Marks

Question 32 — Forensic Chemistry (25 marks)

(a) (i) Identify the technique used to separate amino acids on the basis of differences in their charge. **1**

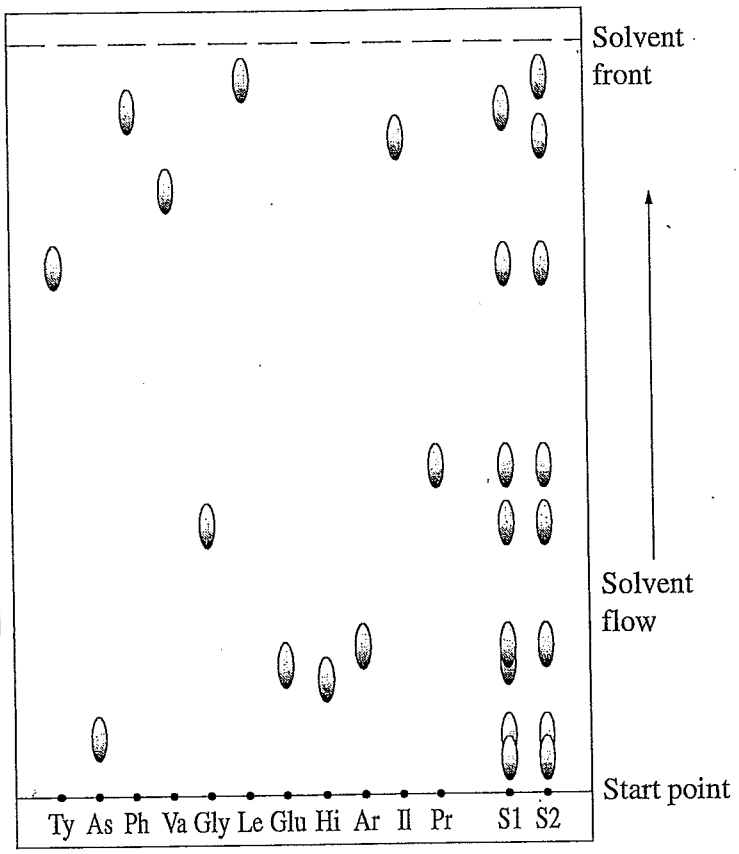
(ii) Explain how a mass spectrometer operates, and identify its usefulness for forensic science. **3**

(b) Oxytocin and vasopressin are small proteins consisting of nine amino acids. A forensic scientist decided to determine the amino acid composition of both proteins using paper chromatography. Samples of both proteins were first hydrolysed into their constituent amino acids using a mixture of enzymes. The resulting protein hydrolysates were spotted onto a sheet of filter paper together with eleven reference amino acids. After the filter paper had been placed in a suitable solvent and developed, the chromatogram below was obtained.

KEY

Ty = Tyrosine
As = Asparagine
Ph = Phenylalanine
Va = Valine
Gly = Glycine
Le = Leucine
Glu = Glutamic acid
Hi = Histidine
Ar = Arginine
Il = Isoleucine
Pr = Proline

S1 = Vasopressin hydrolysate
S2 = Oxytocin hydrolysate



(i) Contrast the amino acid composition of both proteins after analysing the chromatogram. **2**

(ii) Explain how variations in the composition and structure of proteins affect their biological functions. **4**

Question 32 continues on page 38