Sample Paper

9

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

General Instructions

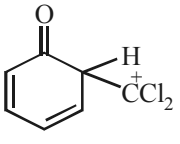
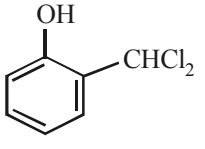
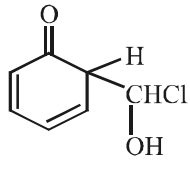
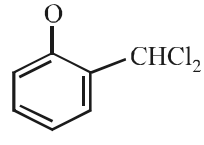
1. *The Question Paper contains three sections.*
2. *Section A has **25** questions. Attempt any **20** questions.*
3. *Section B has **24** questions. Attempt any **20** questions.*
4. *Section C has **6** questions. Attempt any **5** questions.*
5. *All questions carry equal marks.*
6. *There is no 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. The bleaching action of chlorine is due to
(a) reduction (b) hydrogenation (c) chlorination (d) oxidation

2. When phenol is reacted with $CHCl_3$ and NaOH followed by acidification, salicyladehyde is obtained. Which of the following species are involved in the above mentioned reaction as intermediate?

(a)  (b)  (c)  (d) 

3. *n*-Propyl bromide on treatment with ethanolic potassium hydroxide produces
(a) propane (b) propene (c) propyne (d) propanol

4. Which of the following is isoelectronic pair?
(a) ICl_2, ClO_2 (b) BrO_2^-, BrF_2^+ (c) ClO_2, BrF (d) CN^-, O_3

5. When common salt is dissolved in water
(a) The melting point of the solution increases. (b) The boiling point of solution decreases.
(c) Both melting point and boiling point decrease. (d) The boiling point of the solution increases.

6. All of the following statements apply to proteins except
(a) Proteins generally have no definite melting point (b) Proteins contain the grouping —CONH—
(c) Proteins have high molecular weight (d) Proteins can only contain the elements C, H, O and N.

7. Which of the following oxides of nitrogen is a coloured gas?
(a) N_2O (b) NO (c) N_2O_5 (d) NO_2

8. When chlorobenzene is reacted with acetyl chloride in the presence of anhydrous $AlCl_3$, the major product formed is
(a) 2-chloroacetophenone (b) 3-chloroacetophenone
(c) 4-chloroacetophenone (d) 1, 4-dichlorobenzene

9. In the unit cell of KCl (NaCl type), Cl^- ions constitute ccp and K^+ ions fall into the octahedral holes. These holes are:
(a) one at the centre and 6 at the centres of the faces (b) one at the centre and 12 at the centres of the edges
(c) 8 at the centres of 8 small cubes forming the unit cell (d) none of these

10. A solution is prepared by dissolving 10 g NaOH in 1250 mL of a solvent of density 0.8 g/mL. The molality of the solution in mol kg^{-1} is
(a) 0.25 (b) 0.2 (c) 0.008 (d) 0.0064

11. When adenine is attached to ribose sugar, it is called adenosine. To make a nucleotide from it, it would require
(a) oxygenation (b) addition of a base (c) addition of phosphate (d) hydrogenation

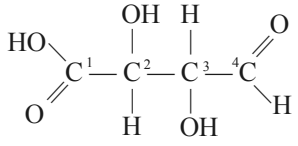
12. The nitrogen oxides that contain(s) N–N bond(s) is /are
(i) N_2O (ii) N_2O_3 (iii) N_2O_4 (iv) N_2O_5
(a) (i) and (ii) (b) (ii), (iii) and (iv) (c) (iii) and (iv) (d) (i), (ii) and (iii)

13. Iodine molecules are held in the crystals lattice by..... .
(a) London forces (b) dipole – dipole interactions
(c) covalent bonds (d) coulombic forces

14. At the state of dynamic equilibrium, for
solute + solvent $\rightleftharpoons$ solution.
(a) Rate of dissolution = Rate of unsaturation. (b) Rate of dissolution = Rate of unsaturation.
(c) Rate of dissolution = Rate of saturation (d) Rate of crystallization = Rate of saturation.

15. The sharp melting point of crystalline solids is due to
(a) a regular arrangement of constituent particles observed over a short distance in the crystal lattice
(b) a regular arrangement of constituent particles observed over a long distance in the crystal lattice
(c) same arrangement of constituent particles in different directions
(d) different arrangement of constituent particles in different directions.

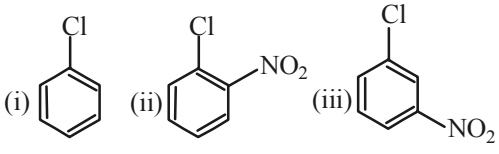
16. Which of the carbon atoms presents in the molecule given below are asymmetric?



(a) 1, 2, 3, 4 (b) 2, 3 (c) 1, 4 (d) 1, 2, 3

17. The process by which synthesis of protein takes place based on the genetic information present in m-RNA is called
(a) Translation (b) Transcription (c) Replication (d) Messenger hypothesis

18. Arrange compounds in increasing order of reaction.



(a) (i) < (ii) < (iii) (b) (iii) < (ii) < (i) (c) (i) < (iii) < (ii) (d) (iii) < (i) < (ii)

19. Phosphine is not evolved when
(a) white phosphorus is boiled with a strong solution of $Ba(OH)_2$
(b) phosphorus acid is heated
(c) calcium hypophosphite is heated
(d) metaphosphoric acid is heated.

20. Phenol undergoes electrophilic substitution more easily than benzene because
(a) –OH group exhibits +M effect and hence increases the electron density on the *o*- and *p*-positions.
(b) oxocation is more stable than the carbocation
(c) both (a) and (b)
(d) –OH group exhibits acidic character

21. The correct order of the packing efficiency in different types of unit cells is ..... .
(a) *fcc* < *bcc* < simple cubic (b) *fcc* > *bcc* > simple cubic
(c) *fcc* < *bcc* > simple cubic (d) *bcc* < *fcc* > simple cubic

22. An organic compound of molecular formula $C_4H_{10}O$ does not react with sodium. With excess of HI, it gives only one type of alkyl halide. The compound is
(a) Ethoxyethane (b) 2-Methoxypropane (c) 1-Methoxypropane (d) 1-Butanol

23. On mixing 40 mL of chloroform and 20 mL of acetone, the total volume of the solution is
(a) < 60 mL (b) > 60 mL (c) = 60 mL (d) Cannot be predicted

24. Which of the esters shown, after reduction with $LiAlH_4$ and aqueous workup, will yield two molecules of only a single alcohol?
(a) $CH_3CH_2CO_2CH_2CH_3$ (b) $C_6H_5CO_2CH_2C_6H_5$ (c) $C_6H_5CO_2C_6H_5$ (d) None of these

25. P—O—P bond is present in
(a) $H_4P_2O_6$ (b) $H_4P_2O_5$ (c) Both (a) and (b) (d) Neither (a) nor (b)

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. The secondary structure of a protein refers to
(a) fixed configuration of the polypeptide backbone (b) α – helical backbone
(c) hydrophobic interactions (d) sequence of α – amino acids

27. Conant Finkelstein reaction for the preparation of alkyl iodide is based upon the fact that
(a) Sodium iodide is soluble in methanol, while sodium chloride is insoluble in methanol
(b) Sodium iodide is soluble in methanol, while NaCl and NaBr are insoluble in methanol
(c) Sodium iodide is insoluble in methanol, while NaCl and NaBr are soluble
(d) The three halogens differ considerably in their electronegativity

28. $CH_3—F \xrightarrow{OH^{\ominus}} CH_3—OH$ ..... (A)

$CH_3—F \xrightarrow[(ii)\ OH^{\ominus}]{(i)\ NaI} CH_3—OH$ ..... (B)

The best way to convert CH_3F into CH_3OH is
(a) A (b) B (c) Both are same (d) None

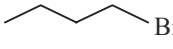
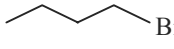
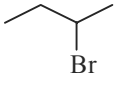
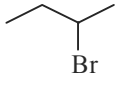
29. Which pair gives Cl_2 at room temperature :
(a) NaCl + Conc. H_2SO_4 (b) Conc. HCl + $KMnO_4$ (c) NaCl + Conc. HNO_3 (d) NaCl + MnO_2

30. Vapour pressure of benzene at 30°C is 121.8 mm Hg. When 15 g of a non volatile solute is dissolved in 250 g of benzene its vapour pressure decreased to 120.2 mm Hg. The molecular weight of the solute (Mo. wt. of solvent = 78)
(a) 356.2 (b) 456.8 (c) 530.1 (d) 656.7

31. Which of the following element has the property of diffusing through most commonly used laboratory materials such as rubber, glass or plastics?
(a) Xe (b) Rn (c) He (d) Ar

32. The presence or absence of hydroxyl group on which carbon atom of sugar differentiates RNA and DNA?
(a) 1^{st} (b) 2^{nd} (c) 3^{rd} (d) 4^{th}

33. Which of the following statements are correct?
(i) Natural abundance of noble gases is ~ 1% by volume of which Ar is the major constituent.
(ii) Noble gases have high positive values of electron gain enthalpy.
(iii) Preparation of XeF_2 requires F_2 in excess amount.
(iv) Complete hydrolysis of all three XeF_2, XeF_4 and XeF_6 gives Xe as one of product.
(a) (i) and (iii) (b) (ii) and (iv) (c) (i) and (ii) (d) (ii) and (iii)

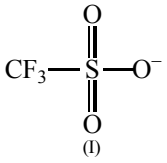
34. $CH_3CH_2CH_2CH_2OH + NaBr + H^{\oplus} \longrightarrow$
Identify product and mechanism of the reaction
(a)  and S_N1 (b)  and S_N2
(c)  and S_N1 (d)  and S_N2

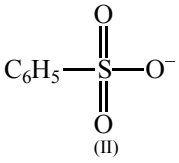
35. Which of the following fluorides of xenon is impossible?
(a) XeF_2 (b) XeF_3 (c) XeF_4 (d) XeF_6

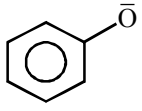
36. The boiling point of a solution of 0.11 g of a substance in 15 g of ether was found to be 0.1°C higher than that of pure ether. The molecular weight of the substance will be ($K_b = 2.16°K\ kg\ mol^{-1}$)
(a) 148 (b) 158 (c) 168 (d) 178

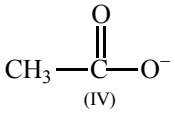
37. What is the normality of a 1 M solution of H_3PO_4?
(a) 0.5 N (b) 1.0 N (c) 2.0 N (d) 3.0 N

38. Consider the following anions.


(I)


(II)


(III)


(IV)

When attached to sp^3-hydridised carbon, their leaving group ability in nucleophilic substitution reaction decreases in the order:

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

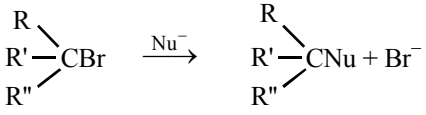
39. IUPAC name of *m*-cresol is ..... .

(a) 3-methylphenol (b) 3-chlorophenol (c) 3-methoxyphenol (d) benzene-1,3-diol

40. Which of the following is not a characteristics of fibrous proteins?

(a) In the fibrous proteins, polypeptide chains are held together by hydrogen and disulphide bonds.
(b) These have fibre like structure.
(c) These are generally soluble in water.
(d) These have elongated shape.

41. Which of the statement(s) is/are true, regarding following reaction?



(i) The reaction involves the formation of transition state.
(ii) Higher the nucleophilic character of the nucleophile, faster will be the reaction.
(iii) The product is always optically inactive.

(a) (ii) only (b) (ii) and (iii) (c) All the three (d) None of the three

42. The correct statement(s) about O_3 is (are)

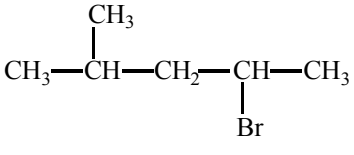
(i) O—O bond lengths are equal
(ii) Thermal decomposition of O_3 is endothermic
(iii) O_3 is diamagnetic in nature
(iv) O_3 has a bent structure

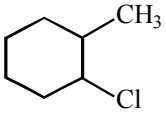
(a) (i) and (iii) (b) (ii) and (iii) (c) (i), (iii) and (iv) (d) (i) and (iv)

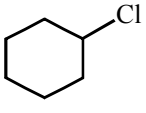
43. A solid AB crystallises as NaCl structure and the radius of the cation is 0.100nm. The maximum radius of the anion can be:

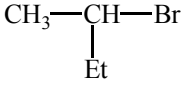
(a) 0.137 nm (b) 0.241 nm (c) 0.274 nm (d) 0.482 nm

44. Among the given halides, which one will give same product in both S_N1 and S_N2 reactions.

(I) 

(II) 

(III) 

(IV) 

(a) (III) only (b) (I) and (II) (c) (III) and (IV) (d) (I), (III) and (IV)

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.

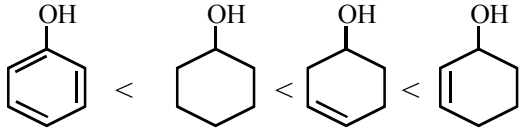
45. **Assertion:** Chlorine is a powerful bleaching agent.

Reason : Bleaching action is due to oxidation.

46. **Assertion :** Azeotropic mixtures are formed only by non-ideal solutions and they may have boiling points either greater than both the components or less than both the components.

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

47. **Assertion:** The ease of dehydration of the following alcohols is



Reason: Alcohols leading to conjugated alkenes are dehydrated to a greater extent.

48. **Assertion:** F – F bond in F_2 molecule is weak.

Reason: F atom is small in size.

49. **Assertion :** Vacancy defect results in decrease in density of the substance.

Reason : Vacancy defect developed when a substance is heated.

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 compounds given in column I with the hybridisation and shape given in column II and mark the correct option.

Column-I	**Column-II**
(A) XeF_6	(i) Distorted octahedral
(B) XeO_3	(ii) Square planar
(C) $XeOF_4$	(iii) Pyramidal
(D) XeF_4	(iv) Square pyramidal

(a) A – (i), B – (iii), C – (iv), D – (ii) (b) A – (i), B – (ii), C – (iv), D – (iii)

(c) A – (iv), B – (iii), C – (i), D – (ii) (d) A – (iv), B – (i), C – (ii), D – (iii)

51. 'Alcohols can be prepared by the reduction of the corresponding carbonyl compound.'
Identify the correct analogy regarding the above statement.

(a) $CH_3CHO : CH_3CH_2OH :: CH_3COCH_3 : CH_3\underset{\displaystyle OH}{\underset{|}{C}}HCH_3$

(b) $CH_3CHO : CH_3OH :: CH_3COCH_3 : CH_3CH_2OH$

(c) $CH_3CH_2CHO : CH_3\underset{\displaystyle OH}{\underset{|}{C}}HCH_3 :: CH_3CHO : CH_3CH_2OH$

(d) HCHO : CH_3OH : : CH_3COCH_3 : CH_3CH_2OH

52. Choose the incorrect analogy.

(a) Monosaccharide : Glucose : : Disaccharides : Sucrose

(b) Aldopentose : Ribose : : Ketohexose : Fructose

(c) Purines : Adenine, Guanine : : Pyrimidines : Cytosine thymine

(d) H-coupling : Adenine-Cytosine : : H-bonding : Guanine-thymine

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

Point defects explain about the imperfections of solids. Point defects are accounted when the crystallization process occurs at a very fast rate. These defects mainly happen due to deviation in the arrangement of constituting particles. The defects are of two types namely point defects and line defects.

Point defects can be further classified into types:

(i) Stoichiometric defect

(ii) Frenkel defect

(iii) Schottky defect

53. Schottky defect in crystals is observed when

(a) an ion leaves its normal site and occupies an interstitial site

(b) unequal number of cations and anions are missing from the lattice

(c) density of the crystal increases

(d) equal number of cations and anions are missing from the lattice

54. Which defect causes decrease in the density of crystal

(a) Frenkel (b) Schottky (c) Interstitial (d) F – centre

55. Frenkel and Schottky defects are :

(a) nucleus defects (b) non-crystal defects (c) crystal defects (d) nuclear defects

OMR ANSWER SHEET

Sample Paper No –9

- ✶ 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	