Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Chromatography

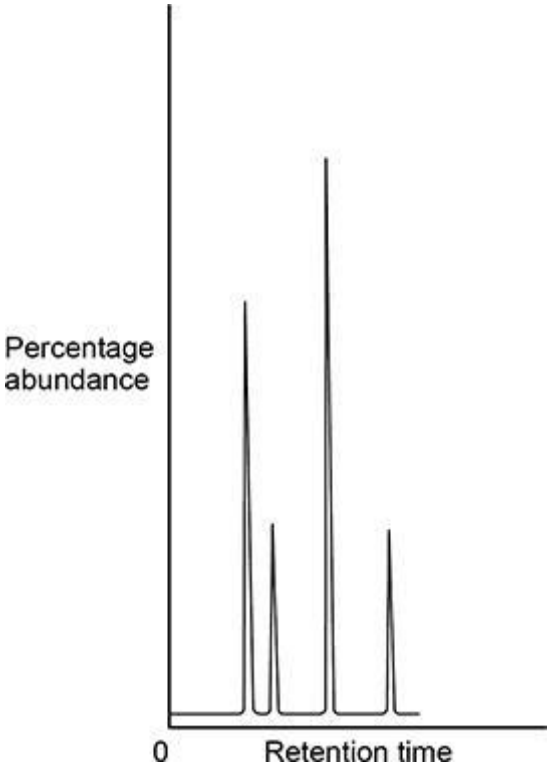
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Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

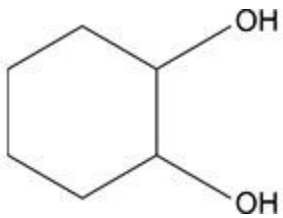
The diagram below shows a gas chromatogram for a sample containing four isomers with the molecular formula $C_6H_{12}O_2$

The carrier gas is nitrogen and the stationary phase is polar.



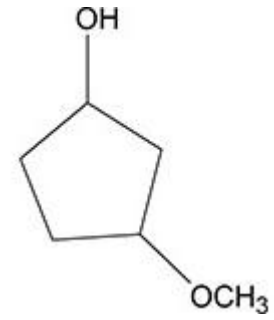
Which of the four isomers in this sample is the most abundant?

A



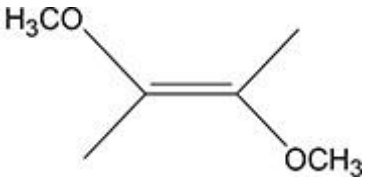
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B



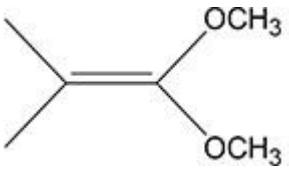
○

C



○

D



○

(Total 1 mark)

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Q2.

Endomorphin-2 is a peptide with the amino acid sequence shown.

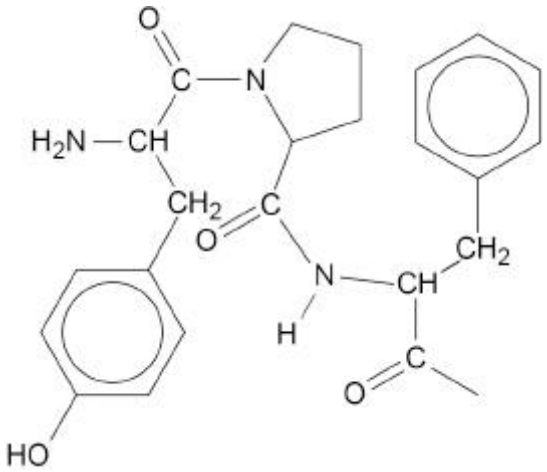
Tyr–Pro–Phe–Phe–NH_2

Each amino acid is represented by a three-letter abbreviation.

Tyr = tyrosine Pro = proline Phe = phenylalanine

Figure 1 shows part of the structure of endomorphin-2, showing the Tyr–Pro–Phe– part of the molecule.

Figure 1



(a) The $–NH_2$ at the end of the amino acid sequence of endomorphin-2 shows that the terminal functional group is an amide, not an acid.

Complete the structure of endomorphin-2 in **Figure 1**.

(2)

(b) Use the structure in **Figure 1** to draw the skeletal formula of proline, Pro.

(1)

A student hydrolyses a sample of endomorphin-2 to break it down into its constituent amino acids.

The student analyses the resulting mixture by thin-layer chromatography, TLC.

(c) State a reagent and the conditions needed for the hydrolysis.

Reagent _____

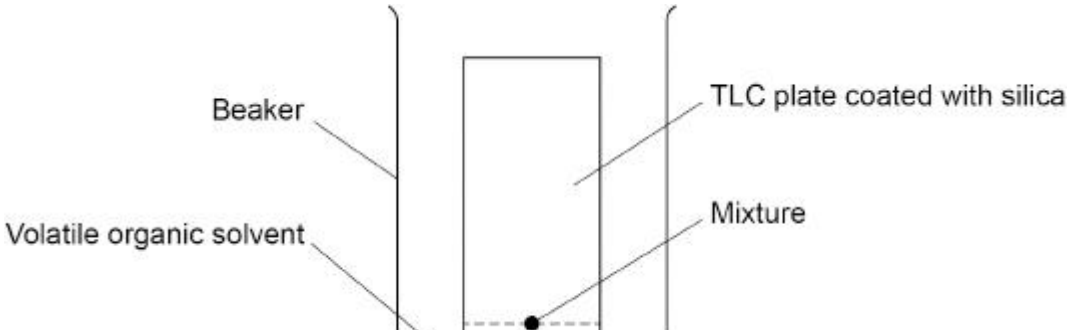
Conditions _____

(2)

(d) **Figure 2** shows the apparatus used for the TLC.

Figure 2

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There is a piece of the apparatus missing from **Figure 2**. This omission will result in an inaccurate chromatogram.

Identify the missing piece of the apparatus.

State and explain why this piece of the apparatus is needed.

Missing piece _____

Explanation _____

_____

_____

_____

(3)

(e) State why the amino acids separate on the TLC plate.

_____

_____

_____

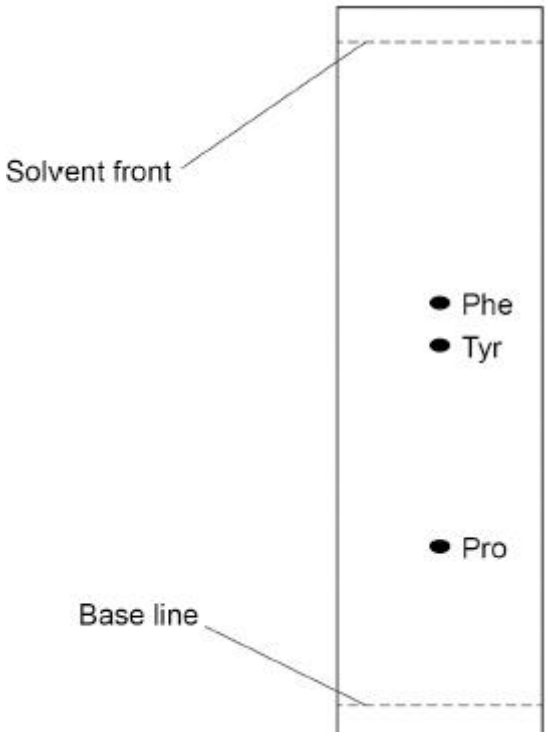
(1)

When the solvent has risen up the TLC plate, the student removes the plate from the beaker and sprays it with a developing agent.

Figure 3 shows the result.

Figure 3

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(f) Name a suitable developing agent.

State why the developing agent is needed.

Name _____

Why needed _____

_____

_____

(2)

(g) Determine the R_f value for Tyr.

R_f _____

(1)

(Total 12 marks)

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Q3.

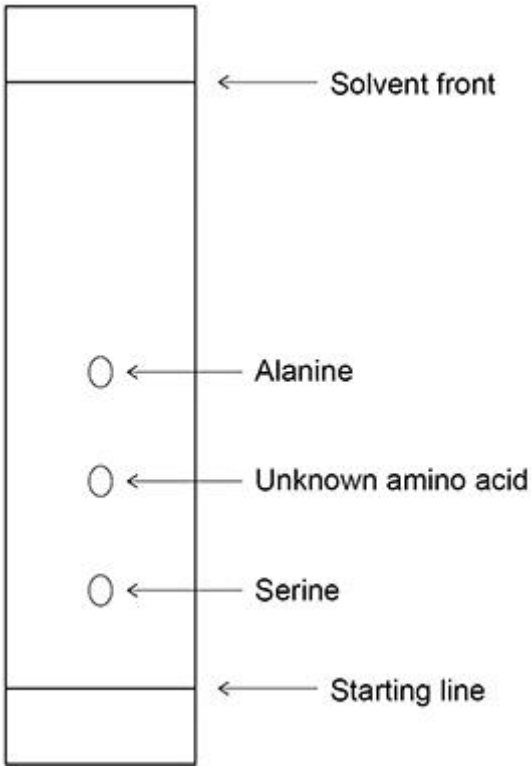
The protein fibroin can be broken down into amino acids using an enzyme.

(a) A student uses thin-layer chromatography (TLC) to identify these amino acids.

The student identifies two of the amino acids as alanine and serine.

Use the figure below to calculate the R_f value of the unknown amino acid. Show your working.

Use your R_f value and the table below to identify the unknown amino acid.



Amino acid	**R_f value**
tyrosine	0.25
glycine	0.34
valine	0.64
leucine	0.73

Rf value _____

Identity _____

(2)

(b) The amino acids cannot be seen as they move during the experiment.

State how the amino acids can be made visible at the end of the experiment.

_____

_____

(1)

(c) State why each amino acid has a different R_f value.

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_____

_____

_____

(1)

(Total 4 marks)

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