Infra-red

Question Paper

Level	Pre U
Subject	Chemistry
Exam Board	Cambridge International Examinations
Topic	Infra-red
Booklet	Question Paper

Time Allowed: 48 minutes

Score: /40

Percentage: /100

Grade Boundaries:

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1. The structures of a pair of isomers are shown.

$$\begin{array}{c|c} H & H \\ \hline C & C \\ H & H \\ \end{array} \begin{array}{c|c} C & C \\ \hline C & H \\ \end{array} \begin{array}{c|c} H \\ \hline C & C \\ \end{array}$$

isomer 2

(a) Give the molecular formula of these isomers.

.....[1]

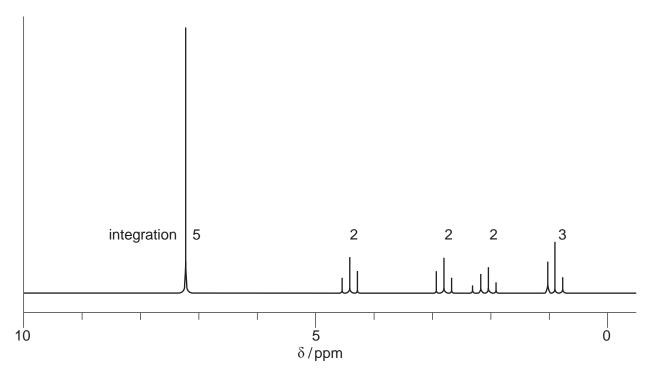
(b) What type of isomerism is shown by these two isomers?

.....[1]

(c) Isomer 1 is called 2-phenylethyl propanoate. Give the name of isomer 2.

.....[1]

(d) The ¹H NMR spectrum of one of the isomers is shown.



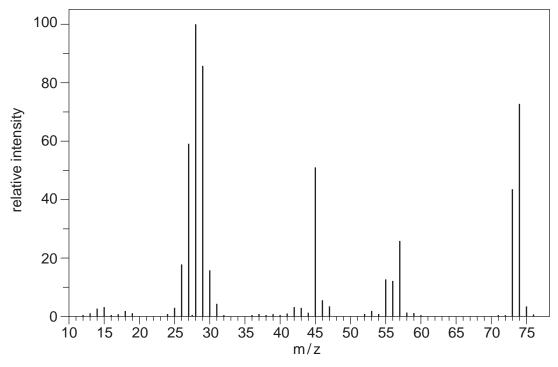
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Explain which of isomers 1 or 2 corresponds to the ¹ H NMR spectrum shown. You should refer to the splitting patterns and integration values of all the peaks in your answer. Note that the phenyl group protons appear as a single peak.			
16			

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(e) X and Y are two compounds that can be made by hydrolysis of isomer 1.

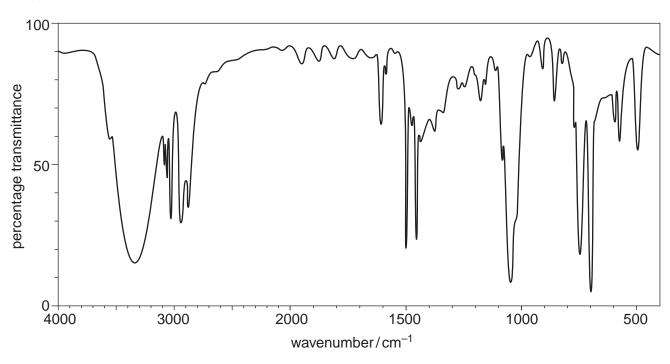
 ${\bf X}$ has the composition by mass C, 48.6%; H, 8.11%; O, 43.2%. The mass spectrum of ${\bf X}$ is shown.



(i) Calculate the empirical formula of X.

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(f) The IR spectrum of Y is shown.



(i)	Show the structure of Y ar	nd explain	how the	· IR	spectrum	confirms	the	identity	of	the
	functional group present.									

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		 	 [2]

(ii) Show the structure of ${\bf X}$ and explain how its spectrum will compare to that of ${\bf Y}$.

[2]

[Total: 20]

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2. Fig. 6.1 shows the structures of a pair of isomers.

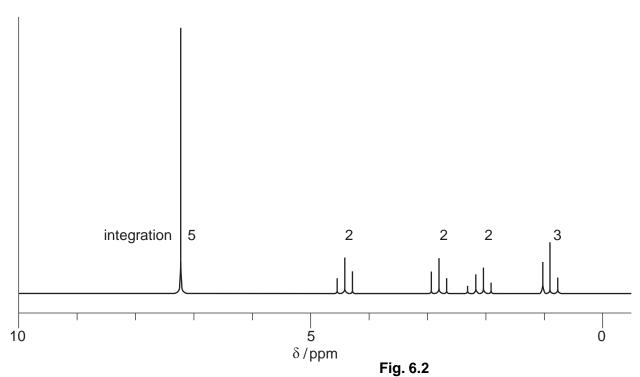
Fig. 6.1

(a) Give the molecular formula of these isomers.

(b) What type of isomerism is shown by these two isomers?

(c) Isomer 1 is named 2-phenylethyl propanoate. Give the name of isomer 2.

(d) The ¹H NMR spectrum of one of the isomers is shown in Fig. 6.2.



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Explain which of the two isomers corresponds to the ¹ H NMR spectrum in Fig. 6.2. You should refer to the splitting patterns and integration values of all the peaks in your answer. Note that the phenyl group protons appear as a single peak.			

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(e) X and Y are two compounds that can be made by hydrolysis of isomer 1 in Fig. 6.1.

X has the composition by mass C, 48.6%; H, 8.11%; O, 43.2%. The mass spectrum of **X** is shown in Fig. 6.3.

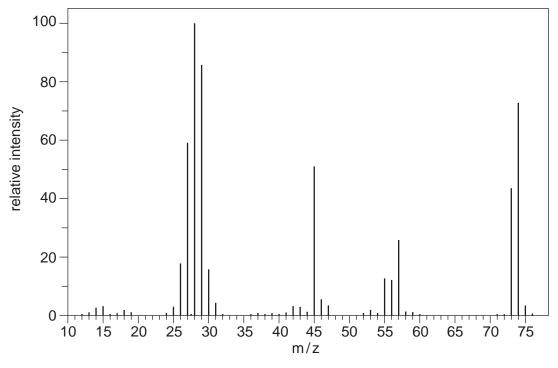


Fig. 6.3

(i) Calculate the empirical formula of X.

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The IR spectrum of Y is shown in Fig. 6.4.

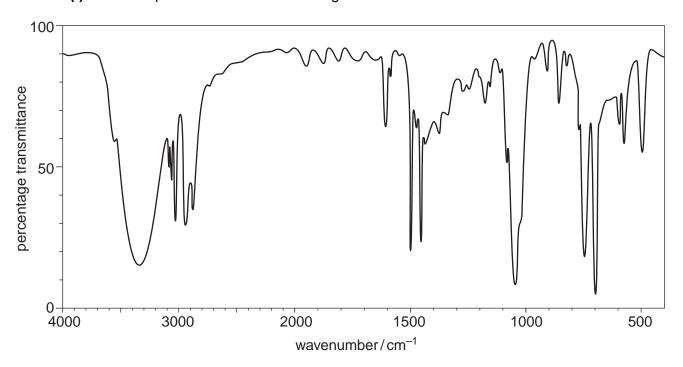


Fig. 6.4

(i)	Show the structure of Y and explain how the spectrum in Fig. 6.4 confirms the
	identity of the functional group present.

 [2]

Show the structure of **X** and explain how its IR spectrum will compare to that of **Y**.

[Total: 20]