

Name of the Student: _____

Max. Marks : 19 Marks

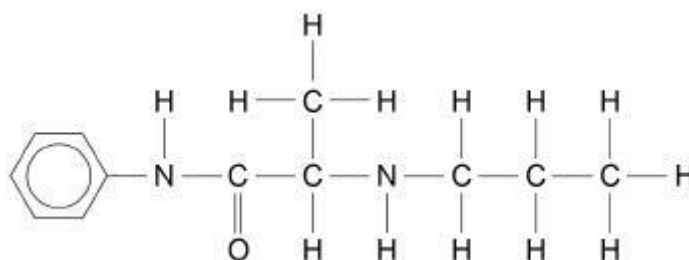
Time : 19 Minutes

Q1.

Prilocaine is used as an anaesthetic in dentistry.

Figure 1 shows the structure of prilocaine.

Figure 1



- (a) Draw a circle around any chiral centre(s) in **Figure 1**.

(1)

- (b) Identify the functional group(s) in the prilocaine molecule.

Tick (✓) the box(es) corresponding to the functional group(s).

Amide	Amine	Ester	Ketone
☐	☐	☐	☐

(1)

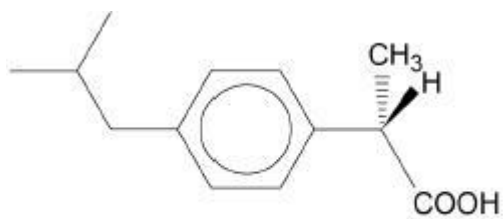
- (c) Prilocaine is completely hydrolysed in the human body to give a mixture of products.

Draw the structures of the two organic products formed in the complete hydrolysis of prilocaine in acidic conditions.

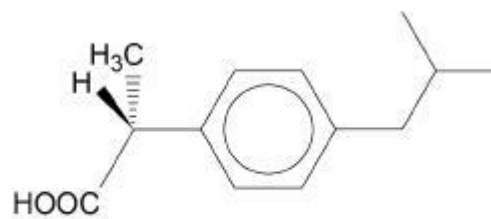
(3)

- (d) **Figure 2** shows optical isomers **F** and **G**.

Figure 2



Isomer **F**



Isomer **G**

Isomer **F** is the active compound in the medicine ibuprofen.

In the manufacture of ibuprofen both isomers **F** and **G** are formed. An enzyme is then used to bind to isomer **G** and catalyse its hydrolysis.

After the products of hydrolysis of **G** are removed, a pure sample of isomer **F** is collected.

Explain how a structural feature of this enzyme enables it to catalyse the hydrolysis of isomer **G** but not the hydrolysis of isomer **F**.

(2)

(Total 7 marks)

Q2.

This question is about amines.

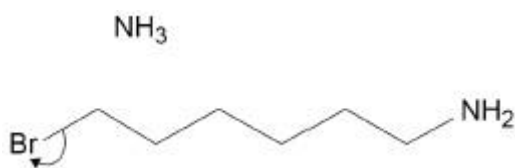
- (a) Give an equation for the preparation of 1,6-diaminohexane by the reaction of 1,6-dibromohexane with an excess of ammonia.

(2)

- (b) Complete the mechanism for the reaction of ammonia with 6-bromohexylamine to form 1,6-diaminohexane.

Suggest the structure of a cyclic secondary amine that can be formed as a by-product in this reaction.

Mechanism



Cyclic secondary amine

(4)

- (c) 1,6-Diaminohexane can also be formed in a two-stage synthesis starting from 1,4-dibromobutane.
Suggest the reagent and a condition for each stage in this alternative synthesis.

Stage 1 reagent and condition

Stage 2 reagent and condition

(3)

- (d) Explain why 3-aminopentane is a stronger base than ammonia.

(2)

(e) Justify the statement that there are no chiral centres in 3-aminopentane.

(1)

(Total 12 marks)