Sample Paper

5

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

General Instructions

1. *The Question Paper contains three sections.*
2. *Section A has **25** questions. Attempt any **20** questions.*
3. *Section B has **24** questions. Attempt any **20** questions.*
4. *Section C has **6** questions. Attempt any **5** questions.*
5. *All questions carry equal marks.*
6. *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. Affinity for hydrogen decreases in the group from fluorine to iodine. Which of the halogen acids should have highest bond dissociation enthalpy?
(a) HF (b) HCl (c) HBr (d) HI

2. DNA and RNA contain four bases each. Which of the following bases is not present in RNA?
(a) Adenine (b) Uracil
(c) Thymine (d) Cytosine

3. Sulphuric acid has great affinity for water because it
(a) Decomposes water (b) Forms hydrate with water
(c) Hydrolyse the acid (d) Decomposes the acid

4. Which among MeX, RCH_2X, R_2CHX and R_3CX is most reactive towards S_N2 reaction?
(a) MeX (b) RCH_2X (c) R_2CHX (d) R_3CX

5. Which colour is observed when ZnO is heated?
(a) Yellow (b) Violet (c) Green (d) Blue

6. Compound that will show the highest lattice energy
(a) KF (b) NaF (c) CsF (d) RbF

7. Volatile nature of halogens is because
(a) The halogen molecules are more reactive
(b) The force existing between the molecules are only weak van der Waal forces
(c) Halogen molecules are bounded by strong forces
(d) Halogen molecules are bounded by electrostatic forces.

8. Solids which do not show the same physical properties in different directions are called
(a) Pseudo solids (b) Isotropic solids (c) Polymorphic solids (d) Anisotropic solids

9. For a binary ideal liquid solution, the total vapour pressure of the solution is given as:
(a) $P_{total} = P_A^\circ + (P_A^\circ - P_B^\circ)x_B$ (b) $P_{total} = P_B^\circ + (P_A^\circ - P_B^\circ)x_A$
(c) $P_{total} = P_B^\circ + (P_B^\circ - P_A^\circ)x_A$ (d) $P_{total} = P_B^\circ + (P_B^\circ - P_A^\circ)x_B$

10. Graphite cannot be classified as
(a) conducting solid (b) network solid (c) covalent solid (d) ionic solid

11. Bromination of toluene gives
(a) only *m*-substituted product (b) only *p*-substituted product
(c) mixture of *o*-and *p*-substituted products (d) mixture of *o*-and *m*-substituted products

12. At iso-electric point:
(a) conc. of cation is equal to conc. of anion
(b) Net charge is zero.
(c) Maximum conc. of di-polar ion (Zwitter ion) will be present
(d) All of the above

13. Chlorobenzene can be prepared by reacting aniline with :
(a) hydrochloric acid
(b) cuprous chloride
(c) chlorine in presence of anhydrous aluminium chloride
(d) nitrous acid followed by heating with cuprous chloride

14. Argon is used
(a) in filling airships
(b) to obtain low temperature
(c) in high temperature welding
(d) in radiotherapy for treatment of cancer

15. An aromatic ether is not cleaved by HI even at 525 K. The compound is
(a) $C_6H_5OCH_3$ (b) $C_6H_5OC_6H_5$ (c) $C_6H_5OC_3H_7$ (d) Tetrahydrofuran

16. Which of the following compounds is a good conductor of electricity in solution state?
(a) Covalent (b) Molecular (c) Metallic (d) Ionic

17. The compound which reacts fastest with Lucas reagent at room temperature is
(a) butan-1-ol (b) butan-2-ol (c) 2-methylpropan-1-ol (d) 2-methylpropan-2-ol

18. Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a positive deviation from Raoult's law?
(a) Methanol and acetone (b) Chloroform and acetone
(c) Nitric acid and water (d) Phenol and aniline

19. Phenol is less acidic than ..... .
(a) ethanol (b) *o* - nitrophenol
(c) *o*-methylphenol (d) *o*-methoxyphenol

20. The catalyst used in the manufacture of HNO_3 by Ostwald's process is :
(a) platinum gauze (b) vanadium pentoxide
(c) finely divided nickel (d) platinum black

21. Rapid interconversion of α-D-glucose and β-D-glucose to solution is known as:
(a) racemization (b) asymmetric induction
(c) fluxional isomerization (d) mutarotation

22. Elimination of bromine from 2-bromobutane results in the formation of –
(a) predominantly 2-butyne
(b) predominantly 1-butene
(c) predominantly 2-butene
(d) equimolar mixture of 1- and 2-butenes

23. Which of the following is an example of *vic*-dihalide?
(a) Dichloromethane (b) 1, 2-dichloroethane
(c) Ethylidene chloride (d) Allyl chloride

24. Which of the following can be used as an anaesthesia ?
(a) N_2O (b) NO (c) NCl_3 (d) NO_2

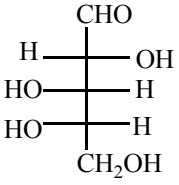
25. At a given temperature, osmotic pressure of a concentrated solution of a substance ..... .
(a) is higher than that of a dilute solution
(b) is lower than that of a dilute solution
(c) is same as that of a dilute solution
(d) cannot be compared with osmotic pressure of dilute solution

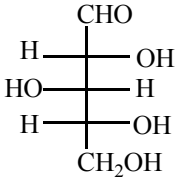
SECTION-B

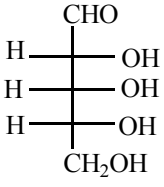
*This section consists of 24 multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.*

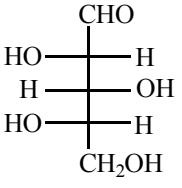
26. Hydrochloric acid at 25ºC is
(a) ionic and liquid (b) covalent and liquid
(c) ionic and gas (d) None of these

27. Which L-sugar on oxidation gives an optically active dibasic acid (2COOH groups)?

(a) 

(b) 

(c) 

(d) 

28. A brown ring is formed in the ring test for NO_3^- ion. It is due to the formation of
(a) $[Fe(H_2O)_5(NO)]^{2+}$ (b) $FeSO_4 . NO_2$ (c) $[Fe(H_2O)_4(NO)_2]^{2+}$ (d) $FeSO_4 . HNO_3$

29. The C–O–H bond angle in ethanol is nearly
(a) 90° (b) 104° (c) 120° (d) 180°

30. Electron gain enthalpy with negative sign of fluorine is less than that of chlorine due to :
(a) High ionization enthalpy of fluorine (b) Smaller size of chlorine atom
(c) Smaller size of fluorine atom (d) Bigger size of 2*p* orbital of fluorine

31. The statement "If 0.003 moles of a gas are dissolved in 900 g of water under a pressure of 1 atmosphere, 0.006 moles will be dissolved under a pressure of 2 atmospheres", illustrates
(a) Dalton's law of partial pressure (b) Graham's law
(c) Raoult's law (d) Henry's law

32. A solution containing 4.0 g of PVC in 2 litre of dioxane (industrial solvent) was found to have an osmotic pressure 3.0×10^{-4} atm at 27°C. The molar mass of the polymer (g/mol) will be :
(a) 1.6×10^4 (b) 1.6×10^5 (c) 1.6×10^3 (d) 1.6×10^2

33. Aryl halides are extremely less reactive towards nucleophilic substitution than alkylhalides. Which of the following accounts for this ?
(i) Due to resonance in aryl halides.
(ii) In alkyl halides carbon atom in C–X bond is sp^2 hybridised whereas in aryl halides carbon atom in C–X bond is sp^3 hybridized.
(iii) Due to stability of phenyl cation.
(iv) Due to possible repulsion there are less chances of nucleophile to approach electron rich arenes.
(a) (i), (ii) and (iv) (b) (i), (ii) and (iii) (c) (i) and (iv) (d) (ii), (iii) and (iv)

34. $MF + XeF_4 \longrightarrow 'A' \left(M^+ = \text{Alkali metal cation}\right)$

The state of hybridisation of the central atom in 'A' and shape of the species are:

(a) sp^3d, TBP (b) sp^3d^3, distorted octahedral

(c) sp^3d^3, pentagonal planar (d) No compound formed at all

35. Which of the following statements is not true about glucose?

(a) It is an aldohexose (b) On heating with HI it forms *n*-hexane

(c) It is present in furanose form (d) It does not give 2, 4-DNP test

36. Aryl fluoride may be prepared from arene diazonium chloride using :

(a) HBF_4/Δ (b) $HBF_4 / NaNO_2, Cu, \Delta$

(c) CuF / HF (d) Cu / HF

37. The correct order of S—S bond length in following oxyanions is:

(I) $S_2O_4^{2-}$ (II) $S_2O_5^{2-}$ (III) $S_2O_6^{2-}$

(a) I > II > III (b) I > III > II (c) III > II > I (d) III > I > II

38. Which of the following layering pattern will have a void fraction of 0.260?

(a) ABCCBAABC (b) ABBAABBA (c) ABCABCABC (d) ABCAABCA

39. Which of the following will give vinyl chloride ?

(a) $CH_2 = CH_2 + Cl_2 \xrightarrow{600°C}$ (b) $ClCH_2 - CH_2Cl \xrightarrow[\text{ethanol}]{KOH}$

(c) $CH \equiv CH + HCl \xrightarrow{Hg^{2+}}$ (d) All of these

40. Which of the statements given below is incorrect?

(a) Cl_2O_7 is an anhydride of perchloric acid

(b) O_3 molecule is bent

(c) ONF is isoelectronic with O_2N^-.

(d) OF_2 is an oxide of fluorine

41. Which of the following statements is incorrect?

(a) A solution in which no more solute can be dissolved at the same temperature and pressure is called a saturated solution.

(b) An unsaturated solution is one in which more solute can be dissolved at the same temperature.

(c) The solution which is in dynamic equilibrium with undissolved solute is the saturated solution.

(d) The minimum amount of solute dissolved in a given amount of solvent is its solubility.

42. Arrange the following compounds in increasing order of boiling point.

Propan - 1- ol, butan - 1 - ol, butan - 2 - ol,

pentan - 1 - ol

(a) Propan-1-ol, butan-2-ol, butan-1-ol, pentan-1-ol (b) Propan-1-ol, butan-1-ol, butan-2-ol, pentan-1-ol

(c) Pentan-1-ol, butan-2-ol, butan-1-ol, propan-1-ol (d) Pentan-1-ol, butan-1-ol, butan-2-ol, propan-1-ol

43. Which one of the following is wrong?

(a) Oxygen and sulphur belong to the same group of periodic table

(b) Oxygen is a gas while sulphur is solid

(c) Both oxygen and sulphur show +2, +4 and +6 oxidation states

(d) H_2S has no hydrogen bonding

44. Which of the following statements is true for ionic solids ?

(a) Ionic solids are soluble in CCl_4, C_6H_6, etc.

(b) Under the electric field cations and anions acquire translatory motion in opposite directions

(c) Structural units have strong electrostatic force of attraction

(d) Structural units have dipole-dipole interactions

Given below are two statements 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 and R is also false.

45. Assertion : Liquid He can climb up the wall of the glass vessel in which it is placed.
Reason : Liquid flow from a higher to a lower level.

46. Assertion : Lower alcohols are soluble in water.
Reason : Lower alcohols do not form hydrogen bonding with water molecules.

47. Assertion : Symmetric and unsymmetric ethers can be prepared by Williamson's synthesis.
Reason : Williamson's synthesis is an example of nucleophilic substitution reaction.

48. Assertion: Oxygen is thermodynamically more stable than ozone.
Reason: Ozone decomposes to form oxygen.

49. Assertion : *o*-nitrophenol is less soluble in water than the *m* and *p*-isomers.
Reason : *m* and *p*-nitrophenols exist as associated molecules.

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 columns

Column - I	**Column - II**
(A) $CH_2=CH-CH_2Cl$	(p) *gem*-Dichloride
(B) $CH_2=CHX$	(q) Vinylic halide
(C) CH_3CHCl_2	(r) *vic*-Dichloride
(D) CH_2ClCH_2Cl	(s) Allylic halide

(a) A – (r), B – (q), C – (p), D – (s) (b) A – (q), B – (p), C – (s), D – (r)
(c) A – (s), B – (q), C – (p), D – (r) (d) A – (r), B – (p), C – (s), D – (q)

51. Which of the following analogies is incorrect?
(a) XeF_4 : square planar : : XeO_3 : Pyramidal (b) $XeOF_4$: square pyramidal : : XeF_2 : Linear
(c) $XeOF_4$: Pyramidal : : XeF_4 : square pyramidal (d) XeO_3 : Pyramidal : : $XeOF_4$: square pyramidal

52. For the reaction sequence

$$C_2H_5Br \xrightarrow{AgCN} X \xrightarrow{Reduction} Y$$

Which of the following analogies is correct?
(a) X : Ethyl isocyanide : : Y : Ethylmethylamine (b) X : Ethylamine : : Y : Isopropylamine
(c) X : Ethyl isocyanide : : Y : Ethylamine (d) X : Isopropylamine : : Y : *n*-propylamine

Case Study : *Read the following paragraph and answers the questions.*

The normal boiling point of a substance is the temperature at which the vapour pressure equals 1 atm. If a nonvolatile solute lowers the vapour pressure of a solvent, it must also affect the boiling point. Because the vapour pressure of the solution at a given temperature is less than the vapour pressure of the pure solvent, achieving a vapour pressure of 1 atm for the solution requires a higher temperature than the normal boiling point of the solvent. Thus the boiling point of a solution is always greater than that of the pure solvent. The magnitude of the increase in the boiling point is related to the magnitude of the decrease in the vapour pressure. The decrease in the vapour pressure is proportional to the concentration of the solute in the solution. Hence the magnitude of the increase in the boiling point must also be proportional to the concentration of the solute.

53. Identify which of the following is a colligative property :

(a) freezing point (b) boiling point

(c) osmotic pressure (d) all of the above

54. Assume three samples of juices A, B and C have glucose as the only sugar present in them. The concentration of sample A, B and C are 0.1M, .5M and 0.2 M respectively. Freezing point will be highest for the fruit juice:

(a) A (b) B

(c) C (d) All have same freezing point

55. When a non volatile solid is added to pure water it will:

(a) boil above 100°C and freeze above 0°C (b) boil below 100°C and freeze above 0°C

(c) boil above 100°C and freeze below 0°C (d) boil below 100°C and freeze below 0°C

OMR ANSWER SHEET

Sample Paper No –5

- ✶ Use Blue / Black Ball pen only.
- ✶ Please do not make any atray marks on the answer sheet.
- ✶ Rough work must not be done on the answer sheet.
- ✶ Darken one circle deeply for each question in the OMR Answer sheet, as faintly darkend / half darkened circle might by rejected.

Start time : _____ End time _____ Time taken _____

1. Name (in Block Letters)

2. Date of Exam

3. Candidate's Signature

SECTION-A

1.	a	b	c	d	9.	a	b	c	d	18.	a	b	c	d
2.	a	b	c	d	10.	a	b	c	d	19.	a	b	c	d
3.	a	b	c	d	11.	a	b	c	d	20.	a	b	c	d
4.	a	b	c	d	12.	a	b	c	d	21.	a	b	c	d
5.	a	b	c	d	13.	a	b	c	d	22.	a	b	c	d
6.	a	b	c	d	14.	a	b	c	d	23.	a	b	c	d
7.	a	b	c	d	15.	a	b	c	d	24.	a	b	c	d
8.	a	b	c	d	16.	a	b	c	d	25.	a	b	c	d
9.	a	b	c	d	17.	a	b	c	d					

SECTION-B

26.	a	b	c	d	34.	a	b	c	d	42.	a	b	c	d
27.	a	b	c	d	35.	a	b	c	d	43.	a	b	c	d
28.	a	b	c	d	36.	a	b	c	d	44.	a	b	c	d
29.	a	b	c	d	37.	a	b	c	d	45.	a	b	c	d
30.	a	b	c	d	38.	a	b	c	d	46.	a	b	c	d
31.	a	b	c	d	39.	a	b	c	d	47.	a	b	c	d
32.	a	b	c	d	40.	a	b	c	d	48.	a	b	c	d
33.	a	b	c	d	41.	a	b	c	d	49.	a	b	c	d

SECTION-C

50.	a	b	c	d	52.	a	b	c	d	54.	a	b	c	d
51.	a	b	c	d	53.	a	b	c	d	55.	a	b	c	d

No. of Qns. Attempted		Correct		Incorrect		Marks	