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. Which one of the following cannot be called as a 'non-stoichiometric defect'?

(a) Metal excess defect due to anion vacancies

(b) Metal excess defect due to presence of extra cations

(c) Metal deficiency due to absence of cations

(d) Combination of vacancy and interstitial defects

2. The solubility of a gas varies directly with pressure of the gas is based upon:

(a) Raoult's law (b) Henry's law

(c) Nernst's distribution law (d) None of these

3. Which one absorbs U.V. radiation in stratosphere?

(a) CO_2 (b) N_2 (c) O_3 (d) H_2

4. Which of the following reagent cannot be used to prepare an alkyl chloride from an alcohol?

(a) $HCl + ZnCl_2$ (b) $SOCl_2$ (c) NaCl (d) PCl_5

5. Proteins are denatured in the:

(a) Mouth (b) Stomach (c) Small intestine (d) Large intestine

6. The first step of the acid catalysed hydration of alkenes, involves the protonation of alkene to form a carbocation by electrophilic attack of _____

(a) H^+ (b) H_2O (c) H_3O^+ (d) OH^-

7. Glucose and galactose are:

(a) Anomers (b) Optical isomers (c) Epimers (d) None of these

8. Propene when reacted with water in the presence of H_2SO_4 gives _____

(a) Propan-1-ol (b) Propan-2-ol

(c) 2-Methylpropan-1-ol (d) 2-Methylpropan-2-ol

9. Crystalline solids have the different values of:

(a) Refractive index (b) Electrical resistance

(c) Both (a) and (b) (d) Short range order

10. Which of the following has lowest reducing character?

(a) H_2O (b) H_2S (c) H_2Te (d) H_2Se

11. Which of the following is a pyrimidine base?

(a) Adenine (b) Guanine (c) Uracil (d) None of these

12. Chloromethane on treatment with excess of ammonia yields mainly:

(a) N, N-Dimethylmethanamine $\left(CH_3-N\begin{matrix}CH_3\\CH_3\end{matrix}\right)$

(b) N–methylmethanamine ($CH_3-NH-CH_3$)

(c) Methanamine (CH_3NH_2)

(d) Mixture containing all these in equal proportion

13. Solids do not have:
(a) Fluidity (b) Rigidity (c) Shape (d) Volume

14. What happens to the size of atoms of elements of p-block as we move from left to right in the same period?
(a) Size increases (b) Size decreases
(c) Size does not change (d) Size increases then decreases

15. Identify the catalyst in the hydration of alkenes to produce alcohols:
(a) HCl (b) $FeCl_3$ (c) Pt (d) Ni

16. Among the following halogens, the one which does not forms an oxyacid is:
(a) Fluorine (b) Chlorine (c) Bromine (d) Iodine

17. Carbylamine test involves heating a mixture of:
(a) Alcoholic KOH, methyl iodide and sodium metal
(b) Alcoholic KOH, methyl iodide and primary amine
(c) Alcoholic KOH, chloroform and primary amine
(d) Alcoholic KOH, methyl alcohol and primary amine

18. Which defect is not found in pure alkali metal halides?
(a) Frenkel defect (b) Schottky defect (c) Both (a) and (b) (d) Point defect

19. Which of the following is an example of aldohexose?
(a) Ribose (b) Fructose (c) Sucrose (d) Glucose

20. When chloroform is heated with aqueous NaOH, it gives:
(a) Formic acid (b) Sodium formate (c) Acetic acid (d) Sodium acetate

21. Only if the calculated molar mass is higher than the actual molar mass of the solute, the calculated molar mass is considered to be abnormal molar mass.
(a) True (b) False (c) Can't say (d) Both (a) and (b)

22. 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

23. Oxygen molecule is :
(a) Paramagnetic (b) Diamagnetic (c) Ferromagnetic (d) Ferrimagnetic

24. Positive deviation from Raoult's law is observed when:
(a) Inter molecular forces of attraction between the two liquids is greater than that between individual liquids.
(b) Inter molecular forces of attraction between the two liquids is smaller than that between individual liquids.
(c) Force of attraction between two liquids is greater than that between individual liquids.
(d) Force of attraction between two liquids is smaller than that between individual liquid.

25. Which of the following class of compounds is not a part of the large group of carbohydrates?
(a) Polyamino aldehydes (b) Polyhalo aldehydes
(c) Polyhydroxy ketones (d) Polyhydroxy carboxylic acids

Section-B

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

26. Which of the following has lowest reducing character?
(a) H_2O (b) H_2S (c) H_2Te (d) H_2Se

27. Which alkyl halides react most readily by nucleophilic substitution?
(a) CH_3CH_2Cl (b) CH_3CH_2I (c) CH_3CH_2Br (d) CH_3CH_2F

28. Which of the following alcohol is most soluble in water?
(a) Propanol (b) Butanol (c) Pentanol (d) Hexanol

29. What will be the number of octahedral voids in terms of the number 'N' where N is number of closed packed particles

(a) 2N **(b)** N **(c)** 1/2N **(d)** 3N

30. Maltose on hydrolysis gives:

(a) α-D-glucose (b) α and β-D-glucose (c) Glucose and fructose (d) Fructose only

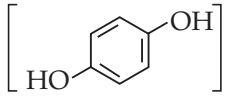
31. Reduction potentials of some ions are given below. Arrange them in decreasing order of oxidising power.

Ion	ClO_4^-	IO_4^-	BrO_4^-
Reduction potential E^-/V	E^- = 1.19V	E^- =1.65V	E^- = 1.74 V

(a) $ClO_4^- > IO_4^- > BrO_4^-$ (b) $IO_4^- > BrO_4^- > ClO_4^-$

(c) $BrO_4^- > IO_4^- > ClO_4^-$ (d) $BrO_4^- > ClO_4^- > IO_4^-$

32. The correct IUPAC name of the given compound is:



(a) Benzene 1,4 –diol (b) Hydroquinone

(c) p-Dihydroxy benzene (d) m-Dihydroxy benzene

33. The solubility of a gas varies directly with pressure of the gas, is based upon:

(a) Raoult's law (b) Henry's law

(c) Nernst's distribution law (d) None of these

34. What should be the correct IUPAC name for diethylbromomethane?

(a) 1-Bromo-1,1-diethylmethane

(b) 3-Bromopentane

(c) 1-Bromo-1-ethylpropane

(d) 1-Bromopentane

35. Which of the following carbohydrates is not a sugar?

(a) Glucose (b) Fructose (c) Lactose (d) Cellulose

36. Packing efficiency of the BCC is:

(a) 68% (b) 74% (c) 52% (d) 45%

37. Which of the following is true regarding polyhydric alcohols?

(a) It should have one or more OH groups (b) It should have two or more OH groups

(c) It should have three or more OH groups (d) It should have more than four OH groups

38. Conversion of ethyl bromide to ethylene is an example of:

(a) Hydrohalogenation

(b) Intramolecular dehydrohalogenation

(c) Dehydration

(d) Hydration

39. The reaction, $3ClO^-(aq) \longrightarrow ClO_3^-(aq) + 2Cl^-(aq)$, is an example of:

(a) Oxidation reaction (b) Reduction reaction

(c) Disproportionation reaction (d) Decomposition reaction

40. Sodium methoxide on heating with bromoethane gives _____

(a) methoxymethane (b) methoxyethane

(c) ethoxyethane (d) diethyl ether

41. How is osmotic pressure related to the concentration of a solute in a solution?

(a) $\pi \propto c$ (b) $\pi \propto pv$ (c) $\pi \propto T$ (d) $\pi \propto 1/c$

42. Which of the following is not an interhalogen compound?

(a) ICl_4^- (b) ClF_5 (c) IPO_4 (d) ClF_3

43. The amino acids are the end products of the digestion of:

(a) Lipids (b) Fats (c) Proteins (d) Enzymes

44. α-helix refers to:

(a) Primary structure of proteins (b) Secondary structure of proteins

(c) Tertiary structure of proteins (d) Quaternary structure of proteins

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

Assertion: Crystalline solids melt at the sharp and characteristic temperature.

Reason: They have definite geometrical shape.

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: H_2S is less acidic than H_2Te.

Reason: It is due to decrease in acidic character down the group.

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: The boiling point of *p*-nitrophenol is higher than that of *o*-nitrophenol because

Reason: *p*-Nitrophenol has intermolecular hydrogen bonding so it has more boiling point and less volatile than *o*-nitrophenol which has intramolecular hydrogen bonding.

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: Atomic and ionic radii of group 16 elements increase from top to bottom in the group.

Reason: The elements of Group16 have six electrons in the outermost shell.

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: Molality is a better method to express concentration than molarity.

Reason: Molality is defined in terms of mass of solvent and not mass of solution.

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.

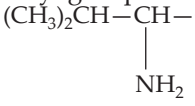
(c) A is true but R is false.

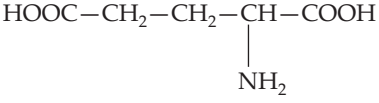
(d) A is false but R is true.

Section-C

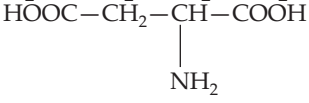
This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

50. 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) 

(b) 

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

(d) 

51. Ozone turns trimethyl paper:

(a) Green (b) Violet (c) Red (d) Black

52. Which law is followed to increase the solubility of CO_2 in soft drinks and soda water, the bottle is sealed under high pressure.

(a) Raoult's law (b) Henry's law (c) Avogadro's law (d) Gay Lussac's law

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

Point defects play an important part in determining the physical properties of most crystalline substances, most notably those controlling the transport of matter and the properties that stem from it. Even a crystal of high purity under conditions of no irradiation contains point defects in thermal equilibrium. Some lattice sites are vacant, and some atoms are displaced from their normal lattice sites into interstitial positions or onto "wrong" lattice sites. For stochiometric compounds of high purity, the concentrations of these point defects are very low, even at temperatures up to the melting point. A meaningful model, then, is to consider the crystal as a solvent containing a very dilute solution of simple, individual vacancies and interstitials. Long-range interactions among the defects and with impurity atoms, and short-range interactions that produce pairs or other clusters can be introduced in a first order approximation.

Source: Crawford, J.H. & Slifkin, L.M. (2013). Point Defects in Solids: General and Ionic Crystals, Chapter 1, Volume 1, 1-2.

53. Which one of the given below statements is wrong about Frenkel defect -

(a) It is a combination of vacancy and interstitial defects

(b) Cations leave their actual lattice sites and occupy the interstitial space in the solid

(c) Density remains the same

(d) Density of the crystal increases

54. Which one of the following is an 'interstitial void'?

(a) Octahedral void **(b)** Tetrahedral void

(c) Both (a) and (b) **(d)** None of the above

55. This type of defect arises due to absence of equal number of cations and anions from lattice sites in the crystalline solid of the type A^+B^- and it lowers the density of the crystal-

(a) Vacancy defect **(b)** Schottky defect

(c) Interstitial defect **(d)** Frenkel defect

❑❑

Answers

Sample Paper

Section-A

1. (d) Combination of vacancy and interstitial defects

Explanation: Non-stoichiometric defect is the defect that causes the ratio of the number of cations to anions to be different from that indicated by the ideal chemical formula. Such defects are of two types: Metal excess defects and metal deficiency defects. Metal excess defect is caused by anionic vacancies and extra cations in the interstitial sites whereas metal deficiency defect is caused by cationic vacancies and extra anions in the interstitial sites. Thus, Combination of vacancy and interstitial defects cannot be called as non-stoichiometric defect.

2. (b) Henry's law.

Explanation: Henry's law states that at a constant temperature, the solubility of a gas is directly proportional to the pressure of the gas. In other words, the partial pressure of the gas in vapour phase (p) is proportional to the mole fraction of the gas (x) in the solution.

$$p = K_H x$$

Where K_H is the Henry's law constant.

Hence, the given statement is Henry's law.

3. (c) O_3

Explanation: The ozone layer or ozone shield is a region of Earth's stratosphere that absorbs most of the sun's ultraviolet radiation. It contains a high concentration of ozone (O_3) in relation to other parts of the atmosphere, although still small in relation to other gases in the stratosphere.

4. (c) NaCl

Explanation: Alkyl Chloride is an ionic compound which cannot displace –OH group by Cl. Rest all other reagents (HCl + $ZnCl_2$, $SOCl_2$, PCl_5) displaces –OH from alcohol and provide Cl.

5. (b) Stomach

Explanation: Denaturation involves the breaking of many of the weak linkages, or bonds (e.g., hydrogen bonds), within a protein molecule that are responsible for the highly ordered structure of the protein in its natural (native) state. Denatured proteins have a looser, more random structure and are insoluble in nature the denaturation of proteins takes place in the stomach.

6. (c) H_3O^+

Explanation: The water reacts with the H^+ ion of the mineral acid to form a hydronium ion (H_3O^+). This ion attacks the carbon double bond to form a carbocation and give a water molecule.

7. (b) Optical isomers

Explanation: An optically active compounds exists in two isomeric forms that rotate the plane polarized light in opposite directions. They are called optical isomers and the phenomena is called optical isomerism. Optical isomers have the same physical properties such as Melting point, boiling point, density etc.

8. (b) Propan-2-ol

Explanation: Since propene is an unsymmetrical alkene, the given hydration reaction takes place in accordance to Markovnikov's rule, to form propan-2-ol. The double bond is broken and the OH group attaches at the second carbon.

9. (c) Both (a) and (b)

Explanation: 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. This arises from different arrangement of particles in different directions. Since the arrangement of particles is different along different directions, the value of the same physical property is found to be different along each direction.

10. (a) H_2O

Explanation: H_2S is the effective reducing agent. Reducing agent is the one which reduce the oxidizing agent. It becomes H_2SO_4 after receiving oxygen atoms.

11. (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.

12. (c) Methanamine (CH_3NH_2)

Explanation: Primary amine is obtained as a major product by taking large excess of ammonia.

$$CH_3Cl + NH_3 \rightarrow CH_3NH_2 + HCl$$

13. (a) Fluidity

Explanation: Solids do not have the property to flow that is they do not flow since the intermolecular forces between the solids are strong and the particles of the constituent are tightly packed.

14. (b) Size decreases

Explanation: The size of the atoms of the elements decrease from left to right in the same period. Considering the row to be the same, the electrons are added to the same shell. However, the increase in atomic number reflects the increase in number of protons i.e. the positive charge. Hence, the overall effective nuclear charge increases. Consequently, the electron cloud is pulled even closer to the nucleus of the atom. Therefore, the size decreases.

15. (a) HCl

Explanation: Alkenes react with water in the presence of a mineral acid as a catalyst to form alcohols. The H^+ ion from the acid helps to form a carbocation for nucleophilic attack.

16. (a) Fluorine

Explanation: Fluorine does not form any oxy-acid. An oxyacid, oxoacid, or ternary acid is an acid that contains oxygen. Specifically, it is a compound that contains hydrogen, oxygen and at least one other element, with at least one hydrogen atom bonded to oxygen that can dissociate to produce the H^+ cation and the anion of the acid.

17. (c) Alcoholic KOH, chloroform and primary amine

Explanation: Aliphatic and aromatic primary amines on heating with CCl_4 and alcoholic potassium hydroxide (alc. KOH) gives alkyl isocyanides or carbylamines. So, Carbylamine test is performed in alcoholic KOH by heating a mixture of chloroform and primary amine.

18. (a) Frenkel defect.

Explanation: Frenkel defect is not found in the pure alkali metal halides because this defect is due to vacancy of ion, which is shifted in interstitial spaces and because the ions are too large and cannot get into interstitial sites.

19. (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.

20. (b) Sodium formate

Explanation: Chloroform when heated with aqueous solution of caustic soda, first it produces formic acid which reacts further and forms sodium formate.

$$CHCl_3 + 3NaOH \rightarrow CH(OH)_3 \xrightarrow{-H_2O} HCOOH \xrightarrow{NaOH} HCOONa$$

21. (b) False

Explanation: When we correlate molar mass with osmotic pressure as a colligative property, we sometimes encounter a situation where the calculated molar mass of the solute is either higher or lower than the actual molar mass. This is called the abnormal molar mass. Abnormal molar mass occurs as a result of dissociation or association of molecules. Thus, the statement "Only if the calculated molar mass is higher than the actual molar mass of the solute, the calculated molar mass is considered to be abnormal molar mass."

22. (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.

23. (a) Paramagnetic

Explanation: According to molecular orbital Theory (MOT), there is 1 unpaired electron in the $\pi^2 px$ anti-bonding orbital and another unpaired electron in $\pi^2 py$ anti-bonding orbital. As molecules containing unpaired electrons are strongly attracted by magnetic field, hence oxygen has paramagnetic nature. Unpaired electrons spin in the same direction of each other which increases magnetic field effect.

24. (c) Force of attraction between two liquids is smaller than that between individual liquid.

Explanation: The solutions that follow Raoult's law are known as ideal solutions. The enthalpy and volume of mixing are zero. The solutions undergoing mixing do not show any kind of interactions. But those solutions that show deviations from Raoult's law have weaker intermolecular forces of attraction between the two liquids than between individual liquids. Such liquid solutions have weaker bonds and solutions exhibit higher vapour pressure than the vapour pressure of individual liquids. Such kinds of solutions absorb heat while getting mixed and the enthalpy of the mixing is endothermic. They have low boiling points. An example of such a solution is acetone and benzene. Thus, positive deviation from Raoult's law is observed when force of attraction between two liquids is smaller than that between individual liquid.

25. (c) Polyhydroxy ketones

Explanation: Polyamino aldehydes and polyhalo aldehydes do not contain an OH group. Polyhydroxy carboxylic acids do not contain a CHO or a keto group. These also do not produce OH substituted compounds on hydrolysis.

Section-B

26. (a) H_2O

Explanation: H_2O has lowest reducing character. Water is an inorganic, transparent tasteless, odourless and nearly colourless chemical substance, which is the main constituent of Earth's hydrosphere and the fluids of all known living organisms in which it acts as a solvent. It is vital for all known forms of life, even though it provides no calories or organic nutrients. It's chemical formula is H_2O.

27. (b) CH_3CH_2I

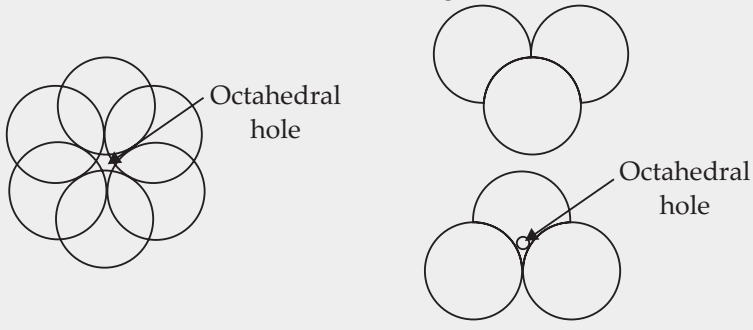
Explanation: The melting and boiling points of molecular compounds are generally quite low compared to those of ionic compounds. Ionic solids typically melt at high temperatures and boil at even higher temperatures. For example, sodium chloride melts at 801°C and boils at 1413°C. So in this case CH_3CH_2I will react most readily by nucleophilic substitution

28. (a) Propanol

Explanation: Propanol is most soluble in water because the lower alcohols are highly soluble in water due to the presence of –OH group in the alcohols it forms H-bond with itself and molecular association takes place which causes the increase in the boiling point of the corresponding alcohols due to the increase in the number of carbon atoms and therefore high temperature is required to break this association of bonds and thus the solubility in water increases.

29. (b) N

Explanation: The atom in octahedral void is in contact with 6 neighbouring atom. If the number of close packed sphere be N, then the number of octahedral void generated will be N.



30. (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.

31. (c) $BrO_4^- > IO_4^- > ClO_4^-$

Explanation: The reduction potential of the substance is the ability of the substance to be reduced. So as the reduction potential increases reducing ability of the substance increases. It means oxidizing power of the substance (The ability of the substance to make the other substance to lose the electrons increases which noting but oxidizing power) increases. So the decreasing order of oxidizing power is $BrO_4^- > IO_4^- > ClO_4^-$.

32. (a) Benzene 1, 4 –diol

Explanation: The International Union of Pure and Applied Chemistry (IUPAC) have given certain rules to name the organic compounds known as the nomenclature system. It is a set of logical rules devised to circumvent problems caused by arbitrary nomenclature.

33. (b) Henry's law

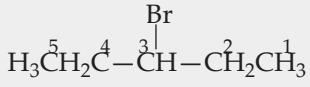
Explanation: Henry's law states that at a constant temperature, the solubility of a gas is directly proportional to the pressure of the gas. In other words, the partial pressure of the gas in vapour phase (p) is proportional to the mole fraction of the gas (x) in the solution.

$$p = K_H x$$

Here, K_H is the Henry's law constant.
Hence, the given statement is Henry's law.

34. (b) 3-Bromopentane

Explanation:



35. (d) Cellulose

Explanation: Glucose, fructose and lactose are examples of compounds that are sweet in taste and are called sugars. Cellulose is a non-sugar that is tasteless, water insoluble and amorphous.

36. (a) 68%

Explanation: The packing efficiency of the BCC crystal lattice is 68% with the empty space of 32% in the crystal lattice.

37. (b) It should have two or more OH groups

Explanation: Alcohols may be classified as mono-, di- tri- or polyhydric depending on whether it has one, two, three or more OH groups in its structure. Di- and trihydric alcohols are also classified as polyhydric.

38. (b) Intramolecular dehydrohalogenation

Explanation: In ethyl alcohol, the attacking species is the ethoxide anion, which is a much stronger base than the hydroxide anion, so it directly extracts the beta hydrogen from ethyl bromide, followed by elimination of the bromide anion from the adjacent carbon atom to form ethene. So, it is an example of Intramolecular dehydrohalogenation.

39. (c) Disproportionation reaction

Explanation: The reaction $3ClO^-$ (aq) $\rightarrow$ ClO_3^- (aq) + $2Cl^-$ (aq.) is an example of disproportionation reaction. In this reaction, chlorine is oxidized as well as reduced. The oxidation states of chlorine in ClO^- (aq), ClO_3^- (aq.) and Cl^- (aq.) are +1, +5 and −1 respectively.

40. (b) methoxymethane

Explanation: This is an example of Williamson synthesis of unsymmetrical ether, where CH_3ONa is reacted with CH_3CH_2Br to form $CH_3CH_2OCH_3$, which is ethyl methyl ether.

41. (a) $\pi \propto c$

Explanation: The osmotic pressure of a solution is proportional to the molar concentration of the solute particles in solution. Mathematically it can be represented as:

$$\pi \propto C$$

$$\pi = C R T \text{ (For Electrolytic solution)}$$

$\pi = i$ C RT (For Non-electrolytic solution)

42. (c) IPO_4

Explanation: Interhalogen compounds are formed when halogen group elements react with each other. In other words, it is a molecule which consists of two or more different elements of group 17. These are four types of interhalogen compounds: Diatomic interhalogens (AX), Tetratomic interhalogens (AX_3), Hexatomic interhalogens (AX_5) and Octatomic interhalogens (AX_7). ICl_4^-, ClF_5, ClF_3 are the examples of Interhalogen compounds.

43. (c) Protein

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.

44. (b) Secondary structure of proteins

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

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

Explanation: Crystalline solids melt at the sharp and characteristic temperature. They have definite geometrical shape. Thus both assertion and reason are true and reason is the correct explanation for assertion.

46. (c) A is true but R is false.

Explanation: Due to the decrease in bond (E–H) dissociation enthalpy down the group, acidic character increases. Thus assertion is true but reason is false.

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

Explanation: The boiling point of *p*-nitrophenol is higher than that of o-nitrophenol because *p*-Nitrophenol has intermolecular hydrogen bonding so it has more boiling point and less volatile than *o*-nitrophenol which has intramolecular hydrogen bonding. Thus both assertion and reason are true and reason is the correct explanation for assertion.

48. (b) Both A and R are true and R is not the correct explanation of A.

Explanation: Due to increase in the number of shells, atomic and ionic radii of group 16 elements increase from top to bottom in the group. Thus both assertion and reason are true but reason is not the correct explanation of the assertion.

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

Explanation: Molality is a better method to express concentration than molarity because molality is defined in terms of mass of solvent and not mass of solution. Thus both assertion and reason are true and reason is the correct explanation for assertion.

Section-C

50. (b, d)

Explanation:

(b) $HOOC-CH_2-CH_2-\underset{\displaystyle NH_2}{\underset{|}{CH}}-COOH$

Number of COOH group = 2

Number of NH_2 group = 1

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

(d) $HOOC-CH_2-CH_2-\underset{\displaystyle NH_2}{\underset{|}{CH}}-COOH$

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.

51. (b) Violet

Explanation: Ozone turns trimethyl paper to violet colour.

52. (b) Henry's law

Explanation: Henry's law states that "The partial pressure of the gas in vapour phase is proportional to the mole fraction of the gas in the solution."

53. (d) density of the crystal increases

Explanation: In frenkel defect, there is no effect on the density of the crystalline solid because no anion or cation leaves the lattice site. Hence, the statement which is incorrect about frenkel defect is that density of the crystal increases.

54. (c) both (a) and (b)

Explanation: Vacuums in solid states mean empty space in a closed packed system between the constituent particles. Such empty spaces are known as the openings, interstices or interstitial voids. Interstitial voids are of two types, tetrahedral void and octahedral void.

55. (b) Schottky defect

Explanation: This type of defect arises due to absence of equal number of cations and anions from lattice sites in the crystalline solid of the type A^+B^- and it lowers the density of the crystal.