Solved Paper, 2021-2022

CHEMISTRY

Term-I, Set-4

Series : SSK/3

Question Paper Code No. 056/3/4

Time allowed : 90 Minutes **Max. Marks : 35**

General Instructions :

*(i) This question paper contains **55** questions out of which **45** questions are to be attempted.*
*(ii) All questions carry **equal marks**.*
*(iii) This question paper consists of three Sections – Section **A, B** and **C**.*
*(iv) **Section A** contains 25 questions. Attempt any **20** questions from Q. No. 01 to 25.*
*(v) **Section B** contains 24 questions. Attempt any **20** questions from Q. No. 26 to 49.*
*(vi) **Section C** contains 6 questions. Attempt any **5** questions from Q. No. 50 to 55.*
*(vii) 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.*
(viii) There is only one correct option for every multiple choice questions (MCQ). Marks will not be awarded for answering more than one option.
(ix) There is no negative marking.

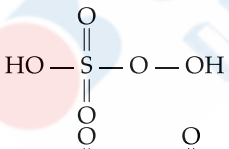
Section-A

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?
(A) chloroform and acetone
(B) ethanol and acetone
(C) n-hexane and n-heptane
(D) phenol and aniline

2. Which of the following is known as amorphous solid?
(A) Glass **(B)** Plastic
(C) Rubber **(D)** All of the above

3. The structure of pyrosulphuric acid is

(A)


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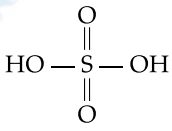

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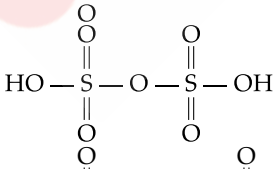

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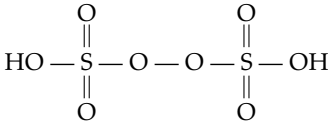


4. The C — O — H bond angle in alcohol is
(A) slightly greater than 109°28′.
(B) slightly less than 109°28′
(C) slightly greater than 120°.
(D) slightly less than 120°.

5. Consider the following reaction

$$CH_3 - CH = CH_2 \xrightarrow[2.\ aq.\ KOH]{1.\ HBr}$$

The major end product is

(A) $CH_3 - \underset{\displaystyle OH}{\underset{|}{CH}} - CH_3$

(B) $CH_3 - \underset{\displaystyle Br}{\underset{|}{CH}} - CH_3$

(C) $CH_3 - CH_2 - CH_2 - OH$
(D) $CH_3 - CH_2 - CH_2 - Br$

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.

7. The oxidation state – 2 is most stable in
(A) O **(B)** S
(C) Se **(D)** Te

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) $p_{solute} = p^{\circ}_{solute} \cdot x_{solute}$
(B) $p = K_H . x$
(C) $p_{Total} = p_{solvent}$
(D) $p_{solute} = p^{\circ}_{solvent} . x_{solvent}$

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.

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

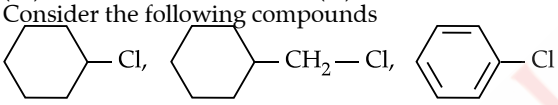
13. Which of the following statements is wrong?
(A) Oxygen shows $p\pi$-$p\pi$ bonding.
(B) Sulphur shows little tendency of catenation.
(C) Oxygen is diatomic whereas sulphur is polyatomic.
(D) O–O bond is stronger than S–S bond.

14. Amino acids which cannot be synthesized in the body and must be obtained through diet are known as
(A) Acidic amino acids
(B) Essential amino acids
(C) Basic amino acids
(D) Non-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

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

17. Consider the following compounds



I II III

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

18. Which of the following forms strong $p\pi - p\pi$ bonding?
(A) S_8 **(B)** Se_6
(C) Te_4 **(D)** O_2

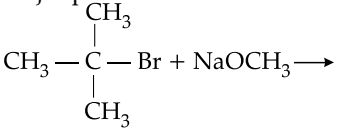
19. F_2 acts as a strong oxidising agent due to
(A) low Δ_{bond} H° and low Δ_{hyd} H°
(B) low Δ_{bond} H° and high Δ_{hyd} H°
(C) high Δ_{bond} H° and high Δ_{eg} H°
(D) low Δ_{hyd} H° and low Δ_{eg} H°

20. Which of the following sugar is known as dextrose?
(A) Glucose **(B)** Fructose
(C) Ribose **(D)** Sucrose

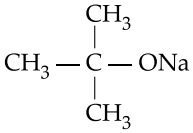
21. Cu reacts with dilute HNO_3 to evolve which gas?
(A) N_2O **(B)** NO_2
(C) NO **(D)** N_2

22. Which of the following is a network solid?
(A) SO_2 **(B)** SiO_2
(C) CO_2 **(D)** H_2O

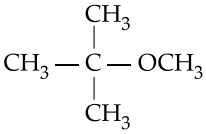
23. Major product formed in the following reaction



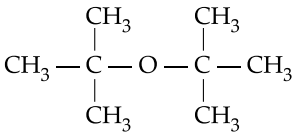
(A)



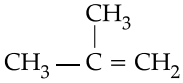
(B)



(C)



(D)



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)

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

27. The base which is present in DNA but not in RNA,
(A) Cytosine **(B)** Guanine
(C) Adenine **(D)** Thymine

28. In the following reaction

$$CH_3 - CH = CH - CH_2 - OH \xrightarrow{PCC}$$

the product formed is:
(A) $CH_3 - CHO$ and CH_3CH_2OH
(B) $CH_3 - CH = CH - COOH$
(C) $CH_3 - CH = CH - CHO$
(D) $CH_3 - CH_2 - CH_2 - CHO$

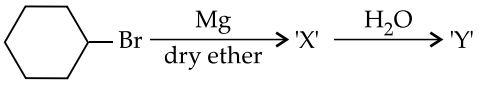
29. Enantiomers differ only in
(A) boiling point
(B) rotation of polarized light
(C) melting point
(D) solubility

30. The number of lone pairs of electrons in XeF_4 is
(A) zero **(B)** one
(C) two **(D)** three

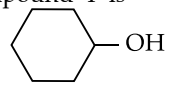
31. Sulphuric acid is used to prepare more volatile acids from their corresponding salts due to its
(A) strong acidic nature
(B) low volatility
(C) strong affinity for water
(D) ability to act as a dehydrating agent

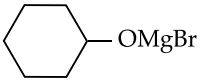
32. An element with density 6 g cm^{-3} forms a fcc lattice with edge length of 4×10^{-8} cm. The molar mass of the element is ($N_A = 6 \times 10^{23}$ mol^{-1})
(A) 57.6 g mol^{-1} **(B)** 28.8 g mol^{-1}
(C) 82.6 g mol^{-1} **(D)** 62 g mol^{-1}

33. In the reaction

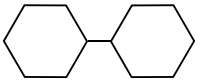


compound 'Y' is

(A) 

(B) 

(C) 

(D) 

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 K kg mol^{-1})

(A) 100°C **(B)** 100.52°C

(C) 100.104°C **(D)** 100.26°C

36. Nucleic acids are polymer of

(A) amino acids **(B)** nucleosides

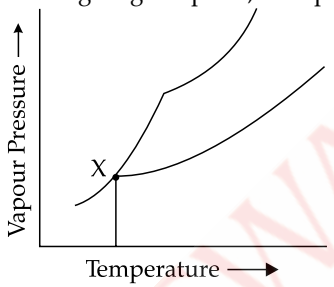
(C) nucleotides **(D)** glucose

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

39. XeF_6 on reaction with NaF gives

(A) $Na^+ [XeF_7]^-$ **(B)** $[NaF_2]^- [XeF_5]^+$

(C) $Na^+[XeF_6]^-$ **(D)** $[NaF_2]^+ [XeF_5]^-$

40. Glucose on reaction with Br_2 water gives

(A) Saccharic acid **(B)** Hexanoic acid

(C) Gluconic acid **(D)** Salicylic acid

41. Which of the following is optically inactive?

(A) (+) – Butan–2–ol **(B)** (–) – Butan–2–ol

(C) (±) –Butan–2–ol

(D) (+)–2–Bromobutane

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.

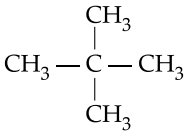
(D) Halogens have maximum negative electron gain enthalpy.

43. Which of the following has highest boiling point?

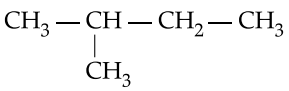
(A) C_2H_5–F **(B)** C_2H_5–Cl

(C) C_2H_5–Br **(D)** C_2H_5–I

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

(A) 

(B) $CH_3CH_2CH_2CH_2CH_3$

(C) 

(D) All of the above

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.

46. **Assertion (A):** H_2S is less acidic than H_2Te.
Reason (R): H-S bond has more Δ_{bond} H° 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.

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)

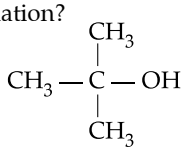
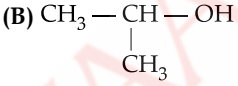
(C) (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)

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

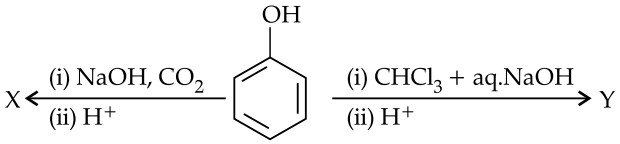
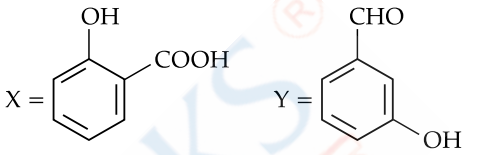
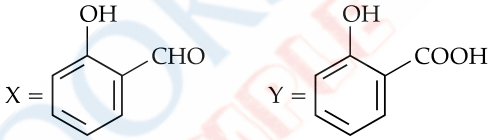
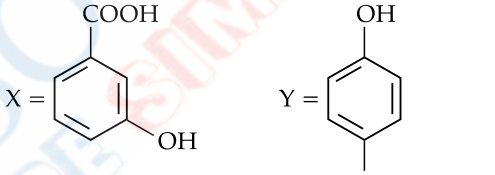
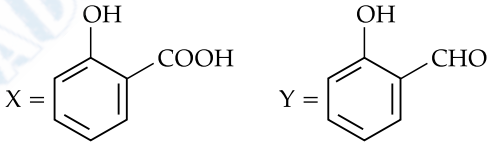
51. Which of the following analogies is correct?
(A) XeF_2: linear:: XeF_6: square planar
(B) moist SO_2: Reducing agent:: Cl_2: bleaching agent
(C) N_2: Highly reactive gas:: F_2: inert at room temperature
(D) NH_3: strong base:: HI: weak acid

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

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?
(A) 
(B) 
(C) $CH_3 - CH_2 - OH$ **(D)** $CH_3 - OH$

54. Which of the following group increases the acidic character of phenol?
(A) CH_3O^- **(B)** CH_3^-
(C) NO_2^- **(D)** All of these

55. Consider the following reaction

the products X and Y are
(A) 
(B) 
(C) 
(D) 

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SOLUTIONS

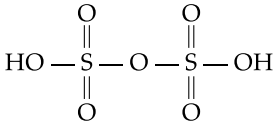
Section-A

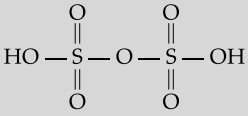
1. **(C)** *n*-hexane and *n*-heptane

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.

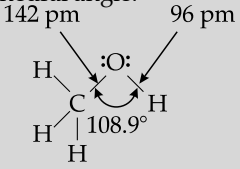
2. **(D)** All of the above

***Explanation*:** Glass, plastic, rubber all are amorphous solids as they are non-crystalline solids in which the atoms and molecules are not organized in a definite lattice pattern.

3. **(C)** 

***Explanation*:** $H_2S_2O_7$ is pyrosulphuric acid.


4. **(B)** slightly less than 109°28′

***Explanation*:** C-O-H bond angle in alcohol is slightly less than 109°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.

Methanol

5. **(A)** $CH_3-\underset{\underset{OH}{|}}{CH}-CH_3$

***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.

$$CH_3-CH=CH_2 + HBr \longrightarrow CH_3-\underset{\underset{Br}{|}}{CH}-CH_3$$

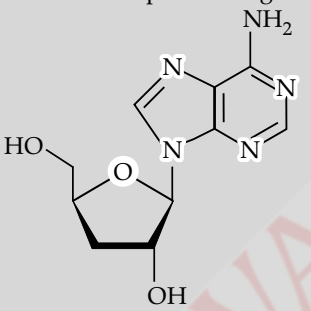
Propene — 2-bromopropane

$$CH_3-\underset{\underset{OH}{|}}{CH}-CH_3 \xleftarrow{aq.KOH}$$

2-propanol

6. **(C)** a nitrogenous base and a pentose sugar

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



7. **(A)** O

***Explanation*:** Group 16 elements (chalcogens) have six valence electrons each with general electronic configuration of ns^2np^4. Highly electronegative oxygen shows -2 oxidation state as it accepts 2 electrons to complete its octet. However, down the group from S, Se, Te, Po the stability of –2 oxidation state decreases with decrease in the electronegativity of elements. They show +2,+4, +6 oxidation states.

8. **(D)** Isotropic in nature.

***Explanation*:** Crystalline solids are anisotropic in nature *i.e.,* they possess different properties in different directions. However, they have a sharp melting point, regular geometry and are true solids.

9. **(D)** $p_{solute} = p^{\circ}_{solvent}.x_{solvent}$

***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. **(A)** shows a positive deviation from Raoult's law

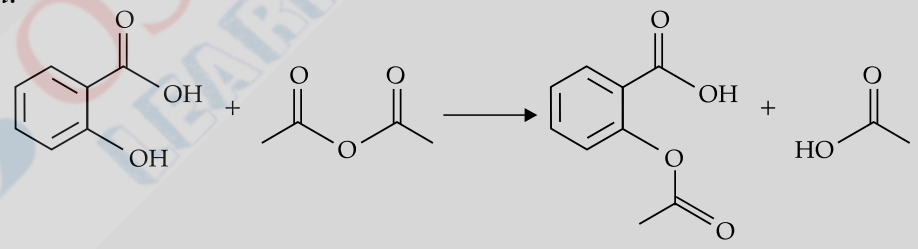
***Explanation*:** An azeotropic mixture that has a boiling point lesser than its constituents is known as minimum boiling azeotropes and show positive deviation from Raoult's law.

11. **(D)** ZnO

***Explanation*:** In metal excess defect due to cations, heating the compound releases extra cations which occupy the interstitial sites in crystals and the same number of electrons goes to neighbouring interstitial sites. *E.g.* ZnO.

12. **(B)** Salicylic acid

***Explanation*:**



13. **(B)** Sulphur shows little tendency of catenation

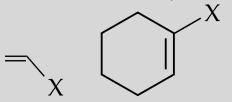
***Explanation*:** Oxygen is small in size therefore the lone pairs of electrons repel the O-O bond greatly as compared to lone pairs of electrons in S-S bond. Hence, S-S bond is stronger than the O-O bond and the sulphur shows greater tendency for catenation than oxygen.

14. **(B)** Essential amino acids

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

15. **(D)** Vinyl halide

***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. **(B)** = 50 ml

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

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

17. (B) II>III>I

***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. (D) O_2

***Explanation*:** Oxygen molecule has strong $p_\pi - p_\pi$ bonding.

19. (B) low Δ_{bond} H° and high Δ_{hyd} H°

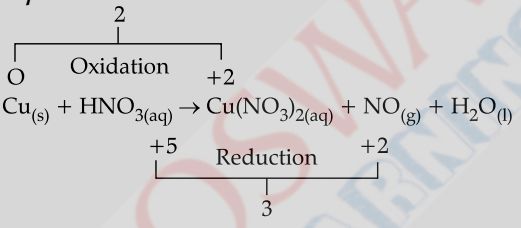
***Explanation*:** Flourine molecule has high hydration energy and low bond dissociation energy. That's why it acts as a strong oxidising agent.

20. (A) Glucose

***Explanation*:** Glucose is known as dextrose.

21. (C) NO

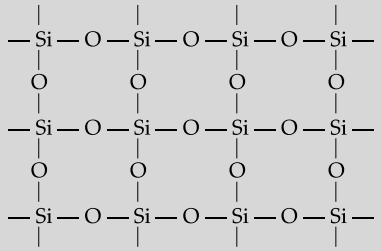
***Explanation*:**



$$3Cu(s) + 2HNO_3(aq) \rightarrow 3Cu(NO_3)_2(aq) + 2NO(g) + H_2O(l)$$

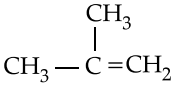
22. (B) SiO_2

***Explanation*:** SiO_2 is a network solid. A network solid or covalent network solid (also called atomic crystalline solids) is a chemical compound (or element) in which the atoms are bonded by covalent bonds in a continuous network extending throughout the material.



Three dimensional structure of SiO_2

23. (D)



***Explanation*:**

$$(CH_3)_3C - Br + Na - O - Me \longrightarrow CH_3 - \underset{\underset{CH_3}{|}}{C} = CH_2 + NaBr + CH_3OH$$

iso-butene

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

24. (B) NaCl and NaClO

***Explanation*:** Chlorine reacts with cold and dilute NaOH to produce a mixture of sodium chloride (NaCl) and sodium hypochloride (NaOCl).

$$2NaOH + Cl_2 \rightarrow NaCl + NaOCl + H_2O$$

25. (C) Molar mass of solute (M)

***Explanation*:**
Boiling Point Elevation

$$\Delta T_b = K_b \times m \times i$$

ΔT_b: Change in boiling point; K_b: Molal elevation constant (0.51 °C/m for water); m: Molality of solution; i: Van't Haff factor ...(i)

Molality $$m = \frac{x}{W} \times 1000$$

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

26. (A) 0.08

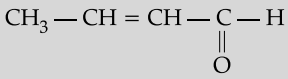
***Explanation*:** Mole fraction of gas X in solution = 0.04
Pressure = 2.5 bar
Let $p_1 = P_0 X_1$
$2.5 = 0.04\ P_0$ ...(i)
Let pressure be doubled, then p_2
$5.0 = X_2\ P_0$ ...(ii)
Dividing Eqn ii by eqn I, we get
$5.0/2.5 = X_2/0.04$
$2 \times 0.04 = X_2$
$X_2 = 0.08$

27. **(D)** Thymine

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

28. **(C)** $CH_3 - CH = CH - CHO$

***Explanation*:** $CH_3-CH=CH-CH_2-OH \xrightarrow{PCC}$



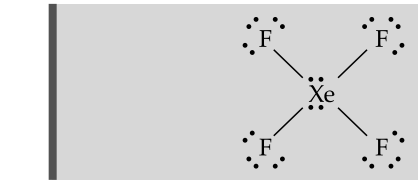
Where PCC : Pyridinium chloro oxochromate.
PCC oxidises primary alcohols to aldehydes

29. **(B)** rotation of polarised light

***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. **(C)** two

***Explanation*:** The XeF_4 (xenon tetrafluoride) molecule is hypervalent with six electron pairs around the central xenon (Xe) atom. Out of these, four are bonding pairs, and two are lone pairs.



31. **(B)** low volatility

***Explanation*:** Sulphuric acid has high boiling point so has low volatility hence, used to prepare more volatile acids.

32. **(A)** 57.6 g mol^{-1}

***Explanation*:** Density of element d = 6 g cm^{-3}
Edge length of FCC lattice, $a = 4 \times 10^{-8}$ cm
$N_A = 6 \times 10^{23}$ mol^{-1}
z = no. of effective constituent particles in one unit cell
Density of cubic unit cell

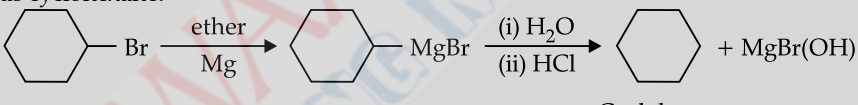
$$d = \frac{zM}{a^3 N_A}$$

For an FCC, $z = 4$ $\quad M = \frac{da^3 N_A}{z}$

$M = 6 \times (4 \times 10^{-8})^3 \times 6 \times 10^{23}/4$
$= 576 \times 10^{-1} = 57.6$ g mol^{-1}

33. **(C)**

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



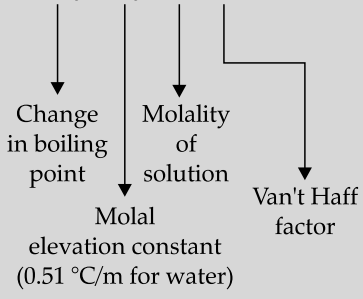
Cyclohexane

34. **(A)** NH_3

***Explanation*:** NH_3 is the weakest reducing agent in the hydrides of group 15. The reducing character of hydrides of group 15 elements increases from top to bottom because the Z-H strength (Here Z= N, P, As, Sb, or Br) bond decreases down the group due to an increase in the size of the central atom.

35. **(C)** 100.104°C

***Explanation*:** Molality of solution = 0.2 m
K_b of water = 0.52 K kg mol^{-1}
Boiling Point Elevation
$\Delta T_b = K_b \times m \times i$



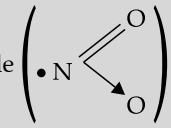
For most non-electrolytes dissolved in water, the van't Hoff factor is essentially 1.
Hence, Elevation in Boiling point = 0.52 × 0.2 = 0.104C°
Therefore,
Boiling point = 100 + 0.104 = 100.104 C°

36. **(C)** nucleotides

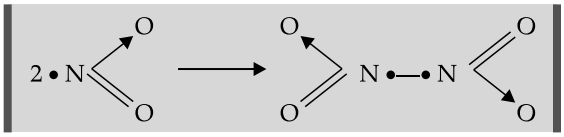
***Explanation*:** Nucleic acids are polymers of nucleotides.

37. **(B)** NO_2 (g)

***Explanation*:** In NO_2 structure, there is an unpaired electron on nitrogen atom, so it is reactive, hence it dimerises to pair up its electron and gains stability as N_2O_4.

$NO_2(g)$ is an odd electron molecule 

Hence, it undergoes dimerisation to form stable molecule with even number of electrons.



38. **(A)** Boiling point of solution

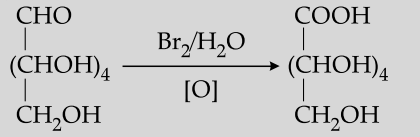
***Explanation*:** Point X represents the boiling point of the solution.

39. **(A)** $Na^+[XeF_7]$

***Explanation*:** $XeF_6 + NaF \rightarrow Na^+[XeF_7]^-$

40. **(C)** Gluconic acid

***Explanation*:** Gluconic acid.



41. **(C)** (±) Butan-2-ol

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

42. **(B)** Halogens are more reactive than inter halogens.

***Explanation*:** Interhalogen compounds are more reactive than all halogens.
Halogens due to their tiny size and effective nuclear charge, are highly electronegative with low dissociation energies and high negative electron gain enthalpies. Therefore, they have a high tendency to gain an electron and act as strong oxidizing agents.
Halogens absorb different quanta of radiations that lie in the visible region. This typically results from the excitation of outer electrons to higher energy levels, resulting in different colours.

43. **(D)** C_2H_5–I

***Explanation*:** For the same alkyl group the boiling points of haloalkanes are in the order of
RF < RCl< RBr < 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. **(B)** CH_2 CH_2 CH_2 CH_2 CH_3

***Explanation*:** When alkanes larger than ethane are halogenated, isomeric products are formed.

45. **(C)** A is true but R is false.

***Explanation*:** A raw mango placed in saline solution loses water and shrivels into pickle. Mango looses water due to osmosis and turns into a pickle.

46. **(A)** Both A and R are true and R is the correct Explanation of A.

***Explanation*:** H_2S is less acidic than H_2Te as we move down the group the bond dissociation enthalpy decreases and it is easier to remove H^+.

47. **(B)** Both A and R are true but R is not the correct explanation of A.

***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. **(D)** A is false but R is true.

***Explanation*:** Equal number of cations and anions are missing from their normal sites in Schottky defect which leads to considerable decrease in density.

49. **(B)** Both A and R are true but R is not the correct explanation of A.

***Explanation*:** Absence of *d*-orbitals in fluorine is the reason it doesn't form the oxoacids having higher oxidation states such as +3, +5, or +7. So, the +1 oxidation state is shown by fluorine only with the element oxygen. Thus, it forms only one oxoacid, HOF.

SECTION-C

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

***Explanation*:** Schottky and Frenkel defects are stoichiometric defects.
Crystalline solids have long range order.
FCC structure is made up of layers of octahedral, -type planes. These stack in a sequence ABC ABC.
Metal excess defects due to anionic vacancies is called F-centres.

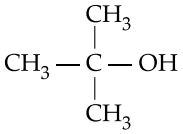
51. **(B)** moist SO_2: Reducing agent:: Cl_2: bleaching agent

***Explanation*:** The reducing character of sulphur dioxide is due to evolution of nascent hydrogen when it is moist.
Chlorine is a good bleaching agent, due to its oxidising properties because it produces nascent oxygen.

52. **(D)** A: Denatured protein B: Secondary structure

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

53. **(A)**

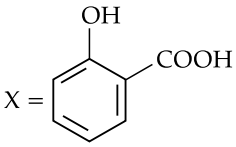


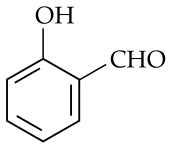
***Explanation*:** *Tert* –alcohols are resistant to oxidation.

54. **(C)** NO_2^-

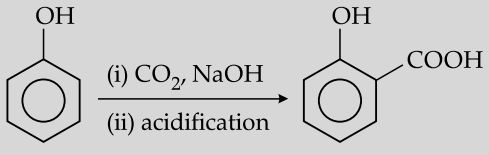
***Explanation*:** NO_2 is an electron withdrawing group, hence it increases the acidic character of phenol.

55. (D)

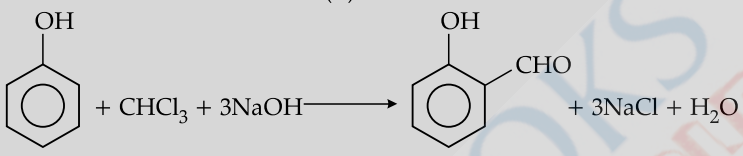
X = 

Y = 

***Explanation*:**



Salicylic acid
(X)



major product
(salicyladehyde)

❍❍❍

Term – I

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A

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02	Ⓐ Ⓑ Ⓒ Ⓓ	17	Ⓐ Ⓑ Ⓒ Ⓓ	32	Ⓐ Ⓑ Ⓒ Ⓓ	47	Ⓐ Ⓑ Ⓒ Ⓓ
03	Ⓐ Ⓑ Ⓒ Ⓓ	18	Ⓐ Ⓑ Ⓒ Ⓓ	33	Ⓐ Ⓑ Ⓒ Ⓓ	48	Ⓐ Ⓑ Ⓒ Ⓓ
04	Ⓐ Ⓑ Ⓒ Ⓓ	19	Ⓐ Ⓑ Ⓒ Ⓓ	34	Ⓐ Ⓑ Ⓒ Ⓓ	49	Ⓐ Ⓑ Ⓒ Ⓓ
05	Ⓐ Ⓑ Ⓒ Ⓓ	20	Ⓐ Ⓑ Ⓒ Ⓓ	35	Ⓐ Ⓑ Ⓒ Ⓓ	50	Ⓐ Ⓑ Ⓒ Ⓓ
06	Ⓐ Ⓑ Ⓒ Ⓓ	21	Ⓐ Ⓑ Ⓒ Ⓓ	36	Ⓐ Ⓑ Ⓒ Ⓓ	51	Ⓐ Ⓑ Ⓒ Ⓓ
07	Ⓐ Ⓑ Ⓒ Ⓓ	22	Ⓐ Ⓑ Ⓒ Ⓓ	37	Ⓐ Ⓑ Ⓒ Ⓓ	52	Ⓐ Ⓑ Ⓒ Ⓓ
08	Ⓐ Ⓑ Ⓒ Ⓓ	23	Ⓐ Ⓑ Ⓒ Ⓓ	38	Ⓐ Ⓑ Ⓒ Ⓓ	53	Ⓐ Ⓑ Ⓒ Ⓓ
09	Ⓐ Ⓑ Ⓒ Ⓓ	24	Ⓐ Ⓑ Ⓒ Ⓓ	39	Ⓐ Ⓑ Ⓒ Ⓓ	54	Ⓐ Ⓑ Ⓒ Ⓓ
10	Ⓐ Ⓑ Ⓒ Ⓓ	25	Ⓐ Ⓑ Ⓒ Ⓓ	40	Ⓐ Ⓑ Ⓒ Ⓓ	55	Ⓐ Ⓑ Ⓒ Ⓓ
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