

Sample Paper

2

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. Reaction of $C_6H_5CH_2Br$ with aqueous sodium hydroxide follows
(a) S_N1 mechanism
(b) S_N2 mechanism
(c) Any of the above two depending upon the temperature of reaction
(d) Saytzeff rule
2. The α -D glucose and β -D glucose differ from each other due to difference in carbon atom with respect to its
(a) conformation (b) configuration (c) number of OH groups (d) size of hemiacetal ring
3. Which of the following is a primary halide?
(a) Isopropyl iodide (b) Secondary butyl iodide (c) Tertiary butyl bromide (d) Neohexyl chloride
4. In the reaction
 $HNO_3 + P_4O_{10} \rightarrow HPO_3 + X$, the product X is
(a) N_2O_5 (b) N_2O_3 (c) NO_2 (d) H_2O
5. Select the one that is likely to show anisotropy
(a) paper (b) wood (c) glass (d) barium chloride
6. Value of Henry's constant K_H _____.
(a) increases with increase in temperature. (b) decreases with increase in temperature.
(c) remains constant. (d) first increases then decreases.
7. Solid CH_4 is
(a) ionic solid (b) covalent solid (c) molecular solid (d) does not exist
8. The order of reactivity of the given haloalkanes towards nucleophile is :
(a) $RI > RBr > KCl$ (b) $RCl > RBr > RI$ (c) $RBr > RCl > RI$ (d) $RBr > RI > RCl$
9. Denaturation of proteins leads to loss of its biological activity by
(a) Formation of amino acids (b) Loss of primary structure
(c) Loss of both primary and secondary structures (d) Loss of both secondary and tertiary structures
10. Which one of the following is not an allylic halide?
(a) 4-Bromopent-2-ene (b) 3-Bromo-2-methylbut-1-ene
(c) 1-Bromobut-2-ene (d) 4-Bromobut-1-ene

11. The number of P – O – P bonds in cyclic metaphosphoric acid is
 (a) zero (b) two (c) three (d) four
12. What is the correct order of reactivity of alcohols in the following reaction?

$$\text{R} - \text{OH} + \text{HCl} \xrightarrow{\text{ZnCl}_2} \text{R} - \text{Cl} + \text{H}_2\text{O}$$

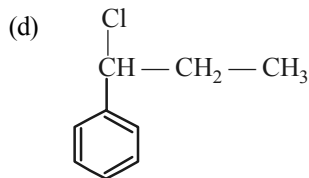
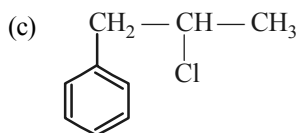
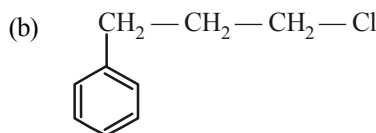
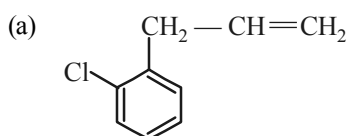
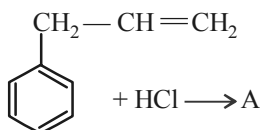
 (a) $1^\circ > 2^\circ > 3^\circ$ (b) $1^\circ < 2^\circ < 3^\circ$ (c) $3^\circ > 2^\circ > 1^\circ$ (d) $3^\circ > 1^\circ > 2^\circ$
13. F-centre is
 (a) anion vacancy occupied by unpaired electron. (b) anion vacancy occupied by electron.
 (c) cation vacancy occupied by electron. (d) anion present in interstitial site.
14. Monochlorination of toluene in sunlight followed by hydrolysis with aq. NaOH yields
 (a) *o*-cresol (b) *m*-cresol (c) 2, 4-dihydroxytoluene (d) benzyl alcohol
15. The decrease in the vapour pressure of solvent depends on the
 (a) quantity of non-volatile solute present in the solution
 (b) nature of non-volatile solute present in the solution
 (c) molar mass of non-volatile solute present in the solution
 (d) physical state of non-volatile solute present in the solution
16. Which of the following are isomers?
 (a) Methyl alcohol and dimethyl ether (b) Ethyl alcohol and dimethyl ether
 (c) Acetone and acetaldehyde (d) Propionic acid and propanone
17. The deep blue colour produced on adding excess of ammonia to copper sulphate is due to presence of
 (a) Cu^{2+} (b) $[\text{Cu}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}$
 (c) $[\text{Cu}(\text{NH}_3)_6]^{2+}$ (d) $[\text{Cu}(\text{NH}_3)_2(\text{H}_2\text{O})_4]^{2+}$
18. Chromosomes are made from
 (a) proteins (b) nucleic acids
 (c) proteins and nucleic acids (d) carbohydrates and nucleic acids
19. Ethylidene chloride is a/an
 (a) *vic*-dihalide (b) *gem*-dihalide (c) allylic halide (d) vinylic halide
20. The correct kinetic rate equation for the addition-elimination mechanism of nucleophilic aromatic substitution
 (a) $\text{rate} = k [\text{aryl halide}] [\text{nucleophile}]$ (b) $\text{rate} = k [\text{aryl halide}]$
 (c) $\text{rate} = k [\text{aryl halide}] [\text{nucleophile}]^2$ (d) $\text{rate} = k [\text{nucleophile}]$
21. The correct order of increasing oxidising power is
 (a) $\text{F}_2 > \text{Br}_2 > \text{Cl}_2 > \text{I}_2$ (b) $\text{F}_2 < \text{Cl}_2 < \text{Br}_2 < \text{I}_2$ (c) $\text{Cl}_2 > \text{Br}_2 > \text{F}_2 > \text{I}_2$ (d) $\text{I}_2 < \text{Br}_2 < \text{Cl}_2 < \text{F}_2$
22. An unripe mango placed in a concentrated salt solution to prepare pickle shrivels because
 (a) it gains water due to osmosis (b) it loses water due to reverse osmosis
 (c) it gains water due to reverse osmosis (d) it loses water due to osmosis
23. Which one is most stable to heat –
 (a) HClO (b) HClO₂ (c) HClO₃ (d) HClO₄
24. Glucose on prolonged heating with HI gives :
 (a) *n*-Hexane (b) 1-Hexene (c) Hexanoic acid (d) 6-iodohexanal
25. The correct decreasing order of basic strength is:
 (a) $\text{AsH}_3 > \text{SbH}_3 > \text{PH}_3 > \text{NH}_3$ (b) $\text{SbH}_3 > \text{AsH}_3 > \text{PH}_3 > \text{NH}_3$
 (c) $\text{NH}_3 > \text{PH}_3 > \text{AsH}_3 > \text{SbH}_3$ (d) $\text{PH}_3 > \text{AsH}_3 > \text{SbH}_3 > \text{NH}_3$

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.

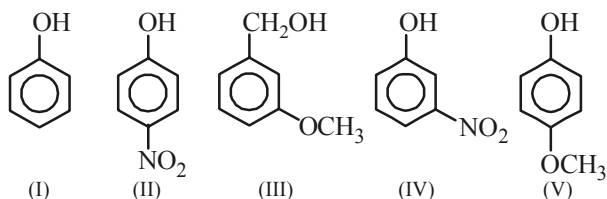
26. In nitrogen family, the H-M-H bond angle in the hydrides gradually becomes closer to 90° on going from N to Sb. This shows that gradually
 (a) The basic strength of the hydrides increases
 (b) Almost pure *p*-orbitals are used for M-H bonding
 (c) The bond energies of M-H bonds increase
 (d) The bond pairs of electrons become nearer to the central atom

27. A solution of sucrose (molar mass = 342 g mol^{-1}) has been prepared by dissolving 68.5 g of sucrose in 1000 g of water. The freezing point of the solution obtained will be (K_f for water = $1.86 \text{ K kg mol}^{-1}$).
- (a) -0.372°C (b) -0.520°C (c) $+0.372^\circ\text{C}$ (d) -0.570°C
28. If the elevation in boiling point of a solution of 10 gm of solute (mol. wt. = 100) in 100 gm of water is ΔT_b , the ebullioscopic constant of water is
- (a) 10 (b) $10 \Delta T_b$ (c) ΔT_b (d) $\frac{\Delta T_b}{10}$
29. Aryl halides can not be prepared by the reaction of aryl alcohols with PCl_3 , PCl_5 or SOCl_2 because
- (a) phenols are highly stable compounds.
 (b) carbon-oxygen bond in phenols has a partial double bond character.
 (c) carbon-oxygen bond is highly polar
 (d) all of these
30. In the preparation of HNO_3 , we get NO gas by catalytic oxidation of ammonia. The moles of NO produced by the oxidation of two moles of NH_3 will be
- (a) 2 (b) 3 (c) 4 (d) 6
31. A mixture of two amino acids having pI 9.60 and 5.40 can be separated
- (a) by adjusting the pH of the solution at 9.60 (b) by adjusting the pH of the solution at 4.20
 (c) by adjusting the pH of the solution at 7.0 (d) by adjusting the pH of the solution at 7.5.
32. What is 'A' in the following reaction?



33. Which of the following statements is wrong?
- (a) Single N — N bond is stronger than the single P — P bond.
 (b) PH_3 can act as a ligand in the formation of coordination compounds with transition elements.
 (c) NO_2 is paramagnetic in nature.
 (d) Covalency of nitrogen in N_2O_3 is four.
34. An element (atomic mass 100 g/mol) having *bcc* structure has unit cell edge 400 pm. The density of element is
- (a) 2.144 g/cm^3 (b) 7.289 g/cm^3 (c) 5.188 g/cm^3 (d) 10.376 g/cm^3
35. Aryl halides can not be prepared by the reaction of aryl alcohols with PCl_3 , PCl_5 or SOCl_2 because
- (a) phenols are highly stable compounds.
 (b) carbon-oxygen bond in phenols has a partial double bond character
 (c) carbon-oxygen bond is highly polar
 (d) all of these.

36. The products of the chemical reaction between $\text{Na}_2\text{S}_2\text{O}_3$, Cl_2 and H_2O are
 (a) S, HCl, Na_2SO_4 (b) S, HCl, Na_2S (c) S, HCl, Na_2SO_3 (d) S, NaClO_3
37. 1 M, 2.5 litre NaOH solution is mixed with another 0.5 M, 3 litre NaOH solution. Then find out the molarity of resultant solution
 (a) 0.80 M (b) 1.0 M (c) 0.73 M (d) 0.50 M
38. Mark the correct order of decreasing acid strength of the following compounds.



- (a) $\text{V} > \text{IV} > \text{II} > \text{I} > \text{III}$ (b) $\text{II} > \text{IV} > \text{I} > \text{III} > \text{V}$ (c) $\text{IV} > \text{V} > \text{III} > \text{II} > \text{I}$ (d) $\text{V} > \text{IV} > \text{III} > \text{II} > \text{I}$
39. Oxidation states of P in $\text{H}_4\text{P}_2\text{O}_5$, $\text{H}_4\text{P}_2\text{O}_6$, and $\text{H}_4\text{P}_2\text{O}_7$, are respectively:
 (a) +3, +5, +4 (b) +5, +3, +4 (c) +5, +4, +3 (d) +3, +4, +5
40. If z is the number of atoms in the unit cell that represents the closest packing sequence ABC ABC, the number of tetrahedral voids in the unit cell is equal to :
 (a) z (b) $2z$ (c) $z/2$ (d) $z/4$
41. Which of the following pairs of ions are isoelectronic and isostructural?
 (a) CO_3^{2-} , NO_3^- (b) ClO_3^- , CO_3^{2-} (c) SO_3^{2-} , NO_3^- (d) ClO_3^- , SO_3^{2-}
42. Which one of the following will most readily be dehydrated in acidic conditions ?



43. Which of the following statements are correct ?
 (i) In phenols, the —OH group is attached to sp^2 hybridised carbon of an aromatic ring
 (ii) The carbon – oxygen bond length (136 pm) in phenol is slightly more than that in methanol
 (iii) Partial double bond character is due to the conjugation of unshared electron pair of oxygen with the aromatic ring.
 (iv) Phenol has sp^2 hybridised state of carbon to which oxygen is attached.
 (a) (i), (ii) and (v) (b) (i), (ii) and (iii) (c) (i), (iii) and (iv) (d) (i) and (iv)
44. How many bridging oxygen atoms are present in P_4O_{10} ?
 (a) 5 (b) 6 (c) 4 (d) 2

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 :** In the reaction between RCH_2OH & PCC, an Aldehyde is obtained.
Reason : PCC involves the change in oxidation state of chromium from +6 to +3.
46. **Assertion :** Anti Markovnikov's rule is not applicable for HF, HCl or HI except HBr.
Reason : Addition of HCl, HF or HI to alkenes forms only Markovnikov's products.
47. **Assertion :** Iodine is more soluble in water than in carbon tetrachloride.
Reason : Iodine is a non-polar compound.

48. **Assertion :** tert-butyl bromide undergoes Wurtz reaction to give 2, 2, 3, 3-tetramethylbutane.
Reason : In Wurtz reaction, alkyl halides react with sodium in dry ether to give hydrocarbon containing double the number of carbon atoms present in the halide.
49. **Assertion :** One molal aqueous solution of glucose contains 180 g of glucose in 1 kg of water.
Reason : Solution containing one mole of solute in 1000 g solvent is called one molal solution.

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 (Oxyacid)	Column-II (Materials for preparation)
(A) H_3PO_2	(p) Red P + alkali
(B) H_3PO_3	(q) $\text{P}_4\text{O}_{10} + \text{H}_2\text{O}$
(C) H_3PO_4	(r) $\text{P}_2\text{O}_3 + \text{H}_2\text{O}$
(D) $\text{H}_4\text{P}_2\text{O}_6$	(s) White P + alkali
(a) (A)–(s), (B)–(r), (C)–(q), (D)–(p)	(b) (A)–(p), (B)–(r), (C)–(q), (D)–(s)
(c) (A)–(s), (B)–(r), (C)–(p), (D)–(q)	(d) (A)–(q), (B)–(r), (C)–(p), (D)–(s)

51. Correctly analogy is

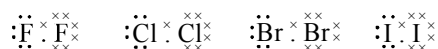
- (a) Soda water: gas in liquid :: Sugar solution: solid in liquid.
 (b) German silver: solid in solid :: Sugar solution: liquid in solid.
 (c) Air: gas in gas :: Soda water : liquid in gas
 (d) Sugar solution : liquid in solid :: Air : gas in gas

52. Find the incorrect analogy

- (a) Glucose : 6 Carbon :: Fructose : 5 Carbon
 (b) Glucose : 4 Chiral centre :: Fructose : 4 Chiral centre
 (c) Glucose : Polyhydroxy Aldehyde :: Fructose : Polyhydroxy ketone
 (d) Glucose : Monosaccharide :: Fructose : Monosaccharide

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

The discovery and preparation of several of the interhalogen compounds followed shortly after the discovery of the elements themselves. Since the halogens are all relatively strongly electronegative elements, each lacking one electron to complete its outer shell, they form diatomic molecules with a shared electron-pair bond between them:



In a very similar manner, interhalogen molecules are formed, the simplest type being represented by ClF , BrCl , IBr , etc., whose physical properties are intermediate between those of the two elements involved. However, these properties are not necessarily the average of those of the two parent elements.

Of the six possible uni-univalent halogen halides, five, all except iodine fluoride, are known to exist; the latter is probably too unstable, since in the known iodine-fluorine compounds, iodine always has a valence greater than 1.

Considerably more interest from a structural standpoint are the interhalogen compounds in which one of the halogens has a valence greater than 1. Three such series exist: AB_3 , AB_5 and AB_7 . No compounds are known where an even number of atoms of one halogen combine with an odd number of another; such a molecule would have an unpaired electron.

53. Interhalogen compounds are more reactive than the individual halogen because

- (a) two halogens are present in place of one
 (b) they are more ionic
 (c) their bond energy is less than the bond energy of the halogen molecule
 (d) they carry more energy

OMR ANSWER SHEET

Sample Paper No –2

- ★ 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.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	9.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	18.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
2.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	10.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	19.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
3.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	11.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	20.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
4.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	12.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	21.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
5.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	13.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	22.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
6.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	14.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	23.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
7.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	15.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	24.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
8.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	16.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	25.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
9.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	17.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d					

SECTION-B

26.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	34.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	42.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
27.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	35.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	43.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
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30.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	38.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	46.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
31.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	39.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	47.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
32.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	40.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	48.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
33.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	41.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	49.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

SECTION-C

50.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	52.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	54.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
51.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	53.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d	55.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

No. of Qns. Attempted	<input type="text"/>	Correct	<input type="text"/>	Incorrect	<input type="text"/>	Marks	<input type="text"/>
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