Sample Paper

Time: 90 Minutes

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

(c)

(b)

(d)

1. Consider the reactions :

(i)
$$(CH_3)_2CH - CH_2Br \xrightarrow{C_2H_5OH} (CH_3)_2CH - CH_2OC_2H_5 + HBr$$

(ii)
$$(CH_3)_2CH - CH_2Br \xrightarrow{C_2H_5O} (CH_3)_2CH - CH_2OC_2H_5 + Br^-$$

The mechanisms of reactions (i) and (ii) are respectively :

- (a) $S_N 1$ and $S_N 2$ (b) $S_N 1$ and $S_N 1$ $S_N 2$ and $S_N 2$ (d) $S_N 2$ and $S_N 1$ (c) 2. An azeotropic mixture of two liquids has a boiling point higher than either of them when it: (a) shows positive deviation from Raoult's law (b) shows negative deviation from Raoult's law
 - (c) shows ideal behaviour
- (d) is saturated 3. The oxidation state of central atom in the anion of compound NaH₂PO₂ will be
- (a) +3 (b) +5
- The solubility of gases in liquids (water) is favoured by 4.
- (a) increase in both pressure and temperature (b) (c) increase in pressure and decrease in temperature (d)
- 5. The symbols D and L represent
- (a) the optical activity of compounds.

6.

- (c) the dextrorotatory nature of molecule.
- At room temperature, HCl is a gas while HF is a low boiling liquid. This is because
- (a) H-F bond is covalent
- (b) (c) HF has metallic bond
- 7. Which reagent will you use for the following reaction?
 - - (a) Cl_2/UV light (b)
 - (c) Cl₂ gas in dark
- 8. Which one of the following statements is wrong?
 - (a) SO_2 dissolves in water and forms sulphurous acid (b)
 - (c) SO_2 has pungent odour (d)
- (d) HF has hydrogen bond

H-F bond is ionic

 $NaCl + H_2SO_4$ (d) Cl₂ gas in the presence of iron in dark

the levorotatory nature of molecule

decrease in both pressure and temperature

decrease in pressure and increase in tempeature

the relative configuration of a particular stereoisomer.

(d) -3

- SO₂ acts as a bleaching agent
- SO₂ acts only as oxidising agent



SP-40

9.	Most crystals show good cleavage because their atoms, ions or molecules are													
	(a) weakly bonded together	(b) strongly bonded together												
	(c) spherically symmetrical	(d) arranged in planes												
10.	The unit of ebullioscopic constant is													
	(a) $K \text{ kg mol}^{-1}$ or $K \text{ (molality)}^{-1}$	(b) mol kg K^{-1} or K^{-1} (molality)												
	(c) kg mol ⁻¹ K ⁻¹ or K ⁻¹ (molality) ⁻¹	(d) K mol kg ^{-1} or K (molality)												
11.	In face centred cubic lattice, a unit cell is share	l equally by how many unit cells												
	(a) 2 (b) 4	(c) 6 (d) 8												
12.	The major product formed when 1, 1, 1-trichloro-p	opane is treated with aqueous potassium hydroxide is:												
10	(a) Propyne (b) I-Propanol	(c) 2-Propanol (d) Propionic acid												
13.	α -Amino acids are	NIL moun												
	The unit of ebulioscopic constant is (b) $K = 1$ (modulity) (b) $K = 1$ (modulity) (c) $K = 1$ (modulity) (c													
	(b) actuate due to $- NH_3$ group and basic due to $-$	coo group.	l H ₂											
	(d) none is true													
14.	When CH ₂ CH ₂ CHCl ₂ is treated with NaNH ₂ the n	oduct formed is												
		NH ₂ Cl												
	(a) $CH_2 - CH = CH_2$ (b) $CH_3 - C = CH$	(c) $CH_3CH_2CH < CH_2$ (d) $CH_3CH_2CH < CH_2CH < CH_2C$												
		NH ₂ NH ₂ NH ₂	2											
15.	Which one of the following pairs is obtained on he	ting ammonium dichromate?												
	(a) N_2 and H_2O (b) N_2O and H_2O	(c) NO and H_2O (d) NO and NO_2												
16.	Molecular formula of amyl alcohol is													
	(a) $C_7H_{14}O$ (b) $C_6H_{13}O$	(c) $C_5H_{12}O$ (d) $C_5H_{10}O$												
17.	The limiting radius ratio for tetrahedral shape is:													
	(a) $0 \text{ to } 0.155$ (b) $0.225 \text{ to } 0.414$	(c) 0.155 to 0.225 (d) 0.414 to 0.732												
18.	Which of the following compounds will react with	sodium hydroxide solution in water?												
	(a) C_6H_5OH (b) $C_6H_5CH_2OH$	(c) $(CH_3)_3COH$ (d) C_2H_5OH												
19.	Blood has been found to be isotonic with													
	(a) Normal saline solution	(b) Saturated NaCl solution												
	(c) Saturated KCl solution	(d) Saturated solution of a 1 : 1 mixture of NaCl and KCl												
•••		$1 \rightarrow 0^{-1}$	•											
20.	which one of the following substituents at para-pos	tion is most effective in stabilizing the phenoxide	1 !											
	(a) $-CH_3$ (b) $-OCH_3$	(c) $-COCH_3$ (d) $-CH_2OH$												
21.	Which of the following is the best description for t	e behaviour of bromine in the reaction given below?												
	$H_2O + Br_2 \rightarrow HOBr + HBr$													
	(a) Proton acceptor only	(b) Both oxidized and reduced												
	(c) Oxidized only	(d) Reduced only												
22.	Glycosidic linkage is actually an -	(4)												
	(a) Carbonyl bond (b) Ether bond	(c) Ester bond (d) Amide bond												
23	2-Bromonentane is heated with notassium ethoxid	in ethanol. The major product obtained is												
20.	(a) 2 ethoymentane (b) pentene_1	(c) trans-2 pentene (d) cis-pentene-2												
24	(a) 2-ethoxyperitane (b) period of pro-	(c) <i>in uns-z</i> -pentene (u) <i>ens</i> -pentene-z												
24.	() CH + HE - CH -													
• -	(a) $CH_4 + HF \rightarrow$ (b) $CH_3OH + HF \rightarrow$	(c) $CH_4 + F_2 \rightarrow$ (d) $CH_3Br + AgF \rightarrow$												
25.	Which of the following statements is not true for	alogens?												
	(a) All form monobasic oxyacids	(b) All are oxidizing agents												
	(c) Chlorine has the highest electron-gain enthal	by (d) All but fluorine shows positive oxidation states												

Sample Paper-6

SECTION-B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

26. The molecular mass of a solute cannot be calculated by which of the following?

(a)
$$M_B = \frac{W_B \times RT}{\pi V}$$
 (b) $M_B = \frac{p^{\circ} W_B M_A}{(p^{\circ} - p) W_A}$ (c) $M_B = \frac{\Delta T_b W_B \times 1000}{K_b W_A}$ (d) $M_B = \frac{K_b W_B \times 1000}{\Delta T_b \times W_A}$

27. Which inert gas show abnormal behaviour on liquefaction

(b) He (d) Kr (a) Xe (c) Ar

28. If one strand of DNA has the sequence ATGCTTGA, the sequence in the complimentary strand would be (a) TCCGAACT (b) TACGTAGT (c) TACGAACT (d) TAGCTAGT

29. In the solid state, SO_3 may have structure



(c) a & b both

Which yields isopropyl methyl ether with little or no by products ? 30.

- (a) $(CH_3)_2 CHO^- Na^+ + CH_3 I \longrightarrow$
- (c) $(CH_3)_2 CHOH + CH_3 OH \xrightarrow{H_2SO_4}$ (d)

31. By mixing ammonium chloride to potassium nitrite and heating, we get

- (a) Ammonium nitrate (b) $KNH_4(NO_3)_2$ (c) Nitrogen (d) Nitrogen dioxide
- The solubility of N_2 in water at 300 K and 500 torr partial pressure is 0.01 g L⁻¹. The solubility (in g L⁻¹) at 750 torr partial 32. pressure is :
 - (a) 0.0075 (b) 0.005 (c) 0.02 (d) 0.015
- 33. The volume of 4 N HCl and 10 N HCl required to make 1 litre of 6 N HCl are
 - (a) 0.75 litre of 10 N HCl and 0.25 litre of 4 N HCl
 - (d) (c) 0.67 litre of 4 N HCl and 0.33 litre of 10 N HCl 0.80 litre of 4 N HCl and 0.20 litre of 10 N HCl
- 34. The reaction conditions leading to the best yield of C_2H_5Cl are :
 - (b) $C_2H_6 + Cl_2 \xrightarrow{\text{dark}}$ (a) C_2H_6 (excess) + $Cl_2 \xrightarrow{UV \text{ light}}$ (d) $C_2H_6 + Cl_2 \xrightarrow{UV \text{ light}}$ (c) $C_2H_6 + Cl_2 (excess) \xrightarrow{UV \text{ light}} \rightarrow$

35. The number of bonds between sulphur and oxygen atoms in $S_2 O_8^{-2}$ and the number of bonds between sulphur and sulphur atoms in rhombic sulphur, respectively, are: (a) 4 and 6 (b) 8 and 8 (c) 8 and 6 (d) 4 and 8 36. Glucose molecule reacts with 'X' number of molecules of phenylhydrazine to yield osazone. The value of 'X' is (a) four (b) one (c) two (d) three

- **37.** On sulphonation of C_6H_5Cl
 - (a) *m*-chlorobenzenesulphonic acid is formed
 - (c) o-chlorobenzenesulphonic acid is formed
- benzenesulphonic acid is formed (b)
- mixture of o- and p-chlorobenzene sulphonic acid is formed (d)

SP-41



- (d) None of these
- (b) $CH_3O^-Na^+ + (CH_3)_2CHI \longrightarrow$
- All of these

- (b) 0.50 litre of 4 N HCl and 0.50 litre of 10 N HCl

SP-42

20	TT 1'	• . • • • • • • • • • • • • • • • • • •	1	1	C		• / 1
.38.	Helijim-oxygen i	mixture is used by	v deen sea	i divers in	preference	to nitrogen-or	xvgen mixture because
	inemain ongeen	innitial e 15 abea o	, acep see		preference	to marogen of	1,5011 miniture occurate

- (a) Nitrogen is much less soluble in blood than helium
- (b) Helium is much less soluble in blood than nitrogen
- (c) Nitrogen is highly soluble in water
- (d) Due to high pressure deep under the sea nitrogen and oxygen react to give poisonous nitric oxide.
- **39.** The radii of Na^+ and Cl^- ions are 95 pm and 181 pm respectively. The edge length of NaCl unit cell is
 - (a) 276 pm (b) 138 pm (c) 552 pm (d) 415 pm
- 40. Among the following compounds, which one has the shortest C Cl bond?

(a)
$$\underset{CH_3}{H_3C} \xrightarrow{Cl} (b) \underset{CH_2}{H_1C} \xrightarrow{Cl} (c) \underset{H_3C-Cl}{H_3C-Cl} (d) \underset{CH_2}{\overset{CH}} \xrightarrow{Cl} (d) \underset{CH_2}{\overset{CH}}$$

- **41.** Iodine reacts with concentrated HNO₃ to yield Y along with other products. The oxidation state of iodine in Y, is: (a) 5 (b) 7 (c) 3 (d) 1
- 42. A solid dissolves in water exothermically. If its saturated solution at 20°C is cooled to 0°C, then
 - (a) some solid seperates out (b) some ice separates out
 - (c) both the solid and ice separate (d) neither the solid nor the ice separates out
- **43.** Which of the following reactions will not result in the formation of anisole?
 - (a) Phenol + dimethyl sulphate in presence of a base (b) Sodium phenoxide is treated with methyl iodide
 - (c) Reaction of diazomethane with phenol (d) Reaction of methylmagnesium iodide with phenol
- 44. The number of Cl = O bonds in perchloric acid is

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

 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: An ionic compound AB₃ has fcc arrangement where 'A' present at corner. If A atoms are missing from two corners in each unit cell. The new formula of compound will be AB₄.
 Reason : No. of atom 'A' per unit cell will become 3/4.
- 46. Assertion: A mixture of He and O₂ is used for respiration for deep sea divers.Reason : He is soluble in blood.
- 47. Assertion : Lucas reagent $[HCl + ZnCl_2(anhydrous)]$ on reaction with tertiary alcohols immediately produces turbidity. Reason : This is because tertiary alcohols easily form halides which are immiscribe in water.
- **48.** Assertion: *ter*-butyl methyl ether is not prepared by the reaction of *ter*-butyl bromide with sodium methoxide. **Reason:** Sodium methoxide is a strong nucleophile.
- **49.** Assertion : Both rhombic and monoclinic sulphur exist as S_8 but oxygen exists as O_2 . **Reason :** Oxygen forms $p\pi - p\pi$ multiple bond due to small size and small bond length but $p\pi - p\pi$ bonding is not possible in sulphur.

Sample Paper-6

SP-43

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.



(a) A:2,2::B:2,2 (b) A:2,4::B:2,4 (c) A:4,2::B:2,4 (d) A:4,2::B:4,2**Case Study**: *Read the following paragraph and answers the questions.*

Solids can be classified as crystalline or amorphous on the basis of the nature of order present in the arrangement of their constituent particles. Amorphous solids behave like super cool liquids as the arrangement of constituent particles has short-range order, isotropic in nature and no sharp melting point. Crystalline solids have a characteristic shape, with the arrangement of constituent particles of long-range order, anisotropic in nature and a sharp melting point. The classification of crystalline solids is based on their property. The crystalline property depends on the nature of interactions between the constituent particles, and therefore these solids are divided into four different categories:

Chemistry

- SP-44
- Ionic solids
- Covalent or Network solids
- Molecular solids
- Metallic solids
- **53.** Which of the following statement(s) is/are correct?
 - (i) Crystalline solids have definite characteristic geometrical shape.
 - (ii) Crystalline solids have long range order.
 - (iii) Sodium chloride and quartz glass are examples of crystalline solids.
 - (iv) Crystalline solids are isotropic in nature.
 - (a) (i),(ii) and (iii) (b) (i),(ii) and (iv) (c) (i) and (ii) (d) (i) only
- 54. Crystalline solids are anisotropic in nature. What is the meaning of anisotropic in the given statement?
 - (a) A regular pattern of arrangement of particles which repeats itself periodically over the entire crystal.
 - (b) Different values of some of physical properties are shown when measured along different rdirections in the same crystals.
 - (c) An irregular arrangement of particles over the entire crystal.
 - (d) Same values of some of physical properties are shown when measured along different directions in the same crystals.
- 55. Which of the following statements about amorphous solids is incorrect ?
 - (a) They melt over a range of temperature.
 - (c) There is no orderly arrangement of particles.
- (b) They are anisotropic.
- (d) They can be compressible.

Sample Paper

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



- 1. (a) A strong nucleophile favours the S_N^2 reaction and a weak nucleophile favours the S_N^1 reaction. First reaction is S_N^1 reaction because C_2H_5OH is used as solvent which is a weak nucleophile. Second reaction is S_N^2 reaction because $C_2H_5O^-$ is strong nucleophile.
- 2. (b) Show negative deviation from Raoult's law.
- 3. (c) Let oxidation state of P in NaH_2PO_2 is x.

$$1 + 2 \times 1 + x + 2 \times (-2) = 0$$

$$1 + 2 + x - 4 = 0$$

$$+ x - 1 = 0$$

$$x = + 1$$

- **4.** (c) Dissolution of gases in liquids is generally an exothernic process accompanied by a large decrease in volume. Follow Le chatelier's principle.
- 5. (b) The letter 'D' or 'L' before the name of any compound indicate, the relative configuration of a particular stereoisomer.
- 6. (d) Due to hydrogen bonding, HF is a liquid.
- (a) It is a substitution reaction which involves the replacement of 1° and 2° hydrogens of alkanes by chlorine. It occurs in presence of ultraviolet light.

$$\begin{array}{c} \begin{array}{c} 10 & 20 & 20 & 10 \\ CH_3CH_2CH_2CH_3 & & \hline \\ UV \text{ light} \end{array} \end{array}$$

- 8. (d) SO₂ acts as an oxidising agent as well as reducing agent.
- 9. (d) Crystals show good cleavage because their constituent particles are arranged in planes.
- 10. (a) As we know from elevation in boiling point that

$$\Delta T_{b} = K_{b}m \implies K_{b} = \frac{\Delta T_{b}}{m}$$

Unit of
$$K_b = \frac{\text{unit of } \Delta T_b}{\text{unit of } m} = \frac{K}{\text{molality}}$$

$$=\frac{K}{\text{mol kg}^{-1}}=K \text{ mol}^{-1} \text{ kg}$$

11. (c)



An isolated *fcc* cell is shown here. Each face of the cell is common to two adjacent cells. Therefore, each face centre atom contributes only half of its volume and mass to one cell. Arranging six cells each sharing the remaining half of the face centred atoms, constitutes fcc cubic lattice. e.g., Cu and Al.

12. (d)
$$Cl_3C - CH_2CH_3 + KOH \xrightarrow{heat}$$

$$(OH)_{3}C - CH_{2}CH_{3} + 3KCI$$

$$O$$

$$H$$

$$CH_{3}CH_{2}C - OH$$

$$Propanoic acid$$

13. (b) Amino acids exist as zwitterions in which acidic character is due to $-NH_3^+$ and basic due to $-COO^-$ group.

$$\begin{array}{c} \begin{array}{c} & & & R \\ H_{3} \overset{+}{N} \overset{+}{C} HCOOH \xleftarrow{acid} & H_{3} \overset{+}{N} \overset{+}{C} HCOO^{-} \\ & & & & \\ & & & \\ & & & & \\ & & &$$

$$CH_{3} - CH = CHCl \xrightarrow{\text{NaNH}_{2}} CH_{3} - C \equiv CH$$

Final Product

15. (a)
$$(NH_4)_2 Cr_2 O_7 \xrightarrow{\Delta} N_2 + 4H_2 O + Cr_2 O_3$$

16. (c)

14. (b)

- 17. (b) For tetrahedral shape radius ratio is 0.225 0.414.
- **18.** (a) Phenol, being more acidic in nature, reacts with sodium hydroxide solution gives phenoxide ion. This phenoxide ion is resonance stabilised.
- **19.** (a) Normal saline is 0.16 M NaCl solution.
- **20.** (c) Electron withdrawing group stabilises the benzene ring due to delocalisation of charge.

 $-CH_3$ and $-CH_2OH$ are electron donating group and hence decrease the stability of benzene ring $-OCH_3$ is weaker electron withdrawing group than $-COCH_3$. Hence $-COCH_3$ group more stabilize the phenoxide ion at *p*-position.

21. (b)
$$H_2O + Br_2 \longrightarrow HOBr + HBr_2$$

Thus, here oxidation number of Br increases from 0 to +1 and also decreases from 0 to -1. Thus, it is oxidised as well as reduced.

22. (b) Glycosidic linkage is actually an ether bond as the linkage forming the rings in an oligosaccharide or polysaccharide is not just one bond, but the two bonds sharing an oxygen atom e.g. sucrose



 (c) Potassium ethoxide is a strong base, and 2bromopentane is a 2° bromide, so elimination reaction predominates

$$CH_{3}CH(Br)CH_{2}CH_{2}CH_{3} \xrightarrow{OC_{2}H_{5}^{-}} \\ CH_{3}CH = CHCH_{2}CH_{3} + CH_{2} = CHCH_{2}CH_{2}CH_{3} \\ Pentene - 2(major) trans Pentene - 1(minor) cis$$

Since *trans*- alkene is more stable than *cis, thus trans*pentene -2 is the main product. 24. (d) Fluoroalkanes are difficult to prepare directly because flourination of hydrocarbons with pure F_2 gas occurs explosively. Therefore these are prepared by treating alkyl chloride or bromide with salts such as Hg_2F_2 , AgF. The reaction is called swarts reaction.

 $CH_3Br + AgF \rightarrow CH_3F + AgBr$

- 25. (N) (a) All form monobasic oxyacids *e.g.* HOF, HOCl, HOBr and HOI. But HOF is unstable at room temperature $2\text{HOF} \rightarrow 2\text{HF} + \text{O}_2$
 - (b) All halogens are good oxidizing agents.
 - (c) Electron gain enthalpy order: Cl > F > Br > I
 - (d) Fluorine is the most electronegative atom, thus, it shows only -1 oxidation state. The oxidation states of elements in HOF are ${}^{+1}_{H-O-F}{}^{O-1}_{F}$

All other halogens can show odd positive oxidation number *i.e.* +1, +3, +5 and +7.

26. (c)
$$M_B = \frac{\Delta T_b \times W_B \times 1000}{K_b \times W_A}$$
 is wrong. The correct form is
 $M_B = \frac{K_b \times W_B \times 1000}{\Delta T_b \times W_A}$

- **27.** (b) At 2.2 K, liquid helium can flow.
- (c) In a DNA molecule, A === T (Two H-bonds) C === G (Three H-bonds)
 Purine → Adenine (A), Guanine (G)
 Pyrimidine → Cytosine (C), Thymine (T)
 So the complimentary sequence of ATGCTTGA is TACGAACT.
- **29.** (a) SO_3 forms trimer in solid state.

30. (a)
$$(CH_3)_2 CHO^- Na + CH_3 I$$
 —

$$(CH_3)_2CH - O - CH_3 + NaI$$

- **31.** (c) $NH_4Cl + KNO_2 \xrightarrow{\Delta} KCl + N_2 + 2H_2O$
- 32. (d) According to Henry's law

$$\frac{P_1}{P_2} = \frac{S_1}{S_2} \implies \frac{500}{750} = \frac{0.01}{S_2}$$
$$\sum S_2 = \frac{750 \, \text{°} \, 0.01}{500} = 0.015 \, \text{g/L}$$

- 33. (c) $N_1V_1 + N_2V_2 = NV$ $4x + 10(1-x) = 6 \times 1; -6x = -4; x = 0.67$ Thus 0.67 litre of 4N HCl 1-x=1-0.67=0.33 litre of 10 N HCl
- 34. (a) C_2H_6 (excess) + $Cl_2 \xrightarrow{UV \text{ light}} C_2H_5Cl$ +HCl





36. (d) We know that glucose reacts with one molecule of phenylhydrazine to give phenylhydrazone. When warmed with excess of phenylhydrazine, the secondary alcoholic group adjacent to the aldehyde group is oxidised by another molecule of phenylhydrazine to a ketonic group. With this ketonic group, the third molecule of phenylhydrazine condenses to glucosazone. Therefore the value of X is 3.

$$\begin{array}{ccc} CHO + H_2NNHC_6H_5 & CH = NNHC_6H_5 \\ | & CHOH & CHOH \\ | & warm \rightarrow & | \\ (CHOH)_3 & | \\ CH_2OH & CH_2OH \\ Glucose & Glucose phenylhydrozone \\ | H_2NNHC_6H_5 & CH = NNHC_6H_5 \\ | CH = NNHC_6H_5 & H_2NNHC_6H_5 \\ | CH = NNHC_6H_5 & CH = NNHC_6H_5 \\ | CHOH)_3 & | \\ CH_2OH & CH_2OH \\ (CHOH)_3 & | \\ CH_2OH & CH_2OH \\ Glucosazone & CH_2OH \\ (CHOH)_3 & | \\ CH_2OH & CH_2OH \\ CH_2OH & CH_$$

37. (d) -Cl is o, p-directing.

38. (b)

39. (c) In a *fcc* lattice, the distance between the cation and anion is equal to the sum of their radii, which is equal to half of the edge length of unit cell,

i.e.
$$r^{+} + r^{-} = \frac{a}{2}$$
 (where $a = \text{edge length}$)
 $r^{+} = 95 \text{ pm}, r^{-} = 181 \text{ pm}$
Edge length $= 2r^{+} + 2r^{-} = (2 \times 95 + 2 \times 181) \text{ pm}$

=(190+362) pm=552 pm.

- 40. (d) Due to conjugation of lonepair of Cl with π bond, partial double bond character decreases bond length that's why compound (d) has shortest C–Cl bond length.
- 41. (a) Conc. HNO₃ oxidises I₂ to iodic acid (HIO₃). I₂ + 10HNO₃ \rightarrow 2HIO₃ + 10NO₂ + 4H₂O

In HIO₃ oxidation state of iodine is +5.

- 42. (d) In case of exothermic dissolution, the solubility of the solid increases on lowering the temperature. On cooling, the solution becomes unsaturated and solid solute does not separate. At 0° C, water in the solution does not freeze.
- **43.** (d) Phenol has active (acidic) hydrogen so it reacts with CH_3MgI to give CH_4 , and not anisole

$$C_6H_5OH + CH_3MgI \longrightarrow CH_4 + C_6H_5OMgI$$

44. (b) The structure of perchloric acid is

The number Cl = O bond in $HClO_4$ is 3.

45. (a) No. of Atom 'A' per unit cell =

$$6(8-2=6)$$
 corners $\times \frac{1}{8}$ atom per unit cell $= \frac{6}{8} = \frac{3}{4}$

No. of atom 'B' per unit cell = 6 faces $\times \frac{1}{2}$ atom per unit cell = 3

Hence, the formula of the compound = $A_{3/4}B_3$ or A_3B_{12} i.e., AB_4 .

- 46. (c) A mixture of He and O_2 is used for respiration by deep sea divers but Helium is not soluble in blood.
- 47. (a)

52.

(A)

48. (b) *Ter*-butyl bromide and sodium methoxide reacts to form 2-methylpropene and ethanol (elimination reaction).

$$CH_{3} \xrightarrow[CH_{3}]{} CH_{3} \xrightarrow[CH$$

51. (b)
$$CH_3Br + AgF \longrightarrow CH_3F + AgBr$$

Swartz reaction
 $CH_3Cl + NaI \longrightarrow CH_3I + NaCl$
Finkelstein reaction

$$\begin{array}{c} \textbf{(l)} & H_2S_2O_8 & H_2S_2O_7 \\ Peroxodisulphuric & Pyrosulphuric \\ acid & acid & acid \\ O & O & O & O \\ \parallel & \parallel & \parallel & \parallel \\ HO - S - O - O - S - OH \\ \parallel & \parallel & HO & S & S \\ \parallel & \parallel & HO & S & O & HO \\ \parallel & \parallel & HO & HO & S & O \\ \hline \textbf{(l)} & \textbf{(l)} & \textbf{(l)} & \textbf{(l)} & \textbf{(l)} \\ O & O & O & O \\ \hline \hline \textbf{(l)} & \textbf{(l)} & \textbf{(l)} & \textbf{(l)} \\ \hline \textbf{(l)} & \textbf{(l)} & \textbf{(l)} & \textbf{(l)} \\ \hline \textbf{(l)} & \textbf{(l)} & \textbf{(l)} & \textbf{(l)} \\ \hline \textbf{(l)} & \textbf{(l)} \\ \hline \textbf{(l)} & \textbf{(l)} & \textbf{(l)} \\ \hline \textbf{(l)} & \textbf{(l)} & \textbf{(l)} \\ \hline \textbf{(l)} & \textbf$$

- **53.** (c) Quartz glass is an example of amorphous solid and crystalline solids are anisotropic in nature.
- **54.** (b) Crystalline solids are anisotropic in nature that is some of their physical properties like electrical resistance or refractive index show different values when measured along different directions in the same crystals.
- **55.** (b) Amorphous solids are isotropic, because these substances show same properties in all directions.