

Chemical Reaction and Equation

Previous Years' CBSE Board Questions

1. When 2 mL of sodium hydroxide solution is added to few pieces of granulated zinc in a test tube and then warmed, the reaction that occurs can be written in the form of a balanced chemical equation as : (2024)

- (a) $\text{NaOH} + \text{Zn} \rightarrow \text{NaZnO}_2 + \text{H}_2\text{O}$
- (b) $2\text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$
- (c) $2\text{NaOH} + \text{Zn} \rightarrow \text{NaZnO}_2 + \text{H}_2$
- (d) $2\text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2\text{O}$

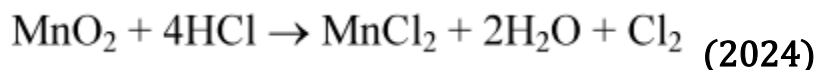
Answer. (b) / $2 \text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2$

2. Select from the following a decomposition reaction in which source of energy for decomposition is light: (2024)

- (a) $2\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$
- (b) $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- (c) $2\text{AgBr} \rightarrow 2\text{Ag} + \text{Br}_2$
- (d) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$

Answer. (c) / $\longrightarrow 2 \text{AgBr} \rightarrow 2 \text{Ag} + \text{Br}_2$

3.



The reaction given above is a redox reaction because in this case :

- (a) MnO_2 is oxidised and HCl is reduced.
- (b) HCl is oxidised.
- (c) MnO_2 is reduced.
- (d) MnO_2 is reduced and HCl is oxidised.

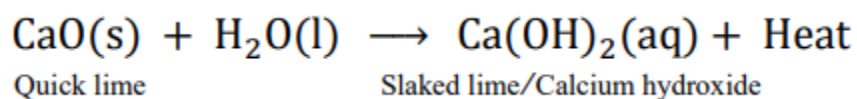
Answer. (d) / MnO_2 is reduced and HCl is oxidised

4. Assertion (A): Hydrogen gas is not evolved when zinc reacts with nitric acid.
Reason (R): Nitric acid oxidises the hydrogen gas produced to water and itself gets reduced. (2024)

Answer. (a) /Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

5. Name the type of chemical reaction in which calcium oxide reacts with water. Justify your answer by giving balanced chemical equation for the chemical reaction. (2024)

Answer. Combination reaction – Single product is formed (or any other)



6. Write one chemical equation each for the chemical reaction in which the following have taken place : (2024)

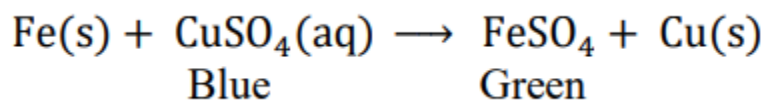
(i) Change in colour

(ii) Change in temperature

(iii) Formation of precipitate

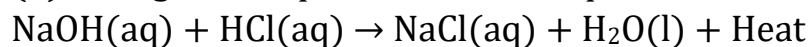
Mention colour change/temperature change (rise/fall)/compound precipitated along with equation.

Answer. (i) Change in colour: The solution will become green in colour.



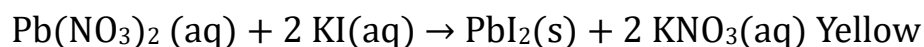
(or any other reaction which shows change in colour)

(ii) Change in temperature: The temperature will increase.



(or any other reaction which shows change in temperature)

(iii) Formation of precipitate: Yellow precipitate of PbI₂ is formed.

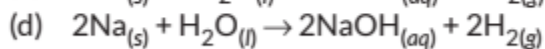
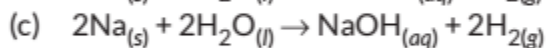
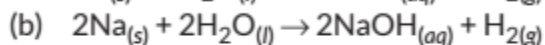
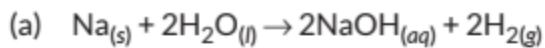


(or any other reaction which shows formation of precipitate)

1.1 Chemical Equations

MCQ

1. Sodium reacts with water to form sodium hydroxide and hydrogen gas. The balanced equation which represents the above reaction is



(Term I, 2021-22)

2. It is important to balance the chemical equations to satisfy the law of conservation of mass. Which of the following statements of the law is incorrect?

(a) The total mass of the elements present in the reactants is equal to the total mass of the elements present in the products.

(b) The number of atoms of each element remains the same, before and after a chemical reaction.

(c) The chemical composition of the reactants is the same before and after the reaction.

(d) Mass can neither be created nor can it be destroyed in a chemical reaction.

(Term 1, 2021-22)

3. In which of the following, the identity of initial substance remains unchanged?

(a) Curdling of milk

(b) Formation of crystals by process of crystallisation

(c) Fermentation of grapes

(d) Digestion of food (2020)

4. Identify 'x', 'y' and 'z' in the following reaction: $2\text{KClO}_3 \xrightarrow{2\text{KCl} + 3\text{O}_2}$

(a) x=gas; y = reaction condition; z = gas

(b) x=solid; y = liquid; z = gas

(c) x = number of moles of KClO_3 ; y = reaction condition; z = number of molecules of oxygen

(d) x = physical state of KClO_3 and KCl ; y = reaction condition, z=physical state of O_2 (2020)

5. Assertion (A): Following is a balanced chemical equation for the action of steam on iron: $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$

Reason (R): The law of conservation of mass holds good for a chemical equation.

- (a) Both (A) and (R) are true and reason (R) is the correct explanation of the assertion (A).
- (b) Both (A) and (R) are true, but reason (R) is not the correct explanation of the assertion (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true. (2020)

VSA (1 mark)

6. What is a balanced chemical equation? (2021 C)

7. Translate the following statement into a balanced chemical equation:
"Barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate." (2019)

SAI (2 marks)

8. Give the chemical name of the reactants as well as the products of the following chemical equation: $\text{HNO}_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}$ (2021 C)

SA II (3 marks)

9. Explain the significance of photosynthesis. Write the balanced chemical equation involved in the process. (Board Term I, 2017) U

10. Write balanced chemical equations for the following chemical reactions:

- (a) Hydrogen + Chlorine $\rightarrow \rightarrow \rightarrow$ Hydrogen chloride (NCERT Intext)
- (b) Lead + Copper chloride $\rightarrow \rightarrow$ Lead chloride + Copper (Board Term 1, 2014)
- (c) Zinc oxide + Carbon \rightarrow Zinc + Carbon monoxide

1.2 Types of Chemical Reactions

MCQ

11. When aqueous solutions of potassium iodide and lead nitrate are mixed, an insoluble substance separates out. The chemical equation for the reaction involved is

- (a) $\text{KI} + \text{PbNO}_3 \longrightarrow \text{PbI} + \text{KNO}_3$
(b) $2\text{KI} + \text{Pb}(\text{NO}_3)_2 \longrightarrow \text{PbI}_2 + 2\text{KNO}_3$
(c) $\text{KI} + \text{Pb}(\text{NO}_3)_2 \longrightarrow \text{PbI} + \text{KNO}_3$
(d) $\text{KI} + \text{PbNO}_3 \longrightarrow \text{PbI}_2 + \text{KNO}_3$ (2023)

12. A metal ribbon 'X' burns in oxygen with a dazzling white flame forming a white ash 'Y'. The correct description of X, Y and the type of reaction is

(a) X Ca; Y=CaO;

Type of reaction = Decomposition

(b) X-Mg; Y=MgO;

Type of reaction = Combination

(c) X-Al; Y Al₂O₃;

Type of reaction = Thermal decomposition

(d) X=Zn; Y=ZnO;

Type of reaction = Endothermic (2023)

13. The balanced chemical equation showing reaction between quick lime and water is

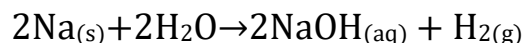
(a) $2\text{CaO} + \text{H}_2\text{O} \rightarrow 2\text{CaOH} + \text{H}_2 + \text{Heat}$

(b) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2 + \text{Heat}$

(c) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{Heat}$

(d) $2\text{CaO} + 3\text{H}_2\text{O} \rightarrow 2\text{Ca}(\text{OH})_3 + \text{O}_2 + \text{Heat}$ (2023)

14. Study the following chemical reaction:



The reducing agent in this reaction is

(a) Na (b) H₂O (c) NaOH (d) H₂ (2023)

15. Assertion (A): In the following reaction



ZnO undergoes reduction.

Reason (R): Carbon is a reducing agent that reduces ZnO to Zn.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A)

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A)

(c) Assertion (A) is true, but Reason (R) is False.

(d) Assertion (A) is false, but Reason (R) is true. (2023)

16. Assertion (A): Reaction of quick lime with water is an exothermic reaction.
Reason (R): Quicklime reacts vigorously with water releasing a large amount of heat.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A)
- (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A)
- (c) Assertion (A) is true, but Reason (R) is False.
- (d) Assertion (A) is false, but Reason (R) is true. (2023)

17. A student took sodium sulphate solution in a test tube and added barium chloride solution to it. He observed that an insoluble substance has formed. The colour and molecular formula of the insoluble substance is (Term 1, 2021-22)

- (a) grey, Ba_2SO
- (b) yellow, $Ba(SO_4)_2$
- (c) white, $BaSO_4$
- (d) pink, $BaSO_4$

18. $C_6H_{12}O_6(og) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l)$ The above reaction is a/an

- (a) displacement reaction
- (b) endothermic reaction
- (c) exothermic reaction
- (d) neutralisation reaction. (Term 1, 2021-22)

19. Which of the following statement about the reaction given below are correct?



- (i) HCl is oxidized to Cl_2 -
 - (ii) MnO_2 is reduced to $MnCl_2$.
 - (iii) $MnCl_2$ acts as an oxidizing agent.
 - (iv) HCl acts as an oxidizing agent.
- (a) (ii), (iii) and (iv)
 - (c) (i) and (ii) only
 - (b) (i), (ii) and (iii)
 - (d) (iii) and (iv) only (Term I, 2021-22)

20. Which one of the following reactions is categorised as thermal decomposition reaction?

- (a) $2\text{H}_2\text{O}_{(l)} \rightarrow 2\text{H}_{2(g)} + \text{O}_{2(g)}$
- (b) $2\text{AgBr}_{(s)} \rightarrow 2\text{Ag}_{(s)} + \text{Br}_{2(g)}$
- (c) $2\text{AgCl}_{(s)} \rightarrow 2\text{Ag}_{(s)} + \text{Cl}_{2(g)}$
- (d) $\text{CaCO}_{3(s)} \rightarrow \text{CaO}_{(s)} + \text{CO}_{2(g)}$ (Term I, 2021-22)

21. Assertion (A): Burning of natural gas is an endothermic process.

Reason (R): Methane gas combines with oxygen to produce carbon dioxide and water.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true. (Term I, 2021-22)

22. Consider the following processes

- I. Dilution of sulphuric acid
- II. Sublimation of dry ice
- III. Condensation of water vapours
- IV. Dissolution of ammonium chloride in water

The endothermic process(es) is/are

- (a) I and III
- (b) II only
- (c) III only
- (d) II and IV (Term 1, 2021-22)

23. When lead nitrate powder is heated in boiling tube, we observe

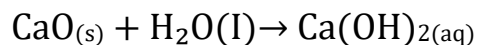
- (a) brown fumes of nitrogen dioxide
- (b) brown fumes of lead oxide
- (c) yellow fumes of nitrogen dioxide
- (d) brown fumes of nitric oxide. (Term 1, 2021-22)

24. Assertion (A): Silver salts are used in black and white photography.

Reason (R): Silver salts do not decompose in the presence of light.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true. (Term I, 2021-22)

25. Calcium oxide reacts vigorously with water to produce slaked lime.



This reaction can be classified as

- (A) combination reaction
- (B) exothermic reaction
- (C) endothermic reaction
- (D) oxidation reaction.

Which of the following is a correct option?

- (a) (A) and (C)
- (b) (C) and (D)
- (c) (A), (C) and (D)
- (d) (A) and (B) (2020) U

26. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of a

- (a) combination reaction
- (b) displacement reaction
- (c) decomposition reaction
- (d) double displacement reaction. (2020)

27. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution:

- (A) exchange of atoms takes place
 - (B) exchange of ions takes place
 - (C) a precipitate is produced
 - (D) an insoluble salt is produced
- The correct option is
- (a) (B) and (D)
 - (b) (A) and (C)
 - (c) only (B)
 - (d) (B), (C) and (D) (2020)



The above reaction is an example of

- (a) displacement reaction
- (b) addition reaction

- (c) substitution reaction
(d) double displacement reaction. (2020 C)

VSA (1 mark)

29. Name the type of chemical reaction which takes place when quicklime is added to water.(2021 C)

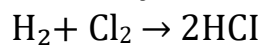
SAI (2 marks)

30. What is observed after about 1 hour of adding the strips of copper and aluminium separately to ferrous sulphate solution filled in two beakers? Name the reaction if any change in colour is noticed. Also, write chemical equation for the reaction. (2019)

31. A student wants to study a decomposition reaction by taking ferrous sulphate crystals. Write two precautions he must observe while performing the experiment. (2019)

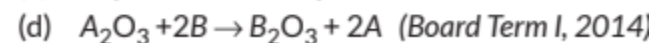
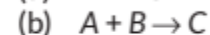
33. A student mixes sodium sulphate powder in barium chloride powder. What change would the student observe on mixing the two powders? Justify your answer and explain how he can obtain the desired change. (2019)

34. Study the following equation of a chemical reaction:



- (i) Identify the type of reaction.
(ii) Write a balanced chemical equation of another example of this type of reaction. (Board Term I, 2015)

35. State the type of chemical reactions, represented by the following equations:



SA II (3 marks)

36. (i) While electrolysing water before passing the current some drops of an acid are added. Why? Name the gases liberated at cathode and anode. Write the relationship between the volume of gas collected at anode and the volume of gas collected at cathode.

(ii) What is observed when silver chloride is exposed to sunlight? Give the type of reaction involved. (2023)

37. (a) Define a double displacement reaction.

(b) Write the chemical equation of a double displacement reaction which is also a

(i) Neutralisation reaction and (ii) Precipitation reaction. Give justification for your answer. (2023)

38. Mention with reason the colour changes observed when:

(i) silver chloride is exposed to sunlight.

(ii) copper powder is strongly heated in the presence of oxygen.

(iii) a piece of zinc is dropped in copper sulphate solution. (2020)

39. A shining metal 'M', on burning gives a dazzling white flame and changes to a white powder 'N'.

(a) Identify 'M' and 'N'.

(b) Represent the above reaction in the form of a balanced chemical equation.

(c) Does 'M' undergo oxidation or reduction in this reaction? Justify. (2020)

40. In the electrolysis of water

(a) Name the gases liberated at anode and cathode.

(b) Why is it that the volume of gas collected on one electrode is two times that on the other electrode?

(c) What would happen if dil. H_2SO_4 is not added to water? (2020)

41. 1 g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance, a visible change is seen in it. Give the chemical equations of reactions, the name and the colour of the products formed in each case. (2020)

42. A compound 'A' is used in the manufacture of cement. When dissolved in water, it evolves a large amount of heat and forms compound 'B'.

(i) Identify A and B.

(ii) Write chemical equation for the reaction of A with water.

(iii) List two types of reaction in which this reaction may be classified. (2020)

43. Identify the type of each of the following reactions. Also write balanced chemical equation for each reaction.

- (i) A reaction in which the reaction mixture becomes warm.
- (ii) A reaction in which an insoluble substance is formed. (2020)

44. Lead nitrate solution is added to a test tube containing potassium iodide solution.

- (a) Write the name and colour of the compound precipitated.
- (b) Write the balanced chemical equation for the reaction involved.
- (c) Name the type of this reaction justifying your answer. (2020)

45. 2 g of silver chloride is taken in a China dish and the China dish is placed in sunlight for sometime. What will be your observation in this case? Write the chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction. (Delhi 2019)

46. Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.

- (a) Zinc reacts with silver nitrate to produce zinc nitrate and silver.
- (b) Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide. (Delhi 2019)

47. When potassium iodide solution is added to a solution of lead (II) nitrate in a test tube, a precipitate is formed.

- (a) What is the colour of this precipitate? Name the compound precipitated.
- (b) Write the balanced chemical equation for this reaction.
- (c) List two types of reactions in which this reaction can be placed. (2019)

48. 2 g of ferrous sulphate crystals are heated in a dry boiling tube.

- (a) List any two observations.
- (b) Name the type of chemical reaction taking place.
- (c) Write balanced chemical equation for the reaction and name the products formed. (AI 2019, Board Term I, 2017, 2016)

49. You might have noted that when copper powder is heated in a China dish, the reddish brown surface of copper powder becomes coated with a black substance.

- (a) Why has this black substance formed?
- (b) What is the black substance?
- (c) Write the chemical equation of the reaction that takes place.

(d) How can the black coating on the surface be turned reddish brown? (AI 2019)

50. Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity. (2018)

51. Take 3 g of barium hydroxide in a test tube, now add about 2 g of ammonium chloride and mix the contents with the help of a glass rod. Now touch the test tube from outside.

(i) What do you feel on touching the test tube?

(ii) State the inference about the type of reaction occurred.

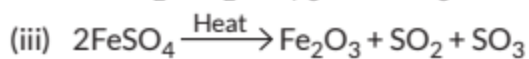
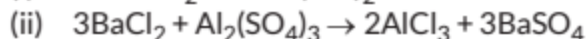
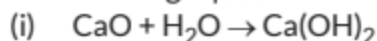
(iii) Write the balanced chemical equation of the reaction involved.

52. (a) A solution of potassium chloride when mixed with silver nitrate solution, an insoluble white substance is formed. Write the chemical reaction involved and also mention the type of the chemical reaction. (NCERT Exemplar)

(b) Ferrous sulphate when heated, decomposes with the evolution of a gas having a characteristic odour of burning sulphur. Write the chemical reaction involved and identify the type of reaction. (Board Term 1, 2016)

53.

Name the type of chemical reaction represented by the following equation :



(Board Term I, 2016)

54.

What is a reduction reaction?

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



LA (5 marks)

55. (a) Can a displacement reaction be a redox reaction? Explain with the help of an example.

(b) Write the type of chemical reaction in the following:

(i) Reaction between an acid and a base

(ii) Rusting of iron. (Board Term I, 2017)

1.3 Have You Observed the Effects of Oxidation Reactions in Everyday Life?

MCQ

56. Copper utensils slowly lose their shiny brown surface and gain a green coat on prolonged exposure to atmospheric air. This is due to the formation of a coating of

(a) copper sulphate

(b) copper carbonate

(c) cupric oxide

(d) cuprous oxide. (2020 C)

SA II (3 marks)

57. What happens when food materials containing fats and oils are left for a long time? List two observable changes and suggest three ways by which this phenomenon can be prevented. (2020)

58. (a) In the following reaction:



Identify the oxidant and reductant.

(b) Give reasons:

(i) Antioxidants are added to foods containing fats and oils.

(ii) White silver chloride turns grey in sunlight. (2019 C)

59. (i) Why is respiration considered as an exothermic reaction? (NCERT)

(ii) Write chemical name and the formula of the brown gas produced during thermal decomposition of lead nitrate.

(iii) Why do chips manufacturers flush bags of chips with gas such as nitrogen? (Board Term I, 2015)

CBSE Sample Questions

1.1 Chemical Equations

MCQ

1. Which of the following correctly represents a balanced chemical equation?

- (a) $\text{Fe}_{(s)} + 4\text{H}_2\text{O}_{(g)} \rightarrow \text{Fe}_3\text{O}_{4(s)} + 4\text{H}_{2(g)}$
- (b) $3\text{Fe}_{(s)} + 4\text{H}_2\text{O}_{(g)} \rightarrow \text{Fe}_3\text{O}_{4(s)} + 4\text{H}_{2(g)}$
- (c) $3\text{Fe}_{(s)} + \text{H}_2\text{O}_{(g)} \rightarrow \text{Fe}_3\text{O}_{4(s)} + \text{H}_{2(g)}$
- (d) $3\text{Fe}_{(s)} + 4\text{H}_2\text{O}_{(g)} \rightarrow \text{Fe}_3\text{O}_{4(s)} + \text{H}_{2(g)}$

(Term I, 2021-22) |

2. Why is it important to balance a skeletal chemical equation?

- (a) To verify law of conservation of energy.
- (b) To verify the law of constant proportion.
- (c) To verify the law of conservation of mass.
- (d) To verify the law of conservation of momentum. (Term I, 2021-22)

1.2 Types of Chemical Reactions

MCQ

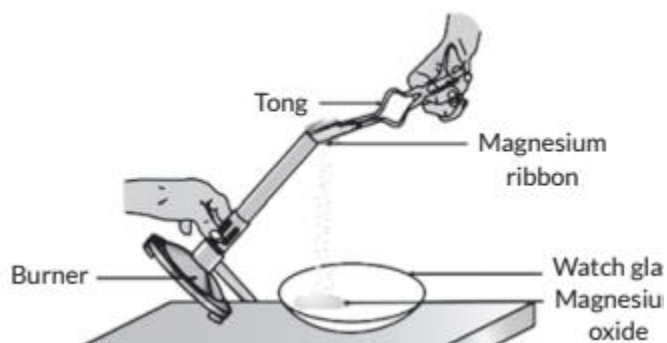
3. In the redox reaction



- (a) MnO_2 is reduced to MnCl_2 & HCl is oxidized to H_2O
- (b) MnO_2 is reduced to MnCl_2 & HCl is oxidized to Cl_2
- (c) MnO_2 is oxidized to MnCl_2 & HCl is reduced to Cl_2
- (d) MnO_2 is oxidized to MnCl_2 & HCl is reduced to H_2O

(2022-23)

4.



Which of the following is the correct observation of the reaction shown in the above set up?

- (a) Brown powder of Magnesium oxide is formed.
- (b) Colourless gas which turns lime water milky is evolved.
- (c) Magnesium ribbon burns with brilliant white light.
- (d) Reddish brown gas with a smell of burning Sulphur has evolved.

(2022-23)

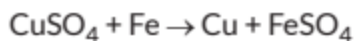
5. Assertion (A): Silver bromide decomposition is used in black and white photography. Reason (R): Light provides energy for this exothermic reaction.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true and R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true. (2022-23)

6. Reema took 5 mL of lead nitrate solution in a beaker and added approximately 4 mL of potassium iodide solution to it. What would she observe?

- (a) The solution turned red.
- (b) Yellow precipitate was formed.
- (c) White precipitate was formed.
- (d) The reaction mixture became hot. (Term I, 2021-22)

7. In the reaction of iron with copper sulphate solution:



Which option in the given table correctly represents the substance oxidised and the reducing agent?

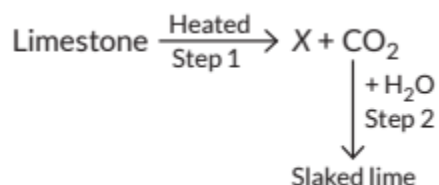
| | Substance Oxidized | Reducing Agent |
|-----|--------------------|-------------------|
| (a) | Fe | Fe |
| (b) | Fe | FeSO ₄ |
| (c) | Cu | Fe |
| (d) | CuSO ₄ | Fe |

(Term I, 2021-22) **An**

8. The chemical reaction between copper and oxygen can be categorized as

- (a) displacement reaction
- (b) decomposition reaction
- (c) combination reaction
- (d) double displacement reaction. (Term I, 2021-22)

9.



Identify the correct option from the given table which represents the type of reactions occurring in step 1 and step 2.

| | Endothermic | Exothermic |
|-----|-------------|------------|
| (a) | × | ✓ |
| (b) | ✓ | × |
| (c) | ✓ | ✓ |
| (d) | × | × |

(Term I, 2021-22) **An**

10. Assertion (A): Decomposition of vegetable matter into compost is an endothermic reaction.

Reason (R): Decomposition reaction involves breakdown of a single reactant into simpler products.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true and R is not the correct explanation of A.

- (c) A is true but R is false.
(d) A is false but R is true. (Term 1, 2021-22)

11. Assertion (A): After white washing the walls, a shiny white finish on walls is obtained after two to three days.

Reason (R): Calcium oxide reacts with carbon dioxide to form calcium hydrogen carbonate which gives shiny white finish.

- (a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true. (2020-21)

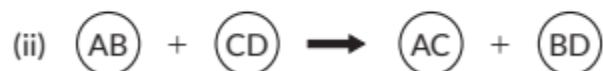
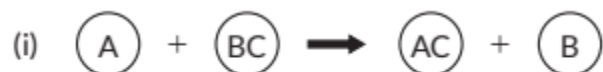
VSA (1 mark)

12. List any two observations when ferrous sulphate is heated in a dry test tube. (2020-21)

13. Identify the products formed when 1 mL of dil. hydrochloric acid is added to 1 g of sodium metal. (2020-21)

SA II (3 marks)

14.



Identify the types of reaction mentioned above in (i) and (ii). Give one example for each type in the form of a balanced chemical equation. (2022-23)

15. (a) Which of the following reactions is/are an endothermic reaction(s) where decomposition also happens?

- Respiration
- Heating of lead nitrate
- Decomposition of organic matter
- Electrolysis of acidified water

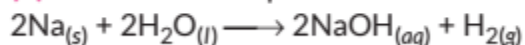
(b) Silver chloride when kept in the open turns grey. Illustrate this with a balanced chemical equation. (2020-21)

SOLUTIONS

Previous Years' CBSE Board Questions

1.

(b): The balanced equation is



2. (c): A balanced equation follows law of conservation of mass that means the total mass of reactants is equal to the total mass of products but the chemical composition of reactants does not remain same before and after the reaction.

3. (b): Formation of crystals is a physical change while others are chemical change.



5. (a): A balanced chemical equation must obey the law of conservation of mass.

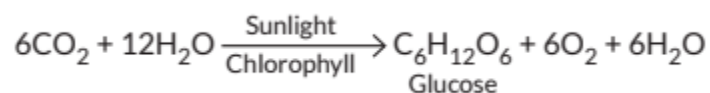
6. The equation which contains an equal number of atoms of each element on both sides of the arrow is called a balanced chemical equation.

7.

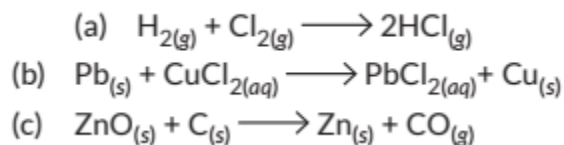


8. Reactants:- Nitric acid, calcium hydroxide (slaked lime) Products:- Calcium nitrate, water

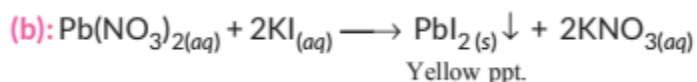
9. Photosynthesis means synthesis with the help of light. It is the process that gives life to all living beings. Photosynthesis is a process by which plants utilize carbon dioxide and water in the presence of sunlight to produce glucose and oxygen.



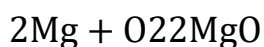
10.



11.

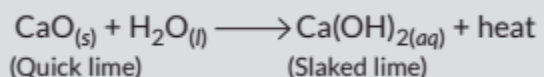


12. (b): Magnesium metal, Mg (X) burns in oxygen with a dazzling white flame forming a white ash, MgO (Y).

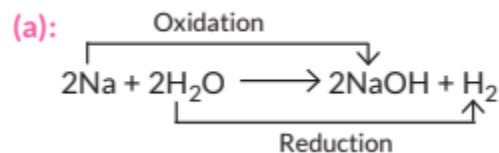


This is a type of combination reaction.

13. (c): Quick lime reacts vigorously with water to produce calcium hydroxide (slaked lime) and release a large amount of heat (exothermic reaction).

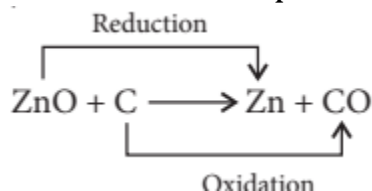


14.



Here, Na is oxidised to NaOH and H₂O is reduced to H₂. Na acts as a reducing agent and H₂O acts as an oxidising agent.

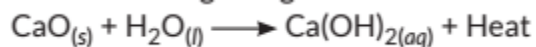
15. (a): The reaction in which oxygen is added or hydrogen is removed or loss of electrons takes place is called an oxidation reaction. In the reaction,



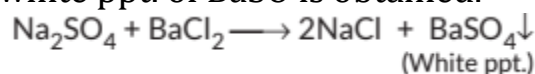
(i) Carbon is getting oxidised to carbon monoxide.

(ii) Zinc oxide is getting reduced to zinc. Carbon is a reducing agent that reduces ZnO to Zn.

16. (a): Reaction of quick lime (CaO) with water is an exothermic reaction because CaO reacts vigorously with water releasing a large amount of heat.



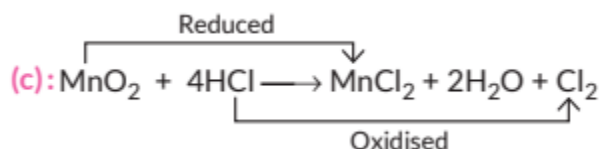
17. (c): The reaction between sodium sulphate and barium chloride is an example of double displacement reaction or precipitation reaction in which white ppt. of BaSO is obtained.



18. (c): In the process of respiration, glucose combines with oxygen in cells of our body and provides energy. Thus, respiration is an exothermic process.

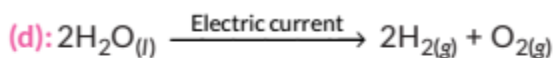


19.

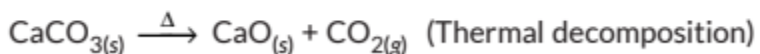
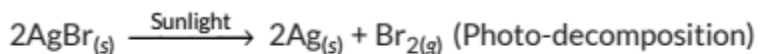
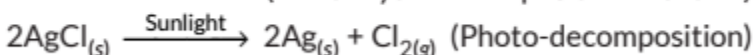


As hydrogen is removed from HCl to give Cl₂, HCl is being oxidised whereas oxygen is removed from MnO₂ to give MnCl₂, hence MnO₂ is reduced. Here MnO₂ acts as an oxidising agent and HCl acts as a reducing agent.

20.

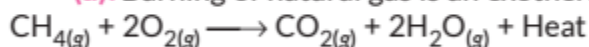


(Electrolytic decomposition reaction)



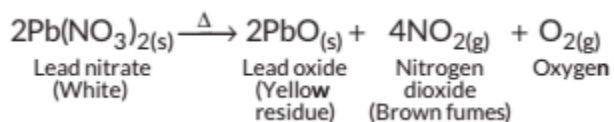
21.

(d): Burning of natural gas is an exothermic process.

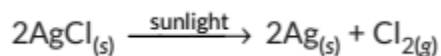


22. (d): During sublimation of dry ice, heat is absorbed, so, it is an endothermic process. Dissolution of NH_4Cl in water is also an endothermic process.

23. (a): When lead nitrate is heated in a boiling tube, brown fumes of nitrogen dioxide are found to evolve and a yellow residue of lead oxide is left behind in the test tube.

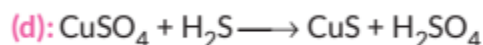


24. (c): Silver salts are used in black and white photography and they decompose in presence of sunlight.



25. (d): The reaction between CaO and H_2O to form $\text{Ca}(\text{OH})_2$ is an exothermic and combination reaction.

26.



It is a double displacement reaction as in this reaction CuSO_4 and H_2S are reacting by exchange of Cu^{2+} and H^+ ions to form two new compounds i.e., CuS and H_2SO_4 .

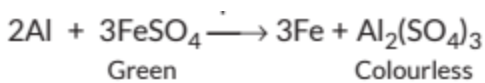
27. (d): In this reaction, exchange of Na^+ and Ba^{2+} ions takes place forming BaSO_4 which is a white precipitate i.e., an insoluble salt.



28. (c): It is a type of substitution reaction.

29. The reaction between CaO and H_2O to form $\text{Ca}(\text{OH})_2$ is an exothermic and combination reaction.

30. Copper is less reactive than Fe, hence copper cannot replace iron from ferrous sulphate solution, so no colour change is observed. Aluminium is more reactive than Fe, hence displace iron from ferrous sulphate solution.



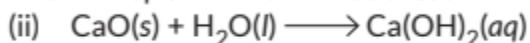
Green colour of solution due to FeSO_4 changes to colourless.

This is an example of single displacement reaction.

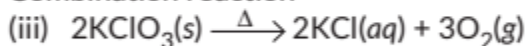
31. (i) Test tube should be dried properly.
(ii) Hold the test tube in a test tube holder.



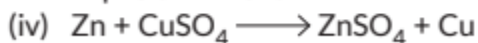
Double displacement or neutralisation reaction



Combination reaction

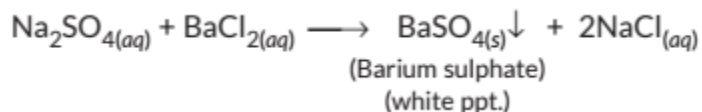


Decomposition reaction



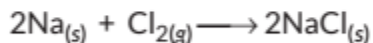
Displacement reaction.

33. When student mixes Na_2SO_4 powder in BaCl_2 powder, no changes will be observed. Student needs to prepare aqueous solution of Na_2SO_4 and BaCl_2 separately in two different test tubes and then on mixing these two solutions, double displacement (precipitation) reaction takes place.



34. (i) Combination reaction.

(ii) Another example of combination reaction is

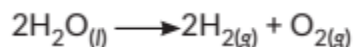


Sodium Chlorine Sodium chloride

35. (a) Displacement reaction.
(b) Combination reaction.
(c) Double displacement reaction.
(d) Displacement reaction or redox reaction.

36. (i) While electrolysis of water, before passing the current, some drops of an acid are added because acid dissociates into ions completely and during electrolysis of water, the number of ions increases causing the solution to become more conducting. This allows the current to pass through the solution easily. In electrolysis of water (acidified), the gases that are evolved at anode

and cathode are oxygen and hydrogen respectively. Hydrogen ions gain electrons from cathode and form hydrogen gas, oxygen ions give electrons to anode and form oxygen gas. The decomposition reaction of water is as follows:



From the above balanced chemical equation, it can be concluded that the volume of hydrogen (obtained at cathode) is twice the volume of oxygen (obtained at anode).

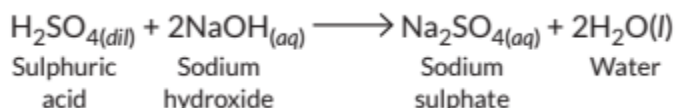
(ii) When silver chloride is exposed to sunlight, white silver chloride turns grey. This is due to the decomposition of silver chloride into silver and chlorine by the light.



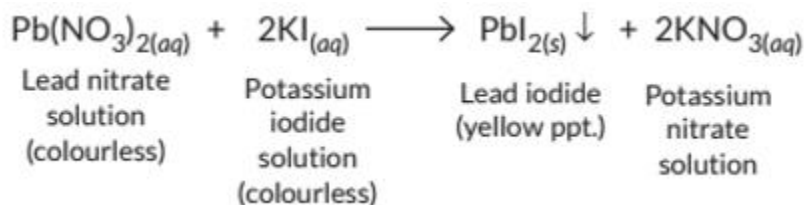
It is decomposition reaction.

37. (a) The chemical reaction in which two reactants exchange ions to form two new compounds is called a double displacement reaction.

(b) (i) When an aqueous solution of an acid reacts with a base (alkali) by exchanging their ions/radicals to form salt and water as the only products, the reaction which takes place is called neutralisation reaction.



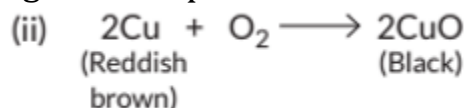
(ii) When the aqueous solutions of two ionic compounds react by exchanging their ions/radicals, to form two or more new compounds such that one of the products formed is an insoluble salt, and hence forms precipitate, the double displacement reaction is said to be precipitation reaction. When lead nitrate solution is mixed with potassium iodide solution, a yellow precipitate is formed. This reaction is a precipitation reaction and can be expressed as follows:



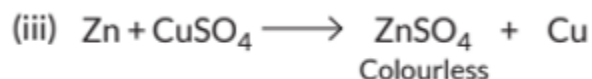
38.



AgCl decomposes on absorbing light energy.



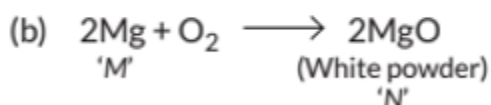
Copper metal undergoes oxidation.



Zn displaces Cu from CuSO₄ solution. Colour changes from blue to colourless.

39.

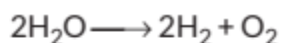
(a) 'M' is Mg and 'N' is MgO



(c) 'M' undergoes oxidation in this reaction because Mg gain oxygen to form MgO.

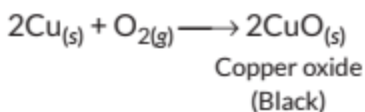
40. (a) At anode: Oxygen gas is liberated. At cathode: Hydrogen gas is liberated.

(b) In the test tube covering the cathode, the amount of gas collected is double than that of the gas collected in the test tube covering the anode due to stoichiometry.

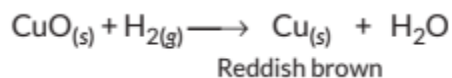


(c) Addition of a few drops of sulphuric acid make water a good conductor of electricity.

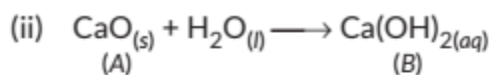
41. When copper powder is heated in a China dish, the reddish brown surface of copper powder becomes coated with a black substance which is copper oxide.



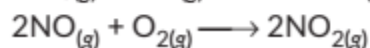
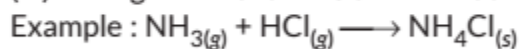
When hydrogen gas is passed over CuO, the black coating on the surface turned reddish brown due to the formation of Cu.



42. (i) A is calcium oxide, CaO which is used in the manufacturing of cement. B is calcium hydroxide, Ca(OH)₂.



(iii) The given reaction is a combination reaction.



43. (i) Exothermic reactions are those reactions in which heat energy is evolved. This makes the reaction mixture warm. For example: combustion reactions are exothermic reactions.

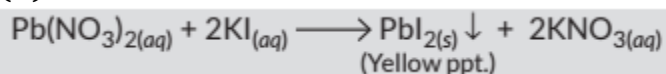


(ii) Precipitation reactions are those reactions in which precipitate is formed. For example :



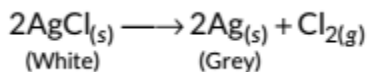
44. (a) When lead nitrate is added to potassium iodide then yellow precipitate of lead iodide is formed along with potassium nitrate.

(b) Balanced chemical reaction is as follows:



(c) This type of reaction is called precipitation reaction in which one of the products formed is an insoluble substance or this is also called double displacement reaction.

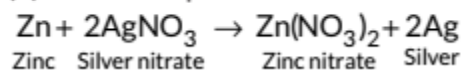
45. When silver chloride is exposed to sunlight, it decomposes to form Ag and Cl₂ gas. The balanced chemical equation is written as:



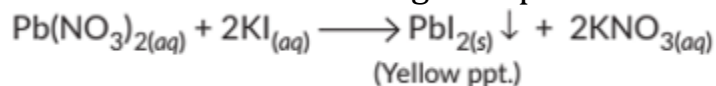
This is an example of photodecomposition reaction.

46.

(a) It is a displacement reaction.

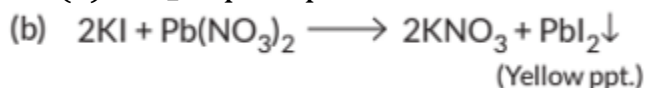


(b) When lead nitrate is added to potassium iodide then yellow precipitate of lead iodide is formed along with potassium nitrate.



This type of reaction is called precipitation reaction.

47. (a) PbI_2 is precipitated and the colour of this precipitate is yellow.

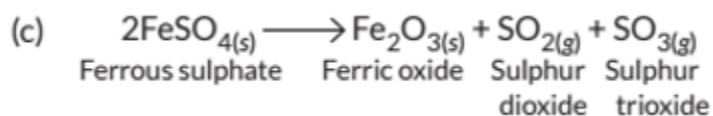


(c) (i) Double displacement reaction

(ii) Precipitation reaction

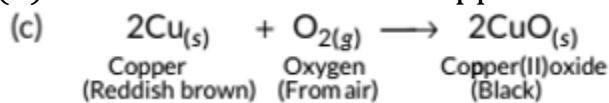
48. (a) Ferrous sulphate crystals ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) lose water when heated and the colour of the crystals changes. It then decomposes to ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide (SO_3) with a smell of burning sulphur.

(b) This is a thermal decomposition reaction.

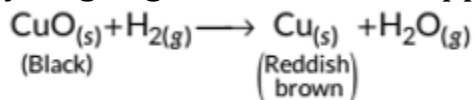


49. (a) The black substance is formed because copper combines with oxygen.

(b) The black substance is copper oxide (CuO).



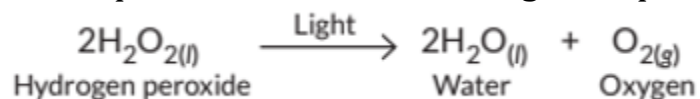
(d) The black coating on the surface can be turned reddish brown by passing hydrogen gas over the hot copper oxide.



50. Decomposition reaction involving absorption of heat:



Decomposition reaction involving absorption of light:

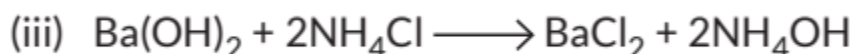


Decomposition reaction involving absorption of electrical energy:

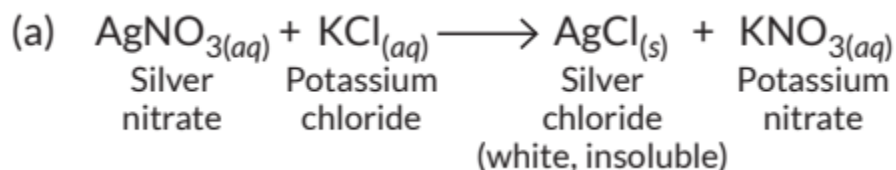


51. (i) When barium hydroxide is added into ammonium chloride, the bottom of test tube is found to be cooler.

(ii) It is an endothermic reaction. Endothermic reactions involve the formation of chemical bonds through the absorption of heat from the surroundings, thereby creating a cooling effect.



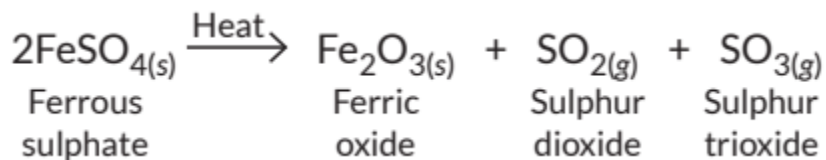
52.



It is a double displacement reaction.

(b) Ferrous sulphate crystals ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) lose water when heated and the colour of the crystals changes. It then decomposes to ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide (SO_3) with a smell of burning sulphur.

This is a thermal decomposition reaction.

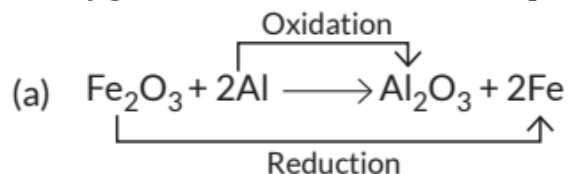


53. (i) Combination reaction.

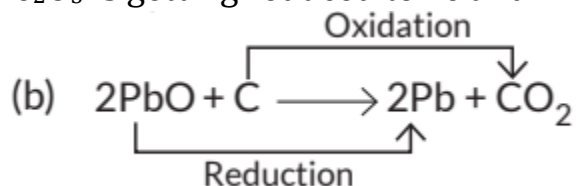
(ii) Precipitation reaction or double displacement reaction.

(iii) Thermal decomposition reaction.

54. Those reactions in which addition of hydrogen to a substance or removal of oxygen from a substance take place are called reduction reactions.

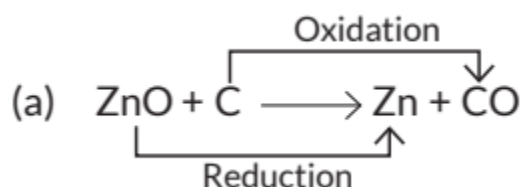


Fe_2O_3 is getting reduced to Fe and Al is getting oxidised to Al_2O_3 -



PbO is reduced to Pb and C is oxidised to CO_2 .

55.

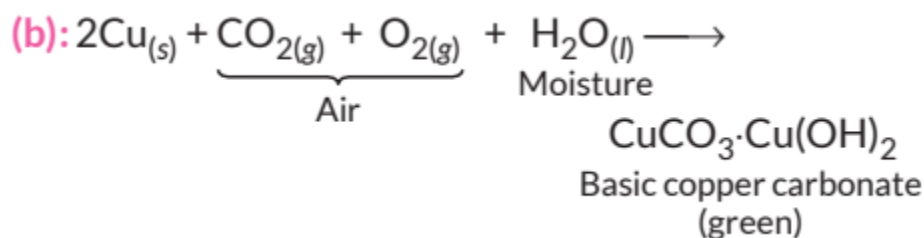


Here, carbon is oxidised to CO and ZnO is reduced to Zn. Thus, the above reaction is a displacement reaction as well as redox reaction.

(b) (i) Neutralisation reaction

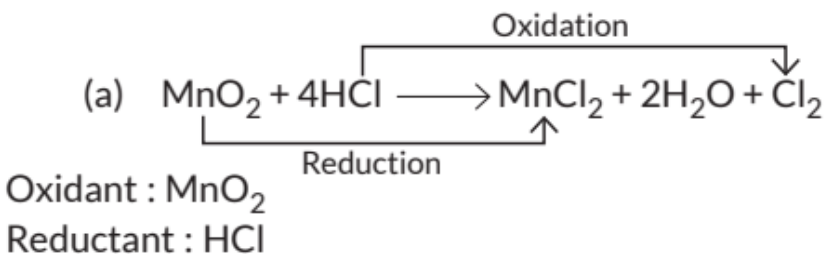
(ii) Oxidation reaction.

56.

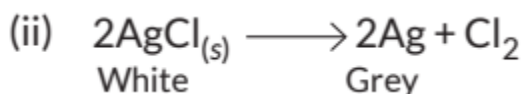


57. Food materials containing fats and oils change their taste and smell due to a process called rancidity. Rancidity is a process in which air reacts with fats and oils which changes the smell and taste of food. Methods of prevention: Vacuum packing, refrigeration of food materials, placing of food materials away from direct sunlight.

59.

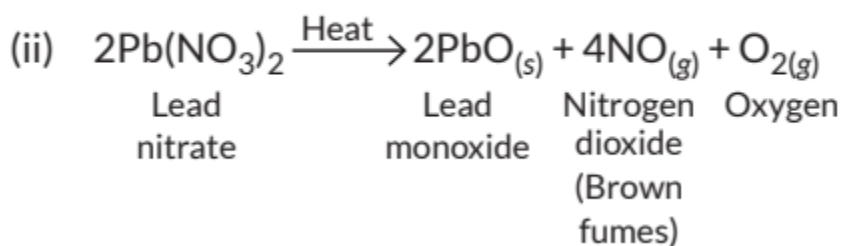


(b) (i) Slow oxidation of oils and fats present in food materials resulting in compounds with unpleasant smell is known as rancidity. Antioxidants are added to foods containing fats and oils to prevent the oxidation of fats and oils and thus increase the shelf life of food.



It undergoes photochemical decomposition reaction. Silver chloride turns grey in sunlight to form silver metal.

59. (i) The glucose produced in our body during digestion combines with oxygen in the cells of our body and provides energy. The special name of this reaction is respiration. Thus respiration is an exothermic process because energy is produced during this process.



Brown gas evolved is nitrogen dioxide (NO_2).

(iii) Chips manufacturers usually flush bags of chips with gas such as nitrogen because atmospheric oxygen can react with chips which may cause change in colour, change in taste. So to cut the contact between air and the chips, nitrogen gas is used which prevents the chips from getting oxidised.

CBSE Sample Questions

1.



2. (c): The chemical equation in which the number of atoms of each element on both the sides are equal is called the balanced chemical equation. A chemical equation should be balanced because the total mass of elements present in the product of a chemical reaction has to be equal to the total mass of elements present in the reactants, i.e., the law of conservation of mass must hold good for the reaction. (0.80)

3. (b): MnO_2 is reduced to $MnCl_2$ as the oxidation state of Mn reduces from +4 to +2 while HCl is oxidized to Cl_2 as the oxidation state of Cl changes from -1 to 0. (1)

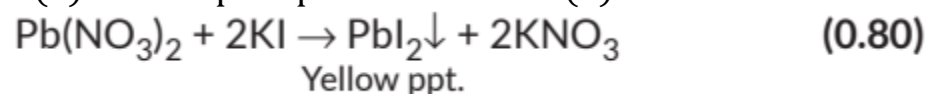
4. (c): Magnesium ribbon burns with brilliant white light. (1)

5.



This reaction is used in black and white photography. This is an endothermic reaction as it requires energy in the form of light.

6. (b): Yellow precipitate is formed. (1)

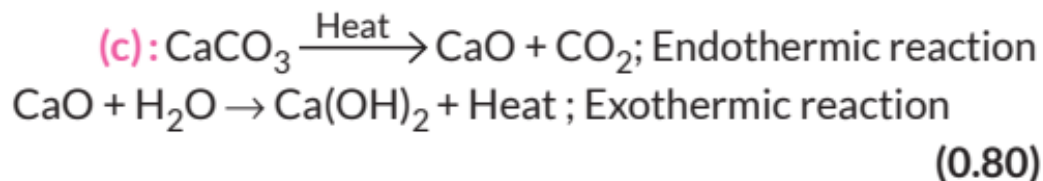


7. (a): Here Fe is oxidized and acts as a reducing agent. (0.80)

8. (c): Combination reaction.

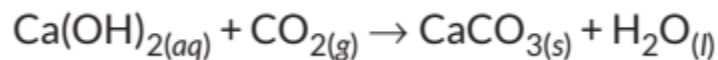


9.



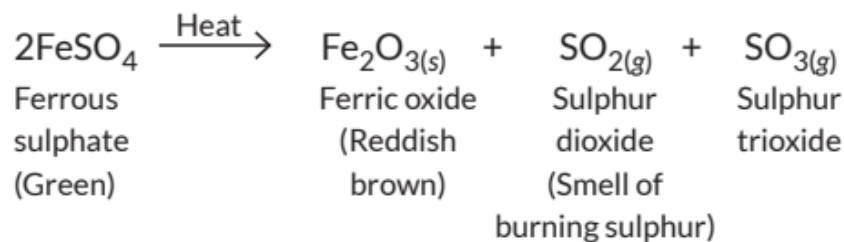
10. (d): Decomposition of vegetable matter into compost is an exothermic reaction. (0.80)

11. (c): Assertion is true, but reason is false.



Calcium hydroxide reacts with carbon dioxide in air to form calcium carbonate which gives shiny white finish. (1)

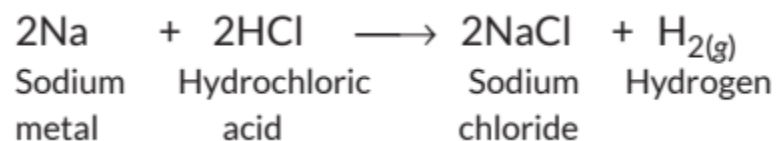
12.



(i) Green coloured ferrous sulphate decomposes to reddish brown ferric oxide.

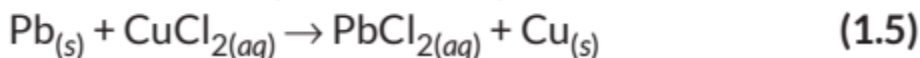
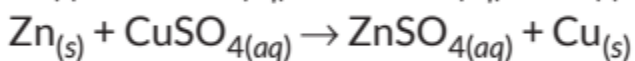
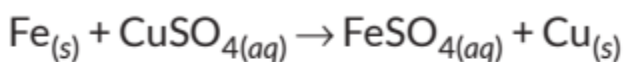
(ii) Colourless gas with choking smell is evolved. (1)

13.



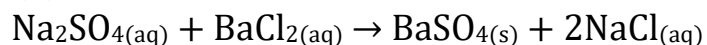
Sodium chloride and hydrogen gas are formed. (1)

14. (i) Displacement Reaction



(Any one of the reaction or other displacement reaction.)

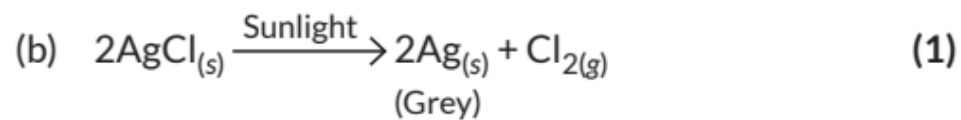
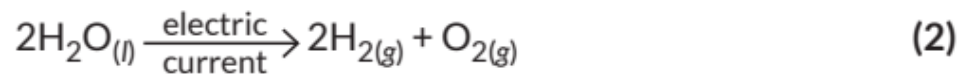
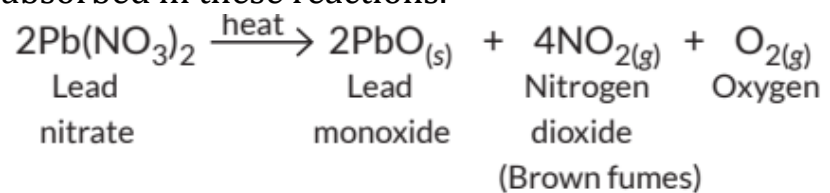
(ii) Double displacement Reaction



(Any one of the reaction or other double displacement reaction.) (1.5)

15. (a) Heating of lead nitrate and electrolysis of acidified water involves decomposition process and these are endothermic reactions as heat is

absorbed in these reactions.



Silver chloride turns grey in sunlight to form silver metal.