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Answers Key:

Case Study Questions

1. (i) (d) : $PQ \longrightarrow P + Q$
   35 g 20 g + ?
   According to law of conservation of mass, Mass of PQ = Mass of P + Mass of Q
   ∴ Mass of Q = (35 - 20)g = 15 g
   (ii) (d) : $2HgO_{(s)} \longrightarrow 2Hg_{(l)} + O_{2(g)}$
   (iii) **(b)**
   (iv) **(b)**
   (v) **(b)**
2. (i) (c) : $Cu + 2AgNO_3 \longrightarrow Cu(NO_3)_2 + 2Ag$
   Copper can displace silver from its salt solution since, copper is more reactive than silver.
   (ii) (c) : $Zn + H_2SO_{4(dil.)} \longrightarrow ZnSO_4 + H_2 \uparrow$
   H_2 is a colourless, odourless gas and burns with a pop sound.
   (iii) (a) : $CuO + H_2 \xrightarrow{Heat} Cu + H_2O$
   Copper oxide, Hydrogen, Copper (Reddish-brown), Water vapour
   (iv) **(c)**: It is a single displacement reaction.
   (v) (d) : $Zn + 2HCl \longrightarrow ZnCl_2 + H_2 \uparrow$
3. (i) **(a)** combination reaction
   (ii) **(d)** Both 'a' and 'b'
   (iii) **(b)** photodecomposition
   (iv) (a) $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$
   (v) **(d)** All of them

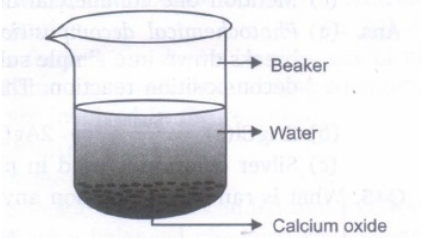
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Assertion and reason

4. (a) If both assertion and reason are true and the reason is correct explanation of assertion.
5. **(b)** Both A and R are true, but R is not the correct explanation of the assertion
6. **(b)** Both A and R are true, but R is not the correct explanation of the assertion.

Answer the following 5 marks questions

7. (a) A white precipitate of barium sulphite is formed when barium chloride is added to the solution of sodium sulphite.
   $\underset{BariumChloide}{BaCl_2} + \underset{Sodiumsulphite}{Na2S03} \rightarrow \underset{Baru\ sulphate(white\ ppt)}{BaS03\downarrow} + \underset{Sodiumchloride}{2NaCI}$
   (b) This precipitation reaction is also a double displacement reaction.
   (c) Barium chloride, suphur dioxide and water are formed when dilute hydrochloric acid is added to this solution of barium sulphite. Since barium chloride is a soluble substance, thus white precipitate of barium sulphite disappears.
   $\underset{Barium\ sulphate(white\ ppt)}{BaCl_2} + \underset{Hydrochloricacid}{2HCl(aq)} \rightarrow \underset{Bariumchloride}{BaCl_2(aq)} + \underset{Sulphurdioxde}{SO_2} + \underset{Water}{H_2O}$
8. (a) (i) $2H_2O \xrightarrow{electricity} 2H2(g) + O2$
   (ii) $CaCO_3 \xrightarrow{heat} CaO + CO_2$
   (iii) $2AgBr \xrightarrow{sunlight} 2Ag + Br_2$
   (b) Copper can displace silver from AgN03 because copper is more reactive than Ag
   $Cu + 2AgNO_3(ag) \longrightarrow Cu(NO_3)2(aq) + 2Ag(s)$
9. Aim: To observe what happens when quicklime is added to water taken in a beaker
   Materials Required: Quicklime (calcium oxide), water, beaker.
   Procedure:
   1. Take Sg of calcium oxide in a beaker.
   2. Add water to it slowly.
   3. Touch the beaker.
   4. Note down the observations.



Formation of slaked lime by the reaction of quicklime with water

Observation:
Calcium oxide reacts with water vigorously to form calcium hydroxide with the evolution of heat.
Chemical Reaction:
$CaO(s) + H_2O(l) \longrightarrow Ca(OH)_2(aq) + Heat$
Quicklime Water Slaked lime
Conclusion:
The reaction between CaO (calcium oxide) and H_2O is a combination reaction. It is an exothermic process because heat is evolved.

Answer the following 3 marks questions

10. (i) $H_2 + Cl_2 \rightarrow 2HCI$
(ii) $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 3BaSO_4 \downarrow + 2AlCl_3$
(iii) $2Na + 2H_2O \rightarrow 2NaOH + H_2$

11. A chemical change is represented by a chemical equation. When the number of atoms of different elements on reactant and product side are equal, then the chemical equation is called a balanced chemical equation.
It is important to balance a chemical equation because
(i) to validate the law of conservation of mass which states that the mass of reactants should be equal to the mass of the products. The total mass of a system is thus conserved.
This law holds true only if number of atoms of reactants reacting together is equal to number of product atoms formed.
(ii) a balanced chemical equation tells us about the physical state of the reactants and products whether they are solid (s), liquid (l) or gas (g) or aqueous(aq).
(iii) it tells us about heat changes that can take place in a chemical reaction. Δ is the symbol of heat. Hence, it is endothermic or exothermic can be deduced from a balanced chemical equations.

12. (a) $2KBr(aq) + BaI_2(aq) \rightarrow 2KI + (aq) + BaBr_2(s)$
Type: Double displacement reaction
(b) $ZnCO_3(s) \xrightarrow{\Delta} ZnO(s)+CO_2(g)$
Type: Thermal decomposition reaction
(c) $H_2(g)+Cl_2(g) \rightarrow 2HCl(g)$
Type: Combination reaction
(d) $Mg(s)+2HCl(aq) \rightarrow MgCl_2(aq)+H_2(g)$
Type: Displacement reaction

13. The food taken by the living beings is ultimately broken down to glucose by the digestive system. The glucose so formed is slowly oxidised to carbon dioxide and water with the release of heat energy. Thus, respiration is an exothermic reaction.
$C_6H_{12}O_6(aq) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l) + energy$
(Glucose)

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14. (i) Combustion reaction and oxidation reaction.
(ii) Double displacement reaction and precipitation reaction.
(iii) Combination reaction.
(iv) Displacement reaction.

15. **Advantage:** In some metals a protective layer is formed on its surface to prevent it from further corrosion.
E.g., aluminium (Al) forms a layer of Aluminium oxide (Al_2O_3) by corrosion. The layer prevents further corrosion.
Disadvantage: Loss of the metal.

16. Arnav had already reacted Mg with dil. HCI to form $MgCl_2$ and gas. The piece of metal that Deepak used was not magnesium but magnesium chloride ($MgCl_2$), hence it did not react with the given acids.

Answer the following 2 marks questions

17. The colour of copper sulphate solution changes when an iron nail is dipped in it because iron being more reactive than copper, displaces copper metal from aqueous copper sulphate solution. Thus, blue colour of copper sulphate fades away to give green colour solution of ferrous sulphate.
$Fe\ (s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Cu(s)$
Grey Blue Green Brown

18. (a) $3H_2(g) + N_2(g) \rightarrow 2NH_3(g)$
(b) $2H_2S(g) + 3O_2(g) \rightarrow 2H_2O(l) + 2SO_2(g)$
(c) $3BaCl_2\ (aq) + Al_2(SO_4)_3\ (aq) \rightarrow 2AICI_3\ (aq) + 3BaSO_4\ (s)\downarrow$
(d) $2K\ (s) + 2H_2O\ (l) \rightarrow 2KOH\ (aq) + H_2\ (g)$

19. **(a) Corrosion:**
The phenomenon due to which open surface of the metals are slowly eaten away by the reaction of air, water and chemicals present in the atmosphere, is called Corrosion.
(b) Rancidity:
It is the process of slow oxidation of oil and fat (which are volatile in nature) present in the food materials resulting in the change of smell and taste in them.

20. (a) Endothermic.
(b) Exothermic.
(c) Exothermic.
(d) Endothermic.

21. $C_2H_2OH+CH_3COOH \xrightarrow[Esterification]{Conc.H_2SO_4} CH_3COOH+H_2O.$

22.

The number of atoms on left hand side of the reaction (i.e., reactants) is equal to the number of atoms on the right hand side of the equation (i.e., product).
Law of conservation of Mass: Mass of atoms in chemical reaction can neither be created nor be destroyed, it remains the same.

Multiple Choice Question

23. (a) (a) and (b)
24. (d) Displacement reaction.
25. (a) Hydrogen gas and Iron chloride are produced.
26. (c) Keeping petrol in a china dish in the open.
27. (d) (ii) and (iii)
28. (d) Ag_2S
29. (b) a brown residue is left
30. (c) lime water turns milky
31. (d) Change in state and colour
32. (d) $2Fe + 3H_2O \rightarrow Fe_2O_3 + H_2$
33. (d) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
34. (a) 3 and 3
35. (a) 90 g
36. (c) (i), (ii) and (iv)
37. (d) remains green with no change in the copper coin.
38. (a)

Reaction P	Reaction Q	Reaction R
decreases	remains the same	increases

39. (a) (d) Assertion is false but Reason is true. The correct form of Assertion is as follows
The colour of aqueous solution of copper sulphate turns white when a piece of lead is added into it because lead is more reactive than copper, hence displaces copper from its salt solution.

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