

**Sample Paper** 

Chemistry

# 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.	The will	The elevation in boiling point of a solution of 13.44 g of CuCl <sub>2</sub> in 1 kg of H <sub>2</sub> O using the following information vill be : (Mol. wt. of CuCl <sub>2</sub> = 134.4 and K <sub>4</sub> = 0.52 K g mol <sup>-1</sup> )					
	(a)	0.16	(b) 0.05	(c)	0.1	(d)	0.2
2.	The	he nucleic acid base having two possible binding sites is:					
	(a)	Thymine	(b) Cytosine	(c)	Guanine	(d)	Adenine
3.	Wh	Vhat is the valence shell electronic configuration of p-block elements?					
	(a)	$ns^2$	(b) $ns^2 np^{1-5}$	(c)	$ns^2 np^{1-6}$	(d)	None of these
4.	The	reaction,					
	2C2	$H_5Br + 2Na - \frac{dry \text{ ether}}{2}$	$\rightarrow C_2H_5 - C_2H_5 + 2NaBr$	is an e	xample of:		
	(a)	The Wurtz reaction		(b)	Sandmeyer's reaction	L	
	(c)	Aldol condensation		(d)	Williamson's reaction	ı	
5.	The	reaction between tert	-Butyl chloride and sodi	um etl	noxide gives		
	(a)	tert-Butyl ethyl ether		(b)	tert-Butyl methyl eth	er	
	(c)	2-Methylprop-1-ene		(d)	butene		
6.	Ab	iological catalyst is :					
	(a)	An amino acid		(b)	A carbohydrate		
	(c)	The nitrogen molecu	le	(d)	An enzyme		
7.	The	incorrect trend regar	ding group 16 hydrides	(H <sub>2</sub> E) i	S:		
	(a)	(a) down the group, the H-E-H bond angle increases					
	(b)	(b) the acidic character of hydrides increases down the group					
	(c)	(c) except water, all hydrides possess reducing properties					
	(d)	(d) thermal stability of hydrides decreases down the group					
8.	For	For the crystal structures how many numbers of Bravais lattice are there?					
	(a )	3	(b) 6	(c)	14	(d)	24
9.	Wh	ich concentration mea	surement is used in Pha	rmacy	?		
	(a)	Mass by volume per	centage	(b)	Mole fraction		
	(c)	Molarity		(d)	Molality		
10.	Gri	gnard's reagent is pre	pared by the action of m	agnesi	um metal on:		
	(a)	Alcohol	(b) Phenol	(c)	Alkyl halide	(d)	Benzene
11.	Gro	Group 16 elements have lower value of first ionisation enthalpy as compared to group 15 elements because:					
	(a) halt-tilled <i>p</i> -orbitals in group 15 elements are more stable						
	(D)	group 16 elements na	ve smaller size than grou	19 15 e	15 cloments have trin	la ha	nd
	(c) group to elements contain double bond while group 15 elements have triple bond						
10	Each point in the spectal lettice is known as a						
12.	Eac	I point in the crystal I	attice is known as :	(b)	Lattice dot		
	(a)	Lattice point		(U) (d)	Lattice origin		
	$(\mathbf{C})$	Lattice shape		(u)	Lattice offgin		

- 13. Which compounds are used to lower the freezing point of the solution?
  - (a) Antifreeze (b) Depressant (c) Coolant (d) Fluid
- 14. Which of the following is halogen exchange reaction?



- **15.** Solid oxygen has a pale blue colour which is attributed to:
  - (a) electronic transitions from the singlet ground state to the triplet excited state
  - (b) electronic transitions from antibonding  $\pi$ -molecular orbitals to bonding  $\sigma 2p_2$  M.O.s
  - (c) electronic transitions from the triplet ground state to anti bonding  $\sigma 2p_2$  molecular orbital
  - (d) electronic transitions from the triplet ground state to the excited singlet state

#### 16. Which of the following is the least reactive functional group?

- (a) Alcohols (b) Ethers
- (c) Aldehydes (d) Ketones
- 17. The arrangement of the molecules in the crystal lattice is determined through:
  - (a) X –ray Diffraction (b) Gamma rays
  - (c) Alpha rays (d) Radioactive waves
- **18.** Which one of the following will produce a primary alcohol by reacting with CH<sub>3</sub>MgI?
  - (a) Acetone (b) Methyl cyanide
  - (c) Ethylene oxide (d) Ethyl acetate

**19.** At equilibrium the rate of dissolution of a solid solute in a volatile liquid solvent is \_\_\_\_\_

- (a) less than the rate of crystallisation (b) greater than the rate of crystallisation
  - (c) equal to the rate of crystallisation

#### 20. Which of the following is the balanced equation describing the combustion of elemental sulphur?

(d) zero

(c) 5

(a)  $2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$ (b)  $H_2S + 2O_2 \rightarrow SO_3 + H_2O$ (c)  $2SO_3 \rightarrow 2S + 3O_2$ (d)  $S + O_2 \rightarrow SO_2$ 

 $\bigcirc$  SO<sub>3</sub>H  $\xrightarrow{Br_2}$  X, is:

**21.** How many crystal systems make the 3-D space lattice?

(b) 6

(a) 7

(d) 4

- (a) 2-Bromo-4-hydroxybenzene sulphonic acid
- (b) 3, 5-Dibromo-4-hydroxybenzene sulphonic acid
- (c) 2-Bromophenol

22. In the sequence HO–

- (d) 2, 4, 6-Tribromophenol
- **23.** Of the following terms used for denoting concentration of a solution, the one which does not get affected by temperature is:
- (a) Molarity
  (b) Molality
  (c) Normality
  (d) Formality
  24. F centers are also known as:

  (a) Colour centers
  (b) Face centers
  (c) Line centers
  (d) None of these

  25. Phenol can be distinguished from ethyl alcohol by all reagents except:

  (a) NaOH
  (b) FeCl<sub>3</sub>
  (c) Br<sub>2</sub>/H<sub>2</sub>O
  (d) Na

### 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 which of the following reactions conc.  $H_2SO_4$  is used as an oxidising reagent?
  - (a)  $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$  (b)  $2HI + H_2SO_4 \rightarrow I_2 + SO_2 + 2H_2O_4$
  - (c)  $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$  (d)  $NaCl + H_2SO_4 \rightarrow NaHSO_4 + HCl$
- 27. Which of the following species can act as the strongest base?
  - (a) <sup>°</sup>OH (b) <sup>°</sup>OR

(c)  $^{\circ}O C_6H_5$ 



(d)

The above reaction is known as:

(a) Wurtz-Fittig reaction

28.

- (c) Sandmeyer's reaction
- **29.** Dry SO<sub>2</sub> does not bleach dry flowers because:
  - (a) nascent hydrogen responsible for bleaching is produced only in presence of moisture
  - (b) water is the actual reducing agent responsible for bleaching
  - (c) water is stronger acid than  $SO_2$
  - (d) the OH<sup>-</sup> ions produced by water cause bleaching
- **30.** Chlorine reacts with ethanol to give:

	(a)	Diethyl chloride	(b) Chloroform	(c)	Acetaldehyde	(d)	Chloral
31.	Wh	ich of the following is	a pyrimidine base?				
	(a)	Adenine	(b) Guanine	(c)	Uracil	(d)	None of these

32. Which reagent will you use for the following reaction? CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub> → CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH + CH<sub>3</sub>CH<sub>2</sub>CHClCH<sub>3</sub>
(a) Cl<sub>2</sub>/UV light
(b) NaCl + H<sub>2</sub>SO<sub>4</sub>

(b) NaCl + H<sub>2</sub>SO<sub>4</sub>(d) Cl<sub>2</sub> gas in the presence of iron in dark

(b) Friedel Craft's reaction

(d) Swarts reaction

33. An example of intensive property is:
(a) Number of moles
(b) Mass
(c) Volume
(d) Density
34. Identify the monosaccharide from the following.

(a) Deoxyribose (b) Sucrose (c) Maltose (d) Fructose **35.** The geometry of  $XeF_6$  molecule and the hybridization of Xe atom in the molecule is:

- (a) Distorted octahedral and  $sp^3d^3$  (b) Square planar and  $sp^3d^2$ 
  - (d) Octahedral and  $sp^3d^3$
- **36.** Which of the following is an example of aldohexose?

(a) Ribose (b) Fructose (c) Sucrose (d) Glucose

37. The following compound is called:

(c) Pyramidal and  $sp^3$ 



(d) BHC

(a) Chloral

(c)  $Cl_2$  gas in dark

**38.** The linkage which holds various amino acid units in primary structures of proteins is: (a) Glycoside linkage (b) Peptide linkage (c) Ionic linkage (d) Hydrogen bond 39. If chlorine gas is passed through hot NaOH solution, two changes are observed in the oxidation number of chlorine during the reaction. These are \_\_\_\_\_ and \_\_\_\_\_ (a) 0 to +5 (b) 0 to +3 (c) 0 to -1(d) 0 to +1 40. Maltose on hydrolysis gives: (b)  $\alpha$  and  $\beta$ -D-glucose (c) Glucose and fructose (d) Fructose only (a)  $\alpha$ -D-glucose 41. The amino acids are the end products of the digestion of: (a) Lipids (b) Fats (c) Proteins (d) Enzymes 42. The tendency of group 16 elements to form catenated compounds is greatest in case of: (a) Oxygen (c) Selenium (b) Sulphur (d) Tellurium **43.**  $\alpha$ -helix refers to: (a) primary structure of proteins (b) secondary structure of proteins (c) tertiary structure of proteins (d) quaternary structure of proteins 44. Amino acids are classified as acidic, basic or neutral depending upon the relative number of amino and carboxyl groups in their molecule. Which of the following are acidic? (a) (CH<sub>3</sub>)<sub>2</sub>CH-CH-COOH

(c) 
$$H_2N - CH_2 - CH_2 - CH_2 - COOH$$

NH<sub>2</sub>

(d) 
$$HOOC-CH_2-CH-COOH$$

**45.** Given below are two statements labelled as Assertion (A) and Reason (R)

**Assertion:** In crystal lattice, the size of the tetrahedral hole is large than an octahedral hole. **Reason:** The cations occupy less space than anions in crystal packing.

Select the most appropriate answer from the options given below:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.
- 46. Given below are two statements labelled as Assertion (A) and Reason (R)Assertion: Hypophosphorous acid is a good reducing agent.Reason: The acids which contain P–H bond have strong reducing properties.Select the most appropriate answer from the options given below:
  - (a) Both A and R are true and R is the correct explanation of A.
  - (b) Both A and R are true but R is not the correct explanation of A.
  - (c) A is true but R is false.
  - (d) A is false but R is true.
- **47.** Given below are two statements labelled as Assertion (A) and Reason (R) **Assertion:** Glucose is dextrose

**Reason:** The open chains of glucose have four asymmetrical carbons. Select the most appropriate answer from the options given below:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

**48.** Given below are two statements labelled as Assertion (A) and Reason (R) **Assertion:** Valency of noble gas is 0.

Reason: Noble gases possess complete octet.

Select the most appropriate answer from the options given below:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.
- 49. Given below are two statements labelled as Assertion (A) and Reason (R)

**Assertion:** Solutions are the homogenous mixtures of two or more than two components. **Reason:** Since its composition and properties are uniform throughout the mixture.

Select the most appropriate answer from the options given below:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

# 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.	The relation between nucleotide triplets and the amino acids is called:				
	(a) transcription	(b) duplication	(c) genetic code	(d) gene	
51.	Which component determines the physical state of the solution?*				
	(a) Solute	(b) Solvent	(c) Water	(d) Protic solvent	
52.	. The minimum bond angle in hydrides of group 16 elements is in:				
	(a) H <sub>2</sub> O	(b) H <sub>2</sub> Te	(c) H <sub>2</sub> Se	(d) H <sub>2</sub> S	

CASE 1: Read the passage given below and answer the following questions 53-55

Crystalline solids have regular ordered arrays of components held together by uniform intermolecular forces, whereas the components of amorphous solids are not arranged in regular arrays. The learning objective of this module is to know the characteristic properties of crystalline and amorphous solids. With few exceptions, the particles that compose a solid material, whether ionic, molecular, covalent, or metallic, are held in place by strong attractive forces between them. When we discuss solids, therefore, we consider the positions of the atoms, molecules, or ions, which are essentially fixed in space, rather than their motions (which are more important in liquids and gases).

Source: https://chem.libretexts.org/Bookshelves/General\_Chemistry/Book%3A\_Chemistry\_(Averill\_and\_ Eldredge)/12%3A\_Solids/12.1%3A\_Crystalline\_and\_Amorphous\_Solids

53.	Solids have the defi	nite			
	(a) Shape and volu	ıme (b) Distances	(c) Rigio	dity (d)	Fluidity
54. Crystalline solids are also known as					
	(a) True solids	(b) False solids	(c) Rigio	d solids (d)	Fluidity solids
55.	5. The best photovoltaic material available for the conversion of the sunlight into electricity is			tricity is	
	(a) Amorphous sil	ica (b) Glass	(c) Qua	rtz (d)	rubber

# Section-A

### **1.** (b) 0.05.

Explanation: The elev	ation in boiling point of a solution is 0.16	
	$\Delta T_b = i K_f m$	
	$\Delta T_b = \frac{1000 \times 0.52 \times 13.44}{134.4 \times 1000} (1 + 2\alpha)$	
	$\Delta T_b = 0.156$	$(:: \alpha = 1)$

### 2. (a) Thymine.

**Explanation:** Two possible binding sites in guanine.



3. (c) The valence shell electronic configuration of *p*-block element is  $ns^2np^{1-6}$ .

**Explanation:** The valence shell electronic configuration of *p*-block element is  $ns^2np^{1-6}$ . The general electronic outer configuration for *p* block components is  $ns^2np^{(1-6)}$ . The general electronic outer configuration of *f*-block element configuration is  $(n-2)f^{(0-14)}(n-1)d^{(0-1)}ns^2$ .

**4.** (a) The Wurtz reaction

**Explanation:** The reaction,  $C_2H_5Br + 2Na + C_2H_5Br \rightarrow C_4H_{10} + 2NaBr$  is known as Wurtz reaction.

5. (c) 2-Methylprop-1-ene

**Explanation:** The reactant sodium ethoxide is a strong nucleophile as well as a strong base, and hence elimination predominates over  $SN_2$  to form alkene as a major product.

**6.** (d) An enzyme.

**Explanation:** Enzymes are macromolecular biological catalysts. These are highly selective catalysts greatly accelerating both the rate and specificity of metabolic reactions. All enzymes are insoluble since they exist in the colloidal state.

7. (a) down the group, the H-E-H bond angle increases

**Explanation:** The acidic character of hydrides increases down the group. Except water, all hydrides possess reducing properties and thermal stability of hydrides decreases down the group.

**8.** (c) 14

**Explanation:** A lattice system is a class of lattices with the same set of lattice point groups, which are subgroups of the arithmetic crystal classes. The 14 Bravais lattices are grouped into seven lattice systems: triclinic, monoclinic, orthorhombic, tetragonal, Rhombohedral, hexagonal, and cubic.

9. (a) Mass by volume percentage

**Explanation:** Mass by volume percentage is used in the pharmacy due to the small size of the medicines in which the mass by volume measure of the concentration is used to get the most appropriate size of the medicine.

**10.** (c) Alkyl halide

**Explanation:** Grignard reagents is prepared by the reaction of an alkyl or aryl halide with magnesium metal.

**11.** (a) half-filled *p*-orbitals in group 15 elements are more stable

**Explanation:** Group 16 elements have a lower value of first ionisation enthalpy as compared to group 15 elements. As group 15 elements have half filled p-orbital due to which group 15 elements have extra stability.

**12.** (a) Lattice Point

**Explanation:** Each point in the crystal lattice is determined by the lattice point also known as the lattice site to determine the position of the spheres in the crystal lattice.

13. (a) Antifreeze

**Explanation:** Antifreeze compounds are the once which lowers the freezing point of the solution by lowering the vapour pressure of the solution.

**14.** (a)  $RX + NaI \rightarrow RI + NaX$ 

Explanation: Exchange of halogen between RX and NaI.

**15.** (d) electronic transitions from the triplet ground state to the excited singlet state

**Explanation:** Solid oxygen has a pale blue colour which is attributed to electronic transition from the singlet ground state to the triplet ground state electronic transitions from antibonding  $r^*$  molecular orbitals (triplet state) to bonding (doublet) molecular orbitals electronic transitions from the antibonding orbital to molecular orbitals (triplet state) to excited anti bonding  $O_2$  molecular orbital (singlet state) electronic transitions from the triplet ground state to the singlet ground state.

16. (b) Ethers

**Explanation:** This is because the (–O–) group in ethers does not contain any active site as compared to for example, hydroxyl group (OH) in alcohols. However, they undergo C–O bond cleavage in drastic conditions.

**17.** (a) X –ray Diffraction

**Explanation:** X-ray Diffraction consists of an X-ray beam being fired at a solid, and from the diffraction of the beams calculated by Bragg's Law the configuration can be determined through the X-ray diffraction of the crystal lattice.

#### 18. (c) Ethylene oxide

**Explanation:** The product will be Ethylene oxide.

**19.** (c) equal to the rate of crystallisation

**Explanation:** Crystallisation is the process of the formation of solid crystals precipitating from a solution. In an unsaturated solution, the rate of dissolution of a solute in a volatile liquid solvent is greater than the rate of crystallisation. In a supersaturated solution, the rate of dissolution of a solute in a volatile liquid solvent is less than the rate of crystallisation. At equilibrium, the rate of dissolution of a solute in a volatile liquid solvent is equal to the rate of crystallisation.

**20.** (d)  $S + O_2 \rightarrow SO_2$ 

**Explanation:** In the given combination reaction  $S + O_2 \rightarrow SO_2$ , we have S and  $O_2$  combining to form  $SO_2$ . Carefully count the atoms up on each side of the equation and then make sure are equal. The number of S atoms on each side of the equation is equal. The number of O atoms on each side of the equation is equal.

#### **21.** (a) 7

**Explanation:** There are seven crystal systems that atoms can pack together to produce 3D space lattice. In which the arrangement of the ions can be determined through the different techniques these systems are Cubic, Tetragonal, Orthorhombic, hexagonal, Rhombohedral, Monoclinic and triclinic respectively.

22. (b) 3, 5-Dibromo-4-hydroxybenzene sulphonic acid

Explanation: The compound 'X' will be 3, 5-Dibromo-4-hydroxybenzene sulphonic acid.

23. (b) Molality

**Explanation:** Molarity of a given solution is defined as the total number of moles of solute per litre of solution.

M = n/V

Here, M is the molarity of the solution that is to be calculated, *n* is the number of moles of the solute and V is the volume of solution given in terms of litres which depends on the temperature and changes with the temperature.

#### **24.** (a) Colour centres

**Explanation:** F centers are also known as colour centers because they impart colour to the crystal due to the electronic transitions between the molecules.

**25.** (d) Na

**Explanation:** As Sodium (Na) reacts with both phenol and ethyl alcohol, thus it can not be used to distinguish phenol from ethyl alcohol. Rest all can be used to distinguish phenol from ethyl alcohol.

## Section-B

#### **26.** (b,c)

**Explanation:** Among the given four options (b) and (c) represent the oxidising behaviour of  $H_2SO_4$ . In (b) reaction it oxidises HI and itself reduces to  $SO_2$  oxidation state of central atom Sulphur decreases from +6 to +4. In option (c) it oxidises copper and itself gets reduced to  $SO_2$ .

#### **27.** (b) <sup>◦</sup>OR

**Explanation:** Weakest acid forms the strongest conjugate base. Since, ROH is the weakest acid, so RO<sup>-</sup> is the strongest base.

#### **28.** (d) Swarts reaction

**Explanation:** Swarts' reaction generally produces alkyl fluorides from alkyl chlorides or alkyl bromides. This reaction is conducted by heating of the alkyl chloride/bromide in the presence of the fluoride of some heavy meals such as silver fluoride.

29. (a) nascent hydrogen responsible for bleaching is produced only in presence of moisture.

**Explanation:** Dry SO<sub>2</sub> does not bleach dry flowers because nascent hydrogen responsible for bleaching is produced only in presence of moisture. In bleaching by SO<sub>2</sub>,  $H_2O$  is important in order to produce nascent hydrogen which is responsible for the bleaching action.

$$5O_2 + 2H_2O \rightarrow H_2SO_4 + 2 [H]$$

#### **30.** (d) Chloral

Explanation: When chlorine reacts with ethanol, Chloral is formed.

$$C_2H_5OH \xrightarrow{Cl_2} CH_3CHO \xrightarrow{3Cl_2} CCl_3CHO$$
  
 $-3HCl \xrightarrow{Cl_3CHO}$   
Chloral

### **31.** (c) Uracil

**Explanation:** DNA contains the Deoxyribose sugar whereas RNA contains the Ribose sugar. All the purine bases Adenine and Guanine are same in both DNA and RNA while the pyrimidine base cytosine and thymine are present in DNA and uracil is present in RNA instead of the thymine as a pyrimidine base.

### **32.** (a) $Cl_2/UV$ light

Explanation: Direct chlorination of alkanes takes place in presence of sunlight (UV light).

33. (d) Density

**Explanation:** An intensive property is a property of matter that does not change as the amount of matter changes, thus density of the solution does not changes with the change in the amount of the matter.

34. (a) Deoxyribose

**Explanation:** Monosaccharides are the simplest carbohydrates which cannot be hydrolysed into simpler units. Deoxyribose ( $C_5H_{10}O_4$ ) is a monosaccharide.

**35.** (a) Distorted octahedral and  $sp^3d^3$ 

**Explanation:** The geometry of XeF<sub>6</sub> molecule and the hybridization of Xe atom in the molecule are distorted octahedral and  $sp^3d^3$  respectively. Xe has 6 bond pairs of electrons and one lone pair of electrons. Xe atom possess  $sp^3d^3$  hybridization which results in the electronic geometry of pentagonal bipyramidal and molecular geometry of distorted octahedral.

36. (d) Glucose

**Explanation:** Aldohexoses have four chiral centers because of that there are 16 possible stereoisomers. Examples of aldohexoses are glucose, mannose, galactose, etc. Glucose is a one of the products of photosynthesis in plants and other photosynthetic organisms. It also serves as an important metabolic intermediate of cellular respiration.

**37.** (b) DDT

Explanation: Common name of the given compound is DDT (Dichloro-Diphenyl Trichloroethane).

**38.** (b) Peptide linkage

**Explanation:** Peptide linkage is the peptide bond formed between the amino acids. It is a covalent bond formed between amino group of one molecule and carboxylic acid group of another molecule. The primary structure of a peptide or protein is the linear sequence of its amino acid structural units. The primary structure of a protein is reported starting from the amino-terminal (N) end to the carboxyl-terminal (C) end.

**39.** (a,c) 0 to +5, 0 to -1

**Explanation:** 6NaOH (Hot) +  $3Cl_2 \rightarrow 5NaCl + NaClO_3$ Therefore, oxidation number of Chlorine changes from 0 to +5 and 0 to -1.

**40.** (a) α-D-glucose

**Explanation:** Maltose is also known as malt sugar. It is a disaccharide, made up of two D - glucose units. The two units of glucose are linked with an alpha 1,4 glycosidic bond. Maltose dissociates it into its monosaccharide after hydrolysis. Using the hydrolysis reaction of maltose we can determine the products.

41. (c) Proteins

**Explanation:** The amino acids are the end products of the digestion of proteins. The hydrolysis of proteins to amino acids is carried out in presence of base or proteolytic enzymes. The amino acids obtained can be separated by various physical techniques such as electrophoresis, paper chromatography and ion exchange chromatography.

42. (b) Sulphur

**Explanation:** Catenation is the property of forming bond with a maximum number of atoms. In group sixteen elements, sulphur has maximum catenation property because of high bonding energy of sulphur atoms. Its electronegativity is close to that of carbon, which helps easy bonding with many atoms.

**43.** (b) Secondary structure of proteins

**Explanation:**  $\alpha$ -helices,  $\beta$ -sheets and random coils are the most common elements of secondary structure in proteins.  $\alpha$ -helices are formed and maintained by backbone interactions parallel to the primary axis of the helix.

**44.** (b,d)

```
Explanation:

(b) HOOC-CH_2-CH_2-CH-COOH

MH_2

Number of COOH group = 2

Number of NH<sub>2</sub> group = 1
```

Since number of COOH groups (2) > number of  $NH_2$  group (1). Therefore this amino acid a acidic amine acid.

(d)  $HOOC-CH_2-CH_2-CH-COOH$ 

Number of COOH group = 2

Number of  $NH_3$  groups = 1

Since, Number of COOH group (2) > Number of  $NH_2$  group (1). Therefore amino acid is acidic. Write other two are neutral amino acid as number of  $NH_2$  group is equal to number of COOH group in then.

**45.** (d) A is false but R is true.

**Explanation:** Tetrahedral holes are smaller in size than octahedral holes. Cations usually occupy less space than anions. Thus assertion is false but reason is true.

**46.** (a) Both A and R are true and R is correct explanation for A.

**Explanation:** Hypophosphorous acid is a good reducing agent as it contains two P–H bonds. Thus both assertion and reason are true and reason is the correct explanation for assertion.

47. (b) Both A and R are true but R is not the correct explanation for A.

**Explanation:** Glucose is also known as dextrose, because it is dextrorotatory (meaning that as an optical isomer rotates the plane polarized light to the right and also an origin for the D designation and the open chains of glucose have four asymmetrical carbons. Thus both assertion and reason are true but reason is not the correct explanation for assertion.

**48.** (a) Both A and R are true and R is the correct explanation of A.

**Explanation:** Noble gases possess the electronic configuration  $ns^2np^6$  and has 8 electrons in their outer shell, hence there valency is 0. Thus Assertion and reason both are true and reason is the correct explanation for assertion.

**49.** (a) Both A and R are true and R is the correct explanation of A.

**Explanation:** Solutions are the homogenous mixtures of two or more than two components and their composition and properties are uniform. Thus both assertion and reason are true and reason is the correct explanation for assertion.

# Section-C

**50.** (c) Genetic code

**Explanation:** The relationship between the nucleotide triplets and the amino acids is called a genetic code. This determines the sequence of amino acids in the proteins that are synthesized.

51. (b) Solvent

**Explanation:** The component that is having more number of moles is known as solvent and the solvent component of the solution determines the physical state of the solution.

**52.** (b) H<sub>2</sub>Te

**Explanation:** All these are the hydrides of 16th group elements in which the central atom undergo  $sp^3$  hybridization and should possess the bond angle 109° but the bond angle distorts due to the repulsion between lone pair and lone pair. But this repulsion is minimum in H<sub>2</sub>Te as the tellurium has large size which makes the repulsion minimum.

#### 53. (a) Shape and volume

**Explanation:** Solids have definite shape and volume due to the strong force of attraction between the constituent molecules or atoms in the crystal.

#### 54. (a) True solids

**Explanation:** Crystalline solids have a long-range order which means that there is a regular pattern of arrangement of particles which repeats itself periodically over the entire crystal. It has a definite regular geometry. Thus they are called true solids.

#### 55. (a) Amorphous silica

**Explanation:** Amorphous silica is the best photovoltaic material available for the conversion of the sunlight into electricity.