



ST. MARYS CO-ED SCHOOL, HARDA

CHAPTER – CHEMICAL REACTIONS AND EQUATIONS

SUBJECT – CHEMISTRY

CLASS- X

1 $2\text{HNO}_3 + \text{Ca(OH)}_2 \rightarrow \text{Ca(NO}_3)_2 + 2\text{H}_2\text{O}$; is an example of

- (i) displacement reaction
 - (ii) double displacement reaction
 - (iii) neutralisation reaction
 - (iv) combination reaction.
- (a) (i) and (ii) (b) (ii) and (iii)
(c) (iii) and (iv) (d) (i) and (iv)

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ANS: (b)

2 Burning Magnesium ribbon is brought in the gas jar of carbon dioxide. Which of the following is correct ?

- (i) It keeps on burning
 - (ii) It gets extinguished
 - (iii) Although CO_2 is non-supporter of combustion but burning magnesium breaks CO_2 into carbon and oxygen, oxygen helps in burning.
 - (iv) Carbon dioxide is supporter of combustion.
- (a) (i) and (iv) (b) (i) and (iii)
(c) (i) and (ii) (d) (iii) and (iv)

ANS: (b)

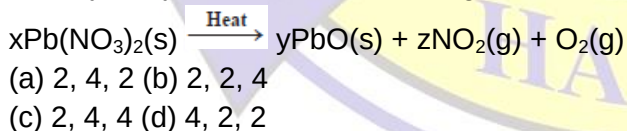
3 What is observed when a solution of potassium iodide is added to silver nitrate solution?

- (a) No reaction takes place
- (b) White precipitate of silver iodide is formed
- (c) yellow precipitate of AgI is formed
- (d) AgI is soluble in water.

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ANS: (c)

4 Identify 'x', 'y' and 'z' in the following balanced reaction



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ANS: (b)

5 Which of the following is precipitation as well as double displacement reaction?

- (a) $\text{NaOH(aq)} + \text{HNO}_3(\text{aq}) \rightarrow \text{NaNO}_3(\text{aq}) + \text{H}_2\text{O(l)}$
- (b) $\text{Cu(s)} + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Cu(NO}_3)_2(\text{aq}) + 2\text{Ag(s)}$
- (c) $2\text{Hg(s)} + \text{O}_2(\text{g}) \xrightarrow{\text{Heat}} 2\text{HgO(s)}$
- (d) $\text{FeCl}_3(\text{aq}) + 3\text{NH}_4\text{OH(aq)} \rightarrow \text{Fe(OH)}_3(\text{s}) + 3\text{NH}_4\text{Cl(aq)}$

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ANS: (d)

6 Which of the following reactions will not take place?

- (a) $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
- (b) $2\text{KBr} + \text{Cl}_2 \rightarrow 2\text{KCl} + \text{Br}_2$
- (c) $\text{Zn} + \text{MgSO}_4 \rightarrow \text{ZnSO}_4 + \text{Mg}$
- (d) $\text{Mg} + \text{FeSO}_4 \rightarrow \text{MgSO}_4 + \text{Fe}$

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ANS: (c)

7 Which of the following involves combination of two elements ?

- (a) $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
- (b) $\text{CaO}(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{g})$
- (c) $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{SO}_3(\text{g})$
- (d) $\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \rightarrow \text{NH}_4\text{Cl}(\text{s})$

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ANS: (a)

8 In the reaction $\text{Hg}_2\text{Cl}_2 + \text{Cl}_2 \rightarrow 2\text{HgCl}_2$

The reducing agent is

- (a) Hg_2Cl_2
- (b) Cl_2
- (c) HgCl_2
- (d) Both Cl_2 and HgCl_2

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ANS: (a)

9 Oxidation involves

- (i) gain of electron
- (ii) loss of electron
- (iii) addition of oxygen or electronegative element
- (iv) removal of hydrogen or electropositive element
- (a) (i), (ii), (iii) (b) (ii), (iii), (iv)
- (c) (i), (iii), (iv) (d) (i), (ii), (iv)

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ANS: (b)

10 The formula of Ammonium phosphate is

- (a) NH_4PO_4 (b) $(\text{NH}_4)_2\text{PO}_4$
- (c) $(\text{NH}_4)_3\text{PO}_4$ (d) $(\text{NH}_4)_3(\text{PO}_4)_2$

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ANS: (c)

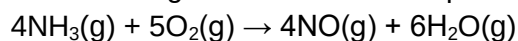
11 Which of the following is a thermal decomposition reaction ?

- (a) $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- (b) $2\text{AgCl} \rightarrow 2\text{Ag} + \text{Cl}_2$
- (c) $\text{ZnCO}_3 \rightarrow \text{ZnO} + \text{CO}_2$
- (d) $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$

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ANS: (c)

12 The following reaction is an example of a



- (i) displacement reaction
- (ii) combination reaction
- (iii) redox reaction
- (iv) neutralisation reaction
- (a) (i) and (iv) (b) (ii) and (iii)
- (c) (i) and (iii) (d) (iii) and (iv)

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ANS: (c)

13 Which of the following are exothermic processes?

- (i) Reaction of water with quick lime
- (ii) Dilution of an acid
- (iii) Evaporation of water
- (iv) Sublimation of camphor (crystals)
- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (i) and (iv)
- (d) (iii) and (iv)

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ANS: (a)

14 Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved ?

- (i) Displacement reaction
- (ii) Precipitation reaction
- (iii) Combination reaction
- (iv) Double displacement reaction
- (a) (i) only (b) (ii) only
- (c) (iv) only (d) (ii) and (iv)

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ANS: (d)

15 Electrolysis of water is a decomposition reaction. The molar ratio of hydrogen and oxygen gases liberated during electrolysis of water is

- (a) 1 : 1 (b) 2 : 1
- (c) 4 : 1 (d) 1 : 2

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ANS: (b)

16 In the following

Questions, the Assertion and Reason have been put forward. Read the statements carefully and choose the correct alternative from the following:

- (a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.
- (b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the

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Assertion.

(c) Assertion is true but the Reason is false.

(d) The statement of the Assertion is false but the Reason is true. Assertion: Magnesium ribbon keeps on burning in atmosphere of nitrogen.

Reason: Magnesium reacts with nitrogen to form magnesium nitrides and this reaction is combination reaction.

ANS: (a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.

17 In the following

Questions, the Assertion and Reason have been put forward. Read the statements carefully and choose the correct alternative from the following:

(a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.

(b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion. 1

(c) Assertion is true but the Reason is false.

(d) The statement of the Assertion is false but the Reason is true. Assertion: Zinc reacts with sulphuric acid to form zinc sulphate and hydrogen gas and it is displacement reaction.

Reason: Zinc reacts with oxygen to form zinc oxide.

ANS: (b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

18 In the following

Questions, the Assertion and Reason have been put forward. Read the statements carefully and choose the correct alternative from the following:

(a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.

(b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion. 1

(c) Assertion is true but the Reason is false.

(d) The statement of the Assertion is false but the Reason is true. Assertion: $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$ is redox reaction.

Reason: MnO_2 oxidises HCl to Cl_2 and gets reduced to MnCl_2 .

ANS: (a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.

19 In the following

Questions, the Assertion and Reason have been put forward. Read the statements carefully and choose the correct alternative from the following:

(a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion. 1

(b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

(c) Assertion is true but the Reason is false.

(d) The statement of the Assertion is false but the Reason is true. Assertion: A lead nitrate on thermal decomposition gives lead oxide, brown coloured nitrogen dioxide and oxygen gas.

Reason: Lead nitrate reacts with potassium iodide to form yellow ppt of lead iodide and the reaction is double displacement as well as precipitation reaction.

ANS: (b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

20 Match Column I with Column II.

Column I	Column II
(i) $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$	(A) Neutralisation reaction
(ii) $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$	(B) Decomposition reaction
(iii) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$	(C) Precipitation reaction
(iv) $2\text{Cu}(\text{NO}_3)_2 \rightarrow 2\text{CuO} + 4\text{NO}_2 + \text{O}_2$	(D) Redox and combination reaction

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ANS: (i) (C) (ii) (D) (iii) (A) (iv) (B)

21 Write the chemical equation of the reaction in which the following changes have taken place with an example of each:

- change in colour
- change in temperature
- formation of precipitate

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ANS: (a) $\text{Cu}(\text{s}) + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}$ The solution will become blue in colour and shiny silver metal will be deposited. (b) $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{Heat}$ The temperature will increase because heat will be evolved. (c) $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{KI}(\text{aq}) \rightarrow \text{PbI}_2(\text{s}) + 2\text{KNO}_3(\text{aq})$
Yellow ppt Yellow precipitate of PbI_2 will be formed.

22 (a) Write the essential condition for the following reaction to take place:

$\text{AgBr} \rightarrow 2\text{Ag} + \text{Br}_2$ Write one application of this reaction. (b) Complete the following chemical equation of a chemical reaction:

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$2\text{FeSO}_4 \xrightarrow{\text{Heat}} \text{Fe}_2\text{O}_3 + \dots + \dots$ (c) What happens when water is added to quick lime. Write chemical equation.

ANS: (a) $2\text{AgBr} \xrightarrow{\text{Sunlight}} 2\text{Ag} + \text{Br}_2$
This reaction is used in photography.

(b) $2\text{FeSO}_4 \xrightarrow{\text{Heat}} \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$

(c) Slaked lime is formed with hissing sound and lot of heat is evolved.

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

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

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ANS: The equations in which gaseous are written in atomic form instead of molecular form and equation is not balanced are called skeltal type chemical equation. The represent gaseous elements formed in atomic state and equation is not balanced.

$\text{H}_2\text{O} \xrightarrow{\text{electrolysis}} \text{H} + \text{O}$ (Skeltal equation) Hydrogen and oxygen are written in atomic forms and equation is not balanced.

$2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$ (Balanced chemical equation)

$\text{H}_2\text{O} \rightarrow \text{H}_2 + \text{O}_2$ is Skeltal equation.

24 Write chemical equation for the reactions taking place when

- (a) Iron reacts with steam
- (b) Magnesium reacts with dil. HCl
- (c) Copper is heated in air.

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ANS: (a) $3\text{Fe}(\text{s}) + 4\text{H}_2\text{O}(\text{g}) \rightarrow \text{Fe}_3\text{O}_4(\text{s}) + 4\text{H}_2(\text{g})$

(b) $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$

(c) $2\text{Cu} + \text{O}_2 \xrightarrow{\text{heat}} 2\text{CuO}(\text{s})$

25 Write balanced equations for the following, mentioning the type of reaction involved.

- (a) Aluminium + Bromine $\rightarrow$ Aluminium bromide
- (b) Calcium carbonate $\rightarrow$ Calcium oxide + Carbon dioxide
- (c) Silver chloride $\rightarrow$ Silver + Chlorine

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ANS: (a) $2\text{Al}(\text{s}) + 3\text{Br}_2(\text{g}) \rightarrow 2\text{AlBr}_3(\text{s})$ (b) $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$ (c) $2\text{AgCl}(\text{s}) \xrightarrow{\text{Sunlight}} 2\text{Ag}(\text{s}) + \text{Cl}_2(\text{g})$

26 Name the type of chemical reaction represent by the following equation: (a) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$

(b) $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow 3\text{BaSO}_4 + 2\text{AlCl}_3$

(c) $2\text{FeSO}_4 \xrightarrow{\text{Heat}} \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$

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- ANS:
- (a) Combination reaction
 - (b) Double displacement reaction (precipitation)
 - (c) Decomposition reaction.

27 State the type of chemical reactions with chemical equations that take place in the following:

- (a) Magnesium ribbon is burnt in air.
- (b) Electric current is passed through water.
- (c) Ammonia and hydrogen chloride gases are mixed.

3

ANS: (a) $2\text{Mg}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{MgO}(\text{s})$ Combination reaction (Redox reaction). (b) $2\text{H}_2\text{O}(\text{l}) \xrightarrow{\text{electrolysis}} 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$ Electrical decomposition reaction. (c) $\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \rightarrow \text{NH}_4\text{Cl}(\text{s})$ Combination reaction.

28 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 the chemical equation for the reaction.

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ANS: (a) Green colour of FeSO_4 disappears and reddish brown Fe_2O_3 is formed. Smell of burning sulphur. (b) Decomposition reaction (c) $2\text{FeSO}_4(\text{s}) \xrightarrow{\text{Heat}} \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$

29 When you have mixed the solutions of lead(II) nitrate and potassium iodide.

- (a) What was the colour of the precipitate formed and can you name the precipitate ?
(b) Write the balanced chemical equation for this reaction.
(c) Is this also a double displacement reaction?

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ANS: (a) The colour of the precipitate is yellow. The name of compound formed as a precipitate is lead iodide (PbI_2).

(b) $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{KI}(\text{aq}) \rightarrow \text{PbI}_2(\text{s}) + 2\text{KNO}_3(\text{aq})$

(c) Yes, it is also a double displacement reaction.

30 The following diagram displays a chemical reaction. Observe carefully and answer the following questions:

- (a) Identify the type of chemical reaction that will take place and define it. How will the colour of the salt change?
(b) Write the chemical equation of the reaction that takes place.
(c) Mention one commercial use of this salt.

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ANS: (a) Photochemical decomposition reaction. Those reactions in which a compound breaks down into simple substances in presence of light are called photochemical decomposition reaction.

The colour of salt will change from white to grey. (b) $2\text{AgCl}(\text{s}) \xrightarrow{\text{Sunlight}} 2\text{Ag}(\text{s}) + \text{Cl}_2(\text{g})$ (c) Silver chloride is used in photography.

31 Write balanced chemical equation for the reactions that take place during respiration. Identify the type of combination reaction that takes place during this process and justify the name. Give one more example of this type of reaction.

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ANS: $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq}) + 6\text{O}_2(\text{aq}) \rightarrow 6\text{CO}_2(\text{aq}) + 6\text{H}_2\text{O}(\text{l}) + \text{Heat energy}$

It is exothermic combination reaction because heat energy is being evolved.

$\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}$

Combustion of methane is another example of exothermic combination reaction.

32 2 g of lead nitrate powder is taken in a boiling tube. The boiling tube is heated over a flame. Now answer the following:

- (a) State the colour of the fumes evolved and the residue left.
(b) Name the type of chemical reaction that has taken place stating its balanced chemical equation.

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ANS: (a) Brown coloured fumes of NO_2 gas are evolved and yellowish brown residue is formed.

(b) Decomposition reaction has taken place as, $2\text{Pb}(\text{NO}_3)_2(\text{s}) \xrightarrow{\text{Heat}} 2\text{PbO}(\text{s}) + 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$

33 What is meant by:

- (a) Displacement reaction

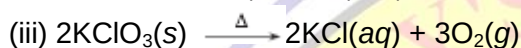
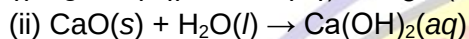
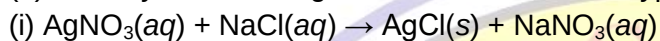
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- (b) Reduction reaction
(c) Combination reaction.

Write balanced chemical equation for each reaction:

ANS: **(a) Displacement reaction:** The reaction in which more reactive element can displace less reactive element from its salt solution, e.g. $\text{Fe(s)} + \text{CuSO}_4\text{(aq)} \rightarrow \text{FeSO}_4\text{(aq)} + \text{Cu(s)}$ **(b) Reduction reaction:** The reaction in which H_2 is added or O_2 is removed or gain of electrons takes place, e.g. $\text{Fe}^{3+} + \text{e}^- \rightarrow \text{Fe}^{2+}$ **(c) Combination reaction:** Those reactions in which two elements or compounds react to form single compound. e.g. $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightarrow 2\text{NH}_3\text{(g)}$

34 (a) Classify the following reactions into different types:



(b) Which of the above reaction(s) is/are precipitation reaction(s)? Why is a reaction called precipitation reaction?

ANS: (a) (i) Precipitation reaction (Double displacement reaction)

(ii) Combination reaction

(iii) Decomposition reaction

(b) (i) is precipitation reaction because one of the products formed is insoluble in water.

35 What is meant by

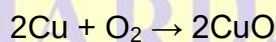
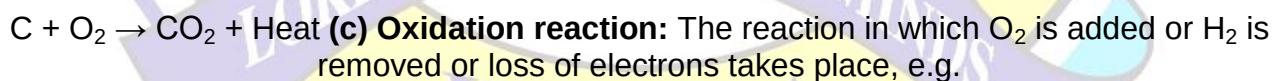
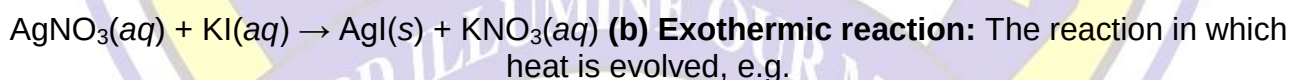
(a) precipitation reaction,

(b) exothermic reaction,

(c) oxidation reaction.

Write balanced chemical equations for an example of each.

ANS: **(a) Precipitation reaction:** The reaction in which two compounds exchange their ions and the product formed is insoluble in water is called precipitation reaction, e.g.

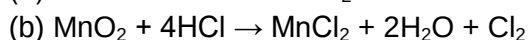
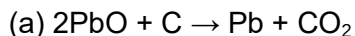


36 A reddish brown coloured metal, used in electrical wires, when powdered and heated strongly in an open china dish, its colour turns black. When hydrogen gas is passed over this black substance, it regains its original colour. Based on the above information answer the following questions. (a) Name the metal and the black coloured substance formed. (b) Write balanced chemical equations for both the reactions.

ANS: (a) Reddish brown metal is copper. When it is heated in china dish in presence of oxygen, black coloured copper oxide is formed. (b) $2\text{Cu(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{CuO(s)}$ When hydrogen gas is passed over heated copper oxide reddish brown copper metal is formed, e.g.



37 What is redox reaction? Identify the substance oxidised and the substance reduced in the following reactions:



ANS: Those reaction in which oxidation and reduction takes place simultaneously are called redox reactions.

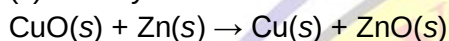
(a) PbO is getting reduced and C is getting oxidised.

(b) MnO₂ is getting reduced. HCl is getting oxidised.

38 (a) Why is respiration considered an exothermic reaction?

(b) Define the terms-oxidation and reduction.

(c) Identify the substance that is oxidised and reduced in the reaction:



ANS: (a) It is because heat is evolved during respiration.

(b) Oxidation is a process in which O₂ is added or H₂ is removed or loss of electrons take place.

Reduction is a process in which H₂ is added or O₂ is removed or gain of electrons take place.

(c) Zn is getting oxidised, CuO is getting reduced.

3 (a) Define a balanced chemical equation. Why should an equation be balanced?

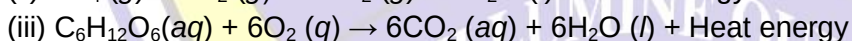
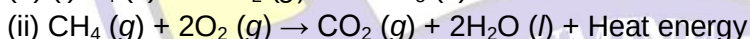
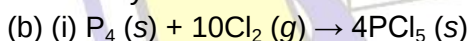
9 (b) Write the balanced chemical equation for the following reaction:

(i) phosphorus burns in presence of chlorine to form phosphorus pentachloride.

(ii) burning of natural gas.

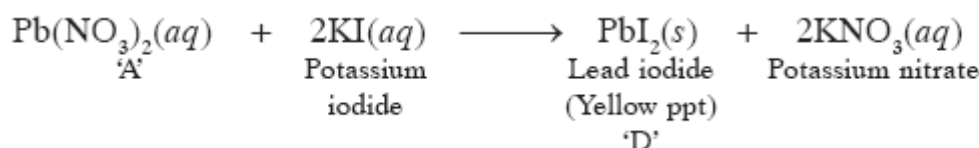
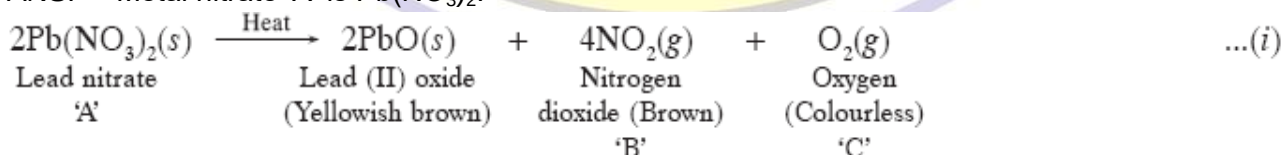
(iii) the process of respiration.

ANS: (a) Balanced chemical equation has an equal number of atoms of different elements in the reactants and products. According to law of conservation of mass, matter can neither be created nor be destroyed in a chemical reaction.



4 A metal nitrate 'A' on heating gives yellowish brown coloured metal oxide along with brown gas 'B' and a colourless gas 'C'. Aqueous solution of 'A' on reaction with potassium iodide forms a yellow precipitate of compound 'D'. Identify 'A, B, C, D'. Also identify the types of both the reactions. Metal present in 'A' is used in alloy which is used for soldering purposes.

ANS: Metal nitrate 'A' is Pb(NO₃)₂.



'A' is lead nitrate, 'B' is nitrogen dioxide, 'C' is oxygen and 'D' is lead iodide.

(i) is decomposition reaction and (ii) is double displacement reaction (Precipitation reaction)



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