Sample Paper 8

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. Basicity of orthophosphoric acid is

(a) 2 (b) 3 (c) 4 (d) 5

2. $CH_3-CH_2-CH_2-Cl \xrightarrow[KOH]{alc.} B \xrightarrow{HBr} C \xrightarrow[ether]{Na} D$

In the above sequence of reactions, the product D is

(a) propane (b) 2, 3-dimethylbutane (c) hexane (d) allyl bromide

3. 200 mL of water is added to 500 mL of 0.2 M solution. What is the molarity of this diluted solution ?

(a) 0.5010 M (b) 0.2897 M (c) 0.7093 M (d) 0.1428 M

4. One mole of calcium phosphide on reaction with excess water gives

(a) one mole of phosphine (b) two moles of phosphoric acid

(c) two moles of phosphine (d) one mole of phosphorus pentoxide

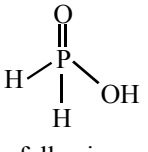
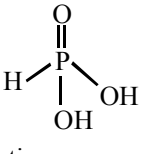
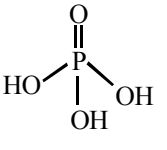
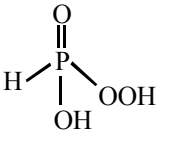
5. An *X* molal solution of a compound in benzene has mole fraction of solute equal to 0.2. The value of *X* is

(a) 14 (b) 3.2 (c) 1.4 (d) 2

6. For osazone formation, the effective structural unit necessary is

(a) $\begin{array}{l} CH_2OCH_3 \\ | \\ CO \\ | \end{array}$ (b) $\begin{array}{l} CH_2OH \\ | \\ CO \\ | \end{array}$ (c) $\begin{array}{l} CH_2OH \\ | \\ CHOCH_3 \\ | \end{array}$ (d) $\begin{array}{l} CHO \\ | \\ CHOCH_3 \\ | \end{array}$

7. The structural formula of hypophosphorous acid is

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

8. In the following sequence of reactions

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

(a) *n*-propyl amine (b) isopropyl amine (c) ethyl amine (d) ethylmethyl amine

9. The number of atoms present in a hexagonal close-packed unit cell is :
(a) 4 (b) 6 (c) 8 (d) 12

10. Liquid ammonia bottles are opened after cooling them in ice for sometime. It is because liquid NH_3
(a) Brings tears to the eyes (b) Has a high vapour pressure
(c) Is a corrosive liquid (d) Is a mild explosive

11. In which of the following pairs of structures, tetrahedral as well as octahedral holes are found?
(a) bcc and fcc (b) hcp and simple cubic
(c) hcp and ccp (d) bcc and hcp

12. On dissolving sugar in water at room temperature solution feels cools to touch. Under which of the following cases dissolution of sugar will be most rapid?
(a) Sugar crystals in cold water (b) Sugar crystals in hot water
(c) Powdered sugar in cold water (d) Powdered sugar in hot water

13. If the radius of the anion in an ionic solid is 200 pm, what would be the radius of the cation that fits exactly into a cubic hole?
(a) 146.4 pm (b) 82.8 pm (c) 45 pm (d) None of these

14. Chlorobenzene is formed by reaction of chlorine with benzene in the presence of $AlCl_3$. Which of the following species attacks the benzene ring in this reaction?
(a) Cl^- (b) Cl^+ (c) $AlCl_3$ (d) $[AlCl_4]^-$

15. Proteins are found to have two different types of secondary structures viz. α-helix and β-pleated sheet structure. α-helix structure of protein is stabilised by:
(a) peptide bonds (b) van der Waal's forces
(c) hydrogen bonds (d) dipole-dipole interactions

16. Chloromethane on treatment with excess of ammonia yields mainly
(a) N, N-dimethylmethanamine $\left(CH_3-N\begin{matrix}CH_3\\CH_3\end{matrix}\right)$
(b) N-methylmethanamine ($CH_3-NH-CH_3$)
(c) methanamine (CH_3NH_2)
(d) mixture containing all these in equal proportion

17. Which of the following oxides is neutral ?
(a) N_2O_3 (b) N_2O_4 (c) N_2O_5 (d) N_2O

18. Alcoholic beverages contain :
(a) isopropyl alcohol (b) *n*-propyl alcohol (c) ethyl alcohol (d) methyl alcohol

19. The most unsymmetrical and symmetrical systems are, respectively :
(a) Tetragonal, Cubic (b) Triclinic , Cubic
(c) Rhombohedral, Hexagonal (d) Orthorhombic, Cubic

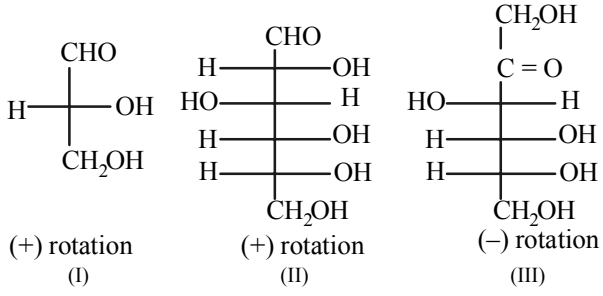
20. The IUPAC name of $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-\overset{\overset{CH_3}{|}}{CH}-CH_3$ is :
(a) 1, 1-dimethyl-1, 3-butanediol
(b) 2-methyl-2-pentanol
(c) 4-methyl-2, 4-pentanediol
(d) 1, 3, 3-trimethyl-1, 3-propanediol

21. 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

22. The characteristic grouping of secondary alcohols is
(a) $-CH_2OH$ (b) $>CHOH$
(c) $-\overset{|}{\underset{|}{C}}-OH$ (d) $>C\begin{matrix}OH\\OH\end{matrix}$

23. How many sigma bonds are present in P_4O_{10}?
(a) 15 (b) 16 (c) 14 (d) 12

24. Optical rotations of some compounds alongwith their structures are given below which of them have D configuration.



(+) rotation (I) (+) rotation (II) (–) rotation (III)

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

25. An organic compound A (C_4H_9Cl) on reaction with Na/diethyl ether gives a hydrocarbon which on monochlorination gives only one chloro derivative, then A is

(a) tert-butyl chloride (b) sec-butyl chloride (c) iso-butyl chloride (d) n-butyl chloride

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. Which is the correct increasing order of boiling points of the following compounds?

1 - bromoethane, 1 - bromopropane, 1 - bromobutane, Bromobenzene

(a) Bromobenzene < 1 - bromobutane < 1 - bromopropane < 1- bromoethane

(b) Bromobenzene < 1 - bromobutane < 1 - bromopropane < 1- bromobutane

(c) 1 - bromopropane < 1 - bromorpropane < 1 - bromoethane < Bromobenzene

(d) 1 - bromoethane < 1 - bromopropane < 1 - bromobutane < Bromobenzene

27. What is Z in following reaction

$CuSO_4 + Z \rightarrow Cu_3P_2 + H_2SO_4$

$HgCl_2 + Z \rightarrow Hg_3P_2 + HCl$

(a) White phosphorus (b) Red phosphorus (c) Phosphine (d) Orthophosphoric acid

28. On the basis of information given below mark the correct option.

Information

(i) In bromoethane and chloroethane mixture intermolecular interactions of A — A and B — B type are nearly same as A — B type interactions.

(ii) In ethanol and acetone mixture A — A or B — B type intermolecular interactions are stronger than A — B type interactions.

(iii) In chloroform and acetone mixture A — A or B — B type intermolecular interactions are weaker than A — B type interactions.

(a) Solution (ii) and (iii) will follow Raoult's law

(b) Solution (i) will follow Raoult's law

(c) Solution (ii) will show negative deviation from Raoult's law

(d) Solution (iii) will show positive deviation from Raoult's law

29. Which one of the following arrangements does not give the correct picture of the trends indicated against it ?

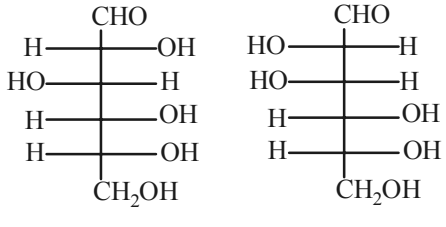
(i) $F_2 > Cl_2 > Br_2 > I_2$: Oxidizing power (ii) $F_2 > Cl_2 > Br_2 > I_2$: Electron gain enthalpy

(iii) $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy (iv) $F_2 > Cl_2 > Br_2 > I_2$: Electronegativity.

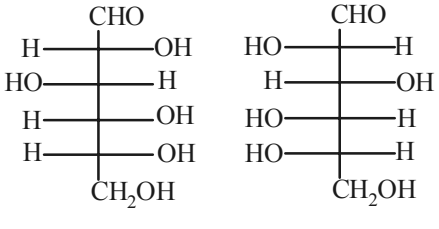
(a) (ii) and (iv) (b) (i) and (iii) (c) (ii) and (iii) (d) (ii), (iii) and (iv)

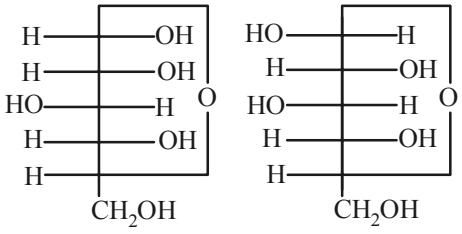
30. Which of the following pairs represents anomers?

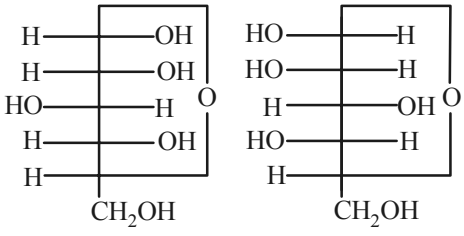
(a)



(b)



(c) 

(d) 

31. Which of the following statements are correct?
(i) Among halogens, radius ratio between iodine and fluorine is maximum.
(ii) Leaving F—F bond, all halogens have weaker X—X bond than X—X′ bond in interhalogens.
(iii) Among interhalogen compounds maximum number of atoms are present in iodine fluoride.
(iv) Interhalogen compounds are more reactive than halogen compounds.
(a) (i) and (ii) (b) (i), (ii) and (iii) (c) (ii) and (iii) (d) (i), (iii) and (iv)

32. *tert*-Butyl ethyl ether can't be prepared by which reaction?
(a) *tert* – Butanol + ethanol $\xrightarrow{H^+}$ (b) *tert*-Butyl bromide + sodium ethoxide $\rightarrow$
(c) Sodium *tert*-butoxide + ethyl bromide $\rightarrow$ (d) Isobutene + ethanol $\xrightarrow{H^+}$

33. Which of the following statements regarding properties of halogens are correct?
(i) Due to small size electron gain enthalpy of fluorine is less than that of chlorine.
(ii) Iodine has same physical state but different colour as compare to other members of the group.
(iii) Fluorine shows no positive oxidation state.
(iv) In $X_2(g) + H_2O(l) \longrightarrow HX(aq) + HOX(aq)$ (where X_2 = Cl or Br)
(a) (i), (ii) and (iv) (b) (i), (iii) and (iv) (c) (ii), (iii) and (iv) (d) (iii) and (iv)

34. When solid SnO_2 is added to an aqueous solution of NaOH, the
(a) vapour pressure is lowered (b) vapour pressure is raised
(c) osmotic pressure is increased (d) boiling point is raised

35. At 300 K the vapour pressure of an ideal solution containing 1 mole of liquid *A* and 2 moles of liquid *B* is 500 mm of Hg. The vapour pressure of the solution increases by 25 mm of Hg, if one more mole of *B* is added to the above ideal solution at 300 K. Then the vapour pressure of *A* in its pure state is
(a) 300 mm of Hg (b) 400 mm of Hg (c) 500 mm of Hg (d) 600 mm of Hg

36. Arrange the following halides in the decreasing order of S_N1 reactivity :

$\underset{(I)}{CH_3CH_2CH_2Cl}$, $\underset{(II)}{CH_2=CHCH(Cl)CH_3}$, $\underset{(III)}{CH_3CH_2CH(Cl)CH_3}$

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

37. Trigonal bipyramidal geometry is shown by :
(a) $XeOF_4$ (b) XeO_3F_2 (c) $FXeOSO_2F$ (d) $[XeF_8]^{2-}$

38. Which of the following statement is not true about secondary structure of protein ?
(a) The alpha helix, beta pleated sheet and beta turns are examples of secondary structure of protein.
(b) The ability of peptide bonds to form intramolecular hydrogen bonds is important to secondary structure.
(c) The steric influence of amino acid residues is important to secondary structure.
(d) The hydrophilic/ hydrophobic character of amino acid residues is important to secondary structure.

39. Which of the following alcohols will yield the corresponding alkyl chloride on reaction with concentrated HCl at room temperature?

(a) $CH_3CH_2—CH_2—OH$ (b) $CH_3CH_2-\underset{\underset{CH_3}{|}}{CH}-OH$

(c) $CH_3CH_2-\underset{\underset{CH_3}{|}}{CH}—CH_2OH$ (d) $CH_3CH_2-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-OH$

40. Which of the following statements are true?
(i) Only type of interactions between particles of noble gases are due to weak dispersion forces.
(ii) Ionisation enthalpy of molecular oxygen is very close to that of xenon.
(iii) Hydrolysis of XeF_6 is redox reaction.
(iv) Xenon fluorides are not reactive.
(a) (i) and (iii) (b) (i) and (ii) (c) (ii) and (iii) (d) (iii) and (iv)

41. In NaCl crystal each Cl^- ion is surrounded by
(a) 4 Na^+ ions (b) 6 Na^+ ions (c) 1 Na^+ ions (d) 2 Na^+ ions

42. Which of the following is not used in Friedel-Craft's reaction?
(a) N–Phenyl acetanilide (b) Bromobenzene (c) Benzene (d) Chlorobenzene

43. A certain salt (X) gives the following tests :
(i) Its aqueous solution is alkaline to litmus.
(ii) On strongly heating it swells to give a glassy bead
(iii) When concentrated sulphuric acid is added to a hot concentrated solution of (X), crystals of H_3BO_3 separate out. Identify the colour of these crystals.
(a) White (b) Blue (c) Brown (d) Violet

44. The azeotropic mixture of water (b.p.100°C) and HCl (b.p.85°C) boils at 108.5°C. When this mixture is distilled it is possible to obtain
(a) pure HCl (b) pure water
(c) pure water as well as pure HCl (d) neither HCl nor H_2O in their pure states

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 but R is true.

45. **Assertion :** Small armount of ingestion of methanol causes blindness and death.
Reason : This is because methanol is oxidised first to methanal and then to methanoic acid which may cause blindness and death.

46. **Assertion:** HNO_3 makes iron passive
Reason: HNO_3 forms a protective layer of ferric nitrate on the surface of iron.

47. **Assertion:** KBr shows schottky as well as Frenkel defect.
Reason: Schottky and Frenkel defects are exhibited by ionic compounds in which radius ratio is intermediate.

48. **Assertion:** HI cannot be prepared by the reaction of KI with concentrated H_2SO_4.
Reason: HI has lowest H — X bond strength among halogen acids.

49. **Assertion :** When alkyl aryl ethers react with excess of hydrogen halides, phenol and alkyl halide are produced.
Reason : Alkyl aryl ethers are cleaved at the alkyl-oxygen due to more stable aryl-oxygen bond.

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) Antifreeze used in car engine	(p) Methanol
(B) Solvent used in perfumes	(q) Phenol
(C) Starting material for picric acid	(r) Ethlene glycol
(D) Wood spirit	(s) Ethanol

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

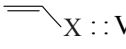
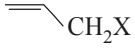
51. Complete the following analogy:

A: Ionic compound with Covalent character : : B : Covalent compound with Ionic character

(a) A : LiI : : B : NaCl
(b) A : Al_2S_3 : : B : LiF
(c) A : $AlCl_3$: : B : HCl
(d) A : NaCl : : B : LiF

52. Which of the following analogies is correct?

(a) Vicinal dihalide : Ethylene chloride : : Gem dihalides : Ethylene dichloride

(b) Allylic halide :  : : Vinylic halides : 

(c) Dipole moment : $CH_3Cl > CH_3F$: : Dipole moment : $CH_3Cl > CH_3Br$

(d) Para isomer : less symmetric : : Meta isomer : more symmetric

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

Alcohols and phenols are the most important compounds used in our daily life. Alcohols are prepared by hydration of alkenes, fermentation of glucose, reduction of aldehydes, ketones, carboxylic acids, and esters. Alcohols are soluble in water. Boiling points increase with the increase in molar mass and decrease with branching. Alcohols on dehydration give alkene at 443K, follow carbocation mechanism. Excess of alcohol at 413K on dehydration with conc. H_2SO_4 also follows the carbocation mechanism but gives diethyl ether. Alcohols undergo nucleophilic substitution reactions, esterification with carboxylic acids, and derivatives like amides, acid halides, acid anhydride. Phenol is prepared from cumene, diazonium salts, anisole, and chlorobenzene. Phenol is used to prepare salicylaldehyde, salicylic acid, aspirin, methyl salicylate, *p*-benzoquinone. Phenol undergoes electrophilic substitution reaction at *o* & *p*-position.

53. The IUPAC name of $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-\overset{\overset{CH_3}{|}}{\underset{\underset{OH}{|}}{C}}-CH_3$ is

(a) 1, 1-dimethyl-1, 3-butanediol
(b) 2-methyl-2, 4-pentanediol
(c) 4-methyl-2, 4-pentanediol
(d) 1, 3, 3-trimethyl-1, 3-propanediol

54. Acid catalyzed hydration of alkenes except ethene leads to the formation of

(a) primary alcohol
(b) secondary or tertiary alcohol
(c) mixture of primary and secondary alcohols
(d) mixture of secondary and tertiary alcohols

55. Which of the following statements are correct ?

(i) Alcohols react as nucleophiles in the reactions involving cleavage of O–H bond.
(ii) Alcohols react as electrophiles in the reactions involving cleavage of O–H bond.
(iii) Alcohols react as nucleophile in the reaction involving cleavage of C–O bond.
(iv) Alcohols react as electrophiles in the reactions involving C–O bond.

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

OMR ANSWER SHEET

Sample Paper No –8

- ✶ 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

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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	