SUPER 10

CBSE Class 12 CHEMISTRY

2021-22 Term I Sample Papers with **OMR Sheets**

disha Publication Inc

Highlights

- 10 Fully Solved Sample Papers with Marking Scheme
- CBSE Sample Paper 2021 with Solutions
- Objective Qns. & Solns. CBSE Sample 2021-22
- Objective Qns. & Solns. 2021 Solved Paper
- Objective Qns. & Solns. CBSE Question Bank
- Latest Revised CBSE Syllabus for 2021-22 (issued on 28-07-2021)
- Covers all new variety Qns - A/R, Case base & MCQs etc.
- Separate OMR Answer Sheet for each Sample Paper

Based on the Pattern of Sample Paper issued by CBSE on 2nd Sep, 2021

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CONTENTS OF FREE SAMPLE BOOK

This sample book is prepared from the book **"Super 10 CBSE Class 12 Chemistry 2021-22 Term I Sample Papers with OMR Sheets".**

ISBN - 9789390711789

MRP- 170/-

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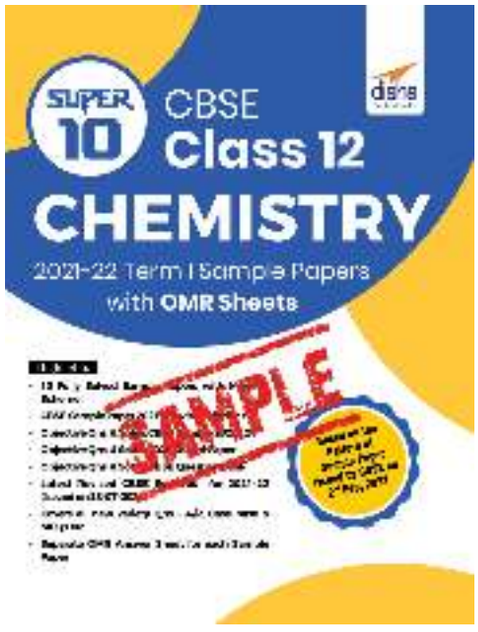
CONTENTS OF COMPLETE BOOK



Sample Paper 4

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. A D-carbohydrate is:
(a) Always dextrorotatory
(b) Always laevorotatory
(c) Always the mirror of the corresponding L-carbohydrate
(d) None of these.

2. Concentrated nitric acid, upon long standing, turns yellow brown due to the formation of
(a) NO (b) NO_2 (c) N_2O (d) N_2O_4

3. Ammonia on catalytic oxidation gives an oxide from which nitric acid is obtained. The oxide is :
(a) N_2O_3 (b) NO (c) NO_2 (d) N_2O_5

4. Which is the least stable form of glucose ?
(a) α-D-Glucose (b) β-D-Glucose (c) Open chain structure (d) All are equally stable

5. The best method for the conversion of an alcohol into an alkyl chloride is by treating the alcohol with
(a) PCl_5 (b) dry HCl in the presence of anhydrous $ZnCl_2$
(c) $SOCl_2$ in presence of pyridine (d) none of these

6. Nitrogen forms N_2, but phosphorus is converted into P_4 from P, the reason is
(a) Triple bond is present between phosphorus atom (b) $p_\pi - p_\pi$ bonding is strong
(c) $p_\pi - p_\pi$ bonding is weak (d) Multiple bond is formed easily

7. Example of molecular solid is :
(a) $SO_2(s)$ (b) SiC (c) C (graphite) (d) NaCl

8. Colligative properties of the solution depend on
(a) Nature of solute (b) Nature of solvent
(c) Number of particles present in the solution (d) Number of moles of solvent only

9. CsCl crystallises in body centred cubic lattice. If '*a*' is its edge length then which of the following expressions is correct?

(a) $r_{Cs^+} + r_{Cl^-} = 3a$ (b) $r_{Cs^+} + r_{Cl^-} = \frac{3a}{2}$ (c) $r_{Cs^+} + r_{Cl^-} = \frac{\sqrt{3}}{2}a$ (d) $r_{Cs^+} + r_{Cl^-} = \sqrt{3}a$

10. Benzene hexachloride is
(a) 1, 2, 3, 4, 5, 6-hexachlorocyclohexane (b) 1, 1, 1, 6, 6, 6-hexachlorocyclohexane
(c) 1, 6-phenyl-1, 6-chlorohexane (d) 1, 1-phenyl-6, 6-chlorohexane

11. The two forms of D–glucopyranose obtained from the solution of D-glucose are better called
(a) isomers (b) anomers (c) epimers (d) enantiomers

12. Which of the following reactions is an example of nucleophilic substitution reaction?
(a) $2\,RX + 2\,Na \rightarrow R - R + 2\,NaX$ (b) $RX + H_2 \rightarrow RH + HX$
(c) $RX + Mg \rightarrow RMgX$ (d) $RX + KOH \rightarrow ROH + KX$

13. Fluorine exhibits an oxidation state of only –1 because
(a) it can readily accept an electron (b) it is very strongly electronegative
(c) it is a non-metal (d) it belongs to halogen family

14. When phenol is treated with excess bromine water, it gives:
(a) *m*-bromophenol (b) *o*- and *p*-bromophenol
(c) 2, 4-dibromophenol (d) 2, 4, 6-tribromophenol

15. Which of the following conditions favours the existence of a substance in the solid state?
(a) High temperature (b) Low temperature
(c) High thermal energy (d) Weak cohensive forces

16. How many alcohols with molecular formula $C_4H_{10}O$ are chiral in nature?
(a) 1 (b) 2 (c) 3 (d) 4

17. Pressure cooker reduces cooking time because
(a) the heat is more easily distributed
(b) the higher pressure tenderizes the food
(c) the boiling point of the water inside is elevated
(d) a larger flame is used

18. IUPAC name of the compound $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - OCH_3$ is.
(a) 1-methoxy-1methylethane (b) 2-methoxy-2-methylethane
(c) 2-methoxypropane (d) isopropylmethyl ether

19. In case of hydride of oxygen family, which of the following physical property change regularly on moving down the group.
(a) Melting point (b) Thermal stability
(c) Boiling point (d) Critical temperature

20. Which one is the absolutely specific term?
(a) A diastereomer (b) An epimer
(c) An anomer (d) None of the three.

21. The compound which contains all the four 1°, 2°, 3° and 4° carbon atoms is
(a) 2, 3-dimethylpentane (b) 3-chloro-2, 3-dimethylpentane
(c) 2, 3, 4-trimethylpentane (d) 3,3-dimethylpentane

22. Sulphur does not exist as S_2 molecule because
(b) It is less electronegative
(b) It has ability to exhibit catenation
(c) It is not able to constitute pπ-pπ bond
(d) It has the tendency to show variable oxidation states

23. The total number of acyclic isomers including the stereoisomers with the molecular formula C_4H_7Cl
(a) 11 (b) 12 (c) 9 (d) 10

24. Which of the following units is useful in relating concentration of solution with its vapour pressure?
(a) Mole fraction (b) Parts per milion (c) Mass percentage (d) Molality

25. Which of the following solutions does not change its colour on passing ozone through it?
(a) Starch iodide solution (b) Alcoholic solution of benzidine
(c) Acidic solution of $K_2Cr_2O_3$ (d) Acidified solution of $FeSO_4$

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 both DNA and RNA, heterocylic base and phosphate ester linkages are at –

(a) C_5' and C_1' respectively of the sugar molecule (b) C_1' and C_5' respectively of the sugar molecule

(c) C_2' and C_5' respectively of the sugar molecule (d) C_5' and C_2' respectively of the sugar molecule

27. In the case of alkali metals, the covalent character decreases in the order:

(a) MF > MCl > MBr > MI (b) MF > MCl > MI > MBr

(c) MI > MBr > MCl > MF (d) MCl > MI > MBr > MF

28. Of the interhalogen AX_3 compounds, ClF_3 is most reactive but BrF_3 has higher conductance in liquid state. This is because

(a) BrF_3 has higher molecular mass

(b) ClF_3 is more volatile

(c) BrF_3 dissociates into BrF_2^+ and BrF_4^- most easily

(d) Electrical conductance does not depend on concentration

29. Molarity of H_2SO_4 is 18 M. Its density is 1.8 g/mL. Hence molality is

(a) 36 (b) 200 (c) 500 (d) 18

30. How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO_3 ? The concentrated acid is 70% HNO_3

(a) 90.0 g conc. HNO_3 (b) 70.0 g conc. HNO_3 (c) 54.0 g conc. HNO_3 (d) 45.0 g conc. HNO_3

31. In the following groups :

(I) –OAc (II) –OMe (III) $-OSO_2Me$ (IV) $-OSO_2CF_3$

the order of leaving group ability is

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

32. Which one of the following reactions of xenon compounds is not feasible?

(a) $3XeF_4 + 6H_2O \longrightarrow 2Xe + XeO_3 + 12HF + 1.5O_2$

(b) $2XeF_2 + 2H_2O \longrightarrow 2Xe + 4HF + O_2$

(c) $XeF_6 + RbF \longrightarrow Rb[XeF_7]$

(d) $XeO_3 + 6HF \longrightarrow XeF_6 + 3H_2O$

33. The **incorrect** statement among the following is:

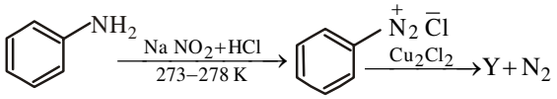
(a) α-D-glucose and β-D-glucose are anomers.

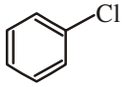
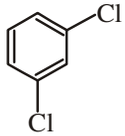
(b) α-D-glucose and β-D-glucose are enantiomers.

(c) Cellulose is a straight chain polysaccharide made up of only β-D-glucose units.

(d) The penta acetate of glucose does not react with hydroxyl amine.

34. Identify the compound Y in the following reaction.



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

35. Elements of group- 15 form compounds in +5 oxidation state. However, bismuth forms only one well characterised compound in +5 oxidation state. The compound is

(a) Bi_2O_5 (b) BiF_5 (c) $BiCl_5$ (d) Bi_2S_5

36. The number of atoms in 100 g of an *fcc* crystal with density, $d = 10\ g/cm^3$ and cell edge equal to 100 pm, is equal to

(a) 1×10^{25} (b) 2×10^{25} (c) 3×10^{25} (d) 4×10^{25}

37. A set of compounds in which the reactivity of halogen atom in the ascending order is

(a) chlorobenzene, vinyl chloride, chloroethane (b) chloroethane, chlorobenzene, vinyl chloride

(c) vinyl chloride, chlorobenzene, chloroethane (d) vinyl chloride, chloroethane, chlorobenzene

38. At room temperature, HCl is a gas while HF is a low boiling liquid. This is because

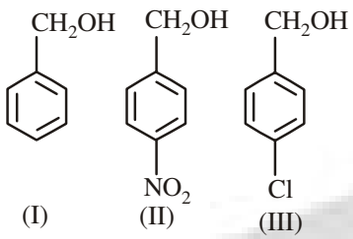
(a) H- F bond is covalent (b) H- F bond is ionic

(c) HF has metallic bond (d) HF has hydrogen bond

39. The normal boiling point of water is 373 K. Vapour pressure of water at temperature T is 19 mm Hg. If enthalpy of vaporisation is 40.67 kJ/mol, then temperature T would be (Use : log 2 = 0.3, R : 8.3 $JK^{-1}\ mol^{-1}$):

(a) 250 K (b) 291.4 K (c) 230 K (d) 290 K

40. Mark the correct increasing order of reactivity of the following compounds with HBr/HCl.



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

41. $NH_4ClO_4 + HNO_3(dil.) \longrightarrow HClO_4 + [X]$

$[X] \xrightarrow{\Delta} Y(g)$

[X] and [Y] are respectively –

(a) NH_4NO_3 & N_2O (b) NH_4NO_2 & N_2 (c) HNO_4 & O_2 (d) None of these

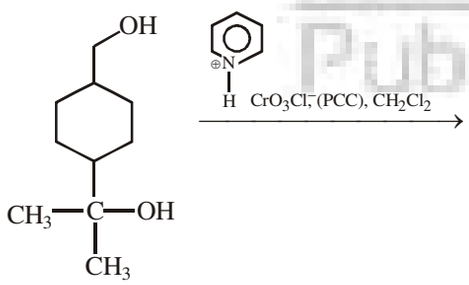
42. The edge length of a face centered cubic cell of an ionic substance is 508 pm. If the radius of the cation is 110 pm, the radius of the anion is

(a) 288 pm (b) 398 pm (c) 618 pm (d) 144 pm

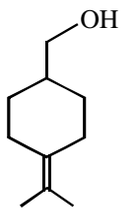
43. A metal 'M' reacts with nitrogen gas to give 'M_3N'. 'M_3N' on heating at high temperature gives back 'M' and on reaction with water produces a gas 'B'. Gas 'B' reacts with aqueous solution of $CuSO_4$ to form a deep blue compound. 'M' and 'B' respectively are :

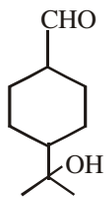
(a) Li and NH_3 (b) Ba and N_2 (c) Na and NH_3 (d) Al and N_2

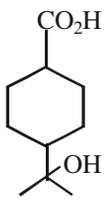
44.

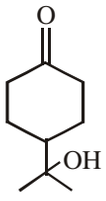


Product of the reaction is:

(a)


(b)


(c)


(d)


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 :** The bond angle in alcohols is slightly less than the tetrahedral angle.
Reason : In alcohols, the oxygen of –OH group is attached to sp^3 hybridized carbon atom.

46. **Assertion :** Atoms in S_8 molecule undergo sp^3 hybridization and contain two lone pair on each atom.
Reason : S_8 has a V-shape.

47. **Assertion :** Ethers behave as bases in the presence of mineral acids.
Reason : Due to the presence of lone pairs of electrons on oxygen.

48. **Assertion :** High concentration of nucleophile favour S_NI mechanism.
Reason : 2° alkyl halides are more reactive than 1° alkyl halides towards S_NI reactions.

49. **Assertion :** When a metal is treated with conc. HNO_3 it generally yields a nitrate, NO_2 and H_2O.
Reason : Conc. HNO_3 reacts with metal and first produces a metal nitrate and nascent hydrogen. The nascent hydrogen then further reduces HNO_3 to NO_2.

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)	$CH_2Cl\,CH_2Cl$	(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. Complete the following analogy :
A : Ideal solution : : B : Non Ideal solution
(a) A : *n*-Heptane + *n*-Hexane : : B : $CCl_4 + SiCl_4$ (b) A : $C_2H_5Br + C_2H_5I$: : B : $HNO_3 + H_2O$
(c) A : $C_6H_5Cl + C_6H_5Br$: : B : $C_6H_5CH_3 + C_6H_5OH$ (d) A : Chloroform + Benzene : : B : Acetone + Aniline

52. Choose the correct anology for oxides of Nitrogen and their structure.
(a) $N_2O : N_2O_3 : NO_2$: : linear : Angular : Planar (b) $NO_2 : N_2O : N_2O_3$: : Planar : Planar : Angular
(c) $N_2O : N_2O_3 : NO_2$: : linear : Planar : Angular (d) $N_2O_3 : NO_2 : N_2O$: : Angular : Angular : Planar

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

The word "colligative" has been adapted or taken from the Latin word "colligatus" which translates to "bound together". A colligative property is a property of a solution that is dependent on the ratio between the total number of solute particles (in the solution) to the total number of solvent particles. Colligative properties are not dependent on the chemical nature of the solution's components. Dilute solution containing non-volatile solute exhibit some properties which depend only on the number of solute particles present and not on the type of solute present. These properties are called colligative properties. These properties are mostly seen in dilute solutions. There are different types of colligative properties of a solution. These include, vapour pressure lowering, boiling point elevation, freezing point depression and osmotic pressure.

53. Which one of the following is a colligative property ?

(a) Boiling point (b) Vapour pressure

(c) Osmotic pressure (d) Freezing point

54. The relative lowering of the vapour pressure is equal to the ratio between the number of

(a) solute molecules to the solvent molecules

(b) solute molecules to the total molecules in the solution

(c) solvent molecules to the total molecules in the solution

(d) solvent molecules to the total number of ions of the solute.

55. Someone has added a non electrolyte solid to the pure liquid but forgot that among which of the two beakers he has added that solid. This problem can be solved by checking

(a) relative lower in vapour pressure (b) elevation in boiling point

(c) depression in Freezing point (d) all above

OMR ANSWER SHEET

Sample Paper No – ☐

2HC

- ✶ 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)

44. 48.

No. of Qns. Attempted		Correct		Incorrect		Marks	

Page for Rough Work

Sample Paper 4

ANSWER KEYS																			
1	(d)	**7**	(a)	**13**	(b)	**19**	(b)	**25**	(c)	**31**	(b)	**37**	(a)	**43**	(a)	**49**	(a)	**55**	(d)
2	(b)	**8**	(c)	**14**	(d)	**20**	(d)	**26**	(b)	**32**	(d)	**38**	(d)	**44**	(b)	**50**	(c)		
3	(b)	**9**	(d)	**15**	(b)	**21**	(b)	**27**	(c)	**33**	(b)	**39**	(b)	**45**	(b)	**51**	(b)		
4	(c)	**10**	(a)	**16**	(a)	**22**	(c)	**28**	(c)	**34**	(a)	**40**	(c)	**46**	(c)	**52**	(c)		
5	(c)	**11**	(b)	**17**	(c)	**23**	(b)	**29**	(c)	**35**	(b)	**41**	(a)	**47**	(a)	**53**	(c)		
6	(c)	**12**	(d)	**18**	(c)	**24**	(a)	**30**	(d)	**36**	(d)	**42**	(d)	**48**	(d)	**54**	(b)		

SOLUTIONS

1. (d)

2. (b) The slow decomposition of HNO_3 is represented by the equation

$$4HNO_3 \rightarrow \underset{\text{(yellow-brown)}}{4NO_2} + 2H_2O + O_2$$

3. (b) $4NH_3(g) + 5O_2(g) \xrightarrow{\text{Catalyst}} 4NO(g) + 6H_2O(g)$

$2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$

$3NO_2(g) + H_2O(l) \longrightarrow 2HNO_3(aq) + NO(g)$

4. (c) Open chain structure is unstable and converted to cyclic.

5. (c) $R-OH + SOCl_2 \xrightarrow{\text{Pyridine}} RCl + SO_2\uparrow + HCl\uparrow$

SO_2 and HCl being gases escape leaving behind pure alkyl halide.

Direct fluorination of alkane is highly exothermic process.

6. (c) Nitrogen form N_2 (*i.e.* N≡N) but phosphorus form P_4, because in P_2, $p_\pi - p_\pi$ bonding is present which is a weaker bonding.

7. (a)

8. (c) Colligative properties of dilute solution containing non volatile solute depends upon the number of particles of the solute present in the solution.

9. (d) For *bcc* lattice, body diagonal = $a\sqrt{3}$

The distance between the body centered atom and one corner atom in cube will be = $\frac{\sqrt{3}a}{2}$

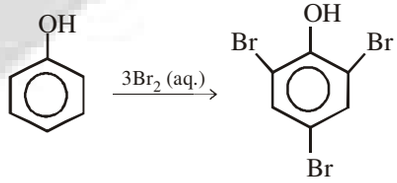
10. (a)

11. (b) The two isomeric forms (α – and β –) of D–glucopyranose differ in configuration only at C-1. Hence these are called anomers.

12. (d)

13. (b) It is the most electronegative element.

14. (d)



2, 4,6-Tribromophenol

Note : The –OH group in phenol, being activating group, facilitates substitution in the *o*- and *p*-positions.

15. (b) At low temperature existence of a substance in solid state is due to slow molecular motion and strong cohesive forces.

These two forces hold the constituent particles together thus causes existence of substance in solid state.

16. (a) Following are the three possible isomers of butanol

(i) $CH_3CH_2 - CH_2 - CH_2OH$

Butan–1–ol

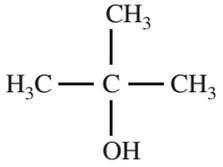
no chiral carbon

(ii) $CH_3 - CH_2 - \overset{*}{CH}(OH) - CH_3$

Butan –2 – ol

1-Chiral Carbon

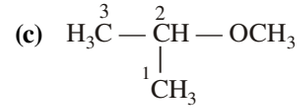
(iii)



2 – methylpropan – 2 – ol

No Chiral Carbon

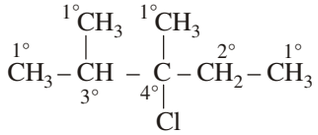
17. **(c)** The boiling point of water inside the cooker increases above 100°C due to accumulation of steam and increase in pressure. Thus making it possible to cook food faster.

18. **(c)** 

IUPAC name of the above compund is 2-methoxypropane.

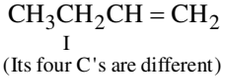
19. **(b)** Order of M.P. of B.P. or critical temperature:
$H_2O > H_2Te > H_2Se > H_2S$

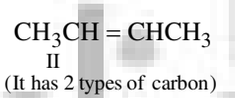
20. **(d)** Since diastereomers are all those isomers which are not enantiomers, there may be more than one diastereomer of a compound. An epimer differs in the configuration of only one chiral carbon, so an epimer can be C—2, C—3, C–4, etc. An anomer may be α- or β- ; so no term is absolutely specific.

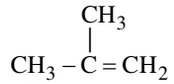
21. **(b)** 
3-chloro-2,3-dimethylpentane

22. **(c)**

23. **(b)** C_4H_7Cl is a monochloro derivative of C_4H_8 which itself exists in three acyclic isomeric forms.


I
(Its four C's are different)


II
(It has 2 types of carbon)

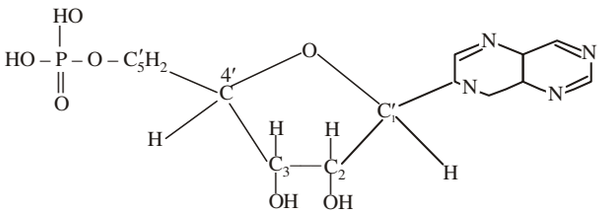

III
(It has 2 types of carbon)

Grand total of acyclic isomers = 6 + 4 + 2 = 12

24. **(a)** According to Henry's law partial pressure of a gas in the solution is proportional to the mole fraction of gas in the solution.
$p = K_H x$; K_H = (Henry's constant)

25. **(c)** Ozone does not react with acidified solution of $K_2Cr_2O_7$.

26. **(b)** In DNA and RNA heterocyclic base and phosphate ester are at C_1' and C_5' respectively of the sugar molecule.



27. **(c)** MI > MBr > MCl > MF. As the size of the anion decreases covalency decreases.

28. **(c)** In liquid state BrF_3 dissociates into BrF_2^+ and BrF_4^- ions most easily.

29. **(c)** Molality (m)

$$= \frac{\text{Molarity}}{\text{Density} - \frac{\text{Molarity} \times \text{Molecular mass}}{1000}}$$

$$= \frac{18}{1.8 - \frac{18 \times 98}{1000}} = 500 \text{ mol kg}^{-1}$$

30. **(d)** $\text{Molarity (M)} = \frac{\text{wt} \times 1000}{\text{mol. wt.} \times \text{vol (mL)}}$

$$2 = \frac{\text{wt.}}{63} \times \frac{1000}{250} \Rightarrow \text{wt.} = \frac{63}{2}\text{ g} = 31.5\text{g}$$

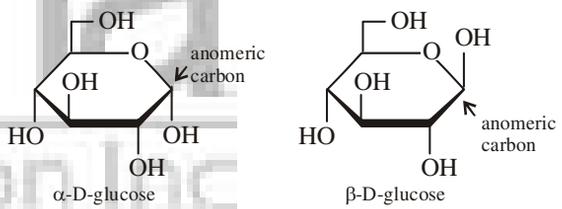
$$\text{wt. of 70\% acid} = \frac{100}{70} \times 31.5 = 45\text{ g}$$

31. **(b)** Weaker the base, better the leaving group. Hence

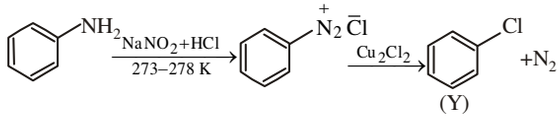
Decreasing order of basicity →
OMe (II) OAc (I) OSO_2Me (III) OSO_2CF_3 (IV)
← Decreasing order of leaving group

32. **(d)** The products of the concerned reaction react each other forming back the reactants.

$$XeF_6 + 3H_2O \longrightarrow XeO_3 + 6HF.$$

33. **(b)** 

34. **(a)** Sandmeyer's reaction



35. **(b)** The only well characterised compound having + 5 oxidation state of Bi is BiF_5. It is due to smaller size and high electronegativity of fluorine.

36. **(d)** $M = \frac{\rho \times a^3 \times N_A \times 10^{-30}}{Z}$

$$= \frac{10 \times (100)^3 \times 6.02 \times 10^{23} \times 10^{-30}}{4} = 15.05$$

$\therefore$ Number of atoms in 100

$$g = \frac{6.02 \times 10^{23}}{15.05} \times 100 = 4 \times 10^{25}$$

37. **(a)** $CH_3CH_2Cl > CH_2 = CHCl > C_6H_5Cl$

38. **(d)** Due to hydrogen bonding, HF is a liquid.

39. **(b)** Given $P_1 = 19$ mm Hg, $P_2 = 760$ mm Hg;
$\Delta H_{vap.} = 40670$ J/mol

Applying Clausius-Clapeyron's equation

$$\log \frac{P_2}{P_1} = \frac{\Delta H_{vap}}{2.303 \times R}\left(\frac{T_2 - T_1}{T_1 T_2}\right)$$

$$\text{or} \quad \log \frac{760}{19} = \frac{40670}{2.303 \times 8.3}\left(\frac{373 - T_1}{T_1 \times 373}\right)$$

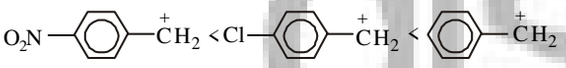
on solving, we get $T_1 = 291.4$ K

40. **(c)** Nucleophilic substitution reaction depend upon the stability of carbocation. As, presence of electron withdrawing group decreases the stability of carbocation in compounds (II) and (III), therefore, will give less stable carbocation than (I).

Further NO_2 group is a stronger EWG than — Cl.

Thus, *p*-NO_2 — C_6H_4 — $\overset{+}{C}H_2$ will be less stable than *p*Cl — C_6H_4 — $\overset{+}{C}H_2$

Hence, the order of stability of carbocations, and thus reactivity of parent alcohol will be:



41. **(a)** $NH_4ClO_4 + HNO_3 \rightarrow \underset{(X)}{HClO_4} + NH_4NO_3$

$$\underset{(Y)}{NH_4NO_3} \xrightarrow{\Delta} N_2O + 2H_2O$$

42. **(d)** For an *fcc* crystal

$$r_{cation} + r_{anion} = \frac{\text{edge length}}{2}$$

$$110 + r_{anion} = \frac{508}{2}$$

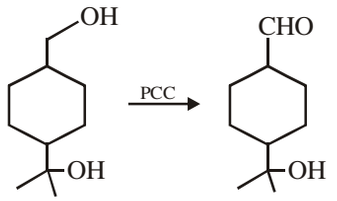
$$r_{anion} = 254 - 110 = 144 \text{ pm}$$

43. **(a)** $\underset{(M)}{Li}(s) + N_2(g) \underset{\text{high temperature}}{\rightleftharpoons} 2Li_3N(s)$

$$Li_3N + 3H_2O \longrightarrow 3LiOH + \underset{(B)}{NH_3}$$

$$CuSO_4 + 4NH_3 \longrightarrow \underset{\text{deep blue compound}}{[Cu(NH_3)_4]SO_4}$$

44. **(b)**



(3° alcohol cannot be oxidized)

45. **(b)** The bond angle $\overset{:O:}{\underset{C\quad H}{\angle}}$ in alcohols is slightly less than the tetrahedral angle (109°-28′). It is due to the repulsion between the unshared electron pairs of oxygen.

46. **(c)** S_8 has puckered ring type structure.

47. **(a)** **R** is the correct explanation of **A**.

48. **(d)** S_NI mechanism does not depend on the concentration of nucleophile. 2° alkyl halides are more reactive than 1° alkyl halides towards S_NI mechanism, because 2° carbocation is more stable than 1° carbocation.

49. **(a)** $\underset{\text{(Metal)}}{M} + \underset{\text{(Conc.)}}{HNO_3} \longrightarrow \underset{\text{(Metal nitrate)}}{MNO_3} + \underset{\text{(Nascent hydrogen)}}{H}$

$$2HNO_3 + \underset{\text{(Nascent hydrogen)}}{2H} \longrightarrow 2NO_2 + 2H_2O$$

50. **(c)** In allylic halides hydrogen atom is bonded to sp^3 hybridised carbon atom. Whereas in vinylic halide, hydrogen atom is bonded to sp^2 hybridised carbon atom.

CH_3CHCl_2 — Ethylidene chloride (*gem*-dihalide)

$\begin{matrix} CH_2 - CH_2 \\ | \quad\quad | \\ Cl \quad\quad Cl \end{matrix}$ — Ethylene dichloride (*vic*-dihalide)

51. **(b)** **52.** **(c)**

53. **(c)** Osmotic pressure is a colligative property.

54. **(b)** According to Raoult's law, the relative lowering in vapour pressure of a dilute solution is equal to the mole fraction of the solute present in the solution.

$$\frac{p^\circ - p}{p} = \text{Mole fraction of solute} = \frac{n}{n+N}$$

55. **(d)** All are colligative properties.