SAMPLE PAPER 5

CHEMISTRY

*A Highly Simulated Practice Questions Paper for CBSE **Class XII** (Term I) Examination*

Instructions

(i) This question paper contains three sections.
(ii) Section A has 25 questions. Attempt any 20 questions.
(iii) Section B has 24 questions. Attempt any 20 questions.
(iv) Section C has 6 questions. Attempt any 5 questions.
(v) Each questions carry 0.77 mark.
(vi) There is NO negative marking.

Roll No. | | | | | | | |

Maximum Marks : 35
Time allowed : 90 min

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. Among the given compounds, the molecular crystal is shown by
(a) ice (b) NaCl (c) graphite (d) SiC

2. In which of the following compounds nitrogen present in the highest oxidation state (O.S.)?
(a) N_2H_4 (b) NH_3 (c) NH_2OH (d) N_3H

3. Identify the reaction.
"When iodobenzene is heated with copper powder in a sealed tube, diphenyl is formed".
(a) Ullmann reaction (b) Wurtz-Fittig reaction
(c) Fittig reaction (d) None of these

4. People add sodium chloride to water while boiling eggs because chloride helps to
(a) decrease the boiling point (b) increase the boiling point
(c) prevent the breaking of eggs (d) None of these

5. Which of the following is the correct formula for the determination of density of unit cell ?
(a) $\frac{a^3 M}{Z \times N_0}$ g cm^{-3} (b) $\frac{M \times N_0}{a^3 \times Z}$ g cm^{-3} (c) $\frac{Z \times M}{a^3 \times N_0}$ g cm^{-3} (d) $\frac{a^3 \times N_0}{Z \times M}$ g cm^{-3}

6. Which of the following reagents cannot be used to oxidise primary alcohols to aldehydes ?

(a) $KMnO_4$ in acidic medium (b) Pyridinium chlorochromate

(c) CrO_3 in anhydrous medium (d) None of these

7. When one mole of magnesium nitride is added with an excess of water, then it gives

(a) one of nitric acid (b) one mole of ammonia

(c) two moles of nitric acid (d) two moles of ammonia

8. Which of the following is the another name for thymine?

(a) 1-methyl uracil (b) 4-methyl uracil

(c) 3-methyl uracil (d) 5-methyl uracil

9. People who takes lot of salt experience puffiness of the body. It is due to

(a) drinking more water

(b) capillary action of water

(c) water retention in tissues cells and intercellular spaces because of osmosis

(d) water loss from the cells through skin tissues

10. The packing efficiency is maximum in …… structure and its coordination number is …… .

(a) fcc, 12 (b) bcc, 8 (c) simple cubic, 4 (d) ccp, 6

11. In DNA, the complementary bases are

(a) adenine and thymine, guanine and cytosine

(b) cytosine and guanine, uracil and adenine

(c) adenine and thymine, guanine and uracil

(d) guanine and adenine, thymine and cytosine

12. ΔH_{sol} of NH_4Cl is > 0. This process is an ...(i)... process and the solubility increases with …(ii)... in temperature.

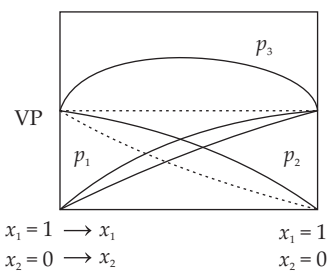
	(i)	(ii)		(i)	(ii)
(a)	endothermic ;	increase	(b)	exothermic ;	decrease
(c)	endothermic ;	decrease	(d)	exothermic ;	increase

13. Which of the following compound attacks pyrex glass ?

(a) XeF_4 (b) XeF_2

(c) XeF_6 (d) None of these

14. Look at the figure given below,



The mixture which correctly interpret the graph is

(a) nitric acid + water (b) benzene + chloroform

(c) acetone + ethyl alcohol (d) water + ethyl alcohol

15. Which of the following is the most suitable reagent for the conversion of

$$RCH_2OH \longrightarrow RCHO$$

(a) $K_2Cr_2O_7$ (b) CrO_3
(c) $KMnO_4$ (d) PCC

16. What is the oxidation state of Pt in $Xe^+[PtF_6]^-$?

(a) + 3 (b) + 4
(c) + 6 (d) + 5

17. The reactant and reagent used for the preparation of butane nitrile by heating is
(a) propyl chloride with KCN
(b) propyl alcohol with KCN
(c) butyl chloride with KCN
(d) None of the above

18. Phenol is less acidic than
(a) *p*-methoxyphenol
(b) *p*-nitrophenol
(c) ethanol
(d) All of these

19. Among the following fluorides, one which further combine with fluorine is .... .

(a) IF_5 (b) NaF
(c) CaF_2 (d) SF_5

20. Denaturation of protein leads to loss of its biological activity by
(a) formation of amino acids
(b) loss of both secondary and tertiary structure
(c) loss of primary structure
(d) None of the above

21. When phenol is reacts with chloroform in presence of KOH the product formed is '*A*' and the name of the reaction is '*B*'.
(a) *A* = salicylic acid; *B* = Kolbe's reaction
(b) *A* = salicylaldehyde; *B* = Reimer-Tiemann
(c) *A* = phenyl salicylate; *B* = Kolbe's reaction
(d) *A* = aspirin; *B* = Reimer-Tiemann reaction

22. Among noble gases (from He to Xe) only xenon reacts with oxygen and fluorine to form stable xenon fluorides and oxides because it
(a) has the largest size
(b) has the lowest ionisation enthalpy
(c) has the highest heat of vaporisation
(d) is most readily available in the nature

23. The compound that does not liberate CO_2 on treatment with aqueous sodium carbonate is
(a) salicylic acid
(b) carbolic acid
(c) benzoic acid
(d) All of these

24. The correct order stability of interhalogen compounds is

(a) $IF_3 > BrF_3 > ClF_3$ (b) $ClF_3 > BrF_3 > IF_3$

(c) $BrF_3 > IF_3 > ClF_3$ (d) $ClF_3 > IF_3 > BrF_3$

25. If a face centered lattice of *X* and *Y*, *X* atoms are present at the corners while *Y* atoms are at the face centres, then what will be the formula of the compound ?

(a) X_2Y_3 (b) XY_3

(c) XY (d) X_3Y

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. Consider the following reaction,

$$A \xrightarrow{CH_3MgBr} B \xrightarrow{H_3O^+} C$$

Here, *A*, *B* and *C* respectively are

	A	*B*	*C*
(a)	CH_3COCH_3	$(CH_3)_3COMgBr$	$(CH_3)_3COH$
(b)	$CHCOOH$	$(CH_3)_2CHOMgBr$	CH_3CH_2OH
(c)	$(CH_3COO)_2Ca$	CH_3CH_2OMgBr	$CH_3-\underset{\displaystyle OH}{\underset{\vert}{C}}H-CH_3$
(d)	CH_3COCH_3	$(CH_3)_3COMgBr$	$CH_3\underset{\displaystyle OH}{\underset{\vert}{C}}HCH_3$

27. If sodium metal crystallises as a body centered cubic lattice with the cell edge 4.29 Å, then the radius of sodium atom is $x \times 10^8$ cm. The value of *x* is

(a) 1.857 (b) 2.371

(c) 3.817 (d) 9.312

28. Which of the following is the correct order of boiling point of hydrides of group 15 elements?

(a) $SbH_3 > NH_3 > AsH_3 > PH_3$ (b) $SbH_3 > NH_3 > PH_3 > AsH_3$

(c) $NH_3 > PH_3 > AsH_3 > SbH_3$ (d) $NH_3 > PH_3 > SbH_3 > AsH_3$

29. Choose the incorrect statement.

(a) Glucose is aldohexose

(b) Naturally occuring glucose is dextrorotatory

(c) Glucose contains three chiral centres

(d) Glucose contains one primary alcoholic group and four secondary alcoholic groups

30. $HOH_2C \cdot CH_2OH$ on heating with periodic acid gives

(a) $2\begin{matrix} H \\ H \end{matrix}\!\!\diagdown\!\!\diagup C=O$ (b) $2\,CO_2$ (c) $2\,HCOOH$ (d) $\underset{\displaystyle CHO}{\underset{\vert}{C}}HO$

31. Which of the following statement is correct regarding relative lowering of vapour pressure?

(a) It is proportional to the ratio of number of solvent molecules to solute molecules

(b) It is proportional to the ratio solute molecules to solvent molecules

(c) It is proportional to ratio solvent molecules to the total number of molecules in solution

(d) It is proportional to the raio of solute molecules to the total number of molecules in solution

32. Which of the following statements is incorrect regarding covalent solids ?

(a) Covalent solids are also called gaint molecule

(b) Diamond and silicon carbide belong to this class of solid

(c) They have extremely high melting point

(d) These are very soft and brittle

33. Which of the most stable hydride ?

(a) AsH_3 (b) SbH_3

(c) PH_3 (d) NH_3

34. For the reaction,

$$RCOOH \longrightarrow RCH_2OH$$

the reagent used is

(a) $NaBH_4$ (b) Na/alcohol

(c) $Zn/Hg—HCl$ (d) $LiAlH_4$/alcohol

35. A 10% solution (by mass) of sucrose in water has a freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water if the freezing point of water is 273.15 K. [Molar mass of sucrose $= 342\text{ g mol}^{-1}$ and molar mass of glucose $= 180\text{ g mol}^{-1}$]

(a) 265.55 K (b) 273.15 K

(c) 280.75 K (d) 286.75 K

36. In which of the following, sulphur is present in $+6$ oxidation state ?

I. Sulphurous acid

II. Dithionic acid

III. Sulphuric acid

IV. Disulphuric acid

Choose the correct option.

(a) I and II (b) III and IV

(c) I and IV (d) Only I

37. The name of the given dipeptide is

$$\underset{\displaystyle CH_3}{H_2N\underset{|}{C}HCONHCH_2COOH}$$

(a) Glycyl glycine (b) Glycyl alanine

(c) Glycine alanine (d) Alanyl glycine

38. On heating ammonium dichromate (I) and barium azide (II) separately, we get

(a) N_2O in I case and NO_2 in second case

(b) N_2O in I case and N_2 in second case

(c) N_2 in both cases

(d) N_2 in I case and NO in second case

39. Look at the reaction given below :

$$CH_3CH_2CH_2I \xrightarrow{\text{Alc. KOH}} X \xrightarrow{Br_2} Y$$

X and Y respectively are

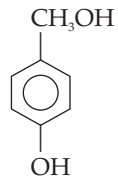
(a) $CH_3CH = CH_2$, $CH_3CH_2CH_2Br$

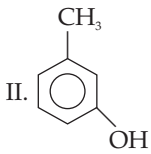
(b) $CH_3-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$, $CH_3-\underset{\displaystyle Br}{\underset{|}{C}}HCH_3$

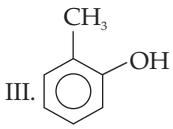
(c) $CH_3CH_2CH_2OH$, $CH_3CH_2CH_2Br$

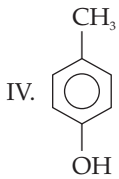
(d) $CH_3CH=CH_2$, $CH_3\underset{\displaystyle Br}{\underset{|}{C}}HCH_2Br$

40. Consider the following compounds :

I. 

II. 

III. 

IV. 

The compound(s) that gives tribromoderivatives on treatment with bromine water is

(a) Only II
(b) I and II
(c) III and IV
(d) Only I

41. Major product obtained when chlorobenzene react with ammonia in presence of cuprous oxide?

(a) Aniline
(b) Benzoic acid
(c) Phenol
(d) Benzoic acid

42. The mole fraction of ethanol in a sample of spirit containing 80 % ethanol by mass

(a) 0.609
(b) 0.96
(c) 0.82
(d) 0.85

43. Which of the following statement is correct about sulphur ?

(a) Sulphur forms only two types of allotropes
(b) Rhombic and monoclinic sulphur are the type of allotropic sulphur
(c) The stable form of sulphur at room temperature is monoclinic sulphur
(d) All of the above statements are correct

44. Select the correct statement.

(a) Melting point of quartz glass is sharp but of quartz is not
(b) Salt has long range order of constituents but ice does not
(c) Heat of fusion is definite for iron but not for rubber
(d) Glass can give two pieces with plain and smooth surfaces when cut with a sharp edged tool

Direction (Q. Nos. 45-49) *For given questions two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as 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** Alcohol and phenol can be distinguished by sodium hydroxide.
Reason Alcohol is more acidic than phenol.

46. **Assertion** The close packing of atoms in cubic structure is in the order fcc > bcc > sc.
Reason The formula used for packing density is $\frac{\text{volume of unit cell}}{a^3}$.

47. **Assertion** Isotonic solution show the phenomenon of osmosis.
Reason Isotonic solution have equal osmotic pressure.

48. **Assertion** Ammonia is used in detection of Cu^{2+} ion.
Reason Ammonia reacts with Cu^{2+} ion to give blue precipitate of CuO.

49. **Assertion** Leucine is an essential amino acid.
Reason The amino acids which the body cannot synthesis are called essential amino acid.

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. Which of the following analogies is correct?
(a) Acidic strength : HF < HCl < HBr < HI : : Stability : HF > HCl > HBr > HI
(b) Thiosulphuric acid : $H_2S_2O_3$: : Caro's acid : $H_2S_2O_3$
(c) SO_3 : Planar triangular : : H_2SO_4 : V-shaped
(d) Oxidation state of N in N_3H : $-\frac{1}{3}$: : Oxidation state of N in NH_3 : +3

51. Complete the following analogy. An equal number of cations and anions are missing from the lattice : *A* : : The smaller cation is dislocated from its normal position to an interstitial site : *B*.
(a) *A* : Schottky : : *B* : Vacancy defect
(b) *A* : Schottky : : *B* : Frenkel
(c) *A* : Frenkel : : *B* : Vacancy defect
(d) *A* : Frenkel : : *B* : Interstitial defect

52. Match the item given in Column I with the item given in Column II and mark the correct codes that are given below.

Column I	Column II
A. CH_3CHCl_2	1. Allyl halide
B. CH_2ClCH_2Cl	2. Vinyl halide
C. $CHCl=CH_2$	3. Alkylidene halide
D. $ClCH_2—CH=CH_2$	4. Alkylene dihalide

Codes

	A	B	C	D
(a)	3	4	2	1
(c)	1	3	2	4

	A	B	C	D
(b)	2	1	3	4
(d)	4	1	3	2

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

Phenol, which is also called carbolic acid, is an aromatic organic compound with the molecular formula C_6H_5OH. In this, the —OH group is directly attached to sp^2-hybridised carbon of an aromatic ring.

The carbon-oxygen bond length (136 pm) in phenol is slightly less than that in methanol. This is due to the partial double bond character on account of the conjugation of unshared electron pair of oxygen with the aromatic ring and sp^3-hybridised state of carbon to which oxygen is attached.

Phenol can be prepared by various means or methods. Some important methods are alkali fusion of sulphonates, hydrolysis of diazonium salts, decarboxylation of salicylic acid and from Grignard reagent. Commercially, it is prepared from Dow's process and from cumene. In Dow's process, phenol is obtained when chlorobenzene is heated with 6-8% NaOH at 623 K under 320 atom pressure. Aerial oxidation of cumene produces cumene hydroperoxide which upon subsequent hydrolysis with an aqueous acid gives phenol and propanone.

Benzene is sulphonated with oleum and benzene sulphonic acid so formed is converted to sodium phenoxide on heating with molten sodium hydroxide. Acidification of the sodium salt gives phenol.

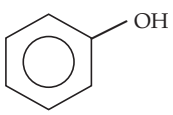
53. What is the role of Grignard reagent?

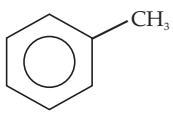
(a) Form new carbon-carbon bonds
(b) Remove carbon-carbon bond
(c) Form new carbon-oxygen bond
(d) Remove carbon-carbon double bond

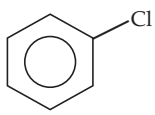
54. Which of the following major product is formed when phenol is treated with sodium hydroxide and carbon dioxide?

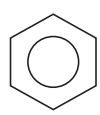
(a) Salicylic acid
(b) Phthalic acid
(c) Salicylaldehyde
(d) Benzoic acid

55. Among the given compounds, one which most easily attacked by an electrophile is .....

(a) 

(b) 

(c) 

(d) 

Answers

1. (a)	**2.** (d)	**3.** (a)	**4.** (b)	**5.** (c)	**6.** (a)	**7.** (d)	**8.** (d)	**9.** (c)	**10.** (a)
11. (a)	**12.** (a)	**13.** (c)	**14.** (c)	**15.** (d)	**16.** (d)	**17.** (a)	**18.** (b)	**19.** (a)	**20.** (b)
21. (b)	**22.** (b)	**23.** (b)	**24.** (a)	**25.** (b)	**26.** (a)	**27.** (a)	**28.** (a)	**29.** (c)	**30.** (a)
31. (d)	**32.** (d)	**33.** (d)	**34.** (d)	**35.** (a)	**36.** (b)	**37.** (d)	**38.** (c)	**39.** (d)	**40.** (a)
41. (a)	**42.** (a)	**43.** (b)	**44.** (c)	**45.** (c)	**46.** (a)	**47.** (d)	**48.** (c)	**49.** (a)	**50.** (a)
51. (b)	**52.** (a)	**53.** (a)	**54.** (a)	**55.** (a)					

EXPLANATIONS

1. Ice is a molecular crystal in which the constituent units are molecules. The forces present between these molecules are hydrogen bonds.

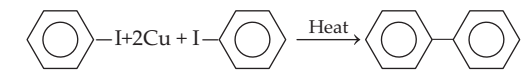
2. In N_2H_4, O.S. of N = – 2

In NH_3, O.S. is N = – 3

In NH_2OH, O.S. in N = – 1

In N_3H, O.S. of N = $-\frac{1}{3}$

3. When iodobenzene is heated with copper powder in a sealed tube, diphenyl is formed. This reaction is called Ullmann reaction.



Iodobenzene Iodobenzene Biphenyl

$+ Cu_2I_2$

4. People add sodium chloride to water while boiling eggs to increase the boiling point.

Because the addition of salt reduces the vapour pressure of the liquid and as a result, boiling point increases.

5. Density of unit cell

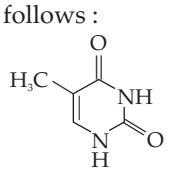
$$= \frac{Z \times \text{mol. wt. } (M)}{a^3\,(\text{volume}) \times \text{Avogadro no. } (N_A)}\ \text{g cm}^{-3}$$

6. $KMnO_4$ will oxidise initially formed aldehyde to carboxylic acids. Hence, it cannot be used in oxidation of primary alcohols to aldehydes.

7. When one mole of magnesium nitride reacts with an excess of water, then 2 moles of ammonia are produced.

$$\underset{1\,\text{mol}}{Mg_3N_2} + 6H_2O(l) \longrightarrow 3Mg(OH)_2 + \underset{2\,\text{mol}}{2NH_3(g)}$$

8. Thymine is also named as 5-methyl uracil. Its structure is as follows :



9. People taking a lot of salt or salty food experience water retention in tissue cells and internuclear spaces because of osmosis. This resulting puffiness or swelling is called edema.

10. In fcc unit cell, the packing efficiency of 74% which is maximum and it is coordinated with 12 other nearest neighbouring atoms or ions.

11. In DNA, the complementary bases are adenine and thymine, guanine and cytosine.

12. The molar enthalpy of solution for ammonium chloride is positive.

Hence, this dissolution of NH_4Cl is endothermic process and the solubility increases with increase in temperature.

13. XeF_6 attacks pyrex glass because in pyrex glass, silica is present which react with XeF_6 to give SiF_4.

$$2XeF_6 + 3SiO_2 \longrightarrow 3SiF_4 + 2XeO_3$$

14. The given graph shows the positive deviation from Raoult's law and among the given options only acetone and ethyl alcohol solution show such deviation.

15. PCC can be used for the given conversion. It is mild in nature and oxidises alcohols into aldehydes.

16. Let oxidation state of Pt in $Xe^{+}[PtF_6]^{-} = x$

$$[\overset{x}{Pt}\overset{-1}{F_6}]^{-}$$

$\therefore \quad x + 6(-1) = -1 \Rightarrow x = +5$

17. Butane nitrile can be prepared by heating propyl chloride with KCN. Its reaction is as follows :

$$\underset{\text{Propyl chloride}}{CH_3CH_2CH_2Cl} + KCN \xrightarrow[S_N2]{\Delta} \underset{\text{Butane nitrile}}{CH_3CH_2CH_2CN} + KCl$$

18. *p*-nitrophenol is a stronger acid than phenol due to $-R$ and $-I$ effects.

- *p*-methoxyphenol is weaker than phenol due to $+R$ and $-I$ effects.

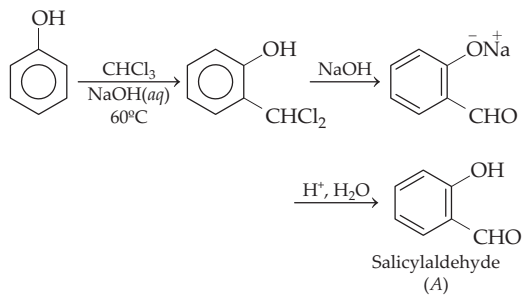
- Phenol loses its hydrogen ion to form the phenoxide ion which resonates and stabilises itself and this loss of electrons makes the phenol more acidic ethanol.

19. IF_5 is the fluoride that further combine with fluorine to give IF_7.

$$IF_5 + F_2 \longrightarrow IF_7$$

20. Denaturation of protein leads to loss its biological activity by loss of both secondary and tertiary structures. While the primary structure remains the same after a denaturation process.

21. According to the given statement, the reaction involves is as follows :



Salicylaldehyde
(*A*)

This reaction is known as Reimer-Tiemann reaction (*B*).

22. Xenon has the lowest ionisation enthalpy, thus, it form stable compounds on reaction with oxygen and fluorine.

23. Phenol is also known as carbolic acid. It is weaker than carbonic acid, i.e. H_2CO_3 and does not liberate CO_2 on treatment with aqueous sodium bicarbonate solution.

24. The stability of interhalogen compounds decreases down the group as size difference or the electronegativity difference between the two halogen atoms, decreases in the same way.

Hence, the order is $IF_3 > BrF_3 > ClF_3$

25. *X* atoms are present at the corners, $8 \times \frac{1}{8} = 1$

Y atoms are present at the face centres, $6 \times \frac{1}{2} = 3$

So, the formula of the crystal is XY_3.

26. $\underset{(A)}{CH_3COCH_3} \xrightarrow{CH_3MgBr} CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OMgBr$ (*B*)

$\xrightarrow{H_3O^+} CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH$ (*C*)

27. Given, edge of the cell (a) = 4.29 Å

Radius of Na (if bcc lattice)

$$= \frac{\sqrt{3}a}{4} = \frac{\sqrt{3} \times 4.29}{4}$$

$$= 1.8574 \text{ Å}$$

$$= 1.8574 \times 10^{-8} \text{ cm}$$

Therefore, the value of $x = 1.8574$

28. NH_3 has tendency to form hydrogen bonds, thus, it has abnormally high boiling point then AsH_3 and PH_3. In other hydrides, it varies directly with molecular weight of molecule due to increased van der Waals' force. This force is least in PH_3 and highest in SbH_3. Thus, the order is $SbH_3 > NH_3 > AsH_3 > PH_3$.

29. Statement (c) is incorrect but other are correct. Glucose contains 4 chiral centres.

30. $\underset{\underset{CH_2OH}{|}}{CH_2OH} \xrightarrow{HIO_4} 2HCHO + HIO_3 + H_2O$

HIO_4 oxidises —CH_2OH to HCHO and breaks the C—C bond of terminal CH_2OH group.

31. The relative lowering of vapour pressure is proportional to the ratio of number of solute molecules to the total number of molecules in solution.

Relative lowering of vapour pressure

$$= \frac{p^\circ - p_s}{p^\circ} = \frac{n_2}{n_1 + n_2}$$

where, p° = vapour pressure of pure solvent

p_s = vapour pressure of solvent

n_1 = number of moles of solvent

n_2 = number of moles of solute

32. Statement (d) is incorrect. Its correct form is as follows :

Covalent solids are very hard but brittle. Rest other statements are correct.

33. NH_3 is most stable than other hydride. On moving down group, the thermal stability of hydrides decreases.

Hence, the order of stability of hydrides is $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$.

34. Among the given options, the reagent used for the conversion of the given acid to alcohol is $LiAlH_4$.

$$R\text{COOH} \xrightarrow{LiAlH_4/\text{Alcohol}} R\text{CH}_2\text{OH}$$

35. Freezing point of water = 273.15 K

Freeing point of sucrose solution = 269.15 K

Weight of the sucrose in solution =

Weight of glucose in solution = 10 g

Molar mass of sucrose = 342 g mol^{-1}

Molar mass of glucose = 180 g mol^{-1}

Depression in freezing point

$$\Delta T_f = \frac{K_f \times W_B \times 1000}{W_A \times M_B}$$

$$\Rightarrow \quad K_f = \frac{\Delta T_f \times W_A \times M_B}{W_B \times 1000}$$

In case of sucrose solution

$$K_f = \frac{(273.15 - 269.15) \times 90 \times 342}{10 \times 1000} \quad ...(i)$$

In case of glucose solution,

$$K_f = \frac{(273 - x) \times 90 \times 180}{10 \times 1000} \quad ...(ii)$$

As K_f is constant,

$\therefore$ Equation (i) = equation (ii)

$$\frac{(273.15 - 269.15)}{10 \times 1000} \times 90 \times 342 = \frac{(273.15 - x) \times 90 \times 180}{10 \times 1000}$$

$$4 \times 342 = (273.15 - x) \times 180$$

$$(273.15 - x) = \frac{4 \times 342}{180} = 7.6$$

$\therefore \quad x = 265.55$ K

So, freezing point of glucose solution = 265.55 K

36. O.S. of S in dithionic acid ($H_2S_2O_6$) = + 5

O.S. of S in sulphurous acid (H_2SO_3) = + 4

O.S. of S in sulphuric acid (H_2SO_4) = + 6

O.S. of S in disulphuric acid ($H_2S_2O_7$) = + 6

Hence, both sulphuric acid and disulphuric acid have +6 oxidation state.

37. The given dipeptide is made up of two amino acids which are alanine and glycine. Hence, the name of dipeptide is alanyl glycine.

38. N_2 is formed in both the cases.

$$\underset{\text{Ammonium dichromate (I)}}{(NH_4)_2Cr_2O_7} \xrightarrow{\Delta} \underset{\text{Nitrogen}}{N_2\uparrow} + \underset{\text{Water}}{4H_2O} + \underset{\text{Chromium (III) oxide}}{Cr_2O_3}$$

$$\underset{\text{Barium oxide (II)}}{Ba(N_3)_2} \xrightarrow{\Delta} \underset{\text{Barium}}{Ba} + \underset{\text{Nitrogen}}{2N_2\uparrow}$$

39. $\underset{\text{1-iodopropane}}{CH_3CH_2CH_2I} \xrightarrow{\text{Alc. KOH}} \underset{\substack{(X)\\ \text{Propene}}}{CH_3—CH=CH_2} \xrightarrow{Br_2} CH_3—\underset{\substack{|\\ Br}}{CH}CH_2Br$

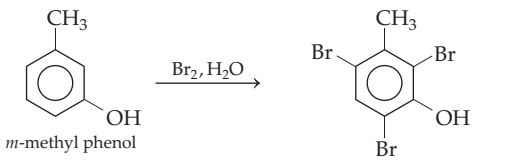
(Y)

1, 2-dibromopropane

40. The bromination of phenol or its derivative, like toluene can be done in the presence of bromine water.

The —OH group is *ortho-para* directing and a strong activating group. So, the bromo group will come at *ortho* and *para* position of —OH on the benzene ring.

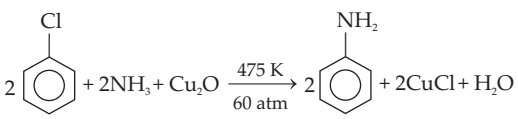
Thus, *m*-methylphenol will give tribromo derivative on treatment with bromine water as its *ortho* and *para* positions are available for substitution.



m-methyl phenol

2, 4, 6-tribromo-3-methyl phenol

41. The reaction between chlorobenzene and NH_3 in the presence of cuprous oxide gives aniline.



Aniline

42. Mole fraction of ethanol = $\chi_{C_2H_5OH}$

$$= \frac{n_{C_2H_5OH}}{n_{C_2H_5OH} + n_{H_2O}}$$

Given that, mass of C_2H_5OH = 80 g

Molar mass of C_2H_5OH = 46 g/mol

$$n_{C_2H_5OH} = \frac{80}{46} = 1.73 \text{ mol}$$

Mass of water = 100 − 80 = 20 g

$$n_{H_2O} = \frac{20}{18} = 1.11$$

$$\chi_{C_2H_5OH} = \frac{1.73}{1.73 + 1.11} = \frac{1.73}{2.84} = 0.609$$

43. Statement (b) is correct, while statements (a) and (c) are incorrect.

The correct forms are as follows:

(a) Sulphur forms numerous allotropes of which the yellow rhombic (α-sulphur) and monoclinic (β-sulphur) forms are the most important.

(c) The stable form of sulphur at room temperature is rhombic sulphur, which transforms to monoclinic sulphur, when heated above 369 K.

44. Statement (c) is correct while that of other statements are incorrect. The correct forms are as follows :

(a) Quartz glass being an amorphous solid does not have shape melting point but quartz being crystalline solid have sharp melting point.

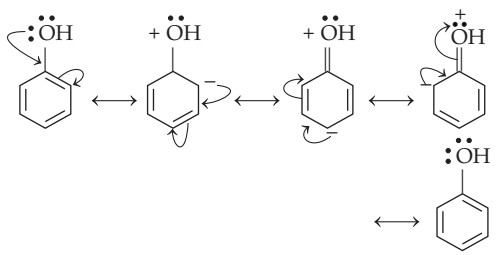
(b) Salt and ice both have long range order of arrangement of constituent particles.

(d) Glass gives two pieces having irregular surface when cut with sharp edged tool.

45. Assertion is true but Reason is false.

- Alcohol and phenol can be distinguished by treating with NaOH. Phenol react with NaOH to produce sodium phenoxide because phenols are acidic in nature, while alcohols are weak acids.

  The greater acidic nature of phenols as compared to alcohols can be explained on the basis of resonance.



  Due to positive charge on oxygen atom, it attracts the electron pair of O—H bond strongly towards itself and thus, facilitates the release of H^+.

46. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

47. Assertion is false but Reason is true. Isotonic solution does not show the phenomenon of osmosis because isotonic solutions are those solutions which have same osmotic pressure.

48. Assertion is true but Reason is false.

Correct Reason is as follows :

Aqueous solution of ammonia reacts with Cu^{2+} ion to form deep blue coloured complex.

49. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

50. Only (a) option is correct and other analogies are incorrect. The correct form are as follows :

(b) Thiosulphuric acid : $H_2S_2O_3$: : Caro's acid : H_2SO_5

(c) SO_3 : Planar triangular : : H_2SO_4 – Tetrahedral shape

(d) Oxidation state of N in N_3H : $-\frac{1}{3}$: :

Oxidation state of N in $NH_3 = -3$

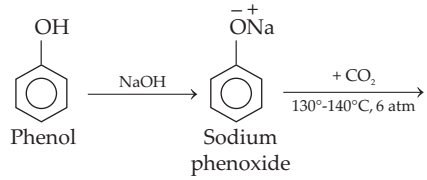
51. • Schottky defect is observed when an equal number of cations and anions are missing from the lattice.

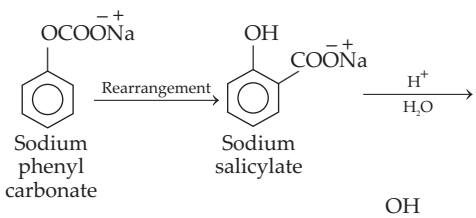
- Frenkel defect is observed when the smaller cation is dislocated from its normal position to an interstitial site.

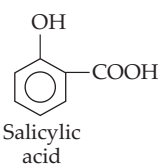
52. A → (3); B → (4); C → (2); D → (1)

53. Grignard reagent is used in organic reactions to form new carbon-carbon bond. It is useful to form alcohols from ketones and aldehydes.

54. When phenol is treated with NaOH and CO_2 salicylic acid is formed. The name of this reaction is Kolbe-Schmidt or Kolbe's reaction.







55. The —OH group present in phenol can release electrons to the ring more easily as compared to other substituents.

Thus, it can be most easily attacked by an electrophile.