
12. The process of equating the number of atoms on both the sides of a chemical equation is known as balancing of a chemical equation.
- The first step in balancing a chemical equation is to write the number of atoms of each element present on the left hand side and right hand side.
  - We should always start balancing with the compound that contains maximum number of atoms. It can be reactant or a product. Then in that compound select the element which has the maximum number of atoms.
  - While balancing a chemical equation, the molecular formulae of the reactants and products should not change. The molecular formulae are simply multiplied by suitable coefficients.
  - To make a chemical equation more informative, the reaction conditions such as temperature, pressure or catalyst are written on the arrow separating the reactants and products.
  - The evolution of gas is indicated by an upward arrow.
  - The formation of precipitate is indicated by a downward arrow.
  - Heat evolved during the reaction is written as + Heat on the product side.
  - Heat absorbed during the reaction is written as + Heat on the reactant side.
13. **Types of chemical reactions :**
- |                                 |                           |
|---------------------------------|---------------------------|
| a. Combination reaction         | b. Decomposition reaction |
| c. Displacement reaction        | d. Redox reaction         |
| e. Double displacement reaction |                           |
14. **Combination reaction** is a reaction in which 2 or more substances combine to give a single product. Combination reaction can be between 2 elements, between an element and a compound or between 2 compounds.
15. **Decomposition reaction:** In a decomposition reaction, a single reactant decomposes to give 2 or more products. Decomposition reactions require energy in the form of heat, light or electricity
16. **Types of decomposition reactions :**
- Decomposition reactions which require heat are known as thermolytic decomposition reactions.
  - Decomposition reactions which require light are known as photolytic decomposition reactions.
  - Decomposition reactions which require electricity are known as electrolytic decomposition reactions.
17. **Displacement reaction:** A reaction in which a more active element displaces less active element from its salt solution.

18. The reactivity series is a list of metals arranged in the order of decreasing reactivity. The most reactive metal is placed at the top and the least reactive metal is placed at the bottom.
19. **Double displacement reaction:** A chemical reaction in which there is an exchange of ions between the reactants to give new substances is called double displacement reaction.
20. **Precipitation reaction:** An insoluble solid known as precipitate is formed during a double displacement reaction. Such reactions are also known as precipitation reactions.
21. **Redox reaction:** A reaction in which oxidation and reduction take place simultaneously in a reaction, is known as a redox reaction.
22. Oxidation is a chemical process in which a substance gains oxygen or loses hydrogen.
23. Reduction is a chemical process in which a substance gains hydrogen or loses oxygen.
24. If a substance gains oxygen or loses hydrogen during a reaction, it is said to be oxidised.
25. If a substance gains hydrogen or loses oxygen during a reaction, it is said to be reduced.
26. A substance that loses oxygen or gains hydrogen is known as an oxidising agent.
27. A substance that loses hydrogen or gains oxygen is known as a reducing agent.
28. An oxidising agent gets reduced whereas a reducing agent gets oxidised.
29. In terms of electronic concept, Oxidation is defined as a loss of electrons while reduction is defined as a gain of electrons.
30. Corrosion is the slow eating up of metals by the action of air and moisture on their surfaces. Corrosion in case of Iron is known as Rusting.
31. Chemically, rust is hydrated ferric oxide ( $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ )
32. **Advantages of corrosion:** Though corrosion is undesirable, it can be advantageous in case of aluminium which on exposure to air, gets coated with a protective layer of aluminium oxide. This protects the metal underneath from further corrosion and damage.
33. **Rancidity:** When oils and fats or foods containing oils and fats are exposed to air, they get oxidised due to which the food becomes stale and gives a bad taste or smell. This is called Rancidity.
34. **Rancidity can be prevented by :**
  - a. Adding antioxidants i.e. the substances which prevent oxidation.
  - b. Refrigeration.
  - c. Storing the food in air-tight containers

# CONCEPT APPLICATION LEVEL - I

[NCERT Questions]

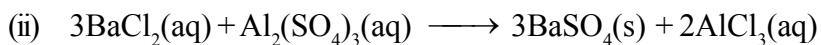
**Q.1** Why should a magnesium ribbon be cleaned before burning in air?

**Ans.** Magnesium is very reactive metal. When stored it reacts with oxygen to form a layer of magnesium oxide on its surface. This layer of magnesium oxide is quite stable and prevents further reaction of magnesium with oxygen. The magnesium ribbon is cleaned by sand paper to remove this layer so that the underlying metal can be exposed to air.

**Q.2** Write the balanced equation for the following chemical reactions.

- (i) Hydrogen + Chlorine  $\longrightarrow$  Hydrogen chloride
- (ii) Barium chloride + Aluminium sulphate  $\longrightarrow$  Barium sulphate + Aluminium chloride
- (iii) Sodium + Water  $\longrightarrow$  Sodium hydroxide + Hydrogen

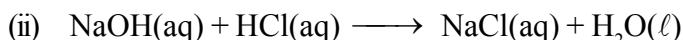
**Ans.** (i)  $H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$



**Q.3** Write a balanced chemical equation with state symbols for the following reactions.

- (i) Solutions of barium chloride and sodium sulphate in water react to give insoluble barium sulphate and the solution of sodium chloride.
- (ii) Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.

**Ans.** (i)  $BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$

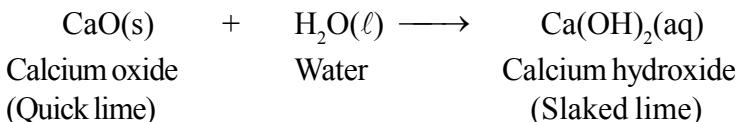


**Q.4** A solution of a substance ‘X’ is used for white washing.

- (i) Name the substance ‘X’ and write its formula.
- (ii) Write the reaction of the substance ‘X’ named in (i) above with water.

**Ans.** (i) The substance ‘X’ is calcium oxide. Its chemical formula is  $CaO$ .

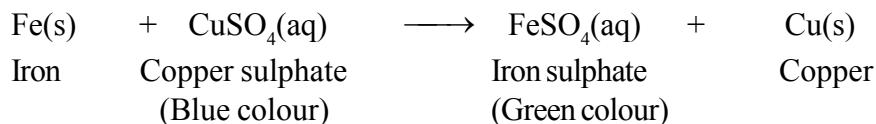
(ii) Calcium oxide reacts vigorously with water to form calcium hydroxide (slaked lime).



**Q.5** Why is the amount of gas collected in one of the test tubes on electrolysis of  $H_2O$ , double of the amount collected in the other? Name this gas.

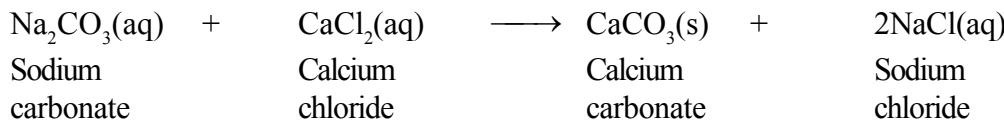
**Ans.** Water ( $H_2O$ ) contains two parts of hydrogen and one part of oxygen. Therefore, the amount of hydrogen and oxygen produced during electrolysis of water is in a 2 : 1 ratio. During electrolysis, since hydrogen goes to one test tube and oxygen goes to another, the amount of gas collected in one of the test tubes is double of the amount collected in the other.

- Q.6 Why does the colour of copper sulphate solution change when an iron nail is dipped in it?  
 Ans. When an iron nail is placed in a copper sulphate solution, iron displaces copper from copper sulphate solution forming iron sulphate, which is green in colour.



Therefore, the blue colour of copper sulphate solution fades and green colour appears.

- Q.7 Give an example of a double displacement reaction.  
 Ans. Sodium carbonate reacts with calcium chloride to form calcium carbonate and sodium chloride.



In this reaction, sodium carbonate and calcium chloride exchange ions to form two new compounds. Hence, it is a double displacement reaction.

- Q.8 Identify the substances that are oxidised and the substances that are reduced in the following reactions.

- (i)  $4\text{Na(s)} + \text{O}_2\text{(g)} \longrightarrow 2\text{Na}_2\text{O(s)}$   
 (ii)  $\text{CuO(s)} + \text{H}_2\text{(g)} \longrightarrow \text{Cu(s)} + \text{H}_2\text{O(l)}$

- Ans. (i) Sodium (Na) is oxidised as it gains oxygen and oxygen gets reduced.  
 (ii) Copper oxide (CuO) is reduced to copper (Cu) while hydrogen (H<sub>2</sub>) gets oxidised to water (H<sub>2</sub>O).

- Q.9 Which of the statements about the reaction below are incorrect?



- (a) Lead is getting reduced.  
 (b) Carbon dioxide is getting oxidised.  
 (c) Carbon is getting oxidised.  
 (d) Lead oxide is getting reduced.  
 (A) (a) and (b)                    (B) (a) and (c)                    (C) (a), (b) and (c)                    (D) all

- Ans. (A) (a) and (b)

- Q.10  $\text{Fe}_2\text{O}_3 + 2\text{Al} \longrightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$

The above reaction is an example of a

- (A) combination reaction.                    (B) double displacement reaction.  
 (C) decomposition reaction.                    (D) displacement reaction.

- Ans. (D) The given reaction is an example of a displacement reaction.

- Q.11 What happens when dilute hydrochloric acid is added to iron filings? Tick the correct answer.

- (A) Hydrogen gas and iron chloride are produced.  
 (B) Chlorine gas and iron hydroxide are produced.  
 (C) No reaction takes place.  
 (D) Iron salt and water are produced.

- Ans. (A) Hydrogen gas and iron chloride are produced. The reaction is as follows:



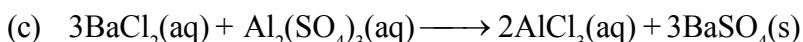
**Q.12** What is a balanced chemical equation? Why should chemical equations be balanced?

**Ans.** A reaction which has an equal number of atoms of all the elements on both sides of the chemical equation is called a balanced chemical equation. The law of conservation of mass states that mass can neither be created nor destroyed. Hence, in a chemical reaction, the total mass of reactants should be equal to the total mass of the products. It means that the total number of atoms of each element should be equal on both sides of a chemical equation. Hence, it is for this reason the chemical equations should be balanced.

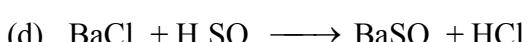
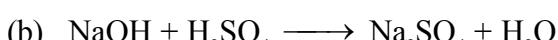
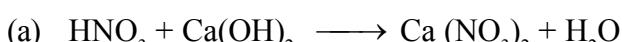
**Q.13** Translate the following statements into chemical equations and then balance them.

- Hydrogen gas combines with nitrogen to form ammonia.
- Hydrogen sulphide gas burns in air to give water and sulphur dioxide.
- Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.
- Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

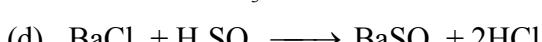
**Ans.** (a)  $3\text{H}_2(\text{g}) + \text{N}_2(\text{g}) \longrightarrow 2\text{NH}_3(\text{g})$



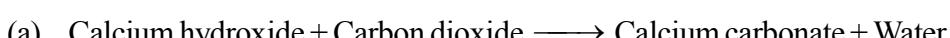
**Q.14** Balance the following chemical equations.



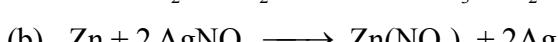
**Ans.** (a)  $2\text{HNO}_3 + \text{Ca}(\text{OH})_2 \longrightarrow \text{Ca}(\text{NO}_3)_2 + 2\text{H}_2\text{O}$



**Q.15** Write the balanced chemical equations for the following reactions.



**Ans.** (a)  $\text{Ca}(\text{OH})_2 + \text{CO}_2 \longrightarrow \text{CaCO}_3 + \text{H}_2\text{O}$



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**Q.16** Write the balanced chemical equation for the following and identify the type of reaction in each case.

- Potassium bromide(aq) + Barium iodide(aq)  $\longrightarrow$  Potassium iodide(aq) + Barium bromide(s)
- Zinc carbonate(s)  $\longrightarrow$  Zinc oxide(s) + Carbon dioxide(g)
- Hydrogen(g) + Chlorine(g)  $\longrightarrow$  Hydrogen chloride(g)
- Magnesium(s) + Hydrochloric acid(aq)  $\longrightarrow$  Magnesium chloride(aq) + Hydrogen(g)

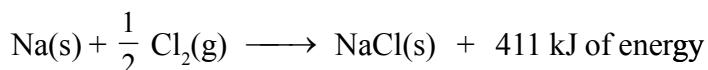
**Ans.** (a)  $2\text{KBr}(\text{aq}) + \text{BaI}_2(\text{aq}) \longrightarrow 2\text{KI}(\text{aq}) + \text{BaBr}_2(\text{s})$  ; Double displacement reaction



**Q.17** What does one mean by exothermic and endothermic reactions? Give examples.

**Ans.** Chemical reactions that release energy in the form of heat, light, or sound are called exothermic reactions.

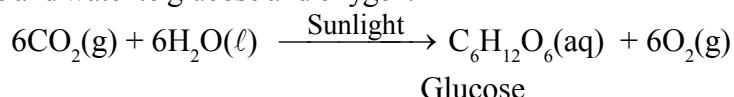
Example: Mixture of sodium and chlorine to yield table salt



In other words, combination reactions are exothermic.

Reactions that absorb energy or require energy in order to proceed are called endothermic reactions.

For example: In the process of photosynthesis, plants use the energy from the sun to convert carbon dioxide and water to glucose and oxygen.



**Q.18** Why is respiration considered as an exothermic reaction? Explain.

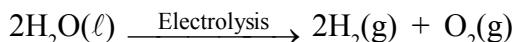
**Ans.** Energy is required to support life. Energy in our body is obtained from the food we eat. During digestion, large molecules of food are broken down into simpler substances such as glucose. Glucose combines with oxygen in the cells and provides energy. The special name of this combustion reaction is respiration. Since energy is released in the whole process, it is an exothermic process.



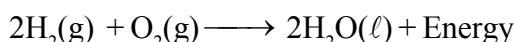
**Q.19** Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.

**Ans.** Decomposition reactions are those in which a compound breaks down to form two or more substances. These reactions require a source of energy to proceed. Thus, they are the exact opposite of combination reactions in which two or more substances combine to give a new substance with the release of energy.

**Decomposition reaction :**  $\text{AB} + \text{Energy} \longrightarrow \text{A} + \text{B}$



**Combination reaction :**  $\text{A} + \text{B} \longrightarrow \text{AB} + \text{Energy}$

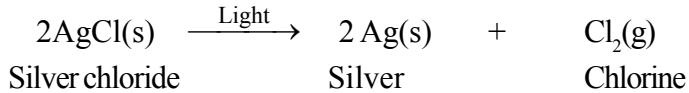


**Q.20** Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

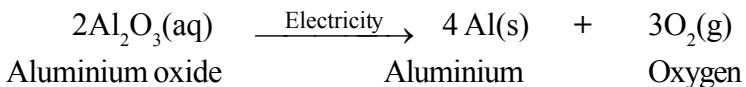
**Ans. (a) Thermal decomposition :**



**(b) Decomposition by light :**

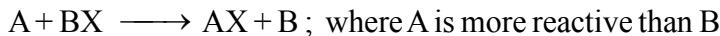


### **(c) Decomposition by electricity :**



**Q.21** What is the difference between displacement and double displacement reactions? Write equations for these reactions.

Ans. In a displacement reaction, a more reactive element displaces a less reactive element from a compound.

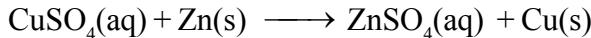


In a double displacement reaction, two atoms or a group of atoms switch places to form new compounds.



For example:

**Displacement reaction :**



## Double displacement reaction:



**Q.22** In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.

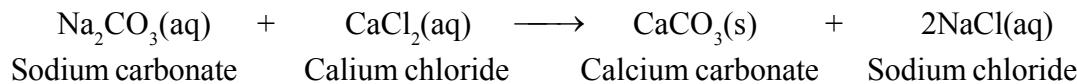
Ans.  $2\text{AgNO}_3(\text{aq}) + \text{Cu}(\text{s}) \longrightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}(\text{s})$

Silver nitrate	Copper	Copper nitrate	Silver
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**Q.23** What do you mean by a precipitation reaction? Explain by giving examples.

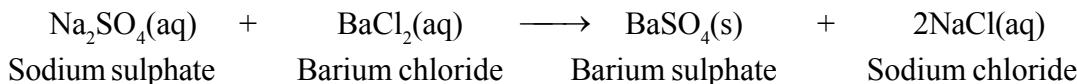
**Ans.** A reaction in which an insoluble solid (called precipitate) is formed is called a precipitation reaction.

For example:



In this reaction, calcium carbonate is obtained as a precipitate. Hence, it is a precipitation reaction.

Another example of precipitation reaction is :



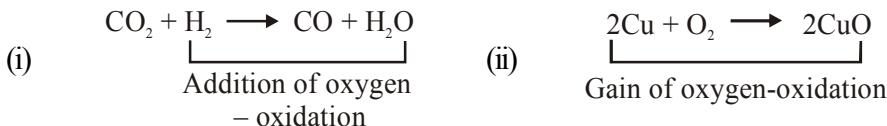
In this reaction, barium sulphate is obtained as a precipitate.

O.24 Explain the following in terms of gain or loss of oxygen with two examples each.



Ans. (a) Oxidation is the gain of oxygen.

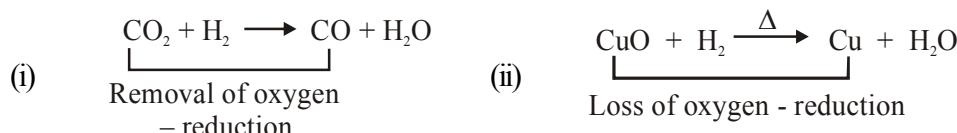
For example:



In equation (i), H<sub>2</sub> is oxidized to H<sub>2</sub>O and in equation (ii), Cu is oxidised to CuO.

- (b) Reduction is the loss of oxygen.

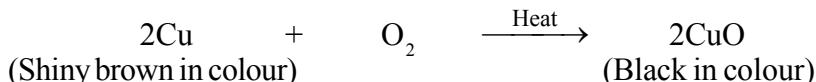
For example:



In equation (i),  $\text{CO}_2$  is reduced to  $\text{CO}$  and in equation (ii),  $\text{CuO}$  is reduced to  $\text{Cu}$ .

**Q.25** A shiny brown-coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and the black coloured compound formed.

Ans. ‘X’ is copper (Cu) and the black-coloured compound formed is copper oxide (CuO). The equation of the reaction involved on heating copper is given below.



**Q.26** Why do we apply paint on iron articles?

Ans. Iron articles are painted because it prevents them from rusting. When painted, the contact of iron articles from moisture and air is cut off. Hence, rusting is prevented.

**Q.27** Oil and fat containing food items are flushed with nitrogen. Why?

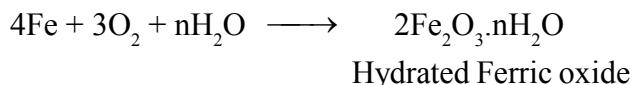
Ans. Nitrogen is an inert gas and does not easily react with these substances. On the other hand, oxygen reacts with food substances and makes them rancid. Thus, bags used in packing food items are flushed with nitrogen gas to remove oxygen inside the pack. When oxygen is not present inside the pack, rancidity of oil and fat containing food items is avoided.

**Q.28** Explain the following terms with one example each.

- (a) Corrosion (b) Rancidity

**Ans. (a) Corrosion :** Corrosion is defined as a process where materials usually metals deteriorate as a result of a chemical reaction with air, moisture, chemicals, etc.

For example, iron in the presence of moisture reacts with oxygen to form hydrated Ferric oxide.



This hydrated iron oxide is rust.

- (b) **Rancidity** : The process of oxidation of fats and oils that can be easily noticed by the change in taste and smell is known as rancidity.

For example, the taste and smell of butter changes when kept for long. Rancidity can be avoided by:

- 1. Storing food in air tight containers
  - 2. Storing food in refrigerators
  - 3. Adding antioxidants
  - 4. Storing food in an environment of nitrogen

# **CONCEPT APPLICATION LEVEL - II**

## **SECTION-A**

## **(OBJECTIVE QUESTIONS)**

- Q.1 When quick lime is reacted with water, calcium hydroxide is formed, it is a  
(A) combination reaction (B) displacement reaction  
(C) double displacement reaction (D) decomposition reaction

Q.2 When water is added in a vessel containing lumps of quick lime, it is observed that  
(A) the vessel becomes hot  
(B) a hissing sound is produced  
(C) lump of quick lime breaks and dissolves partially in water  
(D) All the above.

Q.3 In a beaker 5 g of calcium oxide (quick lime) is mixed with some water, it is observed that  
(A) it dissolves completely (B) it does not dissolve at all  
(C) it is sparingly soluble (D) it forms a transparent mixture

Q.4 Quick lime is a  
(A) red coloured solid (B) green coloured solid  
(C) blue coloured solid (D) colourless or white coloured solid

Q.5 Calcium oxide ( $\text{CaO}$ ) is also known as  
(A) quick lime (B) slaked lime (C) milk of lime (D) lime water

Q.6 The products of reaction between water and quick lime are  
(A) calcium, hydrogen and oxygen (B) calcium and hydrogen  
(C) calcium hydroxide (D) calcium hydroxide and oxygen

Q.7 When Quick lime reacts with water  
(A) heat is absorbed (B) heat is released.  
(C) no change of temperature takes place (D) none of these

Q.8 When we heat ferrous sulphate crystals we observe that  
(A) no gas is evolved  
(B) a brown coloured gas is evolved  
(C) a gas having smell of burning sulphur is evolved  
(D) no residue is left after heating.

Q.9 When crystals of ferrous sulphate are heated strongly red coloured residue is obtained. It is an example of  
(A) combination reaction (B) decomposition reaction  
(C) displacement reaction (D) double displacement reaction

Q.10 The colour of ferrous sulphate crystals is  
(A) Blue (B) Yellow (C) Green (D) Brown

- Q.11 When we heat crystals of ferrous sulphate in a test tube which one of the following is NOT obtained ?  
(A) Brown solid is formed  
(C) A brown gas is evolved

(B) A gas having smell of burning sulphur is evolved  
(D) Oxides of sulphur are produced

Q.12 A student while heating some ferrous sulphate crystals in a dry boiling tube will observe:  
(A) water droplets near the mouth of boiling tube  
(B) colour change of the crystals  
(C) smell of burning sulphur  
(D) All of the above

Q.13 When we heat ferrous sulphate crystals a gas evolves which has a smell of:  
(A) rotten eggs  
(C) irritating smell

(B) pleasant smell  
(D) burning smell

Q.14 The colour changes observed when the ferrous sulphate crystals are heated in a dry boiling tube is  
(A) green → orange → brown  
(C) blue → green → white

(B) green → white → brown  
(D) green → brown → black

Q.15 A student heated small amount of ferrous sulphate in a test tube. She made the following observations:  
(i) Ferrous sulphate colour changes to brown  
(ii) A gas having a smell of burning sulphur is evolved  
(iii) Water droplets collect on the upper side of the test tube  
(iv) Brown coloured gas is evolved.  
The correct set of observation is  
(A) (i), (ii), (iv)      (B) (i), (ii), (iii)      (C) (i), (iii), (iv)      (D) (ii), (iii), (iv)

Q.16 To a solution of copper sulphate in a beaker, some iron filings are dropped.  
After a few minutes it is observed that  
(A) a white precipitate is formed  
(B) the colour of the solution becomes darker  
(C) a reddish brown coating starts appearing on the iron filings  
(D) the solution becomes colourless.

Q.17 When an iron nail rubbed with sand paper is dipped in copper sulphate solution, we observe that copper gets deposited.  
(A) first on the lower part of the nail and proceeds to the upper part  
(B) first on the upper part of the nail and proceeds to the lower part  
(C) on the entire surface of the nail  
(D) on the nail in small patches

Q.18 Reaction of iron nails with copper sulphate solution is an example of  
(A) combination reaction  
(C) displacement reaction

(B) decomposition reaction  
(D) double displacement reaction

Q.19 Iron filings were added to an aqueous solution of copper sulphate solution. After sometime on observation it was found that the colour of the solution has changed from :  
(A) blue to pale green  
(C) blue to colourless

(B) blue to dark green  
(D) blue to reddish brown

- Q.20 Four groups of the students were assigned separately the experiment of interaction of iron nail with a solution of copper sulphate. Each group recorded the observations as given below in the table. Which group of students recorded all the observations correctly?

<b>Group of Students</b>	<b>Initial colour of solution</b>	<b>Final colour of solution</b>	<b>Change in the iron nail</b>
(A)	Blue	Colourless	Grey coat
(B)	Green	Green	Brown coat
(C)	Blue	Blue	Brown coat
(D)	Blue	Light green	Brown coat

- Q.21 To show that iron is more reactive than copper, the correct procedure is to :

- (A) prepare ferrous sulphate solution and dip copper strip in it
- (B) prepare copper sulphate solution and dip iron strip in it
- (C) add dil. nitric acid on both strips
- (D) heat iron and copper strips both

- Q.22 Four students were asked to study the reaction between aqueous solutions of barium chloride and sodium sulphate. They reported that their experiment as follows. On mixing the solutions of the two salts in a test tube

- (i) the colour of the mixture becomes brown
- (ii) the solutions form separate layer
- (iii) a colourless mixture is obtained
- (iv) a white substance settles at the bottom.

The correct report is

- (A) (i)
- (B) (ii)
- (C) (iii)
- (D) (iv)

- Q.23 White ppt obtained when aqueous solutions of  $\text{BaCl}_2$  and  $\text{Na}_2\text{SO}_4$  are mixed, is that of

- (A)  $\text{NaCl}$
- (B)  $\text{BaSO}_4$
- (C) Both (A) and (B)
- (D) None of these

- Q.24 Reaction between a solution of sodium sulphate in water and barium chloride in water is an example of

- (A) combination reaction
- (B) decomposition reaction
- (C) displacement reaction
- (D) double displacement reaction

- Q.25 Barium sulphate is

- (A) colourless and soluble in water
- (B) colourless and insoluble in water
- (C) green colour and soluble in water
- (D) None of these

- Q.26 The insoluble product (precipitate) formed when barium chloride is mixed with sodium sulphate solution is

- (A) barium
- (B) barium sulphate
- (C) sodium chloride
- (D) barium sulphide

- Q.27 To study the reaction between barium chloride and sodium sulphate, the two compounds are mixed in the form of:

- (A) dry powders
- (B) molten liquids
- (C) aqueous solutions
- (D) None of these

- Q.28 A solution of barium chloride in water is

- (A) colourless
- (B) sky blue in colour
- (C) pale green in colour
- (D) reddish brown in colour

## **SECTION-B**

## **(VERY SHORT ANSWER TYPE QUESTIONS)**

[1 MARKS]

- Q.1 What is the colour of fresh crystals of ferrous sulphate?  
Ans. It is light green coloured.

Q.2 Name the type of reaction when ferrous sulphate is heated.  
Ans. Decomposition.

Q.3 What is the formula of crystalline ferrous sulphate?  
Ans.  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ .

Q.4 Name the gases evolved when ferrous sulphate crystals are heated strongly.  
Ans. Sulphur dioxide ( $\text{SO}_2$ ) and sulphur trioxide ( $\text{SO}_3$ ).

Q.5 What is the colour of the residue obtained when crystals of ferrous sulphate are heated strongly in air?  
What is its chemical composition?  
Ans. The residue is red in colour. Chemically it is iron (III) oxide,  $\text{Fe}_2\text{O}_3$ .

Q.6 What are thermal decomposition reactions?  
Ans. When a decomposition reaction is carried out by heating, it is called thermal decomposition reaction.

Q.7 Give an example of thermal decomposition reaction.  
Ans. Decomposition of ferrous sulphate on heating is an example of thermal decomposition.  
$$2\text{FeSO}_4 \xrightarrow{\Delta} \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$$

Q.8 Can the heating of ferrous sulphate be classified as redox reaction?  
Ans. Yes, it is a type of redox reaction.

Q.9 What is the smell of the gases evolved when crystals of ferrous sulphate are heated strongly?  
Ans. The mixture of gases so produced has a pungent suffocating smell of burning sulphur.

Q.10 What happens when crystals of ferrous sulphate are kept exposed to atmosphere for a long time ?  
Ans. Ferrous sulphate is oxidised to ferric sulphate by atmospheric oxygen.

- Q.11 State an example of each an endothermic and exothermic reaction. [SAI-2013,14,15]

- Q.12** To prevent rancidity of foods containing fats and oils, some substances are added to them. What are these substances called. **[SAI-2012,15]**

**Sol.** Substances which are added to prevent rancidity are called antioxidants as they prevent oxidation of fats and oils.

**Common antioxidants are :**

- (a) BHA (Butylated Hydroxy Anisole)
  - (b) BHT (Butylated Hydroxy Toluene)

Vitamin-E and vitamin-C (ascorbic acid) are the two antioxidants occurring in natural fats.

- Q.13 Why burning of a candle wax is considered a chemical change? [SAI-2015]**

Ans. Because when candle burns new products are formed, i.e., hydrocarbons combine

- O.14** Give reason that moist air and acidic gases are not good for some metals. [SAI-2015]

**Ans.** Moist air causes corrosion of iron while acidic gases cause corrosion of copper and silver.

- Q.15 Why does white coloured silver chloride turn grey when kept in sunlight ? [SAI-2015]

Ans. This is due to the decomposition of silver chloride into silver and chlorine by light.

- O.16 Give one industrial application of reduction. [SAI-2015]

**Ans.** It is used in metallurgical processes of refining metals.

### (SHORT ANSWER TYPE QUESTIONS)

[2 MARKS]

- Q.17** Identify the type of chemical reaction and also write the chemical equation for the reaction that takes place when a solution of potassium chloride is mixed with silver nitrate solution. Write the chemical name of one of the products obtained [SAI-2013, 2015]

Ans.  $\text{AgNO}_3(\text{aq}) + \text{KCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{KNO}_3(\text{aq})$

It is double displacement reaction. Silver chloride/Potassium nitrate.

- O.18** Identify the type of each of the following reactions. Also write balanced chemical equation for each.

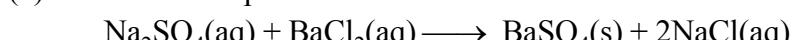
(a) The reaction mixture becomes warm

(b) An insoluble substance is formed

Sol (a) It is a combination reaction



(b) It is a double displacement reaction



- Q.19** Write the balanced chemical equation for the following reaction and identify the type of reaction and define it.  
 ‘Iron(III) oxide reacts with aluminium and gives molten iron and aluminium oxide.’ [SAI-2014, 2015]
- Sol.**  $\text{Fe}_2\text{O}_3 + 2\text{Al} \longrightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$   
 Displacement reaction -One element displaces another element.
- Q.20** Write two observations that you will make when an iron nail is kept in an aqueous solution of copper sulphate. Write the chemical equation for this reaction. [SAI-2012, 2015]
- Ans.** Blue colour changes to light green. Reddish-brown deposit on the iron nail.  
 $\text{Fe(s)} + \text{CuSO}_4\text{(aq)} \rightarrow \text{FeSO}_4\text{(aq)} + \text{Cu(s)}$
- Q.21** Identify the type of each of the following reactions : [SAI-2012]
- (a) A reaction in which a single product is formed from two or more reactants.
  - (b) The reaction mixture becomes warm.
  - (c) An insoluble substance is formed.
  - (d) External surface of the container in which reaction takes place becomes freezing/cold.
- Sol.** (a) Combination reaction  
 (b) Exothermic reaction  
 (c) Precipitation reaction  
 (d) Endothermic reaction
- Q.22** Explain giving chemical equation any two uses of chemical decomposition reaction in industry. [SAI-2013, 2015]
- Sol.** In manufacturing cement, quicklime is used and it is obtained by thermal decomposition of limestone.  
 $\text{CaCO}_3\text{(s)} \longrightarrow \text{CaO(s)} + \text{CO}_2\text{(g)}$
- In manufacturing photochromic glass, silver chloride/bromide is used which turns grey in sunlight.
- $$\begin{aligned} 2\text{AgCl(s)} &\xrightarrow{\text{Sunlight}} 2\text{Ag(s)} + \text{Cl}_2\text{(g)} \\ 2\text{AgBr(s)} &\xrightarrow{\text{Sunlight}} 2\text{Ag(s)} + \text{Br}_2\text{(g)} \end{aligned}$$
- Q.23** Classify the following as exothermic and endothermic reactions:
- |                            |                            |
|----------------------------|----------------------------|
| (a) Photosynthesis         | (b) Respiration            |
| (c) Burning of natural gas | (d) Electrolysis of water. |
- Sol.** (a) Photosynthesis -Endothermic reaction.  
 (b) Respiration - Exothermic reaction.  
 (c) Burning of natural gas -Exothermic reaction.  
 (d) Electrolysis of water -Endothermic reaction.
- Q.24** Write two examples of everyday life, where redox reactions are taking place. [SAI-2015]
- Sol.** (i) Silver jewellery tarnishes due to reaction of  $\text{H}_2\text{S}$  gas of the air and silver is oxidised to silver sulphide.  
 (ii) In rusting of iron, iron is oxidised to iron oxide.
- Q.25** (i) When a metal 'X' is added to salt solution of a metal 'Y', following chemical reaction takes place : Metal X + Salt solution of 'Y'  $\longrightarrow$  Salt solution of 'X' + Metal 'Y'  
 (ii) Mention the inference you draw regarding the reactivity of metal 'X' and 'Y' and also about the type of reaction. State the reason of your conclusions. [SAI-2012, 2013, 2015]
- Sol.** It is a displacement reaction.  
 (i) Metal X is more reactive than metal Y.  
 (ii) Metal X is displacing metal Y from its salt solution. A more reactive metal displaces less reactive one from its salt solution, hence X is more reactive than Y.

- Q.26 On heating blue coloured powder of copper (II) nitrate in a boiling tube, copper oxide (black), oxygen gas and a brown gas X is formed. [SAI-2015]
- Write a balanced chemical equation of the reaction.
  - Identify the brown gas X evolved.
  - Identify the type of reaction.
  - What could be the pH range of aqueous solution of the gas X ?

Sol. (a) Balanced chemical equation :



(b) The brown gas X evolved is nitrogen dioxide ( $\text{NO}_2$ ).

(c) This is a decomposition reaction.

(d) Nitrogen dioxide dissolves in water to form acidic solution because it is an oxide of non-metal. Therefore, pH of this solution is less than 7.

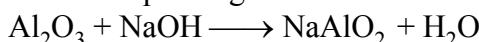
- Q.27  $\text{MnO}_2 + 4\text{HCl} \longrightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$  Identify the substance in the above reaction which is : [SAI-2013]
- Oxidised
  - reduced
  - oxidising agent
  - reducing agent

Sol. (i) HCl              (ii)  $\text{MnO}_2$               (iii)  $\text{MnO}_2$               (iv) HCl.

### (LONG ANSWER TYPE QUESTIONS)

[3 MARKS]

- Q.28 What is meant by balanced chemical equation ? Why chemical equations are balanced? Balance the chemical equation given below :



[SAI-2012, 2013, 2015]

- Ans. • A chemical equation in which the numbers of atoms of each type involved in it are the same on the reactants and products is called balanced chemical equation.
- To follow the law of conservation of mass in a reaction, we need to balance a chemical equation.
- $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$

- Q.29 What is meant by a skeletal chemical equation?

[SAI-2010, 2011]

What does it represent? Using the equation for electrolytic decomposition of water, differentiate between a skeletal chemical equation and a balanced chemical equation.

- Skeletal chemical equation is an unbalanced chemical equation.
- It represents a chemical reaction.



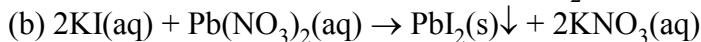
- Q.30 Write two observations each for the following chemical reactions :

[SAI-2015]

- Dilute sulphuric acid is poured over zinc granules.
- Potassium iodide solution is added to lead nitrate solution
- Lead nitrate is strongly heated in a hard glass test tube.

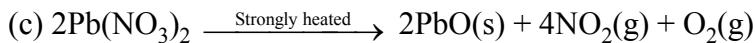
Ans. (a)  $\text{Zn}(\text{s}) + \text{dil. H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{H}_2\uparrow$

- The container of the reaction mixture becomes hot as it is an exothermic reaction.
- Bubbles are seen with the evolution of  $\text{H}_2$  gas, which is combustible gas.



Yellow

- Yellow colour of potassium iodide solution disappears.
- Yellow precipitate of lead iodide is formed.



- (i) Yellow fumes of  $\text{NO}_2$  gas are observed.
- (ii) Light yellow residue of lead oxide is left.

Q.31 Consider the following reaction :



[SAI-2015]

- (a) Name the gases produced in the above reaction.
- (b) Balance the above chemical equation.
- (c) Name the type of chemical reaction.

Ans. (a) Nitrogen dioxide and oxygen.



- (c) Decomposition reaction.

Q.32 Give three examples to indicate the role of decompositon reactions in metal industries. [SAI-2015]

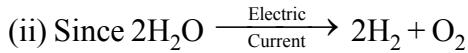
Ans. (i) CaO is obtained from  $\text{CaCO}_3$  by thermal decompositon.  
 (ii) Sodium (Na) metal is obtained from  $\text{NaCl}$  (sodium chloride) by electrolytic decomposition.  
 (iii) Aluminium (Al) metal is obtained from  $\text{Al}_2\text{O}_3$  by electrolytic decomposition.

Q.33 In the electrolysis of water :

[SAI-2012]

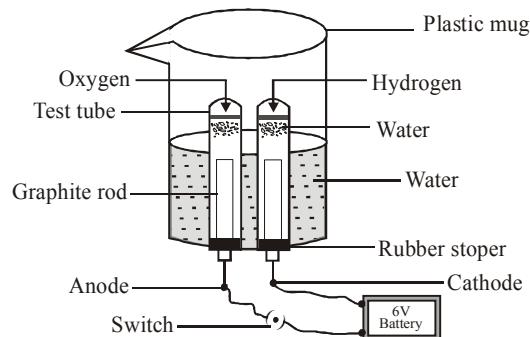
- (i) Name the gas collected at the cathode and anode respectively.
- (ii) Why is the volume of one gas collected at one electrode double that at the other ? Name this gas
- (iii) How will you test the evoled gases ?

Ans. (i) At cathode – Hydrogen gas ( $\text{H}_2$ ) At anode-Oxygen gas ( $\text{O}_2$ )



Hydrogen gas is double of that of oxygen gas because 2 molecules of hydrogen are liberated while only 1 molecule of oxygen is liberated.

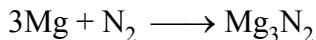
(iii) When a burninng splinter is brought near the mouth of the liberated gases, the burning splinter extinguishes near  $\text{H}_2$  gas while the burning splinter keeps burning more near the  $\text{O}_2$  gas.



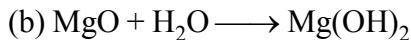
Q.34 A magnesium ribbon is burnt in oxygen to give a white compound X accompanined by emission of light. If the burning ribbon is now placed in an atmosphere of nitrogen, it continues to burn and forms a compound Y. [SAI-2012]

- (a) Write the chemical formulae of X and Y.
- (b) Write a balanced chemical equation when X is dissolved in water.

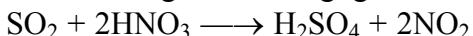
Ans.  $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$



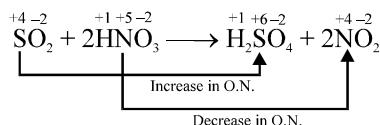
(a) X is  $\text{MgO}$ , Y is  $\text{Mg}_3\text{N}_2$



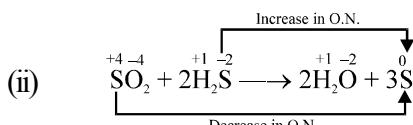
Q.35 Point out the oxidising and reducing agents in the following reactions:



Ans. (i)



$\text{HNO}_3$  is an oxidising agent decrease in O.N. because N atom undergoes decrease in O.N.  
 $\text{SO}_2$  is a reducing agent, because S atom undergoes increase in O.N.

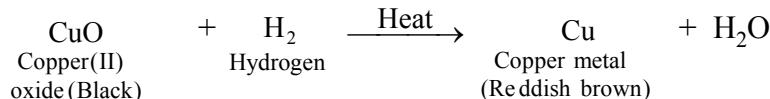


$\text{SO}_2$  is an oxidising agent because S atom undergoes decrease in O.N.  
 $\text{H}_2\text{S}$  is a reducing agent, because S atom undergoes increase in O.N.

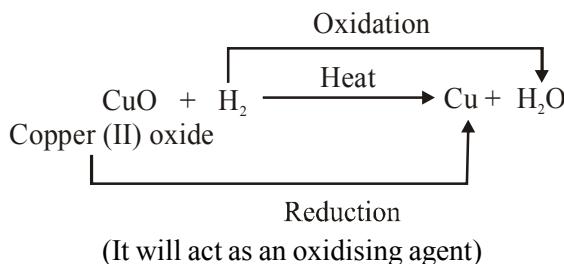
Q.36 “Oxidation and reduction processes occur simultaneously.” Justify this statement with the help of an example. [CBSE Sept. 2010]

Ans. If a substance gains oxygen during a reaction, it is said to be oxidised. If a substance loses oxygen during a reaction, it is said to be reduced.

**For example :** Consider the following reaction :



During this reaction, the copper (II) oxide is losing oxygen and is being reduced. The hydrogen is gaining oxygen and is being oxidised. In other words, one reactant gets oxidised while the other gets reduced during a reaction. Such reactions are called oxidation-reduction reactions or redox reactions. (It will act as reducing agent)



### (VERY LONG QUESTIONS)

[5 MARKS]

Q.37 Write the balanced chemical equations for the following reactions and identify the type of reaction in each case.

- (a) Nitrogen gas is treated with hydrogen gas in the presence of a catalyst 773 K to form ammonia gas.
- (b) Sodium hydroxide solution is treated with acetic acid to form sodium acetate and water.
- (c) Ethanol is warmed with ethanoic acid to form ethyl acetate in the presence of concentrated  $\text{H}_2\text{SO}_4$ .
- (d) Ethene is burnt in the presence of oxygen to form carbon dioxide, water and release heat and light.
- (e) Thermit reaction, iron (III) oxide reacts with aluminium and gives molten iron and aluminium oxide.

[SAI-2014,15]

- Ans. (a)  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \xrightarrow{\text{Catalyst}} 2\text{NH}_3(\text{g})$   
Combination reaction.
- (b)  $\text{NaOH}(\text{aq}) + \text{CH}_3\text{COOH}(\text{aq}) \longrightarrow \text{CH}_3\text{COONa}(\text{aq}) + \text{H}_2\text{O}(\text{l})$   
Double displacement reaction / Neutralisation reaction.
- (c)  $\text{C}_2\text{H}_5\text{OH}(\text{l}) + \text{CH}_3\text{COOH}(\text{l}) \longrightarrow \text{CH}_3\text{COOC}_2\text{H}_5(\text{l}) + \text{H}_2\text{O}(\text{l})$   
Double displacement reaction / Esterification reaction.
- (d)  $\text{C}_2\text{H}_4(\text{g}) + 3\text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g}) + \text{Heat} + \text{Light}$   
Redox reaction / Combustion reaction
- (e)  $\text{Fe}_2\text{O}_3(\text{s}) + 2\text{Al}(\text{s}) \longrightarrow \text{Al}_2\text{O}_3(\text{s}) + 2\text{Fe}(\text{l}) + \text{Heat}$   
Displacement reaction / Redox reaction.

Q.38 List three effects of oxidation in our daily life. Are these effects useful or harmful ? Justify.

[SAI-2012, 2015]

Ans. (i) Corrosion :

It is harmful, as it loses shine of some metals such as copper and silver. Corrosion of iron called rusting is a serious problem as enormous amount of money is spent to replace damaged iron.

(ii) Rancidity :

It is also harmful because when fats and oils are oxidised, they become rancid and their smell and taste change.

(iii) Burning of fuels :

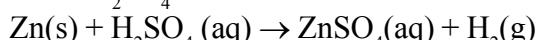
It is useful. As these are exothermic reactions, large amount of heat energy is evolved.

Q.39 What happens when zinc granules are treated with dilute solution of  $\text{H}_2\text{SO}_4$ ,  $\text{HCl}$ ,  $\text{HNO}_3$ ,  $\text{NaCl}$  and  $\text{NaOH}$ , also write the chemical equations if reaction occurs.

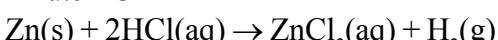
[SAI-2015]

Ans. The reaction of Zn granules with :

(a) Dilute  $\text{H}_2\text{SO}_4$

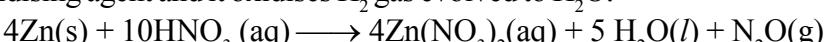


(b) Dilute HCl

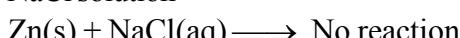


(c) Dilute  $\text{HNO}_3$

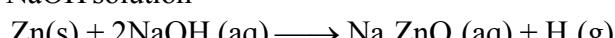
Reaction with dilute  $\text{HNO}_3$  is different as compared to other acids because nitric acid is an oxidising agent and it oxidises  $\text{H}_2$  gas evolved to  $\text{H}_2\text{O}$ .



(d) NaCl solution



(e) NaOH solution



Sodium zincate

Q.40 (i) Solid calcium oxide was taken in a container and water was added slowly to it :

(a) Write the observation.

(b) Write the chemical formula of the product formed.

(ii) What happens when carbon dioxide gas is bubbled through lime water:

(a) in small amount?

(b) in excess?

(iii) Why do you apply paint on iron articles?

[SAI-2014, 2015]



# **CONCEPT APPLICATION LEVEL - III**

- Q.12** In which of the following, heat energy is not released ?  
(A)  $C + O_2 \rightarrow CO_2$       (B)  $CaO + H_2O \longrightarrow Ca(OH)_2$   
(C)  $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$       (D)  $NH_4OH \longrightarrow NH_3 + H_2O$

**Q.13** Digestion is the example of  
(A) displacement reaction      (B) Combination reaction  
(C) neutralisation reaction      (D) Decomposition reactions

**Q.14**  $2 Na + Cl_2 \rightarrow 2NaCl$  this reaction is the example of  
(A) Combination reaction      (B) exothermic reaction  
(C) redox reaction      (D) all of these

**Q.15**  $2H_2S + SO_2 \rightarrow 3S + 2H_2O$ , In this reaction the substance which gets reduced is :  
(A)  $H_2O$       (B) S      (C)  $SO_2$       (D)  $H_2S$

**Q.16** When a black and white photographic film is exposed to light, the gray colour on the film appears due to the presence of  
(A) Silver oxide      (B) Bromine      (C) Silver      (D) All of these

**Q.17** A metal ‘M’ produces white ash of ‘N’ and dazzling white light on burning in the presence of oxygen gas. The metal ‘M’ and ash ‘N’ would be  
(A) magnesiumoxide,manganese respectively      (B) manganese dioxide, magnesium respectively  
(C) magnesium, magnesium oxide respectively      (D) magnesium carbonate, magnesium respectively

**Q.18** A student heated lead nitrate with an aqueous solution of potassium iodide. He would be getting  
(A) white precipitate of lead      (B) yellow precipitate of lead iodide.  
(C) white precipitate of potassium      (D) yellow coloured gas of lead.

**Q.19** Green coating on copper utensils in rainy season is due to the presence of  
(A)  $CuCO_3$       (B)  $CuCO_3 \cdot Cu(OH)_2$       (C)  $Cu(OH)_2$       (D)  $CuS$

**Q.20** An acid which can decolourise purple colour of potassium permagnate solution is  
(A)  $H_2SO_4$       (B) KI      (C)  $MnO_3$       (D)  $K_2Cr_2O_7$ .

**Q.21** In order to prevent the spoilage of potato chips, they are packed in pouches filled with  
(A) nitrogen gas      (B) oxygen gas      (C) sulphur gas      (D) none of these

**Q.22** When we add common salt in  $AgNO_3$  (silver nitrate) solution the precipitate formed will be  
(A) black coloured      (B) blue coloured      (C) yellow coloured      (D) white coloured

**Q.23** Which of the following can be decomposed by the action of light ?  
(A)  $AgCl$       (B)  $KCl$       (C)  $CuCl_2$       (D)  $NaCl$

**Q.24** Give the number of molecules of carbon-dioxide formed upon complete oxidation of glucose.  
(A) 1      (B) 3      (C) 6      (D) 4

**Q.25** Chemical equation for the formation of hydrogen sulphide gas is  $ZnS + xHCl \longrightarrow ZnCl_2 + H_2S \uparrow$ . What is the value of “x and y” in the equation, respectively ?  
(A) 2 and 1      (B) 1 and 2      (C) 2 and 2      (D) 3 and 1

- Q.26 Chemical equation for the combustion of methanol is as follows :  
 $x\text{CH}_3\text{OH(g)} + y\text{O}_2\text{(g)} \rightarrow z\text{CO}_2\text{(g)} + 4\text{H}_2\text{O(g)}$ . What is the value of ‘x, y and z’ in the equation, respectively ?  
 (A) 1, 2 and 3      (B) 1, 2 and 4      (C) 2, 3 and 4      (D) 2, 3 and 2.

- Q.27 The reaction between aqueous solutions of sodium chloride and silver nitrate is  
 (A) displacement reaction      (B) synthesis reaction  
 (C) double displacement reaction      (D) analysis reaction

**Passage (Q.28 to Q.30)**

In a double displacement reaction between aqueous potassium iodide and aqueous lead nitrate, a yellow precipitate of lead iodide is formed.

- Q.28 While performing the activity if lead nitrate is not available, which of the following can be used in place of lead nitrate ?  
 (A) Lead sulphate (insoluble)      (B) Lead acetate  
 (C) Ammonium nitrate      (D) potassium sulphate
- Q.29 Which of the following statements is true regarding precipitates ?  
 (A) Product formation after saturation point  
 (B) Product formation before saturation point  
 (C) Precipitation does not relate to saturation point of a solution  
 (D) Product with higher concentration in a reaction is precipitate.

- Q.30 Which of the following is a double displacement reaction ?  
 (A)  $2\text{KI} + \text{Cl}_2 \longrightarrow 2\text{KCl} + \text{I}_2$       (B)  $\text{Al} + \text{Fe}_2\text{O}_3 \longrightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$   
 (C)  $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + 2\text{HCl}$       (D)  $\text{Mg} + \text{CuSO}_4 \longrightarrow \text{MgSO}_4 + \text{Cu}$

- Q.31 The reaction that releases energy is  
 (A)  $2\text{FeSO}_4(\text{s}) \xrightarrow{\Delta} \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$   
 (B)  $3\text{Pb}(\text{NO}_3)_2(\text{s}) \xrightarrow{\Delta} 2\text{PbO}(\text{s}) + 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$   
 (C)  $2\text{AgBr}(\text{s}) \xrightarrow{\text{Sunlight}} 2\text{Ag}(\text{s}) + \text{Br}_2(\text{g})$   
 (D)  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \longrightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$

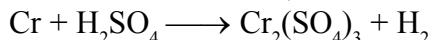
- Q.32  $\text{CH}_4 + \text{Cl}_2 \longrightarrow \text{CH}_3\text{Cl} + \text{HCl}$  reaction is an example of  
 (A) synthetic      (B) analytical      (C) displacement      (D) neutralisation

- Q.33 A brown and bright element “x” when heated in presence of air turns into black substance “y”. If hydrogen gas is passed over this heating material again “x” is obtained. “x” and “y” are  
 (A) Cu and CuO      (B) S & SO<sub>2</sub>      (C) C & CO<sub>2</sub>      (D) Na and NaH

- Q.34 Displacement reaction is :  
 (A)  $\text{CaO}(\text{s}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{Ca(OH)}_2(\text{aq})$   
 (B)  $\text{Pb}(\text{s}) + \text{CuCl}_2(\text{aq}) \rightarrow \text{PbCl}_2(\text{aq}) + \text{Cu}(\text{s})$   
 (C)  $\text{MnO}_2(\text{s}) + 4\text{HCl}(\text{l}) \rightarrow \text{MnCl}_2(\text{s}) + 2\text{H}_2\text{O} + \text{Cl}_2(\text{g})$   
 (D)  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$



**Q.41 Statement 1 :** Balance the following equation with the smallest whole number coefficients. Choose the answer that is the sum of the coefficients, in the balanced equation. Do not forget coefficients of “one”.



The sum of the coefficients, representing the smallest whole number coefficient is 9.

**Statement 2 :** The equation can be balanced in many ways.

- (A) Statement-1 and Statement-2 are true and Statement-2 is the correct explanation of Statement-1.
- (B) Statement-1 and Statement-2 are true but Statement-2 is NOT the correct explanation of Statement-1.
- (C) Statement-1 is true, Statement-2 False.
- (D) Statement-1 is False, Statement-2 True.

**Q.42 Match the following :**

**Column-I**

- (A) Neutralisation
- (B) Precipitation
- (C) Gas-formation
- (D) Oxidation
- (A) A-1, B-2, C-3, D-4
- (C) A-3, B-4, C-2, D-1

**Column-II**

- (1)  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
- (2)  $\text{H}_2\text{SO}_4 + \text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$
- (3)  $\text{ZnS} + 2\text{HCl} \longrightarrow \text{ZnCl}_2 + \text{H}_2\text{S}\uparrow$
- (4)  $\text{PbNO}_3 + \text{Na}_2\text{SO}_4 \rightarrow \text{PbSO}_4 + 2\text{NaNO}_3$
- (B) A-1, B-3, C-2, D-4
- (D) A-2, B-4, C-3, D-1

**Q.43 Match the following :**

**Column-I**

- (A)  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$
- (B)  $2\text{KI} + \text{Br}_2 \rightarrow 2\text{KBr} + \text{I}_2$
- (C)  $\text{Zn} + 2\text{NaCl} \rightarrow 2\text{Na} + \text{ZnCl}_2$
- (A) A-1, B-2, C-3
- (C) A-3, B-1, C-2

**Column-II**

- (1) Double displacement
- (2) No reaction
- (3) Single displacement.
- (B) A-1, B-3, C-2
- (D) A-2, B-1, C-3

**Q.44 Column II gives type of reaction mention in column I, match them correctly.**

**Column-I**

- (A)  $\text{C} + \text{O}_2 \longrightarrow \text{CO}_2$
- (B)  $\text{AgBr} \xrightarrow{\text{light}} \text{Ag} + \text{Br}$
- (C)  $\text{Zn} + \text{CuSO}_4 \longrightarrow \text{ZnSO}_4 + \text{Cu}$
- (D)  $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{Cu}} \text{CH}_3\text{CHO} + \text{H}_2$
- (A) A-2, B-3, C-1, D-4
- (C) A-3, B-4, C-2, D-1

**Column-II**

- (1) Displacement
- (2) Combination
- (3) Decomposition
- (4) Oxidation
- (B) A-1, B-3, C-2, D-4
- (D) A-2, B-4, C-3, D-1

**Q.45**

**Column I**

- (A) Double displacement
- (B) Decomposition
- (C) Precipitation
- (D) Redox
- (A) A-2, B-3, C-1, D-4
- (C) A-4, B-3, C-2, D-1

**Column II**

- (1)  $\text{CuO} + \text{H}_2 \xrightarrow{\text{heat}} \text{Cu} + \text{H}_2\text{O}$
- (2)  $\text{Na}_2\text{SO}_4 \text{ (aq)} + \text{BaCl}_2 \text{ (aq)} \rightarrow \text{BaSO}_4 \text{ (aq)} + 2\text{NaCl} \text{ (aq)}$
- (3)  $\text{CaCO}_3 \xrightarrow{\text{heat}} \text{CaO} + \text{CO}_2$
- (4)  $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- (B) A-1, B-3, C-2, D-4
- (D) A-2, B-4, C-3, D-1

# CONCEPT APPLICATION LEVEL - II

## SECTION-A

### (OBJECTIVE QUESTIONS)

Q.1	A	Q.2	D	Q.3	C	Q.4	D	Q.5	A	Q.6	C	Q.7	B
Q.8	C	Q.9	B	Q.10	C	Q.11	C	Q.12	D	Q.13	C	Q.14	B
Q.15	B	Q.16	C	Q.17	C	Q.18	C	Q.19	A	Q.20	D	Q.21	B
Q.22	D	Q.23	B	Q.24	D	Q.25	B	Q.26	B	Q.27	C	Q.28	A
Q.29	D	Q.30	A										

# CONCEPT APPLICATION LEVEL - III

Q.1	B	Q.2	D	Q.3	B	Q.4	C	Q.5	C	Q.6	D	Q.7	C
Q.8	A	Q.9	D	Q.10	D	Q.11	D	Q.12	D	Q.13	D	Q.14	D
Q.15	C	Q.16	C	Q.17	C	Q.18	B	Q.19	B	Q.20	B	Q.21	A
Q.22	D	Q.23	A	Q.24	C	Q.25	A	Q.26	D	Q.27	C	Q.28	B
Q.29	A	Q.30	C	Q.31	D	Q.32	C	Q.33	A	Q.34	B	Q.35	C
Q.36	C	Q.37	B	Q.38	D	Q.39	D	Q.40	C	Q.41	B	Q.42	D
Q.43	B	Q.44	A	Q.45	C								

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