ISC Class 12th Exam 2024

Chemistry

Assertion and Reason Based Questions

1. Assertion : 0.1 M solution of KCl has greater osmotic pressure than 0.1 M solution of glucose at same temperature.

Reason : In solution, KCl dissociates to produce more number of particles.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

Explanation : 0.1 M solution of KCI has greater osmotic pressure than 0.1 M solution of glucose at same temperature.

p = iCRT

$KCl \rightarrow K+ + Cl-$

So, i for KCl = 2

For glucose = 1

Since KCl is an electrolyte, it dissociate into K* and Cl- ions whereas glucose does not dissociate as it is an organic solute. So, i = 1. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

2. Assertion : In solution, amalgam of mercury with sodium is an example of solid solutions.

Reason : Mercury is solvent and sodium is solute in the solution.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : Amalgam of mercury with sodium is an example of solid solutions. It contains a liquid solute and solid solvent. In the amalgam of mercury (liquid metal) acts as solute and sodium as solvent. Thus, assertion is true, but reason is false.

3. Assertion : Azeotropic mixtures are not formed only by non-ideal solutions and they may have boiling points either greater than both the components or less than both the components.

Reason : The composition of the vapour phase is same as that of the liquid phase of an azeotropic mixture.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (d) Assertion is false but reason is true.

Explanation : Azeotropic mixtures are formed only by non-ideal solutions and they may have boiling points either greater than both the components or less than both the components and the composition of the vapour phase is same as that of the liquid phase of an azeotropic mixture. However, Non-ideal solutions with positive deviation or more vapour pressure than expected, boil at a lower temperature than the components, while those with negative departure boil at a higher temperature. Thus, both assertion and reason are true, but reason is not the correct explanation of assertion.

4. Assertion : At equilibrium, vapour phase will be always rich in component which is more volatile.

Reason : The composition of vapour phase in equilibrium with the solution is determined by the partial pressures of the components.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

Explanation : At equilibrium, the vapour phase will always be rich in volatile components. The higher liquid's vapour pressure is at a given temperature the higher its volatility and the lower the liquid's typical boiling point. The partial pressure of components determines the composition of the vapour phase in equilibrium with the solution. Thus, both assertion and reason true and reason is the correct explanation of assertion.

5. Assertion : An ideal solution obeys Henry's law.

Reason : In an ideal solution, solute-solute as well as solvent solvent interactions are nearly similar to solute-solvent interaction.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (d) Assertion is false but reason is true.

Explanation : An ideal solution obeys Raoult's law. In an ideal solution, it takes exactly the same amount of energy for solvent molecule to break away from the surface of the solution as in the pure solvent. The forces of attraction between solvent-solvent and solute-solute are nearly same as the between solute - solvent interaction. Thus assertion is false but reason is true.

6. Assertion : In cell, current stops flowing when $E_{cell} = 0$.

Reason : Equilibrium of the cell reaction is attained.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

Explanation : For reaction to be spontaneous, E_{cell} should have a positive value and $\Delta_r G_{cell}$ negative. Hence, Current stops flowing when E_{cell} - O because equilibrium of the cell reaction is attained. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

7. Assertion : The resistivity for a substance is its resistance when it is one meter long and its area of cross section is one square meter.

Reason : The SI units of resistivity is ohm metre (Ωm).

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

Explanation :

We know that : $R \propto 1/A$ or $R = p(l/A)$

Where, 1 = length of substance

A = area of cross-section

p = proportionality constant is called resistivity.

Ifl = lm and A = 1 m^2

Then, R = p, i.e., resistance = Resistivity.

The SI units of resistivity is ohm metre (Ωm).

Thus, both assertion and reason are true but reason is not the correct explanation of the assertion.

8. Assertion : If a solution contains both H^+ and Na^+ ions, the H^+ ions are reduced first at cathode.

Reason : Cations with higher E° value are reduced first at cathode.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

Explanation : If a solution contains both H^+ and Na^+ ions, the H^+ ions are reduced first at cathode because Cations with higher E° value are reduced first at cathode. Thus, both assertion and reason are true and the reason is the correct explanation of assertion.

9. Assertion : If the activation energy of a reaction is zero, temperature will have no effect on the rate constant.

Reason : Lower the activation energy, faster is the reaction.

Ans. (b) Both assertion and reason are true but reason is not the correct explanation of the assertion.

Explanation : The Arrhenius expression is $k = Ae^{-Ea/RT}$

When the activation energy is zero, the term $e^{-Ea/RT}$ becomes equal to 1.

Hence, the rate constant becomes independent of the temperature.

When the value of the activation energy is low, the value of the rate constant is higher.

Hence, the rate of the reaction is also high.

Thus, both assertion and reason are true but reason is not the correct explanation of assertion.

10. Assertion : Rate constants determined from Arrhenius equation are fairly accurate for simple as well as complex molecules.

Reason : Reactant molecules undergo chemical change irrespective of their orientation during collision.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : Rate constant determined form Arrhenius equation are fairly accurate for simple and complex molecules because only those molecules which of have proper orientation during collision (i.e., effective collision) and sufficient kinetic lead the chemical change. Thus, assertion is true but reason is false.

11. Assertion : The highest oxidation state of osmium is +8.

Reason : Osmium is a 5d-block element.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

Explanation : Osmium has the electronic configuration $5d^6 6s^2$. As 6d and 6s are close in energy, all the 8 electrons can participate in bonding. Thus, both assertion and reason are true but reason is not the correct explanation of assertion.

12. Assertion :

The highest oxidation state is exhibited in oxo-anions of a metal.

Reason :

This is due to the combination of the metal with oxygen, which is highly electronegative and oxidising agent.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : Oxo metal anions have highest oxidation state, example Cr in $Cr_2O_7^{2-}$ has an oxidation state of +6 whereas Mn in MnO_4-has an oxidation state of +7. This is again due to the combination of the metal with oxygen, which is highly electronegative and oxidising agent. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

13. Assertion : Transition metals have low melting points.

Reason : The involvement of greater number of (n - 1)d and ns electrons in the interatomic metallic bonding.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (d) Assertion is false, but reason is true.

Explanation : Transition metals have higher melting points till middle of the series, then their melting point decreases. This is due to the involvement of greater number of (n-1)d and ns electrons in the interatomic metallic bonding. Thus, assertion is false but reason is true.

14. Assertion : Low spin tetrahedral complexes are rarely observed.

Reason : Crystal field splitting energy is less than pairing energy for tetrahedral complexes.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation :

A compound when it is tetrahedral has sp^3 hybridization which means that the last d-orbital is not empty. The low spin complexes are formed when a strong field ligand forms a bond with the metal or ion. The strong field ligand cause pairing of electrons and it makes the last d-orbital empty and thus tetrahedral is not formed. Also, the d-orbital splitting is small as compared to octahedral. Hence, the orbital splitting energy are not enough to force pairing. As a result, low spin configuration is rarely observed in tetrahedral complexes. Thus, both

assertion and reason are true and reason is the correct explanation of assertion.

15. Assertion : The enthalpies of atomisation of the elements in the first transition series are lower than those of the corresponding elements in the second and third transition series.

Reason : +2 and +3 oxidation states are more common for elements in the first transition series, while higher oxidation states are more common for the heavier elements.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

Explanation : The enthalpies of atomisation of the elements in the first transition series are lower than those of the corresponding elements in the second and third transition series. +2 and +3 oxidation states are more common for elements in the first transition series, while higher oxidation states are more common for the heavier elements. Thus, both assertion and reason are true but reason is not the correct explanation of assertion.

16. Assertion : $KMnO_4$ and $Ce(SO_4)_2$ are coloured.

Reason : They are coloured due to the presence of unpaired electrons in metal ions.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : $KMnO_4$ is coloured due to the charge transfer and not because of the presence of unpaired electrons. Similarly, oxidation state of Ce in $Ce(SO_4)_2$ is +4 with 4f° electronic configuration. It is also coloured (yellow) due to charge transfer and not due to f-f transition. Thus, assertion is true but reason is false.

17. Assertion : Cu^{2+} iodide is not known.

Reason : Cu^{2+} oxidises I- to iodine.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : Cu^{2+} is more stable than Cu^{+} due to high hydration enthalpy and in case of iodine, Cu^{2+} oxidises I^{-} to I_2. Hence, copper(II) iodide is not known. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

18. Assertion : Cl-, H_2O, NH_3 are the examples of unidentate ligands.

Reason : Unidentate ligands bind to central metal ion through a single donor atom.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : Cl-, H_2O, NH_3 attaches with central metal ion through one donor atom hence, these are example of unidentate ligands. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

19. Assertion: $N(CH_2CH_2NH_2)_3$ and EDTA are examples of polydentate ligands.

Reason : Ligands which can ligate through two different atoms are called polydentate ligand.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : In polydentate ligands several donor atoms are present in single ligand. For example, $N(CH_2CH_2NH_2)_3$ has 4 donor atoms whereas, EDTA has 6 donor atoms. Hence, they both are examples of polydentate ligands. On the other hand, ligands which can ligate through two different atoms is called ambidentate ligand. Thus, assertion is true but reason is false.

20. Assertion : $[Pt(NH_3)_3$ C1] will not show geometrical isomerism.

Reason : $[Pt(NH_3)_3C1]$ does not exhibit cis and trans isomers.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : In the given compound, [Pt(NH3)3Cl], three groups of NH3 are present, therefore cis and trans isomerism is not possible. Therefore, the complex will not show geometrical isomerism. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

21. Assertion : $[Fe(CN)_6]^{3-}$is weakly paramagnetic while $[Fe(CN)_6]^{4-}$is diamagnetic.

Reason : $[Fe(CN)_6]^{3-}$ has +3 oxidation state while $[Fe(CN)_6]^{4-}$has +2 oxidation state.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

Explanation :

In the complex [Fe(CN)6]3-the iron is in +3 oxidation state having d5 configuration, so even after pairing due to strong field cyanide ligands one electron will remain unpaired and hence it is weakly paramagnetic. While in the complex [Fe(CN)6]4-iron is in +2 oxidation state and have d6 configuration, so it after pairing due to strong field cyanide ligand no unpaired electron remains, so it is diamagnetic. Thus, both assertion and reason are true but reason is not the correct explanation of assertion.

22. Assertion :

$[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6)]^{3+}$ is colourless.

Reason :

d-d Transition is not possible in $[Sc(H_2O)_6)]^{3+}$.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : The complex $[Sc(H_2O)_6)]^{3+}$ has no unpaired electron in its subshell and thus d-d transition is not possible whereas $[Ti(H_2O)_6]^{3+}$ has one unpaired electron in its d sub-shell which gives rise to d-d transition to impart colour. Hence, $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6)]^{3+}$ is Hence, colourless. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

23. Assertion : When $[Ti(H_2O)_6]C1_3$ is heated, it becomes colourless.

Reason : Water is removed after heating.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : $[Ti(H_2O)_6]C1_3$ on heating becomes colourless because water is removed on heating $[Ti(H_2O)_6]C1_3$ and in the absence of ligand, crystal field splitting does not occur and hence the substance is colourless. Thus, both assertion and reason are correct and reason is the correct explanation of assertion.

24. Assertion : Addition of bromine water to 1-butene gives two optical isomers.

Reason : The product formed contains two asymmetric carbon atoms.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : The addition of Br_2 to 1-butene gives two optical isomers. The product contains one asymmetric carbon.

Number of optical isomers = $2^n = 2^1 = 2$

Thus, Assertion is true but reason is false.

25. Assertion : $CC1_4$ is a fire extinguisher.

Reason : $CC1_4$ is insoluble in water.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

Explanation : $CC1_4$ is carbon tetrachloride and is used in fire extinguisher because it is a heavy non-combustible liquid. $CC1_4$ is insoluble in water due to the absence of hydrogen atom that can form hydrogen bonding with water. Thus, both assertion and reason are true, but reason is not the correct explanation of assertion.

26. Assertion : The boiling points of alkyl halides decrease in the order : RI > RBr > RCl > RF

Reason : The boiling points of alkyl chlorides, bromides and iodides are considerably higher than that of the hydrocarbon of comparable molecular mass.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

Explanation : The boiling point of the identical hydrocarbon component is determined by the atomic mass of the halogen atom. The boiling point of a halogen atom increases as its mass increases. As a result, the boiling point of halogen atoms lowers as the atomic mass of the halogen atom decreases. Thus, both assertion and reason are true, but reason is not the correct explanation of assertion.

27. Assertion : Electron withdrawing groups in aryl halides increase the reactivity towards nucleophilic substitution.

Reason : 2,4-Dinitrochlorobenzene is less reactive than chlorobenzene.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : When electron withdrawing groups (nitro, cyano) are present at the ortho/para position, halobenzenes become reactive to nucleophilic substitution reaction. This is evident by the fact that 2, 4 -dinitrochlorobenzene requires milder hydrolysis condition than chlorobenzene. Thus, assertion is true, but reason is false.

28. Assertion : In Lucas test, 3° alcohols react immediately.

Reason : An equimolar mixture of anhyd. $ZnC1_2$ and conc. HCl is called Lucas reagent.

(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 correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not correct explanation of assertion.

Explanation : Lucas reagent is an equimolar mixture of anhyd. $ZnC1_2$ and conc. HC1. In Lucas test, tertiary alcohols react immediately because of the formation of the more stable tertiary carbocations. Thus, both assertion and reason are true, but reason is not the correct explanation of assertion.

29. Assertion : The water solubility of the alcohols follow the order: tert-butyl alcohol > sec-butyl alcohol > n-butyl alcohol.

Reason : Alcohols form H-bonding with water to show soluble nature.

(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 correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not correct explanation of assertion.

Explanation : The water solubility of the alcohols follow the order: tert-butyl alcohol > sec-butyl alcohol > n-butyl alcohol. The tendency to show H -bonding decreases with increasing hydrophobic character of carbon chain. The hydrophobic character of carbon chain increases with the length of carbon chain. Thus, both assertion and reason are true, but reason is not the correct explanation of assertion.

30. Assertion : The formation of ether from alcohol in acidic medium is a bimolecular reaction.

Reason : A protonated alcohol molecule is attacked by another alcohol molecule while ether formation in acidic medium.

(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 correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : The formation of ether from alcohol in acidic medium is a bimolecular reaction. A protonated alcohol molecule is attacked by another alcohol molecule while ether formation in acidic medium. Thus, Assertion and reason both are correct statements and reason is correct explanation for assertion.

31. Assertion : Dehydration of secondary and tertiary alcohols to give corresponding ethers is not a productive reaction.

Reason : Elimination does not compete with ether formation reaction.

(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 correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : Dehydration of secondary and tertiary alcohols to give corresponding ethers is not a productive reaction. Elimination does compete with ether formation reaction. Thus, Assertion is correct statement but reason is wrong statement.

32. Assertion : Alkyl aryl ethers are cleaved at the alkyl-oxygen bond when reacted with hydrogen halides.

Reason : Aryl oxygen bond are more stable.

(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 correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : Alkyl aryl ethers are cleaved at the alkyl-oxygen bond when reacted with hydrogen halides and aryl oxygen bond are more stable. Thus, Assertion and reason both are correct statements and reason is correct explanation for assertion.

33. Assertion : Anisole undergoes bromination with bromine in absence of iron (III) bromide.

Reason : Iron (III) bromide is used to catalyse halogenation reaction of phenylalkyl ethers.

(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 correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not correct explanation of assertion.

Explanation : Anisole undergoes bromination with bromine in absence of iron (III) bromide. Iron (III) bromide is used to catalyse halogenation reaction of phenylalkyl ethers. Thus, Assertion and reason both are correct statements but reason is not correct explanation for assertion.

34. Assertion : A bright silver mirror is produced during the warming of an aldehyde with freshly prepared ammonical silver nitrate solution.

Reason : A bright silver mirror is produced due to the formation of silver metal.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

Explanation : On warming an aldehyde with freshly prepared ammonical silver nitrate solution (Tollen's reagent), a bright silver mirror is produced due to the formation of silver metal. The aldehydes are oxidised to corresponding carboxylate anion. The reaction occurs in alkaline medium.

35. Assertion : Aldol condensation can be catalysed both by acids and bases.

Reason : β-Hydroxy aldehydes or ketones readily undergo acid catalysed dehydration.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

Explanation : Both carbanions (formed in presence of base) and enol form (formed in presence of an acid) act as nucleophiles and hence add on the Carbonyl group of aldehydes and ketones to give aldols.

36. Assertion : 2, 2-Dimethylpropanal undergoes Cannizzaro reaction with concentrated NaOH.

Reason : Cannizzaro reaction is a disproportionation reaction.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

Explanation : Aldehydes which do not contain α-hydrogen undergo Cannizzaro reaction.

ADD IMAGE

37. Assertion : Characteristic carbonyl reactions are not given by carboxylic acids.

Reason : Carboxylic acids exist as cyclic dimers in solid, liquid and even in vapour state.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

Explanation : As carboxylic acids are resonance stabilised they do not contain true carbonyl group as is present in carbonyl compounds.

38. Assertion : Most carboxylic acids exist as dimers in the vapour phase or in aprotic solvents.

Reason : Higher carboxylic acids are practically insoluble in water due to the increased hydrophobic interaction of hydrocarbon part.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

Explanation : Carboxylic acids exist as dimers due to intermolecular hydrogen bonding which is not broken completely even in the vapour phase or in a protic solvents.

39. Assertion : The angle of C—N—C in the trimethylamine is 108°.

Reason : There is unshared pair of electrons in the trimethylamine which makes the angle less than 109.5°.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : The angle of C—N—C in the trimethylamine is 108°. This is because there is an unshared pair of electrons in the trimethylamine which makes the angle less than 109.5°. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

40. Assertion : In ammonolysis of alkyl halides, primary amine is obtained as a major product by taking large excess of NH3.

Reason : The process of cleavage of the C—X bond by ammonia molecule is known as ammonolysis.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

Explanation : The process of cleavage of the C—X bond by ammonia molecule is known as ammonolysis The process of ammonolysis has the disadvantage of yielding a mixture of primary, secondary and tertiary amines and also a quaternary ammonium salt. Hence by taking large excess of NH_3 primary amine is obtained as major product. Thus, both assertion and reason are true but reason is not the correct explanation of assertion.

41. Assertion : Alkylation and acetylation does not occur in aniline.

Reason : In the presence of $AlCl_3$ nitrogen of aniline adopts positive charge.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

Explanation : Aniline does not undergo Friedel Crafts reaction (alkylation and acetylation) due to salt formation with $AlCl_3$, (the Lewis acid) which is used as a catalyst. Due to this nitrogen of aniline acquires positive charge and hence, act as a strong deactivating group for further reaction. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

42. Assertion : D(+) glucose is dextrorotatory in nature.

Reason : 'D' represents its dextrorotatory nature.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : D(+) glucose is dextrorotatory in nature because it rotates the plane polarised light to right. Glucose is correctly named as D(+)–glucose. 'D' before the name of glucose represents the configuration whereas (+) represents dextrorotarory nature of the molecule. The letters 'D' or 'L' before the name of any compound indicate the relative configuration of a particular stereoisomer.

43. Assertion : 2-Deoxyribose, $C_5H_{10}O_4$ is not a carbohydrate.

Reason : Carbohydrates are hydrates of carbon so compounds which follow $C_x(H_2O)_y$ formula are carbohydrates.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : 2-Deoxyribose $C_5H_{10}O_4$ is a carbohydrate. It is a monosaccharide and is derived from the sugar ribose by loss of an oxygen atom. Carbohydrates are optically active polyhydroxy aldehydes or polyhydroxy ketones or the compounds that can be hydrolysed to polyhydroxy aldehydes or polyhydroxy ketones. Some carbohydrates like Rhamnose do not follow the formula $C_x(H_2O)_y$ Thus, assertion is true but reason is false.

44. Assertion : All naturally occurring α-amino acids except glycine are optically active.

Reason : Most naturally occurring amino acids have L-configuration.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

Explanation : All other naturally occurring α−amino acids except glycine are optically active since the α− carbon atom is asymmetric. These exist both in 'D' and 'L' forms. Most naturally occurring amino acids have a L−configuration and they are usually represented by writing the −NH2 group on the left-hand side. Thus, both assertion reason are three but reason is not the correct explanation of assertion.

45. Assertion : When the native protein is subjected to physical changes such as change in temperature or chemical changes such as change in pH, its H-bonds are disturbed. This disturbance unfolds the globules and uncoils

the helix. As a result, the protein loses its biological activity. This loss of biological activity by the protein is called denaturation.

Reason : One of the examples of denaturation of proteins is the coagulation of egg white when an egg is boiled.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

Explanation : In a biological system, a protein is found to have a unique three-dimensional structure and a unique biological activity. In such a situation, the protein is called native protein. However, when the native protein is subjected to physical changes such as change in temperature or chemical changes such as change in pH, its H-bonds are disturbed. This disturbance unfolds the globules and uncoils the helix. As a result, the protein loses its biological activity. This loss of biological activity by the protein is called denaturation. During denaturation, the secondary and the tertiary structures of the protein get destroyed, but the primary structure remains unaltered. One of the examples of denaturation of proteins is the coagulation of egg white when an egg is boiled.

46. Assertion: The polypeptide chain in globular protein is folded around itself, giving rise to a spherical structure.

Reason : Some enzymes are globular proteins.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (c) Assertion is true but reason is false.

Explanation : The polypeptide chain in globular protein is folded around itself, giving rise to a spherical structure. These are usually soluble in water and all enzymes are globular proteins. Thus, assertion is true but reason is false.

47. Assertion : In presence of enzyme, substrate molecule can be attacked by the reagent effectively.

Reason : Active sites of enzymes hold the substrate molecule in a suitable position.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Explanation : In presence of enzyme, substrate molecule can be attached by the reagent effectively because active sites of enzymes hold the substrate

molecule in a suitable position. So, enzyme catalysed reactions are stereospecific reaction. Thus, both assertion and reason are true and reason is the correct explanation of assertion.

48. Assertion: The helical structure of DNA is double-stranded.

Reason : The helical structure of RNA is single-stranded.

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

(b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Ans. (b) Both assertion and reason are true but reason is not the correct explanation of assertion

Explanation : Double helix is the description of the structure of a DNA molecule. DNA molecule consists of two strands that coil around each other like a twisted ladder. RNA is a single-stranded molecule in many of its biological roles and consists of a much shorter chain of nucleotides. Thus, both assertion and reason are true but reason is not the correct explanation of assertion.