AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XII

ANNUAL EXAMINATIONS (THEORY) 2023

Chemistry Paper II

Time: 1 hour 30 minutes Marks: 35

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are EIGHT questions. Answer ALL questions. Questions 7 & 8 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

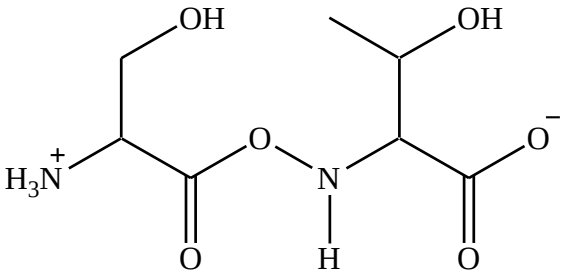
   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue correcting fluid, or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a scientific calculator if you wish.

Q.1. (Total 3 Marks)

Encircle THREE chiral centres in the given dipeptide molecule of two amino acids, serine and threonine.

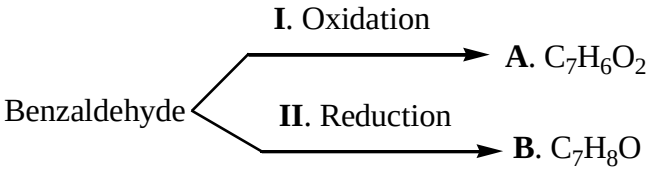


Q.2. (Total 4 Marks)

Write any THREE points describing Williamson ether synthesis. Support your answer by giving any ONE chemical equation.

Q.3. (Total 4 Marks)

Consider the given reactions of benzaldehyde.



a. Write the condensed formulae of the aromatic compounds, **A** and **B**. (2 Marks)

b. Identify the reagents and conditions required in each reaction, **I** and **II**. (2 Marks)

Q.4. (Total 3 Marks)

Describe any THREE functions of carbohydrates in the human body.

Q.5. (Total 3 Marks)

a. What are pesticides? (1 Mark)

_____

_____

b. Name the types of pesticides used to control each of the following pests. (2 Marks)

i. Snail

_____

_____

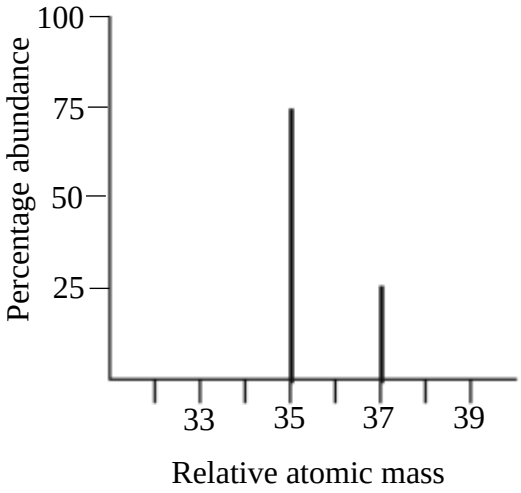
ii. Weeds

_____

_____

Q.6. (Total 4 Marks)

On injecting a normal sample of an element that contains all its natural isotopes, the Mass Spectrometer measured the different masses as shown in the given spectrum.



On the basis of the given isotopic masses, identify the following with a suitable reason.

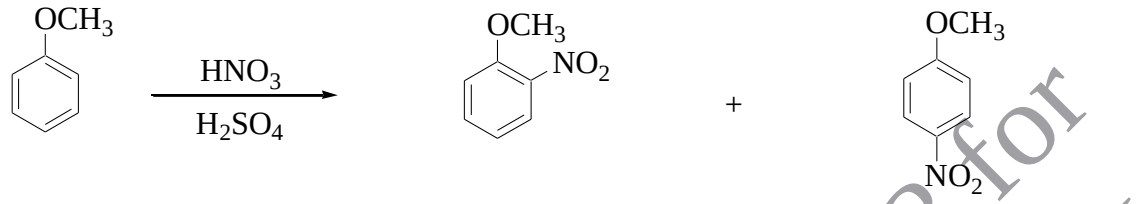
a. Relative abundance of the respective isotopes of the element (2 Marks)

b. The element that has been used in the sample (2 Marks)

Q.7. (Total 7 Marks)

EITHER

a. The electrophilic substitution reaction of methoxy benzene to produce methoxy nitrobenzene with two different orientations is given. The group present on benzene ring decides the position of the next incoming group.



methoxybenzene 1-methoxy-2-nitrobenzene 1-methoxy-4-nitrobenzene

i. Explain the orientation of products in electrophilic substitution reaction of mono-substituted benzene in TWO ways. (3 Marks)

ii. Write the steps that are involved in the mechanism of the given reaction. (4 Marks)

(**Note**: Show the mechanism referring to any ONE product.)

OR

b.

i. Name the process used to disinfect water during raw water treatment. (1 Mark)

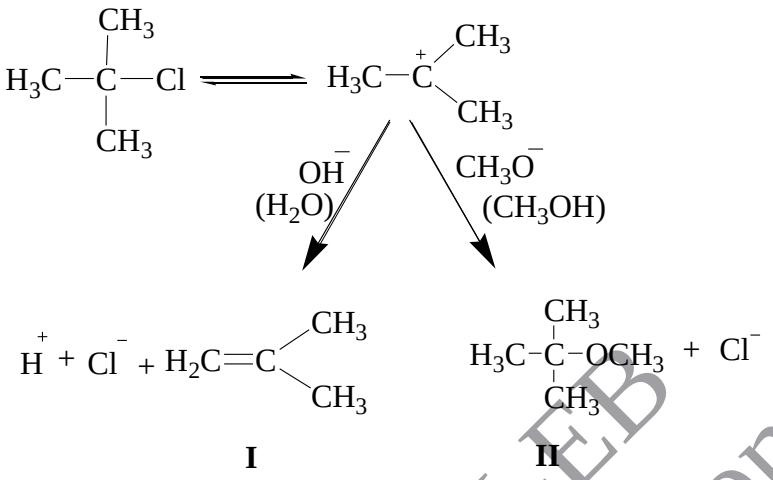
ii. Write the step-wise chemical equations for the process that disinfects water during raw water treatment. Identify the chemical produced as a result of this process that acts as a germicide. (3 Marks)

iii. Describe THREE ways through which the identified process can cause water pollution. (3 Marks)

Q.8. (Total 7 Marks)

EITHER

a. Consider the following reactions of tertiary butyl chloride in the presence of water and methanol as solvents.



I **II**

i. Identify the type of reaction mechanism (elimination or substitution) involved in each reaction, **I** and **II**. (2 Marks)

ii. Explain your answer to part **i** on the basis of the following attributes. (4 Marks)

- Structure of substrate
- Nature of solvent

iii. Why is elimination reaction mechanism more favoured at a high temperature? (1 Mark)

OR

b.

i. Explain how electron withdrawing substituent affect the acidity of carboxylic acids in terms of their

- presence in the molecule.
- position from C=O carbon in the molecule.
- increase in number in the molecule.

Give an example of electron withdrawing substituent to support your answer. (5 Marks)

ii. Write a chemical equation to show the conversion of acetic anhydride into acetamide. (2 Marks)

END OF PAPER

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