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Questions:

Case Study Questions

1. In a balanced chemical reaction, equal number of atoms are present on both sides of reaction. A balanced chemical reaction is based on law of conservation of mass which means that total mass of reactants and products participating in a reaction must be equal. For example, a balanced chemical equation of burning of magnesium in oxygen to form magnesium oxide is written as :

$2Mg + O_2 \longrightarrow 2MgO$

The mass of reactants (2 x 24 + 32 = 80) is equal to the mass of products [2 x (24 + 16) = 80]

(i) In a reaction, 35 g of reactant, PQ breaks down into 20 g of product, P and an unknown amount of product, Q. Using the law of conservation of mass, weight of products, Q will be

(a) 25g	(b) 35g	(c) 30g	(d) 15g

(ii) When solid mercury (II) oxide is heated, liquid mercury and oxygen gas are produced. Which of the following statements is true regarding the balanced chemical equation for this process?

(a) 1 mole of mercury (II) oxide produces two moles of mercury and one mole of oxygen gas

(b) 2 moles of mercury (II) oxide produce one mole of mercury and one mole of oxygen gas

(c) 1 mole of mercury (II) oxide produces half mole of mercury and half mole of oxygen gas

(d) 2 moles of mercury (II) oxide produce 2 moles of mercury and one mole of oxygen gas

(iii) Which of the following laws is satisfied by a balanced chemical equation?

(a) Law of multiple proportions	(b) Law of conservation of mass
(c) Law of conservation of motion	(d) Law of conservation of magnetism

(iv) In the given chemical reaction

$C_6H_{6(l)} + 15O_{2(g)} \longrightarrow mCO_{2(g)} + nH_2O_{(l)}$

The values of m and n are respectively

(a) 14 and 8	(b) 12 and 6	(c) 8 and 10	(d) 12 and 10

(v) Sulphur dioxide reacts with oxygen to form sulphur trioxide. What would be the molar ratio of sulphur dioxide to sulphur trioxide?

(a) 2: 3	(b) 1: 1	(c) 1: 2	(d) 3: 2

2. Reactions in which one element takes place of another element in a compound, are known as displacement reactions. In general, more reactive elements displaces a less reactive element from its compound. In all single displacement reactions, only one element displaces another element from its compound. The single displacement reactions are, however, written as just displacement reactions. The displacement reaction between iron (III) oxide and powdered aluminium produces so much heat that iron metal obtained is in molten form.

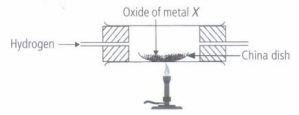
(i) Copper displaces which of the following metals from its salt solution?

(a) $ZnSO_4$	(b) $FeSO_4$	(c) $AgNO_3$	(d) $NiSO_4$

(ii) When zinc reacts with dilute sulphuric acid, the gas evolved is

(a) red in colour and have a sweet smelling
(b) green in colour and have a foul smell
(c) colourless, odourless and burns with a pop sound
(d) colourless, pungent smelling and burns with a pop sound

(iii) When dry hydrogen is passed over a heated oxide of metal X using the apparatus shown below, a reddish-brown residue is obtained



The reddish -brown residue could be

(a) copper	(b) lead	(c) silver	(d) zinc

(iv) Which of the following reactions is a displacement reaction?

(a) $CaO + H_2O \longrightarrow Ca(OH)_2$	(b) $MgCO_3 \longrightarrow Mg + CO_2$
(c) $Mg + CuSO_4 \longrightarrow MgSO_4 + Cu$	(d) $H_2 + Cl_2 \longrightarrow 2HCl$

(v) When dilute hydrochloric acid is added to granulated zinc placed in a test tube, the observation made is

(a) the surface of the metal turns shining
(b) the reaction mixture turns milky
(c) greenish yellow gas is evolved
(d) the colourless and odourless gas evolves with a pop sound.

3. Chemical reaction, a process in which one or more substances, the reactants, are converted to one or more different substances, the products. Substances are either chemical elements or compounds. A chemical reaction rearranges the constituent atoms of the reactants to create different substances as products. Study this table related to the different types of reactions / processes and answer the questions that follow.

S.No.	Name of Process	Word Equation
i	Combustion	Magnesium + Oxygen $\xrightarrow{heat}$ Magnesium dioxide
ii	Photosynsthesis	Carbon dioxide + Water $\xrightarrow[chlorophyll]{sunlight}$ Glucose + Oxygen + Water
iii	Combination	Iron + Sulphur $\xrightarrow{heat}$ Iron sulphide
iv.	Photodecomposition	Silver bromide $\xrightarrow{light}$ Silver + Bromine

(i) The reaction in which two or more substances combine to form a single substance under suitable conditions is

(a) combination reaction (b) combustion

(c) decomposition reaction (d) photosynthesis

(ii) Which of the following is essential for photosynthesis?

(a) Sunlight (b) Chlorophyll (c) Glucose (d) Both 'a' and 'b'

Photosynthesis is the process by which green plants and some other organisms use sunlight to synthesis nutrients from carbon dioxide and water.

(iii) When a chemical compound decomposes on absorbing light and energy, then the reaction which takes place is known as

(a) photosynthesis (b) photodecomposition

(c) combination (d) thermal decomposition.

A photodecomposition is a chemical reaction in which an inorganic chemical (or an organic chemical) is broken down by photons and is the interaction of one or more photons with one target molecule.

(iv) Which of the following reactions is an example of combustion reaction ?

$(a)C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)} (b)Zn_{(s)} + H_2SO_{4(aq)} \longrightarrow ZnSO_{4(aq)} + H_{2(g)} (c)Zn_{(s)} + 2HCl_{(aq)} \longrightarrow ZnCl_{2(aq)} + H_{2(g)} (d)3Mg_{(s)} + N_{2(g)} \longrightarrow Mg_3\,N_{2(s)}$

A combustion reaction is a reaction in which a substance reacts with oxygen gas, releasing energy in the form of light and heat.

(v) Which of the following is an example of combination reaction?

$(a)H_{2(g)} + Cl_{2(g)} \xrightarrow{\text{light}} 2HCl_{(g)} (b)Fe_{(s)} + S_{(s)} \longrightarrow FeS_{(g)} (c)2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(l)} (d)\,All\ of\ them$

A combination reaction (also known as a synthesis reaction) is a reaction where two or more elements or compounds (reactants) combine to form a single compound (product).

Assertion and reason

4. Assertion: CO + $2H_2 \xrightarrow[\triangle]{340\ atm}$ CH_3OH(l)

Reason: It is a combination reaction because CO combines with H_2 to form CH_3OH i.e., two substances combine to form a single compound.

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

5. Assertion: Corrosion of iron is commonly known as rusting.

Reason: Corrosion of iron occurs in presence of moist air.

Codes

(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.

6. Assertion: Zinc reacts with sulphuric acid to form zinc sulphate and hydrogen gas and it is a displacement reaction.

Reason: Zinc reacts with oxygen to form zinc oxide.

Codes

(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.

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QUESTION BANK 365

Answer the following 5 marks questions

7. On adding a drop of barium chloride solution to an aqueous solution of sodium sulphite, white precipitate is obtained.

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

(b) What other name can be given to this precipitation reaction?

(c) On adding dilute hydrochloric acid to the reaction mixture, white precipitate disappears. Why?

8. (a) Write one example for each of decomposition reaction carried out with help of

(i) Electricity (ii) Heat (iii) Light

(b) Which of the following statements is correct and why copper can displace silver from silver nitrate and silver can displace copper from copper sulphate solution.

9. Describe an activity to observe what happens when quicklime is added to water taken in a beaker. State two important observations and name the type of reaction taking place.

Answer the following 3 marks questions

10. Write the balanced equation for the following chemical reactions.

(i) Hydrogen + Chlorine → Hydrogen chloride

(ii) Barium chloride + Aluminium sulphate → Barium sulphate + Aluminium chloride

(iii) Sodium + Water → Sodium hydroxide + Hydrogen

11. What is a balanced chemical equation? Why should chemical equations be balanced?

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

(a) Potassium bromide(aq) + Barium Iodide(aq) → Potassium iodide(aq) + Barium bromide(s)

(b) Zinc carbonate(s) → Zinc oxide(s) + Carbon dioxide(g)

(c) Hydrogen(g) + Chlorine(g) → Hydrogen chloride(g)

(d) Magnesium(s) + Hydrochloric acid(aq) → Magnesium chloride(aq) + Hydrogen(g)

13. Why is respiration considered an exothermic reaction? Explain

14. Identify the type of reactions(s) in the following equations.

$(i)CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O (ii)Pb(NO_3)_2 + 2Kl \longrightarrow Pbl_2 + 2KNO_3 (iii)CaO + H_2O \longrightarrow Ca(OH)_2 (vi)CuSO_4 + Zn \longrightarrow ZnSO_4 + Cu$

15. State one advantage and one disadvantage of corrosion

16. Arnav took magnesium and reacted it with dil. HCI to record the observation. Then Deepak took the same piece of magnesium and reacted it with conc. HNO_3 and dil. $H2SO_4$ but did not see a reaction. Explain this behavior.

Answer the following 2 marks questions

17. Why does the colour of copper sulphate solution change when an iron nail is dipped in it?

18. Translate the following statements into chemical equations and then balance them.

(a) Hydrogen gas combines with nitrogen to form ammonia

(b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide

(c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate
(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

19. Explain the following terms with one example each:
(a) Corrosion (b) Rancidity

20. Which among the following changes are exothermic or endothermic in nature?
(a) Decomposition of ferrous sulphate
(b) Dilution of sulphuric acid
(c) Dissolution of sodium hydroxide in water
(d) Dissolution of ammonium chloride in water

21. Write a balanced chemical equation for the following reaction. Ethanol is warmed with ethanoic acid to form ethyl acetate in the presence of concentrated $HSO_4, {}_2SO_4$.

22. On what basis is a chemical equation balanced?

Multiple Choice Question

23. Which of the statements about the reaction below are incorrect?
$2PbO(s) + C(s) \rightarrow 2Pb(s) + CO_2(g)$
(a) Lead is getting reduced
(b) Carbon dioxide is getting oxidized
(c) Carbon is getting oxidized
(d) Lead oxide is getting reduced.
(a) (a) and (b) (b) (a) and (c) (c) (a), (b) and (c) (d) All of these

24. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$.
The above reaction is an example of a
(a) Combination of reaction (b) Double displacement reaction (c) Decomposition reaction (d) Displacement reaction.

25. What happens when dilute hydrochloric acid is added to iron fillings? Tick the correct answer
(a) Hydrogen gas and Iron chloride are produced. (b) Chloride gas and Iron hydroxide are produced. (c) No reaction takes place (d) Iron salt and water are produced

26. Which one of the following processes involves chemical reactions?
(a) Storing of oxygen gas under pressure in a gas cylinder. (b) Liquefaction of air. (c) Keeping petrol in a china dish in the open.
(d) Heating copper wire in presence of air at high temperature.

27. Which of the following are combination reactions?
(i) $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$
(ii) $MgO + H_2O \rightarrow Mg(OH)_2$
(iii) $4Al + 3O_2 \rightarrow 2Al_2O_3$
(iv) $Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$
(a) (i) and (iii) (b) (iii) and (iv) (c) (ii) and (iv) (d) (ii) and (iii)

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QUESTION BANK 365

28. Silver article turns black when kept in the open for a few days due to formation of
(a) H_2S (b) AgS (c) $AgSO_4$ (d) Ag_2S

29. When crystals of lead nitrate are heated strongly in a dry test tube
(a) crystals immediately melt (b) a brown residue is left (c) white fumes appear in the tube (d) a yellow residue is left

30. When carbon dioxide is passed through lime water
(a) calcium hydroxide is formed (b) white precipitate of CaO is formed (c) lime water turns milky (d) colour of lime water disappears

31. Which of the following feature is common to both physical and chemical change?
(a) Evolution of hydrogen gas (b) Formation of new precipitate (c) Evolution of carbon dioxide (d) Change in state and colour

32. Which one of the following reaction is not balanced?
(a) $CaCO_3 \rightarrow CaO + CO_2$ (b) $2KI + H_2O_2 \rightarrow 2KOH + I_2$ (c) $Mg + 2HCl \rightarrow MgCl_2 + H_2$ (d) $2Fe + 3H_2O \rightarrow Fe_2O_3 + H_2$

33. The balanced chemical equation for the reaction of zinc metal with hydrochloric acid is
(a) $Zn + HCl \rightarrow ZnCl + H_2$ (b) $Zn + HCl \rightarrow ZnCl_2 + H_2$ (c) $Zn + 2HCl \rightarrow 2ZnCl_2 + H_2$ (d) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

34. $NH_4OH + FeCl_3 \rightarrow NH_4Cl + Fe(OH)_3$
To balance the above equation, the coefficient for ammonium hydroxide and ammonium chloride will be:
(a) 3 and 3 (b) 3 and 1 (c) 3 and 2 (d) 2 and 3

35. 10 g of hydrogen is burnt in the presence of excess oxygen. The mass of water formed is
(a) 90 g (b) 45 g (c) 10 g (d) 18 g

36. What is true about the following equation?
$3Fe(s) + 4H_2O(g) \longrightarrow Fe_3O_4(s) + 4H_2(g)$
(i) Iron metal is being oxidised
(ii) Water is being reduced
(iii) Water is acting as reducing agent
(iv) Water is acting as oxidising agent
(a) (i), (ii) and (iii) (b) (ii) and (iv) (c) (i), (ii) and (iv) (d) (ii) and (iv)

37. On placing a copper coin in a test tube containing green ferrous sulphate solution, it will be observed that the ferrous sulphate solution
(a) turns blue, and a grey substance is deposited on the copper coin. (b) turns colourless and a grey substance is deposited on the copper coin
(c) turns colourless and a reddish-brown substance is deposited on the copper coin. (d) remains green with no change in the copper coin.

38. The following reactions are carried out in open vessels.
(P) $2Cu(s) + O_2(g) \xrightarrow{\text{Heat}} 2CuO(s)$
(Q) $Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$
(R) $2FeSO_4(s) \xrightarrow{\text{Heat}} Fe_2O_3(s) + SO_2(g) + SO_3(g)$
Which of the following correctly shows, if the weight of the reaction vessel and contents increases, decreases or remains the same after the reaction as compared to before the reaction?

(a)

Reaction P	Reaction Q	Reaction R
decreases	remains the same	increases

(b)

Reaction P	Reaction Q	Reaction R
remains the same	increases	increases

(c)

Reaction P	Reaction Q	Reaction R
increases	decreases	increases

(d)

Reaction P	Reaction Q	Reaction R
increases	remains the same	decreases

39. **Assertion (A) The colour of aqueous solution of copper sulphate turns colourless when a piece of lead is added to it.**
Reason (R) Lead is more reactive than copper, and hence displaces copper from its salt solution.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

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