

Solved Paper 2022

CHEMISTRY (TERM I)

Time : 90 Minutes

Class-XII

Max. Marks : 35

General Instructions :

- This question paper contains 55 questions out of which 45 questions are to be attempted.
- All questions carry equal marks.
- This question paper consists of three Sections – Section A, B and C.
- Section A contains 25 questions. Attempt any 20 questions from Q. No. 01 to 25.
- Section B contains 24 questions. Attempt any 20 questions from Q. No. 26 to 49.
- Section C contains 6 questions. Attempt any 5 questions from Q. No. 50 to 55.
- The first 20 questions attempted in Section A and Section B and first 5 questions attempted in Section C by a candidate will be evaluated.
- There is only one correct option for every multiple choice questions (MCQ). Marks will not be awarded for answering more than one option.
- There is no negative marking.

Series: SSK/3

056/3/4

SECTION - A

This section consists of 25 Multiple Choice Questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, only first 20 will be considered for evaluation.

1. Which one of the following pairs will form an ideal solution?

- chloroform and acetone
- ethanol and acetone
- n-hexane and n-heptane
- phenol and aniline

Ans. Option (C) is correct.

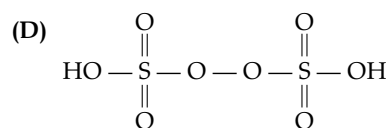
Explanation: n-hexane and n-heptane will form an ideal solution over entire range of concentrations as their intermolecular interactions (solute-solvent) after forming solution are similar to their intermolecular attractions (solute-solute, solvent-solvent) before mixing the components.

* 2. Which of the following is known as amorphous solid?

- Glass
- Plastic
- Rubber
- All of the above

* 3. The structure of pyrosulphuric acid is

-
-
-



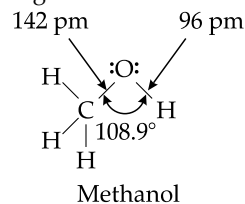
4. The C — O — H bond angle in alcohol is

- slightly greater than $109^{\circ}28'$.
- slightly less than $109^{\circ}28'$.
- slightly greater than 120° .
- slightly less than 120° .

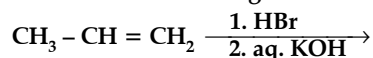
Ans. Option (B) is correct.

Explanation: C-O-H bond angle in alcohol is slightly less than $109^{\circ}28'$.

The oxygen atom is sp^3 hybridised but because of the mutual repulsion of 2 lone pairs of electrons on it the resultant bond angle C-O-H is slightly less than the tetrahedral angle.



5. Consider the following reaction



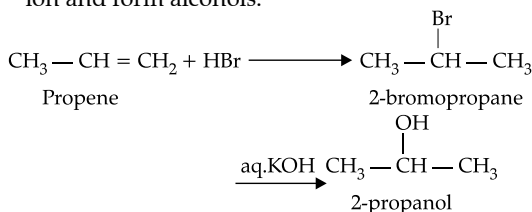
The major end product is

-
-

- (C) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$
 (D) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Br}$

Ans. Option (A) is correct.

Explanation: Propene yields two products, however only one predominates as per Markovnikov's rule i.e., 2-bromopropane which on heating with aq. KOH gives secondary alcohol. Aq. KOH is alkaline in nature so it gives hydroxide ion which is a nucleophile. It replaces halide (bromide in this case) ion and form alcohols.

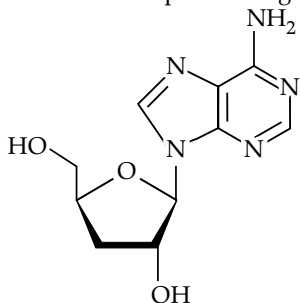


6. Nucleoside are composed of

- (A) a pentose sugar and phosphoric acid.
 (B) a nitrogenous base and phosphoric acid.
 (C) a nitrogenous base and a pentose sugar.
 (D) a nitrogenous base, a pentose sugar and phosphoric acid.

Ans. Option (C) is correct.

Explanation: Nucleosides are composed of a nitrogenous base and a pentose sugar.

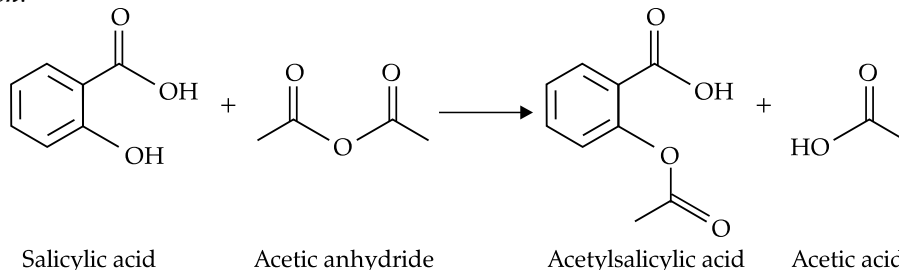


* 7. The oxidation state - 2 is most stable in

- (A) O (B) S
 (C) Se (D) Te

Ans. Option (B) is correct.

Explanation:



* 13. Which of the following statements is wrong?

- (A) Oxygen shows $p\pi-p\pi$ bonding.
 (B) Sulphur shows little tendency of catenation.
 (C) Oxygen is diatomic whereas sulphur is polyatomic.
 (D) O-O bond is stronger than S-S bond.

* 8. Which of the following is not a characteristic of a crystalline solid?

- (A) A true solid
 (B) A regular arrangement of constituent particles
 (C) Sharp melting point
 (D) Isotropic in nature

9. Which of the following formula represents Raoult's law for a solution containing non-volatile solute?

- (A) $p_{\text{solute}} = p^{\circ}_{\text{solute}} \cdot x_{\text{solute}}$
 (B) $p = K_{\text{H}} \cdot x$
 (C) $p_{\text{Total}} = p_{\text{solvent}}$
 (D) $p_{\text{solute}} = p^{\circ}_{\text{solvent}} \cdot x_{\text{solvent}}$

Ans. Option (B) is correct.

Explanation: According to Raoult's law, the vapour pressure of a solution of a non-volatile solute is equal to the vapour pressure of the pure solvent at that temperature multiplied by its mole fraction.

10. An azeotropic solution of two liquids has a boiling point lower than either of the two when it

- (A) shows a positive deviation from Raoult's law.
 (B) shows a negative deviation from Raoult's law.
 (C) shows no deviation from Raoult's law.
 (D) is saturated.

Ans. Option (A) is correct.

Explanation: An azeotropic mixture that has a boiling point lesser than its constituents is known as minimum boiling azeotropes and show positive deviation from Raoult's law.

* 11. Which of the following crystal will show metal excess defect due to extra cation?

- (A) AgCl (B) NaCl
 (C) FeO (D) ZnO

12. Which of the following acids reacts with acetic anhydride to form a compound Aspirin?

- (A) Benzoic acid (B) Salicylic acid
 (C) Phthalic acid (D) Acetic acid

Ans. Option (B) is correct.

Explanation: Amino acids which cannot be synthesized in the body are obtained through diet are called essential amino acids.

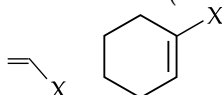
15. Which one of the following halides contains $C_{sp^2}-X$ bond?

- (A) Allyl halide (B) Alkyl halide
(C) Benzyl halide (D) Vinyl halide

Ans. Option (D) is correct.

Explanation: (A) Vinylic halides

These are the compounds in which the halogen atom is bonded to a sp^2 -hybridised carbon atom of a carbon-carbon double bond ($C=C$).



16. On mixing 20 ml of acetone with 30 ml of chloroform. The total volume of the solution is

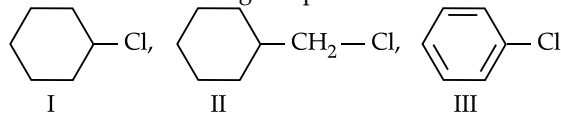
- (A) <50 ml (B) =50 ml
(C) >50 ml (D) =10 ml

Ans. Option (B) is correct.

Explanation: There will be no change in volume on mixing chloroform and acetone. It will be:

$$20 + 30 = 50 \text{ ml}$$

17. Consider the following compounds



The correct order of reactivity towards S_N2 reaction

- (A) I>III>II (B) II>III>I
(C) II>I>III (D) III>I>II

Ans. Option (B) is correct.

Explanation: Chlorine exhibits $-I$ effect, pulling electrons towards itself, thus creating a slight positive charge on the carbon attached.

In compound 2, $-I$ effect of chlorine is most pronounced making the compound reactive towards S_N2 reaction.

In compound 3, $-I$ effect of chlorine is strong but is countered by the resonance effect making substitution possible at o -, p - positions.

In compound 1, $-I$ effect of chlorine is balanced by the $+I$ effect of the cycloalkyl group.

*18. Which of the following forms strong $p\pi - p\pi$ bonding?

- (A) S_8 (B) Se_6
(C) Te_4 (D) O_2

*19. F_2 acts as a strong oxidising agent due to

- (A) low $\Delta_{\text{bond}} H^\circ$ and low $\Delta_{\text{hyd}} H^\circ$
(B) low $\Delta_{\text{bond}} H^\circ$ and high $\Delta_{\text{hyd}} H^\circ$
(C) high $\Delta_{\text{bond}} H^\circ$ and high $\Delta_{\text{eg}} H^\circ$
(D) low $\Delta_{\text{hyd}} H^\circ$ and low $\Delta_{\text{eg}} H^\circ$

20. Which of the following sugar is known as dextrose?

- (A) Glucose (B) Fructose
(C) Ribose (D) Sucrose

Ans. Option (A) is correct.

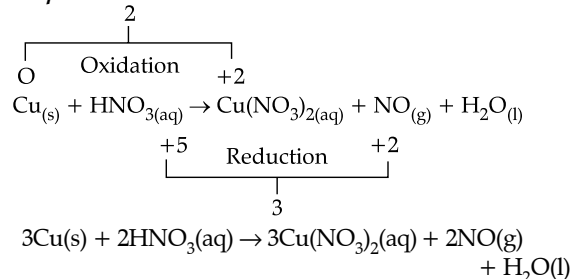
Explanation: Glucose is known as dextrose.

21. Cu reacts with dilute HNO_3 to evolve which gas?

- (A) N_2O (B) NO_2
(C) NO (D) N_2

Ans. Option (C) is correct.

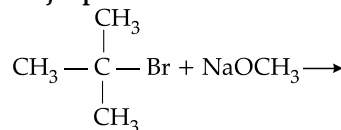
Explanation:



*22. Which of the following is a network solid?

- (A) SO_2 (B) SiO_2
(C) CO_2 (D) H_2O

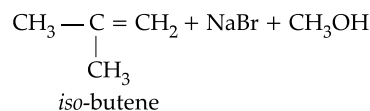
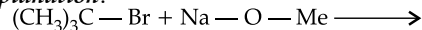
23. Major product formed in the following reaction



- (A) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{ONa} \\ | \\ \text{CH}_3 \end{array}$ (B) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{OCH}_3 \\ | \\ \text{CH}_3 \end{array}$
(C) $\begin{array}{c} \text{CH}_3 \quad \quad \text{CH}_3 \\ | \quad \quad | \\ \text{CH}_3 - \text{C} - \text{O} - \text{C} - \text{CH}_3 \\ | \quad \quad | \\ \text{CH}_3 \quad \quad \text{CH}_3 \end{array}$
(D) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} = \text{CH}_2 \end{array}$

23. Option (D) is correct.

Explanation:



Tert-halide with strong base favours elimination reaction not the substitution reaction.

*24. Chlorine reacts with cold and dilute $NaOH$ to give

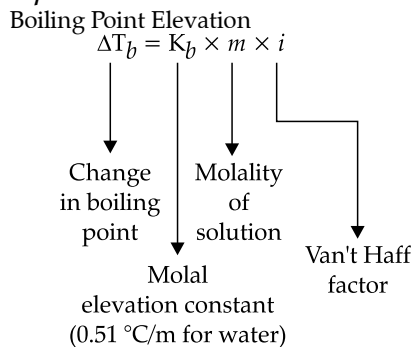
- (A) $NaCl$ and $NaClO_3$
(B) $NaCl$ and $NaClO$
(C) $NaCl$ and $NaClO_4$
(D) $NaClO$ and $NaClO_3$

25. Elevation of boiling point is inversely proportional to

- (A) molal elevation constant (K_b)
(B) molality (m)
(C) molar mass of solute (M)
(D) weight of solute (W)

25. Option (C) is correct.

Explanation:



$$\text{Molality } m = \frac{x}{W} \times 1000 \quad \dots(i)$$

Where, Molality = m
 Number of mole of solute = x
 Weight of solvent in grams = W ... (ii)
 Moles of solute = mass of solute / molar mass of solute ... (iii)
 From eq. (i), (ii), (iii), we derive that elevation of boiling point is inversely proportional to the molar mass of the solute.

SECTION - B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, only first 20 will be considered for evaluation.

26. An unknown gas 'X' is dissolved in water at 2.5 bar pressure and has mole fraction 0.04 in solution. The mole fraction of 'X' gas when the pressure of gas is doubled at the same temperature is

- (A) 0.08 (B) 0.04
 (C) 0.02 (D) 0.92

26. Option (A) is correct.

Explanation: Mole fraction of gas X in solution = 0.04

$$\text{Pressure} = 2.5 \text{ bar}$$

$$\text{Let } P_1 = P_0 X_1 \quad \dots(i)$$

$$2.5 = 0.04 P_0$$

$$\text{Let pressure be doubled, then } p_2 \quad \dots(ii)$$

$$5.0 = X_2 P_0$$

Dividing Eqn ii by eqn I, we get

$$5.0/2.5 = X_2/0.04$$

$$2 \times 0.04 = X_2$$

$$X_2 = 0.08$$

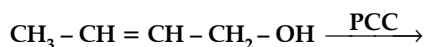
27. The base which is present in DNA but not in RNA,

- (A) Cytosine (B) Guanine
 (C) Adenine (D) Thymine

Ans. Option (D) is correct.

Explanation: Instead of Thymine, RNA has Uracil as nitrogenous base.

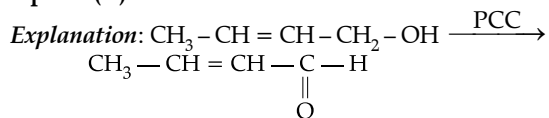
28. In the following reaction



the product formed is:

- (A) $\text{CH}_3 - \text{CHO}$ and $\text{CH}_3\text{CH}_2\text{OH}$
 (B) $\text{CH}_3 - \text{CH} = \text{CH} - \text{COOH}$
 (C) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CHO}$
 (D) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$

28. Option (C) is correct.



Where PCC: Pyridinium chloro oxochromate.
 PCC oxidises primary alcohols to aldehydes

29. Enantiomers differ only in

- (A) boiling point
 (B) rotation of polarized light
 (C) melting point
 (D) solubility

29. Option (B) is correct.

Explanation: Enantiomers are a pair of molecules that exist in two forms that are mirror images of one another but cannot be superimposed one upon the other. However, they differ in direction in which they rotate polarized light, either dextro (d or +) or levo (l or -), when dissolved in solution.

*30. The number of lone pairs of electrons in XeF_4 is

- (A) zero (B) one
 (C) two (D) three

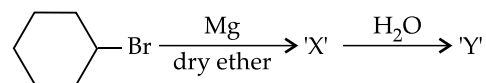
*31. Sulphuric acid is used to prepare more volatile acids from their corresponding salts due to its

- (A) strong acidic nature
 (B) low volatility
 (C) strong affinity for water
 (D) ability to act as a dehydrating agent

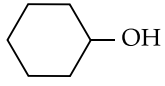
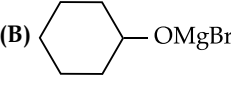

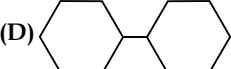
*32. An element with density 6 g cm^{-3} forms a fcc lattice with edge length of $4 \times 10^{-8} \text{ cm}$. The molar mass of the element is ($N_A = 6 \times 10^{23} \text{ mol}^{-1}$)

- (A) 57.6 g mol^{-1} (B) 28.8 g mol^{-1}
 (C) 82.6 g mol^{-1} (D) 62 g mol^{-1}

33. In the reaction

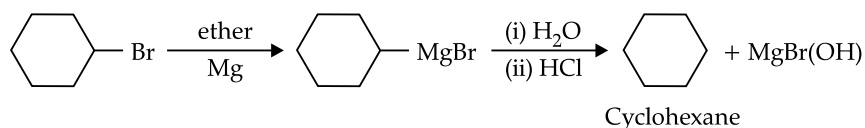


compound 'Y' is

- (A)  (B) 
 (C)  (D) 

33. Option (C) is correct.

Explanation: Bromocyclohexane gives Grignard reagent on treatment with Mg and dry ether, which on hydrolysis yields cyclohexane.



*34. Which of the following is the weakest reducing agent in group 15?

- (A) NH_3 (B) PH_3
(C) AsH_3 (D) BiH_3

35. The boiling point of a 0.2 m solution of a non-electrolyte in water is (K_b for water = $0.52 \text{ K kg mol}^{-1}$)

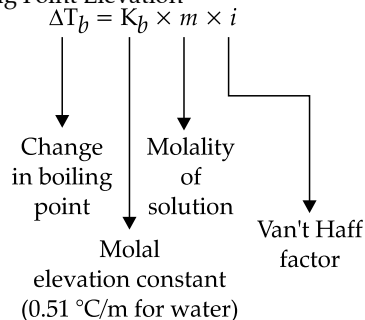
- (A) 100°C (B) 100.52°C
(C) 100.104°C (D) 100.26°C

35. Option (C) is correct.

Explanation: Molality of solution = 0.2 m

K_b of water = $0.52 \text{ K kg mol}^{-1}$

Boiling Point Elevation



For most non-electrolytes dissolved in water, the van't Hoff factor is essentially 1.

Hence, Elevation in Boiling point = $0.52 \times 0.2 = 0.104^\circ\text{C}$

Therefore,

Boiling point = $100 + 0.104 = 100.104^\circ\text{C}$

36. Nucleic acids are polymer of

- (A) amino acids (B) nucleosides
(C) nucleotides (D) glucose

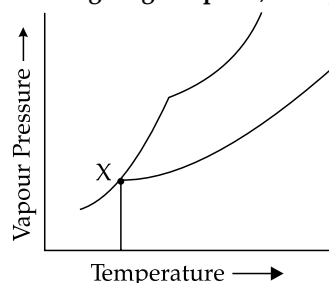
36. Option (C) is correct.

Explanation: Nucleic acids are polymers of nucleotides.

*37. Which of the following gas dimerises to become stable?

- (A) CO_2 (g) (B) NO_2 (g)
(C) SO_2 (g) (D) N_2O (g)

38. In the following diagram point, 'X' represents



- (A) Boiling point of solution
(B) Freezing point of solvent
(C) Boiling point of solvent
(D) Freezing point of solution

38. Option (A) is correct.

Explanation: Point X represents the boiling point of the solution.

*39. XeF_6 on reaction with NaF gives

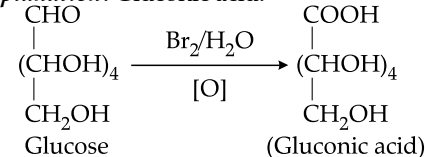
- (A) $\text{Na}^+ [\text{XeF}_7]^-$ (B) $[\text{NaF}_2]^- [\text{XeF}_5]^+$
(C) $\text{Na}^+ [\text{XeF}_6]^-$ (D) $[\text{NaF}_2]^+ [\text{XeF}_5]^-$

40. Glucose on reaction with Br_2 water gives

- (A) Saccharic acid (B) Hexanoic acid
(C) Gluconic acid (D) Salicylic acid

40. Option (C) is correct.

Explanation: Gluconic acid.



41. Which of the following is optically inactive?

- (A) (+) - Butan-2-ol (B) (-) - Butan-2-ol
(C) (±) - Butan-2-ol (D) (+) - 2-Bromobutane

41. Option (C) is correct.

Explanation: (+, -) Butan-2-ol is a racemic mixture so, it is optically inactive.

*42. Which of the following is not a correct statement?

- (A) Halogens are strong oxidising agents.
(B) Halogens are more reactive than interhalogens.
(C) All halogens are coloured.
(D) Halogens have maximum negative electron gain enthalpy.

43. Which of the following has highest boiling point?

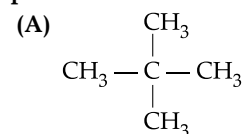
- (A) $\text{C}_2\text{H}_5\text{-F}$ (B) $\text{C}_2\text{H}_5\text{-Cl}$
(C) $\text{C}_2\text{H}_5\text{-Br}$ (D) $\text{C}_2\text{H}_5\text{-I}$

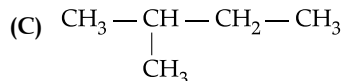
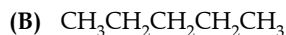
43. Option (D) is correct.

Explanation: For the same alkyl group the boiling points of haloalkanes are in the order of $\text{RF} < \text{RCl} < \text{RBr} < \text{RI}$

as with the increase in size of halogen atom the magnitude of van der Waals forces of attraction increases, resulting in higher boiling points.

44. Which of the following isomer of pentane (C_5H_{12}) will give three isomeric monochlorides on photochemical chlorination?





(D) All of the above

44. Option (B) is correct.

Explanation: When alkanes larger than ethane are halogenated, isomeric products are formed.**Given below are the questions (45-49) labelled as Assertion (A) and Reason (R). Select the most appropriate answer from the options given below:**

(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.

45. Assertion (A): A raw mango placed in a saline solution loses water and shrivel into pickle.

Reason (R): Through the process of reverse osmosis, raw mango shrivel into pickle.

45. Option (C) is correct.

Explanation: A raw mango placed in saline solution loses water and shrivels into pickle. Mango loses water due to osmosis and turns into a pickle.*46. Assertion (A): H_2S is less acidic than H_2Te .Reason (R): H-S bond has more $\Delta_{\text{bond}} \text{H}^\circ$ than H-Te bond.

47. Assertion (A): Chlorobenzene is less reactive towards nucleophilic substitution reaction.

Reason (R): Nitro group in chlorobenzene increases its reactivity towards nucleophilic substitution reaction.

47. Option (B) is correct.

Explanation: Presence of nitro group on *ortho* or *para* position in the ring makes the ring more electron deficient and activated towards nucleophilic substitution reaction as compared to chlorobenzene.

*48. Assertion (A): Due to Schottky defect, there is no effect on the density of a solid.

Reason (R): Equal number of cations and anions are missing from their normal sites in Schottky defect.

*49. Assertion (A): Fluorine forms only one oxoacid HOF.

Reason (R): Fluorine atom is highly electronegative.

SECTION - C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, only first 5 will be considered for evaluation.

*50. Match the following:

	I		II
(i)	Stoichiometric defects	(a)	Crystalline solids
(ii)	Long range order	(b)	F-centres
(iii)	...ABC ABC ABC....	(c)	Schottky and Frenkel defects

(iv)	Number of atoms per unit cell=2	(d)	fcc structure
(v)	Metal excess defect due to anionic vacancies		

Which of the following is the best matched options?

(A) (i)-(d), (ii)-(a), (iii)-(b), (iv)-(c)

(B) (i)-(c), (ii)-(a), (iii)-(d), (v)-(b)

(C) (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)

(D) (i)-(a), (ii)-(b), (v)-(c), (iv)-(d)

*51. Which of the following analogies is correct?

(A) XeF_2 : linear:: XeF_6 : square planar(B) moist SO_2 : Reducing agent:: Cl_2 : bleaching agent(C) N_2 : Highly reactive gas:: F_2 : inert at room temperature(D) NH_3 : strong base:: HI: weak acid

52. Complete the following analogy:

Curdling of milk : A :: α -helix : B

(A) A: Primary structure

B: Secondary structure

(B) A: Denatured protein

B: Primary structure

(C) A: Secondary structure

B: Denatured protein

(D) A: Denatured protein

B: Secondary structure

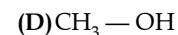
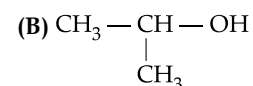
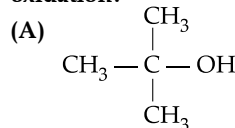
Ans. Option (D) is correct.

Explanation: Curdling of milk is denaturation of protein while alpha helix is a secondary structure of protein.

Case: Read the passage given below and answer the following questions (53-55).

Alcohols and phenols are acidic in nature. Electron withdrawing groups in phenol increase its acidic strength and electron donating groups decrease. Alcohols undergo nucleophilic substitution with hydrogen halides to give alkyl halides. On oxidation primary alcohols yield aldehydes with mild oxidising agents and carboxylic acids with strong oxidising agents while secondary alcohols yield ketones. The presence of -OH groups in phenols activates the ring towards electrophilic substitution. Various important products are obtained from phenol like salicylaldehyde, salicylic acid, picric acid, etc.

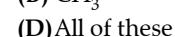
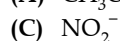
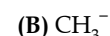
53. Which of the following alcohols is resistant to oxidation?



Ans. Option (C) is correct.

Explanation: Tert -alcohols are resistant to oxidation.

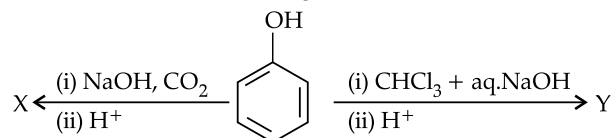
54. Which of the following group increases the acidic character of phenol?



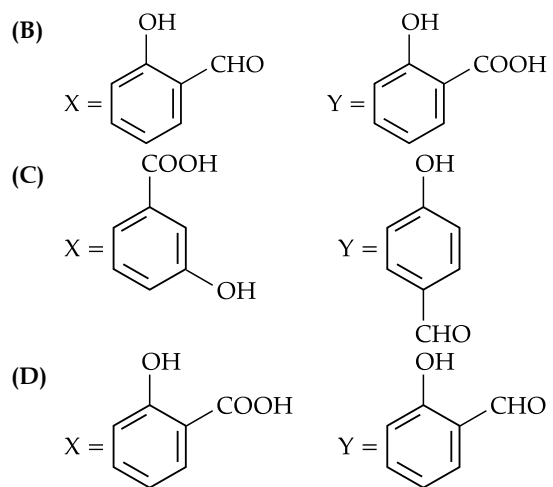
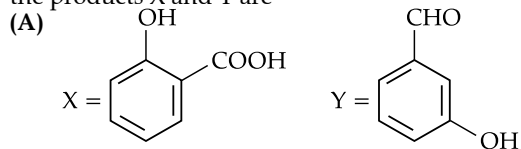
Ans. Option (C) is correct.

Explanation: NO_2 is an electron withdrawing group, hence it increases the acidic character of phenol.

55. Consider the following reaction



the products X and Y are



Ans. Option (D) is correct.

Explanation:

