

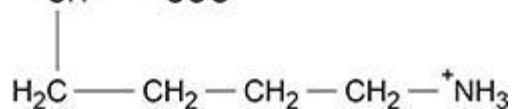
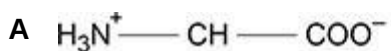
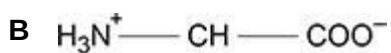
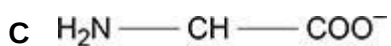
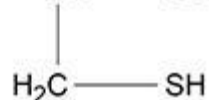
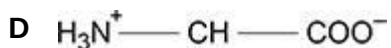
Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Q1.

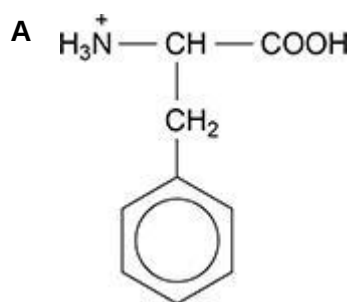
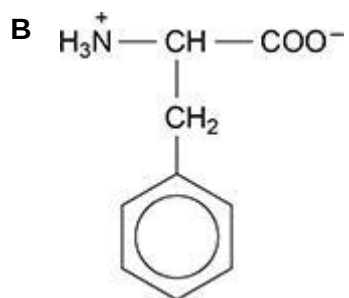
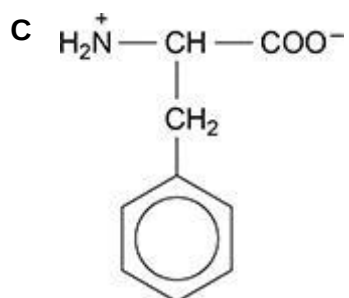
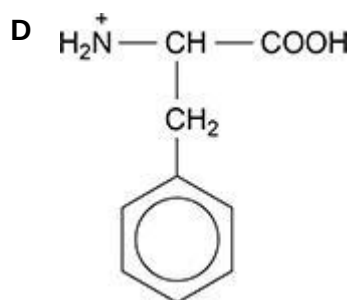
Which structure shows a zwitterion of an amino acid?


☐

☐

☐

☐

(Total 1 mark)

Q2.

Which structure is formed by phenylalanine in solution at pH = 3?

☐☐☐☐

(Total 1 mark)

Q3.

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

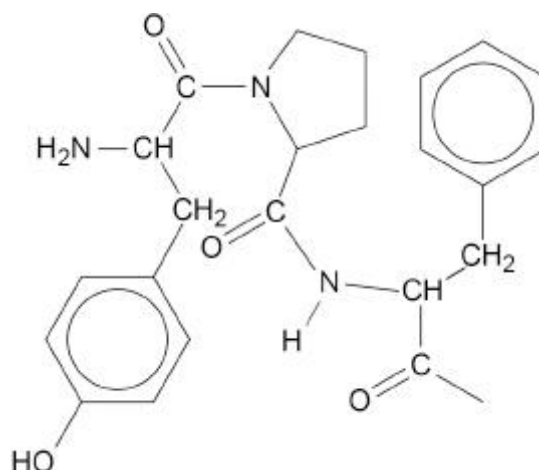


Each amino acid is represented by a three-letter abbreviation.

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.

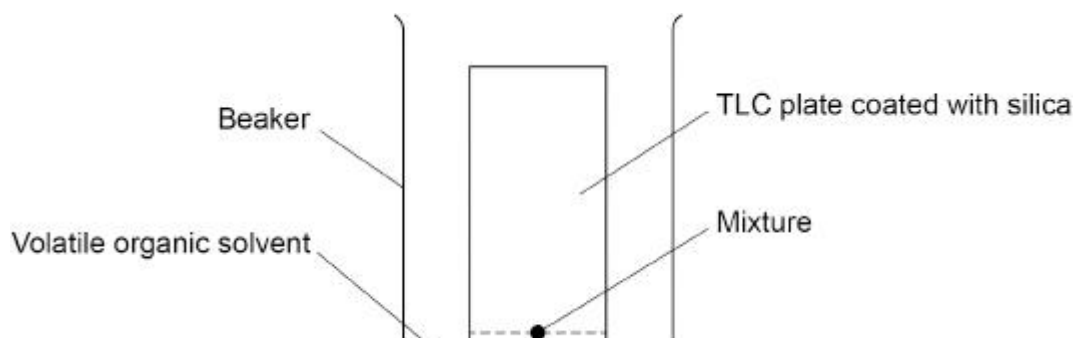
Reagent _____

Conditions _____

(2)

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

Figure 2



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)

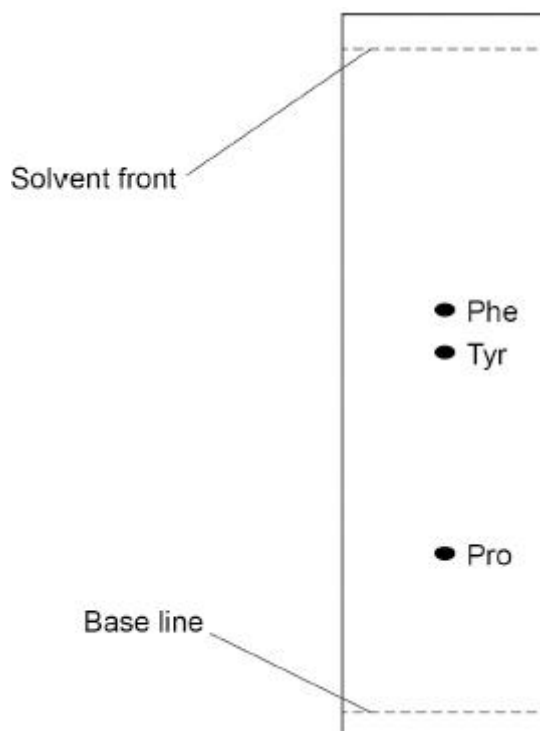
(e) State why the amino acids separate on the TLC plate.

(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



(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)

Q4.

Which statement about enzymes is **not** correct?

- A The tertiary structure of an enzyme influences which molecules can bind to the active site. ☐
- B The action of enzymes can be inhibited by a molecule or ion that binds to the active site. ☐
- C Enzymes work equally well on both optical isomers of a substrate. ☐
- D Computers can be used to design drugs to block active sites on enzymes. ☐

(Total 1 mark)

Q5.

Cisplatin has the formula $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$

Cisplatin is an anti-cancer drug that prevents replication of DNA.

When cisplatin bonds to DNA, which is the correct ligand replacement reaction?

A replacement of one NH_3 ligand

☐

B replacement of two NH_3 ligands

☐

C replacement of one NH_3 ligand and one Cl^- ligand

☐

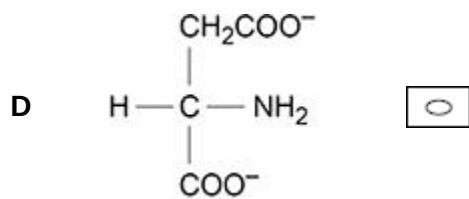
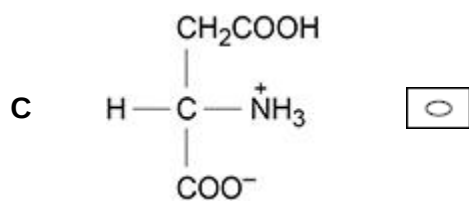
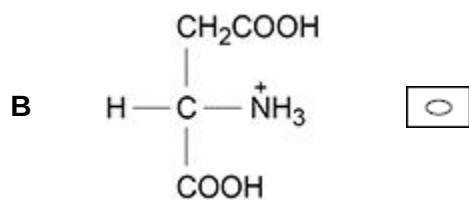
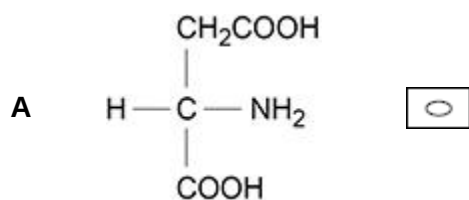
D replacement of two Cl^- ligands

☐

(Total 1 mark)

Q6.

Which is the main species present in an aqueous solution of aspartic acid at pH = 14?



(Total 1 mark)