

Sample Paper

3

Time : 90 Minutes

Max. Marks : 35

General Instructions

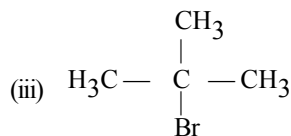
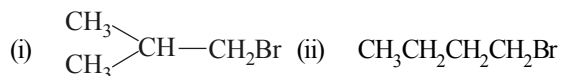
1. The Question Paper contains three sections.
2. Section A has 25 questions. Attempt any 20 questions.
3. Section B has 24 questions. Attempt any 20 questions.
4. Section C has 6 questions. Attempt any 5 questions.
5. All questions carry equal marks.
6. There is no negative marking.

SECTION-A

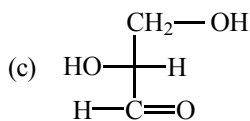
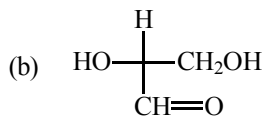
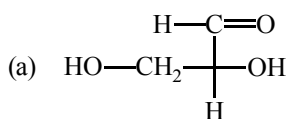
This section consists of 25 multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, **ONLY** first 20 will be considered for evaluation.

1. When orthophosphoric acid is heated to 600°C , the product formed is
(a) PH_3 (b) P_2O_5 (c) H_3PO_3 (d) HPO_3
2. In the preparation of chlorobenzene from aniline, the most suitable reagent is
(a) chlorine in the presence of ultraviolet light (b) chlorine in the presence of AlCl_3
(c) nitrous acid followed by heating with Cu_2Cl_2 (d) HCl and Cu_2Cl_2
3. Ethyl alcohol reacts with thionyl chloride in the presence of pyridine to give
(a) $\text{CH}_3\text{CH}_2\text{Cl} + \text{H}_2\text{O} + \text{SO}_2$ (b) $\text{CH}_3\text{CH}_2\text{Cl} + \text{HCl}$
(c) $\text{CH}_3\text{CH}_2\text{Cl} + \text{HCl} + \text{SO}_2$ (d) $\text{CH}_3\text{CH}_2\text{Cl} + \text{SO}_2 + \text{Cl}_2$
4. The structure of XeF_6 is
(a) Distorted octahedral (b) Pyramidal
(c) Tetrahedral (d) None of the above.
5. The reaction of KMnO_4 and HCl results in
(a) oxidation of Mn in KMnO_4 and production of Cl_2 (b) reduction of Mn in KMnO_4 and production of H_2
(c) oxidation of Mn in KMnO_4 and production of H_2 (d) reduction of Mn in KMnO_4 and production of Cl_2
6. A crystalline solid
(a) changes abruptly from solid to liquid when heated (b) has no definite melting point
(c) undergoes deformation of its geometry easily (d) has an irregular 3-dimensional arrangements
7. Which will form maximum boiling point azeotrope
(a) $\text{HNO}_3 + \text{H}_2\text{O}$ solution (b) $\text{C}_2\text{H}_5\text{OH} + \text{H}_2\text{O}$ solution
(c) $\text{C}_6\text{H}_6 + \text{C}_6\text{H}_5\text{CH}_3$ solution (d) None of these
8. The coordination number in *hcp* is
(a) 6 (b) 12 (c) 18 (d) 24
9. Which chloride is least reactive with the hydrolysis point of view?
(a) CH_3Cl (b) $\text{CH}_3\text{CH}_2\text{Cl}$ (c) $(\text{CH}_3)_3\text{CCl}$ (d) $\text{CH}_2=\text{CH}-\text{Cl}$
10. The function of DNA in an organism is
(a) to assist in the synthesis of RNA molecule
(b) to store information of heredity characteristics
(c) to assist in the synthesis of proteins and polypeptides
(d) all of these.

11. Arrange the following compounds in increasing order of their boiling points.

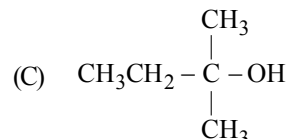
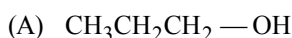


- (a) (ii) < (i) < (iii) (b) (i) < (ii) < (iii) (c) (iii) < (i) < (ii) (d) (iii) < (ii) < (i)
12. Which of the following elements can be involved in $p\pi - d\pi$ bonding?
 (a) Carbon (b) Nitrogen (c) Phosphorus (d) Boron
13. The major reason that phenol is a better Bronsted acid than cyclohexanol is that:
 (a) it is a better proton donor.
 (b) the cyclohexyl group is an electron donating group by induction, which destabilizes the anion formed in the reaction by resonance.
 (c) phenol is able to stabilize the anion formed in the reaction.
 (d) the phenyl group is an electron withdrawing group by induction, which stabilizes the anion formed in the reaction.
14. Crystals can be classified into basic crystal lattice, equal to
 (a) 7 (b) 4 (c) 14 (d) 2
15. $\text{CH}_3\text{CH}_2\text{OH}$ can be converted into CH_3CHO by
 (a) catalytic hydrogenation (b) treatment with LiAlH_4
 (c) treatment with pyridinium chlorochromate (d) treatment with KMnO_4
16. When the solute is present in trace quantities the following expression is used
 (a) gram per million (b) milligram percent (c) microgram percent (d) parts per million
17. The compound $\text{HOCH}_2 - \text{CH}_2\text{OH}$ is
 (a) ethane glycol (b) ethylene glycol
 (c) ethylidene alcohol (d) dimethyl alcohol
18. Catalytic oxidation of NH_3 (passing a mixture of NH_3 and air over heated Pt gauge) gives
 (a) NO (b) N_2O (c) N_2O_3 (d) N_2O_5
19. What is the structure of L-glyceraldehyde?



(d) Both (a) and (b)

20. The order of reactivity of following alcohols with halogen acids is



(a) (A) > (B) > (C)

(b) (C) > (B) > (A)

(c) (B) > (A) > (C)

(d) (A) > (C) > (B)

21. When hydrochloric acid gas is treated with propene in presence of benzoyl peroxide, it gives

(a) 2-chloropropane

(b) allyl chloride

(c) *n*-propyl chloride

(d) No reaction occurs

22. In the preparation of compounds of Xe, Bartlett had taken $\text{O}_2^+ \text{PtF}_6^-$ as a base compound. This is because

(a) both O_2 and Xe have same size.

(b) both O_2 and Xe have same electron gain enthalpy.

(c) both O_2 and Xe have almost same ionisation enthalpy.

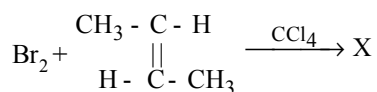
(d) both Xe and O_2 are gases.

23. Low concentration of oxygen in the blood and tissues of people living at high altitude is due to
- (a) low temperature (b) low atmospheric pressure
(c) high atmospheric pressure (d) Both low temperature and high atmospheric pressure
24. Which of the following orders regarding thermal stability of hydrides MH_3 of group 15 is correct?
- (a) $NH_3 > PH_3 > AsH_3$ (b) $NH_3 < PH_3 < AsH_3$ (c) $NH_3 > PH_3 < AsH_3$ (d) $NH_3 < PH_3 > AsH_3$
25. The reactions of (a) oxygen and (b) carbon monoxide with heme (the prosthetic group of haemoglobin) give
- (a) only oxygen-heme complex
(b) only carbon monoxide-heme complex
(c) both oxygen-heme and carbon monoxide-heme complexes but oxygen-heme complex is more stable
(d) Both oxygen-heme and carbon monoxide-heme complexes but carbon monoxide-heme complex is more stable

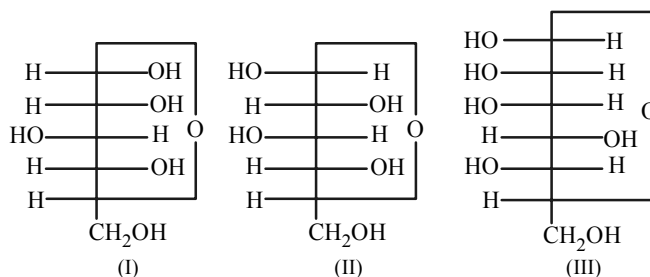
SECTION-B

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.

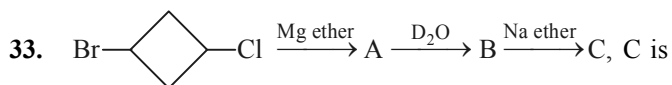
26. Which of the following properties of white phosphorus are shared by red phosphorus?
- (a) It phosphoresces in air (b) It burns when heated in air
(c) It dissolves in CS_2 (d) It reacts with NaOH to give PH_3
27. The sequence of acidic character is
- (a) $SO_2 > CO_2 > CO > N_2O_5$ (b) $SO_2 > N_2O_5 > CO > CO_2$
(c) $N_2O_5 > SO_2 > CO > CO_2$ (d) $N_2O_5 > SO_2 > CO_2 > CO$
28. For a dilute solution, Raoult's law states that:
- (a) the lowering of vapour pressure is equal to the mole fraction of solute
(b) the relative lowering of vapour pressure is equal to the mole fraction of solute
(c) the relative lowering of vapour pressure is proportional to the amount of solute in solution
(d) the vapour pressure of the solution is equal to the mole fraction of solvent
29. X in the following reaction is –



- (a) (+) 2, 3-Dibromobutane (b) (–) 2, 3-Dibromobutane
(c) Rac. 2, 3-Dibromobutane (d) Meso-2, 3-Dibromobutane
30. Which statement is incorrect about osmotic pressure (π), volume (V), and temperature (T)?
- (a) $\pi \propto \frac{1}{V}$, if T is constant. (b) $\pi \propto T$, if V is constant.
(c) $\pi \propto V$, if T is constant. (d) πV , is constant, if T is constant.
31. Incorrect statement about PH_3 is:
- (a) It is produced by hydrolysis of Ca_3P_2 (b) It gives black ppt. (Cu_3P_2) with $CuSO_4$ solution
(c) Spontaneously burns in presence of P_2H_4 (d) It does not react with B_2H_6
32. Three cyclic structures of monosaccharides are given below which of these are anomers.

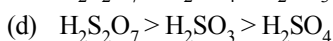
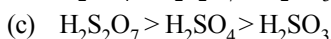
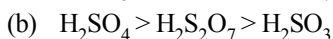
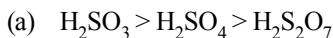


- (a) I and II (b) II and III (c) I and III (d) III is anomer of I and II

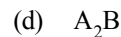


(d) None of these

34. The correct sequence of decreasing number of π -bonds in the structures of H_2SO_3 , H_2SO_4 and $\text{H}_2\text{S}_2\text{O}_7$ is :



35. In h.c.p of A, $\frac{1}{3}$ of tetrahedral voids are occupied by B. What is the formula for compound:



36. How many structural isomers are possible for a compound with molecular formula $\text{C}_3\text{H}_7\text{Cl}$?

(a) 2

(b) 5

(c) 7

(d) 9

37. In solid state PCl_5 is a

(a) covalent solid

(b) octahedral structure

(c) ionic solid with $[\text{PCl}_6]^+$ octahedral and $[\text{PCl}_4]^-$ tetrahedral

(d) ionic solid with $[\text{PCl}_4]^+$ tetrahedral and $[\text{PCl}_6]^-$ octahedral

38. The vapour pressure of an aqueous solution of sucrose at 373 K is found to be 750 mm Hg. The molality of the solution at the same temperature will be :

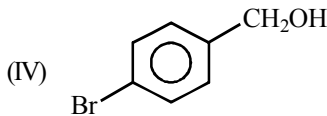
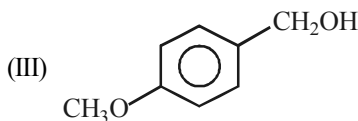
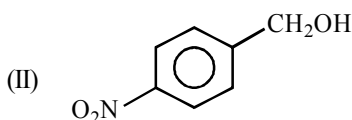
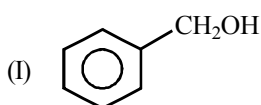
(a) 0.26

(b) 0.73

(c) 0.74

(d) 0.039

39. Consider the following alcohols,



The order of decreasing reactivities of these alcohols towards nucleophilic substitution with HBr is:

(a) III > I > IV > II

(b) III > I > II > IV

(c) I > III > IV > II

(d) I > III > II > IV

40. When SO_2 gas is passed through an acidified solution of $\text{K}_2\text{Cr}_2\text{O}_7$

(a) the solution becomes blue

(b) the solution becomes colourless

(c) SO_2 is reduced

(d) green $\text{Cr}_2(\text{SO}_4)_3$ is formed

41. If AgI crystallises in zinc blende structure with I^- ions at lattice points. What fraction of tetrahedral voids is occupied by Ag^+ ions?

(a) 25%

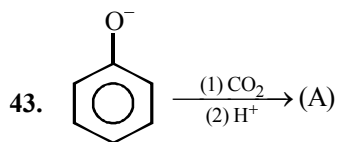
(b) 50%

(c) 100%

(d) 75%

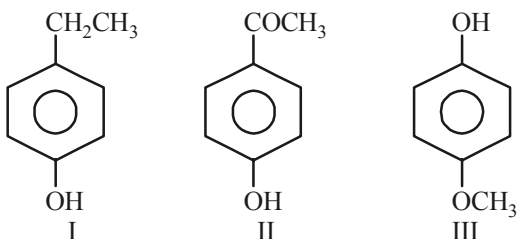
42. Which of these doesn't exist?

- (a) PH_3 (b) PH_5 (c) LuH_3 (d) PF_5



Which of the following is true statement about the reaction?

- (a) Ortho isomer is major if PhONa is used
 (b) Para isomer is major if PhOK is used
 (c) Product formed is further used for preparation of drug aspirin
 (d) All of these
44. Which of the following is the correct order of the acidity of the three compounds ?



- (a) $\text{II} > \text{III} > \text{I}$ (b) $\text{III} > \text{II} > \text{I}$ (c) $\text{II} > \text{I} > \text{III}$ (d) $\text{III} > \text{I} > \text{II}$

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 :** Bond angle of H_2S is smaller than H_2O .

Reason : Electronegativity of the central atom increases, bond angle decreases.

46. **Assertion :** $(\text{CH}_3)_3\text{C} - \overset{\cdot\cdot}{\underset{\cdot\cdot}{\text{O}}} - \underset{\text{C}_2\text{H}_5}{\text{CH}} - \text{CH}_3$

cannot be prepared by Williamson's synthesis.

Reason : Only primary alkyl halide reacts with sodium alkoxide (1° , 2° or 3°) to give ether.

47. **Assertion :** Alkyl iodide can be prepared by treating alkyl chloride/bromide with NaI in acetone.

Reason : NaCl/NaBr are soluble in acetone while NaI is not.

48. **Assertion:** N_2 is less reactive than P_4 .

Reason: Nitrogen has more electron gain enthalpy than phosphorus.

49. **Assertion :** Boiling point of isomeric haloalkanes is

$\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} > \text{CH}_3\text{CH}_2\text{CHBrCH}_3 > (\text{CH}_3)_3\text{CBr}$.

Reason : The boiling point of isomeric haloalkanes decreases with increase in branching.

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 items given in column-I and column-II.

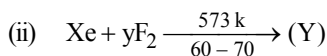
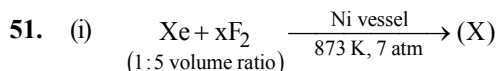
Column-I		Column-II	
(A)	Saturated solution	(i)	Solution having same osmotic pressure at a given temperature as that of given solution.
(B)	Binary solution	(ii)	A solution whose osmotic pressure is less than that of another.
(C)	Isotonic solution	(iii)	Solution with two components.
(D)	Hypotonic solution	(iv)	A solution which contains maximum amount of solute that can be dissolved in a given amount of solvent at a given temperature.

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

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

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

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



x : y :: X : Y

Which of the following represent the correct analogy for x : y :: X : Y

(a) 1 : 2 :: XeF_2 : XeF_4

(b) 2 : 3 :: XeF_4 : XeF_6

(c) 1 : 3 :: XeF_2 : XeF_4

(d) 3 : 2 :: XeF_6 : XeF_4

52. Which of the following analogies is correct?

(a) Minimum Boiling mixture : Maximum Boiling mixture :: –ve deviation : +ve deviation

(b) Mass percentage : Volume percentage :: Industrial chemical application : Liquid solution

(c) PPM : Mole fraction :: Industrial chemical application : concentration of pollutant in water

(d) ΔT_b : ΔT_f :: $K_f M$: $K_b M$

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

Nucleic acid, naturally occurring chemical compound that is capable of being broken down to yield phosphoric acid, sugars, and a mixture of organic bases (purines and pyrimidines). Nucleic acids are the main information-carrying molecules of the cell, and, by directing the process of protein synthesis, they determine the inherited characteristics of every living thing. The two main classes of nucleic acids are deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). Nucleic acids are polynucleotides—that is, long chainlike molecules composed of a series of nearly identical building blocks called nucleotides. Each nucleotide consists of a nitrogen-containing aromatic base attached to a pentose (five-carbon) sugar, which is in turn attached to a phosphate group. Each nucleic acid contains four of five possible nitrogen containing bases : adenine (A), guanine (G), cytosine (C), thymine (T), and uracil (U).

53. Nucleic acids are the polymers of.....

(a) nucleosides

(b) nucleotides

(c) bases

(d) sugars

54. Dinucleotide is obtained by joining two nucleotides together by phosphodiester linkage. Between which carbon atoms of pentose sugars of nucleotides are these linkages present?

(a) 5' and 3'

(b) 1' and 5'

(c) 5' and 5'

(d) 3' and 3'

55. The correct statement regarding RNA and DNA, respectively is

(a) The sugar component in RNA is arabinose and the sugar component in DNA is 2'-deoxyribose.

(b) The sugar component in RNA is ribose and the sugar component in DNA is 2'-deoxyribose.

(c) The sugar component in RNA is arabinose

(d) The sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose

OMR ANSWER SHEET

Sample Paper No –3

- ★ Use Blue / Black Ball pen only.
- ★ Please do not make any stray 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 darkened / half darkened circle might be rejected.

Start time : _____ End time _____ Time taken _____

1. Name (in Block Letters)

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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	
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