Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Amines

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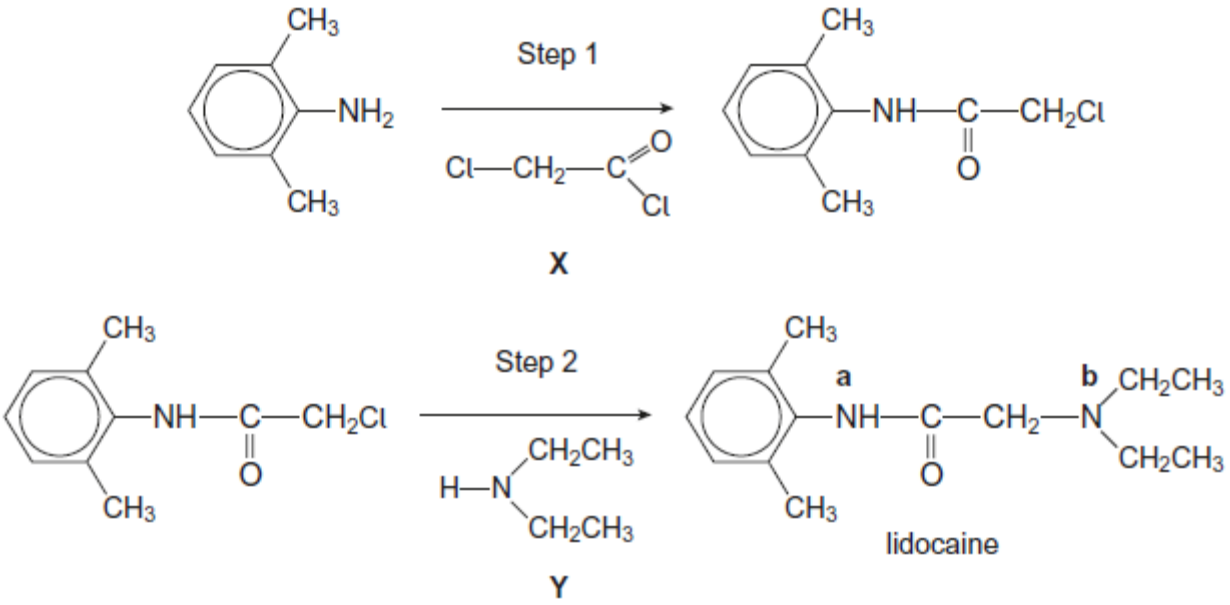
Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Q1.

Lidocaine is a local anaesthetic used in dentistry and in minor surgical operations.
The synthesis of lidocaine in 2 steps from 2,6-dimethylphenylamine is shown.



(a) (i) Give the IUPAC name of reagent **X** in Step 1.

_____

(1)

(ii) Outline a mechanism for Step 1.
In your answer, use RNH_2 to represent 2,6-dimethylphenylamine.

(4)

(b) Name the mechanism for Step 2.

_____

(1)

(c) Which of these is the total number of peaks in the ^{13}C n.m.r spectrum of lidocaine?

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Tick (✔) one box.

8 ☐ 9 ☐ 11 ☐ 12 ☐

(1)

(d) Calculate the percentage by mass of hydrogen in a molecule of lidocaine.

_____

_____

_____

(2)

(e) Give the name, including the classification, of the functional group that contains the nitrogen atom labelled **b**.

_____

(1)

(f) Lidocaine is used medically as the salt lidocaine hydrochloride.

(i) Suggest which one of the nitrogen atoms labelled **a** or **b** is protonated in lidocaine hydrochloride. Explain your answer.

Nitrogen atom protonated _____

Explanation _____

_____

_____

_____

(3)

(ii) Suggest why lidocaine hydrochloride is used medically in preference to lidocaine. Explain your answer.

_____

_____

_____

_____

(2)

(Total 15 marks)

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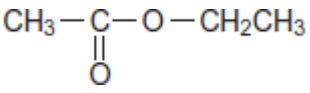
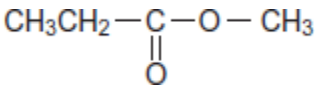
Q2.

(a) **Ester 1** and **Ester 2** were studied by ^{1}H n.m.r. spectroscopy.

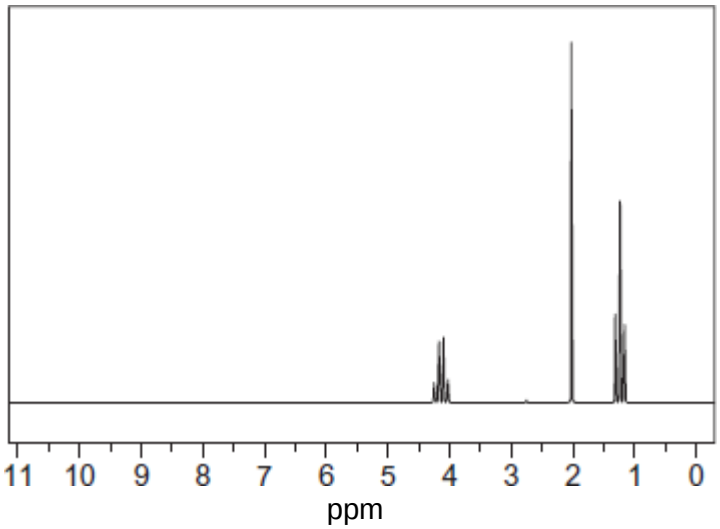


Ester 1



Ester 2

One of the two esters produced this spectrum.



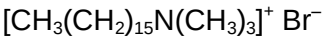
Deduce which of the two esters produced the spectrum shown. In your answer, explain the position and splitting of the quartet peak at δ = 4.1 ppm in the spectrum.

Predict the δ value of the quartet peak in the spectrum of the other ester.

Use **Table B** on the Data Sheet.

(4)

(b) Cetrimide is used as an antiseptic.



cetrimide

Name this type of compound.

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Give the reagent that must be added to $CH_3(CH_2)15NH_2$ to make cetrimide and state the reaction conditions.

Name the type of mechanism involved in this reaction.

(4)

(c) Give a reagent that could be used in a test-tube reaction to distinguish between benzene and cyclohexene.
Describe what you would see when the reagent is added to each compound and the test tube is shaken.

(3)

(Total 11 marks)

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