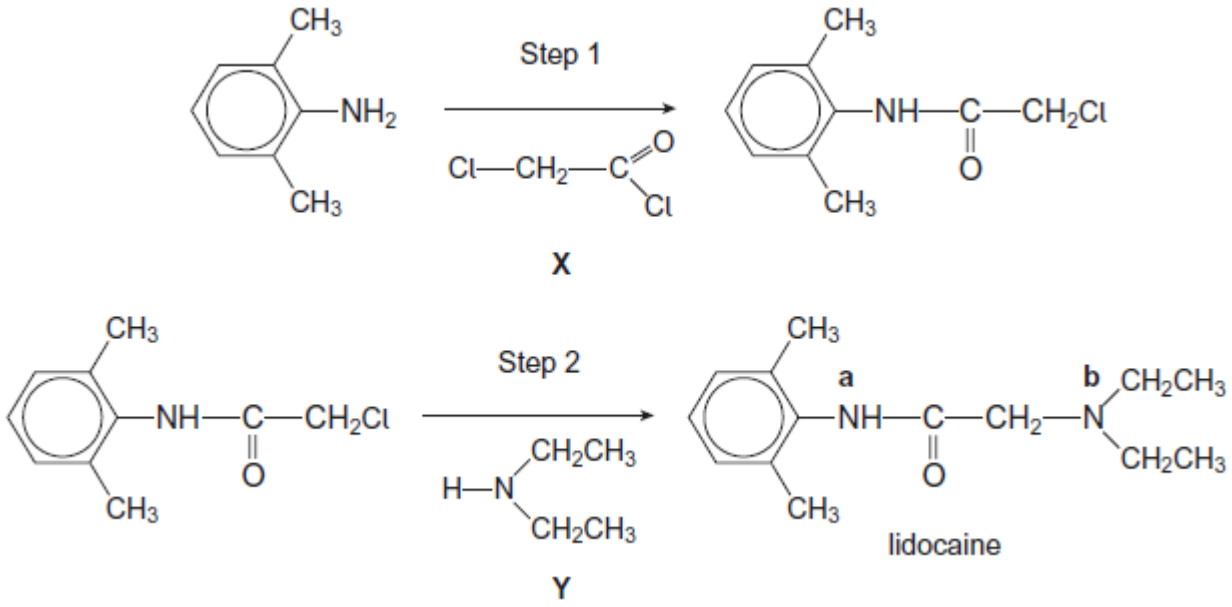
Name of the Student:_____
Max. Marks : 15 Marks **Time : 15 Minutes**

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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