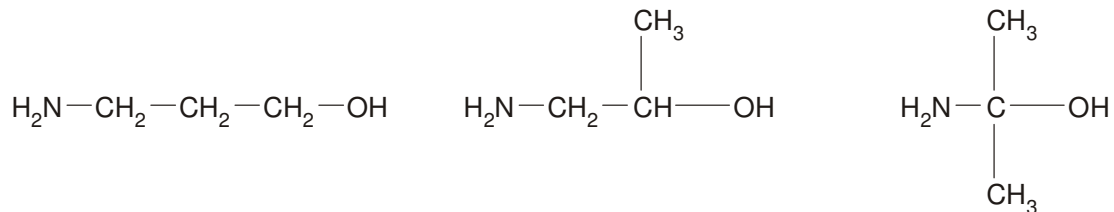


F324 Module 3: HW 11

In this question, one mark is available for the quality of use and organisation of scientific terms.

The structural formulae of three isomers of C₃H₉NO are shown below.



Describe the **similarities** and **differences** you would expect to see when comparing the

- infra-red spectrum of each isomer
- mass spectrum of each isomer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

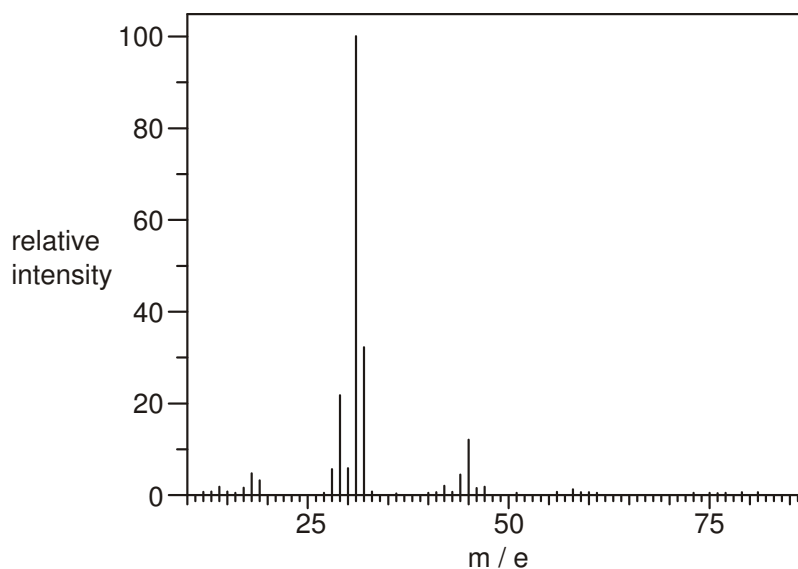
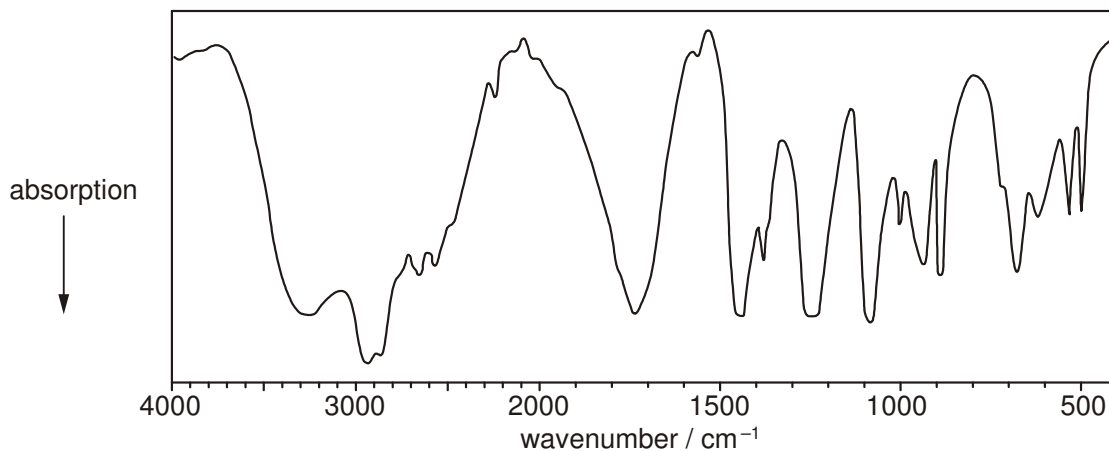
[5]
Quality of Written Communication [1]
[Total 6 marks]

F324 Module 3: HW 11

2. Compound **G** can be extracted from sugar-cane and is commonly used in 'rejuvenating' skin creams because it helps to remove some of the dead cells from the skin surface.

The molecular formula of **G** is $C_2O_3H_4$ and the compound contains **two different** functional groups containing oxygen atoms.

The infra-red and mass spectra of **G** are shown below.



- (a) After inspection of the mass spectrum of **G**, an analyst wrote the comment:

'The molecular ion peak appears to be missing from the spectrum.
The base peak is due to a fragment ion with $m/e = 31$.'

- (i) Explain what is meant by the following terms.

molecular ion peak

.....

base peak

.....

[2]

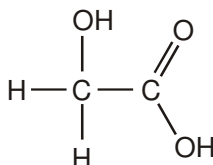
- (ii) Suggest why the molecular ion peak is missing from the spectrum.

.....

.....

[1]

- (b) The structure of compound **G** is shown below.



Show how the infra-red and mass spectra confirm this structure. In your answer, you should suggest a possible structure for the ion that gives the base peak at $m/e = 31$ in the mass spectrum.

.....

.....

.....

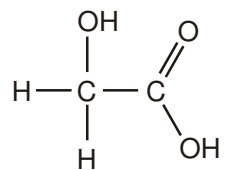
.....

.....

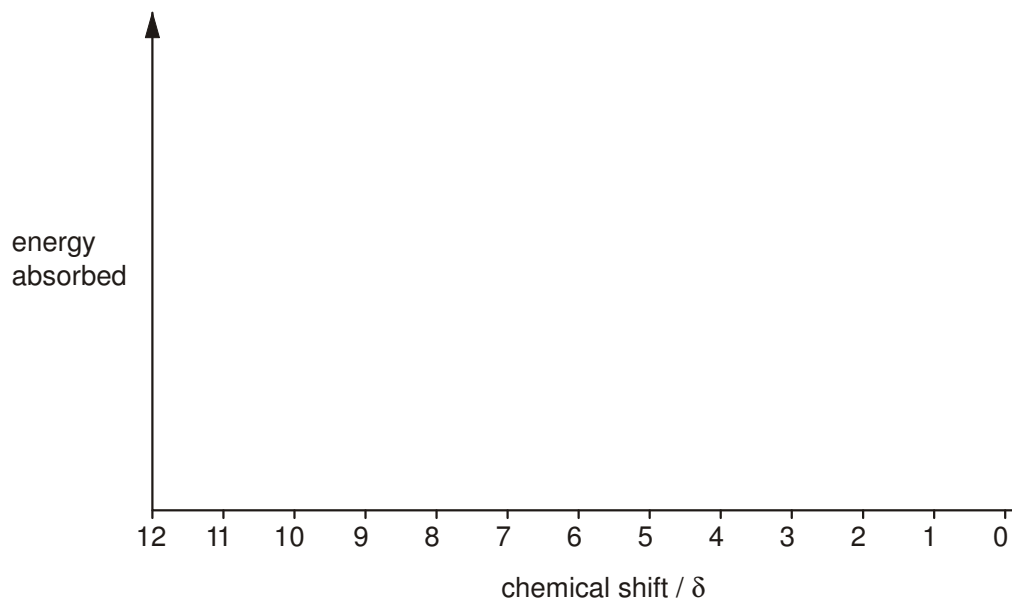
.....

[4]

(c) The structure of compound **G** is shown below.



Sketch the ^1H n.m.r. spectrum of compound **G** and label the relative peak areas. Label any peaks that would be lost from the spectrum on shaking with D_2O .



[4]

[Total 11 marks]