



**INDIAN SCHOOL SOHAR**  
**UNIT TEST I (2023-2024)**  
**CHEMISTRY (043)**  
**SET-1**

CLASS : XII

DATE : 21/05/23

MAX. MARKS: 20

TIME: 40 MINUTES

**General Instructions:**

- (a) There are 10 questions in this question paper with internal choice.
- (b) Section A consists of 6 multiple-choice questions carrying 1 mark each.
- (c) Section B consists of 1 very short answer question carrying 2 marks.
- (d) Section C consists of 1 short answer question carrying 3 marks.
- (e) Section D consists of 1 case- based question carrying 4 marks.
- (f) Section E consists of 1 long answer question carrying 5 marks.
- (g) **All questions are compulsory.**
- (h) **Use of log tables and calculators are not allowed.**

**SECTION-A**

*The following questions are multiple -choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.* (6 x 1 = 6)

1. Which of the following colligative property is used to calculate the molar mass of biomolecules?
 

(a) Relative lowering of vapour pressure	(b) Elevation in boiling point
(c) Depression in freezing point	(d) Osmotic pressure
2. Which of the following molecules is chiral in nature?
 

(a) 2-Bromo-2-methylbutane	(b) 2-Bromobutane
(c) 2-Bromobutane	(d) 1-Bromo-2,2-dimethylbutane
3. The boiling point of water (100 °C) becomes 100.52 °C, if 3 g of a non-volatile solute is dissolved in 200 g of water. The molecular weight of solute is :( $k_b$  for water = 0.6 K m<sup>-1</sup>)
 

(a) 17.31 g mol <sup>-1</sup>	(b) 15.42 g mol <sup>-1</sup>
(c) 12.20 g mol <sup>-1</sup>	(d) 20.46 g mol <sup>-1</sup>

4. The correct IUPAC name of  is:

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| (a) 4-Fluoro-1-methyl-3-nitrobenzene | (b) 1-Fluoro-4-methyl-2-nitrobenzene |
| (c) 2-Fluoro-5-methyl-1-nitrobenzene | (d) 4-Methyl-1-fluoro-2-nitrobenzene |

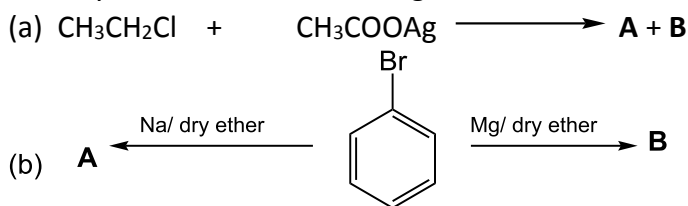
*In the following questions (Q. No. 5 and 6) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices:*

- (a) Assertion and reason both are correct statements and reason is the correct explanation for assertion.
  - (b) Assertion and reason both are correct statements but reason is **not** the correct explanation for assertion.
  - (c) Assertion is correct statement but reason is wrong statement.
  - (d) Assertion is wrong statement but reason is correct statement.
5. **Assertion:** Aquatic species are more comfortable in cold water than in warm water.  
**Reason:** Different gases have different  $k_H$  values at the same temperature.
  6. **Assertion:** Nitration of chlorobenzene leads to the formation of m-Nitro chlorobenzene.  
**Reason:** -NO<sub>2</sub> group is a m-directing group.

**SECTION B**

7. Identify **A** and **B** in the following reaction:

(2x1=2)

**SECTION C**

8. (a) Draw a graph to show the type of deviation from Raoult's law observed when acetone is added to ethanol.
- (b) What happens if we place blood cells in a solution containing 1.2% sodium chloride solution?
- (c) Two liquids A and B boil at  $145^\circ\text{C}$  and  $190^\circ\text{C}$  respectively. Which of them has a higher vapour pressure at  $80^\circ\text{C}$ ? Why?

(3x1=3)

**SECTION D**

*The following question is a case-based question. Read the passage carefully and answer the questions that follow.*

9. The lowering of vapour pressure of a solution causes the lowering of freezing point. At freezing point, the solid phase is in equilibrium with liquid phase. Freezing point is a temperature at which vapour pressure in solution phase is equal to that of solid phase. Antifreeze like ethylene glycol is added in radiators of vehicles especially in cold countries. Common salt is sprinkled over the roads so as to clear snow at hill stations. Depression in freezing point is directly proportional to molality of solution.

**Answer the following questions:**

- (a) Is depression in freezing point a colligative property? Why? (1)
- (b) What is an antifreeze? (1)
- (c) The freezing point of benzene decreases by 2.12 K when 2.5 g of benzoic acid ( $\text{C}_6\text{H}_5\text{COOH}$ ) is dissolved in 25 g of benzene. If benzoic acid forms a dimer in benzene, calculate the van't Hoff factor and the percentage association of benzoic acid. (2)
- (Given  $K_f$  for benzene =  $5.12 \text{ K kg mol}^{-1}$ )

**OR**

- Calculate the amount of  $\text{CaCl}_2$  (molar mass =  $111 \text{ g mol}^{-1}$ ) which must be added to 500 g of water to lower the freezing point by 2K, assuming  $\text{CaCl}_2$  is completely dissociated. (2)
- (Given  $K_f$  for water =  $1.86 \text{ K kg mol}^{-1}$ )

**SECTION E**

*The following question is long answer type, carrying 5 marks with an internal choice.*

10. (a) What happens when:
- (i) 2- Bromopentane reacts with alc. KOH                      (ii) Ethyl chloride reacts with  $\text{AgNO}_2$
- (b) Identify the products formed in the reaction between  $\text{CH}_3\text{CH}=\text{CH}_2$  and HCl. Provide the reason to support your answer.
- (c) Haloarenes are less reactive than haloalkanes towards nucleophilic substitution reaction. Give reason. (2+2+1=5)

**OR**

- (a) Write the reaction for the preparation of:
- (i) Mono bromobenzene from aniline                      (ii) Methyl iodide from methyl bromide
- Write the name of these reactions.

- (b) Write the mechanism of following reaction:  $(\text{CH}_3)_3\text{C-Br} \xrightarrow{\text{aq. NaOH}} (\text{CH}_3)_3\text{C-OH} + \text{NaBr}$
- (c) State one use of (i) DDT and (ii) iodoform. (2+2+1=5)



**INDIAN SCHOOL SOHAR**  
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**SET-2**

CLASS : XII  
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 TIME: 40 MINUTES

**General Instructions:**

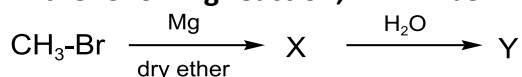
- (a) There are 10 questions in this question paper with internal choice.
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- (f) Section E consists of 1 long answer question carrying 5 marks.
- (g) **All questions are compulsory.**
- (h) **Use of log tables and calculators are not allowed.**

**SECTION-A**

*The following questions are multiple -choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.*

(6x1=6)

1. In the following reaction, 'Y' will be:



- |                         |                                       |
|-------------------------|---------------------------------------|
| (a) CH <sub>4</sub>     | (b) CH <sub>3</sub> MgBr              |
| (c) CH <sub>3</sub> -OH | (c) CH <sub>3</sub> - CH <sub>3</sub> |
2. P<sub>A</sub> and P<sub>B</sub> are the vapour pressure of pure liquid components, A and B, respectively of an ideal binary solution. If x<sub>A</sub> represents the mole fraction of component A, the total pressure(P) of the solution will be:
- |   |   |
|---|---|
| (a) P <sub>A</sub> + x <sub>A</sub> (P <sub>B</sub> -P <sub>A</sub> ) | (b) P <sub>A</sub> + x <sub>B</sub> (P <sub>B</sub> -P <sub>A</sub> ) |
| (c) P <sub>B</sub> + x <sub>A</sub> (P <sub>B</sub> -P <sub>A</sub> ) | (d) P <sub>B</sub> + x <sub>A</sub> (P <sub>A</sub> -P <sub>B</sub> ) |
3. In the presence of air and light, chloroform decomposes into:
- |                       |  |
|-----------------------|--|
| (a) CCl <sub>4</sub>  | (b) (CH <sub>3</sub> ) <sub>2</sub> C(OH)-CCl <sub>3</sub> |
| (c) COCl <sub>2</sub> | (d) CCl <sub>3</sub> CHO                                   |
4. Which of the following mixtures will form maximum boiling azeotropes?
- |                              |                          |
|------------------------------|--------------------------|
| (a) Water- hydrochloric acid | (b) Benzene -methanol    |
| (c) Water- nitric acid       | (d) Acetone - chloroform |

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5. **Assertion (A):** Boiling points of alkyl halides decrease in the order

R-I > R-Br > R-Cl > R-F.

**Reason (R):** Vander Waal's forces decrease with increase in the size of halogen atom.

6. **Assertion (A):** The boiling point 0.1 M urea solution is greater than that of 0.1 M KCl solution.

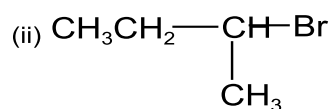
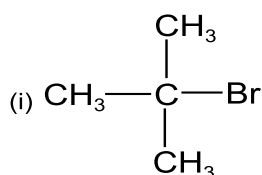
**Reason (R):** Elevation in boiling point is directly proportional to the number of species present in the solution.

### SECTION B

7. 200 cm<sup>3</sup> of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57 x 10<sup>-3</sup> bar. Calculate the molar mass of the protein.  
(Given R = 0.083 L bar K<sup>-1</sup> mol<sup>-1</sup>) (1x2=2)

### SECTION C

8. (a) What is the expected product with an inverted configuration when one of the alkyl halides of the following pair reacts rapidly with aq. KOH? Illustrate the stereochemistry of the reaction.



(b) Write a note on Dow's process.

(2+1=3)

### SECTION D

*The following question is a case-based question. Read the passage carefully and answer the questions that follow.*

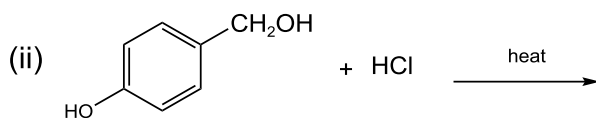
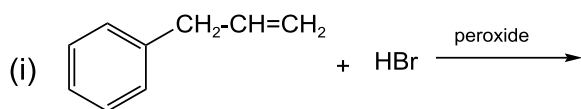
9. Alkyl halides are prepared by the free radical halogenation of alkanes, addition of halogen acids to alkenes, replacement of -OH group of alcohols with halogens using phosphorus halides, thionyl chloride, or halogen acids. Aryl halides are prepared by electrophilic substitution to arene. Fluorine and iodides are best prepared by the halogen exchange method. These compounds find wide applications in industry as well as in day-to-day life. These compounds are generally used as solvents and as starting materials for the synthesis of a large number of organic compounds.

**Answer the following questions:**

(a) Give the best reaction for the conversion of an alcohol into an alkyl chloride? (1)

(b) How is chlorobenzene prepared from Benzene? (1)

(c) Write the monohalo product(s) in each of the following:



(2x1=2)

**OR**

Write the reaction to prepare:

(i) Fluoro benzene from Aniline.

(ii) Methyl fluoride from Methyl bromide.

(2x1=2)

### SECTION E

**The following question is a long answer type, carrying 5 marks with an internal choice.**

- 10.** (a) Calculate the boiling point of a solution prepared by adding 15 g of NaCl to 250 g of water.  
( $K_b$  for water =  $0.512 \text{ K kg mol}^{-1}$ , Molar mass of NaCl = 58.44 g)
- (b) Draw a diagram to illustrate the relationship between vapour pressure and mole fraction of components in a solution exhibiting negative deviation from Raoult's law.
- (c) Give one reason why the mountain streams often contain fewer living things than equivalent streams at sea level. (2+2+1)

**OR**

- (a) 1.5 g of  $\text{Ba}(\text{NO}_3)_2$  dissolved in 100 g of water shows a depression in freezing point equal to  $0.28^\circ\text{C}$ . What is the percentage dissociation of the salt? ( $K_f$  for water =  $1.86 \text{ K m}^{-1}$ , molar mass of  $\text{Ba}(\text{NO}_3)_2 = 261 \text{ g}$ )
- (b) Give two applications of reverse osmosis.
- (c) State Henry's law. (2+2+1)