

Spectroscopy (2019 VCE)

- 1) An unknown organic compound contains carbon, hydrogen and oxygen. It is known that:
- the compound does not contain carbon-to-carbon double bonds (C=C)
 - the molecular ion peak is found at a mass-to-charge ratio (m/z) of 74
 - the ^{13}C NMR has three distinct peaks.
- a. A small peak in the mass spectrum can be identified at $m/z = 75$. Explain the presence of this peak

Solution will appear here

[Solution](#)

- b) Use the information provided to give two possible molecular formulas for this compound

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[Solution](#)

- c) The ^1H NMR spectrum of the compound shows three sets of peaks with a peak area ratio of 3:2:1. What does this information tell you about the structure of the compound and its molecular formula? Justify your answer by referring to the information given about the peaks in the ^1H NMR spectrum.

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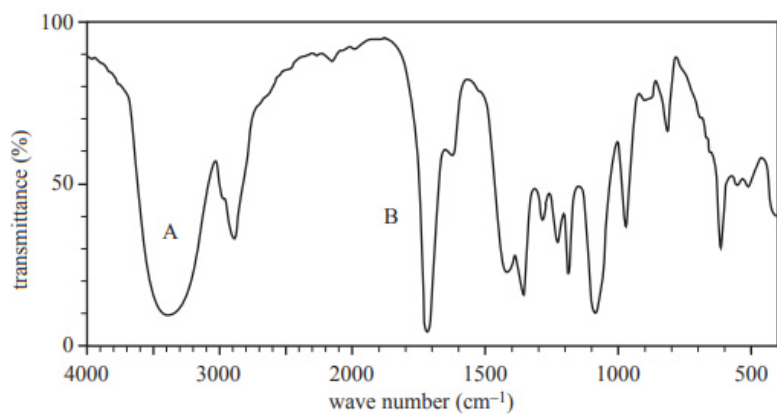
[Solution](#)

- d) There are many structural isomers of this compound. Draw the structural formulas of two possible isomers.

Solution will appear here

[Solution](#)

e) The infra-red (IR) spectrum of the compound is shown below.



Data: SDBS Web, <<http://sdb.s.db.aist.go.jp>>.

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i. Identify the functional groups responsible for the absorption peaks labelled A and B in the IR spectrum.

ii. Using the ¹H NMR information given in part c. and the IR spectrum provided above, draw the structural formula of the compound.

Solution