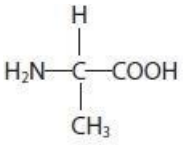
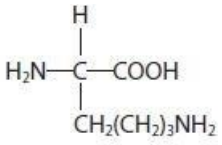
Questions

Q1.

Alanine and lysine are amino acids.



alanine



lysine

(a) Draw the structure of a dipeptide formed when one molecule of alanine reacts with one molecule of lysine.

(1)

(b) The dipeptide formed in part (a) is hydrolysed under **acidic** conditions and the resulting mixture is analysed by column chromatography. The column uses a polar stationary phase.

Explain why lysine leaves the chromatography column after alanine.

(2)

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(Total for question = 3 marks)

Q2.

Chromatography is a technique used to separate the components of a mixture.

Gas chromatography can be used both to separate the components in a mixture and to determine the amount of each present.

(i) State why argon and nitrogen are suitable carrier gases for gas chromatography.

(1)

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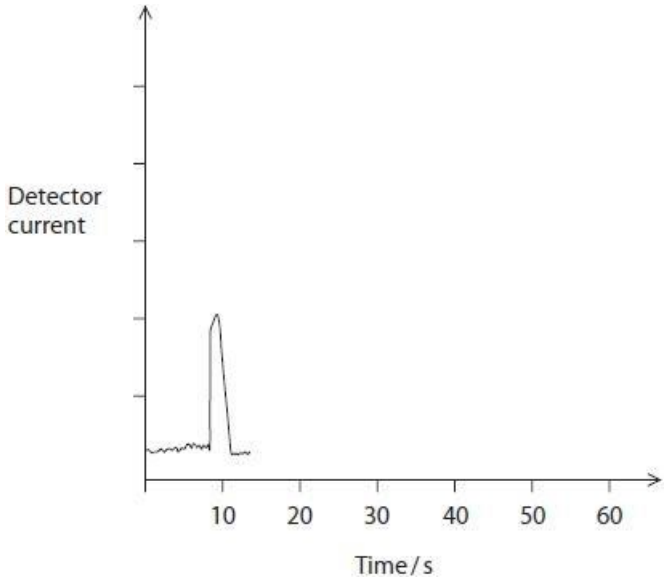
(ii) A mixture containing one part substance **X**, two parts substance **Y** and one part substance **Z** was separated by gas chromatography.

Substance **X** has a retention time of 10 seconds, substance **Y** of 15 seconds and substance **Z** of 40 seconds.
Complete the sketch of this chromatogram.

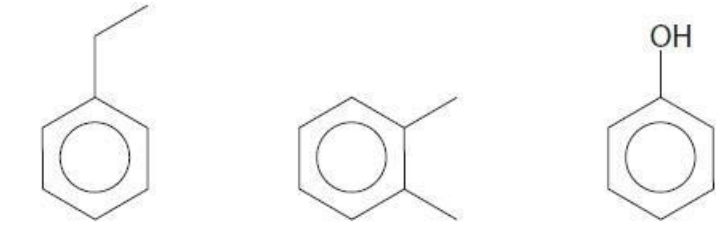
(3)



(Total for question = 4 marks)

Q3.

This question is about the arenes, ethylbenzene, xylene, and phenol, which can be identified in wine samples using gas chromatography.



ethylbenzene xylene phenol

The time taken for a compound to pass through the column in gas chromatography is called the retention time.

Explain why different compounds will have different retention times in the same column, under the same conditions.

(2)

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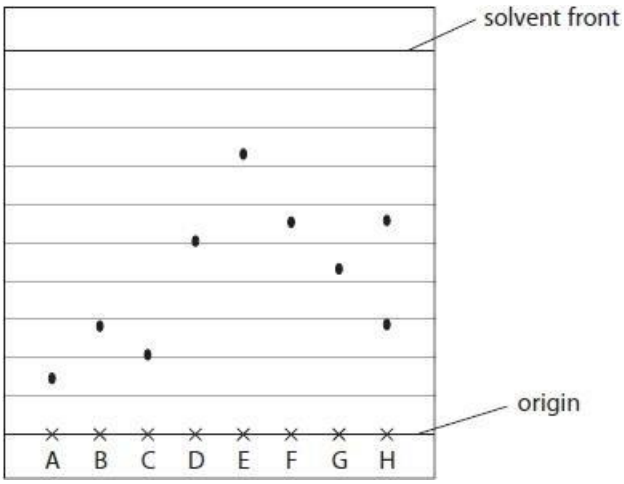
(Total for question = 2 marks)

Q4.

Chromatography is a technique used to separate the components of a mixture.

A sample of a tripeptide was hydrolysed and then placed on a thin layer chromatography (TLC) plate. Samples of possible amino acids present were also placed on the TLC plate for reference.
A simplified diagram of the developed TLC plate is shown.



A – Lysine	B – Serine	C – Histidine	D – Tyrosine
E – Isoleucine	F – Methionine	G – Proline	H – Hydrolysed tripeptide

(i) Calculate the R_f value for the amino acid lysine.

Give your answer to an appropriate number of significant figures.

(1)

(ii) Identify by **name** the two amino acids present in the tripeptide, giving a reason for the lack of a third spot.

(3)

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(iii) Give **two** reasons why different amino acids have different R_f values.

(2)

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(iv) In chromatography, a 'locating' reagent is often used when the components in a mixture are colourless.

Which reagent is used to locate the amino acid spots?

(1)

- ☒ **A** iodine
- ☒ **B** methyl orange
- ☒ **C** ninhydrin
- ☒ **D** phenolphthalein

(Total for question = 7 marks)