

**AIRPORT SENIOR SECONDARY SCHOOL**  
**MODEL EXAMINATION 1(2022-23)**  
**CHEMISTRY**

**CLASS XII**

**TOTAL MARKS: 70**

**TIME : 3 hours**

General instructions:

*Answer all questions. All questions are compulsory.*

*Section A : Questions 1 to 4 are case based questions and carry 1 mark each.*

*Section B : Questions 5 to 20 are MCQs and carry 1 mark each.*

*Section C : Questions 21 to 27 are short answer questions and carry 2 marks each.*

*Section D : Questions 28 to 34 are long answer questions and carry 3 marks each.*

*Section E : Questions 35 to 37 are long answer questions and carry 5 marks each.*

**SECTION A**

Read the following passage and answer the questions that follow.

Boiling point or freezing point of liquid solution would be affected by the dissolved solids in the liquid phase. A soluble solid in solution has the effect of raising its boiling point and depressing its freezing point. The addition of non-volatile substances to a solvent decreases the vapour pressure and the added solute particles affect the formation of pure solvent crystals. According to many researches the decrease in freezing point is directly correlated to the concentration of the solute dissolved in the solvent. This phenomenon is expressed as freezing point depression and it is useful for several applications such as freeze concentration of liquid food and to find the molar mass of an unknown solute in the solution. Freeze concentration is a high quality liquid food concentration method where water is removed by forming ice crystals. The freezing point depression is referred to as a colligative property and it is proportional to the molar concentration of the solution along with vapour pressure lowering, boiling point elevation and osmotic pressure. These are physical characteristics of solutions that depend only on the identity of the solvent and the concentration of the solute. The characters are not depending on the solute's identity.

- 1) When a non-volatile solid is added to pure water it will
  - (a) Boil above  $100^{\circ}\text{C}$  and freeze above  $0^{\circ}\text{C}$
  - (b) Boil below  $100^{\circ}\text{C}$  and freeze above  $0^{\circ}\text{C}$
  - (c) Boil above  $100^{\circ}\text{C}$  and freeze below  $0^{\circ}\text{C}$
  - (d) Boil below  $100^{\circ}\text{C}$  and freeze below  $0^{\circ}\text{C}$
- 2) Colligative properties are:
  - (a) Dependent only on the concentration of the solute and independent of the solvent's and solute's identity.
  - (b) Dependent only on the identity of the solute and the concentration of the solute and independent of the solvent's identity.
  - (c) Dependent on the identity of the solvent and solute and thus on the concentration of the solute.
  - (d) Dependent only on the identity of the solvent and the concentration of the solute and independent of the solute's identity.

- 3) Identify which of the following is a colligative property.
  - (a) Freezing point
  - (b) Boiling point
  - (c) Osmotic pressure
  - (d) All of the above.
- 4) For determination of molar mass of polymers and proteins, which colligative property is used?
  - (a) Relative lowering in vapour pressure
  - (b) Elevation in boiling point
  - (c) Osmotic pressure
  - (d) Depression in freezing point

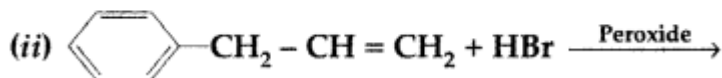
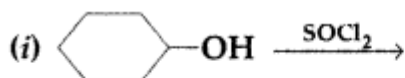
### SECTION B

- 5) Alcoholic solution of KOH is a specific reagent for
  - a) dehydration
  - b) dehalogenation
  - c) dehydrohalogenation
  - d) dehydrogenation
- 6) An  $\alpha$ -helix is structural feature of
  - a) Sucrose
  - b) Polypeptide
  - c) Nucleotides
  - d) Starch
- 7) An unripe mango placed in a concentrated salt solution to prepare pickle, shrinks because
  - a) It gains water due to osmosis
  - b) It loses water due to reverse osmosis
  - c) It gains water due to reverse osmosis
  - d) It loses water due to osmosis
- 8) The value of Henry's constant  $K_H$  is \_\_\_\_\_
  - a) Greater for gases with higher solubility
  - b) Greater for gases with lower solubility
  - c) Constant for all gases
  - d) Not related to the solubility of gases
- 9) Maximum amount of solute that can be dissolved in a specified amount of a given liquid solvent does not depend upon \_\_\_\_\_
  - a) Temperature
  - b) Nature of solute
  - c) Pressure
  - d) Nature of solvent
- 10) The synthesis of alkyl fluoride is best accomplished by
  - a) Finkelstein reaction
  - b) Swartz reaction
  - c) Sandmeyer's reaction
  - d) Kolbe's reaction
- 11) Salicylic acid on heating with acetic anhydride in basic medium gives
  - a) Aspirin
  - b) Methyl salicylate
  - c) Phenyl salicylate
  - d) Acetyl salicylate
- 12) Which of the following is non-reducing sugar?
  - a) Glucose
  - b) Lactose
  - c) Maltose
  - d) Sucrose
- 13) Nucleic acids are polymers of
  - a) Nucleosides
  - b) D-ribose
  - c) Amino acids
  - d) Nucleotides
- 14) Glucose when reduced with HI and red phosphorus gives
  - a) n-pentane
  - b) n-hexane
  - c) n-heptane
  - d) n-octane
- 15) The sugar present in milk is
  - a) Sucrose
  - b) Maltose
  - c) Glucose
  - d) Lactose
- 16) Amino acids are \_\_\_\_\_ in nature
  - a) Acidic
  - b) Basic
  - c) Amphoteric
  - d) None of these

- 17) Relative lowering of vapour pressure is a colligative property because
- It depends on the concentration of a solvent in solution and does not depend on the nature of the solute molecules
  - It depends on the relative number of solute particles in solution and does not depend on the nature of the solute molecules
  - It depends on the concentration of a non-electrolyte solute in solution as well as on the nature of the solute molecules
  - It depends on the concentration of a solvent in solution and also depend on the nature of the solute molecules
- 18) An  $S_N1$  reaction of an optically active alkyl halide gives a product\_\_\_\_\_
- With retention in configuration
  - With inversion in configuration
  - With racemisation
  - None of these
- 19) Our body produces hormone containing iodine called\_\_\_\_\_
- Adrenaline
  - Thyroxine
  - Noradrenaline
  - Insulin
- 20) Which of the following antibiotic is used for the treatment of typhoid?
- Chloramphenicol
  - Tetracycline
  - Pencillin
  - All of these

### SECTION C

- 21) Draw the structure of major monohalo product in each of the following reactions :

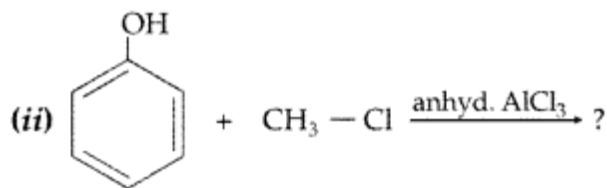
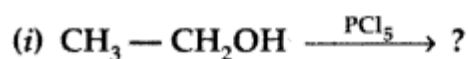


- 22) a) What happens when  $\text{CH}_3\text{—Br}$  is treated with KCN?  
 b) Ortho nitrophenol has lower boiling point than p-nitrophenol. Why?
- 23) Explain what is meant by
- a peptide linkage
  - a glycosidic linkage.
- 24) 18 g of glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$  (Molar mass =  $180 \text{ g mol}^{-1}$ ) is dissolved in 1 kg of water in a sauce pan. At what temperature will this solution boil? ( $K_b$  for water =  $0.52 \text{ K kg mol}^{-1}$ ), boiling point of pure water =  $373.15 \text{ K}$ )
- 25) Although chlorine is an electron withdrawing group, yet it is ortho-, para- directing in electrophilic aromatic substitution reactions. Explain?
- 26) Ortho nitrophenol has lower boiling point than p-nitrophenol. Why?
- 27) Write the main structural difference between DNA and RNA.

### SECTION D

- 28) Write the equations involved in the following reactions:
- Reimer-Tiemann reaction
  - Williamson's ether Synthesis
  - Kolbe's reaction

29) Write the major product in the following equations :



30) Account for the following:

(i) The C – Cl bond length in chlorobenzene is shorter than that in  $\text{CH}_3 - \text{Cl}$ .

(ii) Chloroform is stored in closed dark brown bottles.

(iii) p-dichlorobenzene has a higher m.p. than its o- and m-isomers

31) Differentiate between fibrous proteins and globular proteins. What is meant by the denaturation of a protein?

32) (i) Deficiency of which vitamin causes night-blindness?

(ii) Name the base that is found in nucleotide of RNA only.

(iii) Glucose on reaction with HI gives n-hexane. What does it suggest about the structure of glucose?

33) Account for the following :

(a) The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.

(b) Alkyl halides, though polar, are immiscible with water.

(c) Grignard's reagents should be prepared under anhydrous conditions.

34) I. Write down the structures and names of the products formed when D-glucose is treated with

(i) Hydroxylamine

(ii) Acetic anhydride.

II. Glucose on reaction with HI gives n-hexane. What does it suggest about the structure of glucose?

## SECTION E

35) (i) Differentiate between molality and molarity of a solution. What is the effect of change in temperature of a solution on its molality and molarity?

(ii) Non-ideal solutions exhibit either positive or negative deviations from Raoult's law.

What are these deviations and why are they caused? Explain with one example for each type.

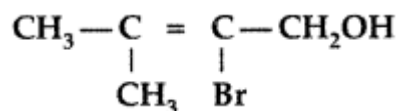
OR

a) Explain why aquatic species are more comfortable in cold water rather than in warm water.

b) State Henry's law and mention two of its important applications.

c) A 1.00 molal aqueous solution of trichloroacetic acid ( $\text{CCl}_3\text{COOH}$ ) is heated to its boiling point. The solution has the boiling point of  $100.18^\circ\text{C}$ . Determine the van't Hoff factor for trichloroacetic acid. ( $K_b$  for water =  $0.512 \text{ K kg mol}^{-1}$ )

36) (i) Give the IUPAC name of the following compound.



(ii) A solution of KOH hydrolyses  $\text{CH}_3\underset{\text{Cl}}{\text{C}}\text{HCH}_2\text{CH}_3$  and  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl}$ . Which one of

these is more easily hydrolysed? Explain.

(iii) State one use each of DDT and iodoform.

(iv) Which alkyl halide from the following pairs would you expect to react more rapidly by  $\text{S}_{\text{N}}^2$  mechanism? Explain your answer?

a)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHBr}$  or  $\text{CH}_3\text{CH}_2\underset{\text{Br}}{\text{C}}\text{HCH}_3$

b)  $\text{CH}_3\text{Br}$  or  $\text{CH}_3\text{I}$

37) a) Describe what you understand by primary structure and secondary structure of proteins.

b) What are essential and non-essential amino acids in human food? Give one example of each type.

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