

Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Mark Schemes

Q1.

(a) Gas chromatography explanation

Different retention times / dipeptides appear at different times.

1

Different balance between solubility in the moving phase / gas carrier **and** retention by the stationary phase / column **OR** different relative affinity for mobile and stationary phases.

1

Mass spectrometry explanation

Same m/z values.

1

(Both) dipeptides / **J** and **K** have same molecular formula / M_r .

1

(b) ser-ala

1

ala-lys

1

ser-ala-lys

This order only.

1

[7]

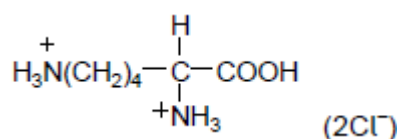
Q2.

(a) 2,6-diaminohexanoic acid

Ignore additional , or – or spaces.

1

(b) (i)



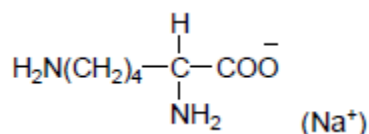
NB both N must be protonated.

Allow $-\text{NH}_3^+$ allow CO_2H Allow $-\text{H}_3\text{N}^+$.

Penalise – C_4H_8 – here.

1

(ii)



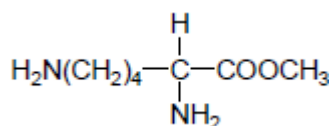
Allow CO_2^- .

Allow $-\text{H}_2\text{N}$.

Allow $-\text{COONa}$ but penalise $\text{O}-\text{Na}$ bond shown.

1

(iii)

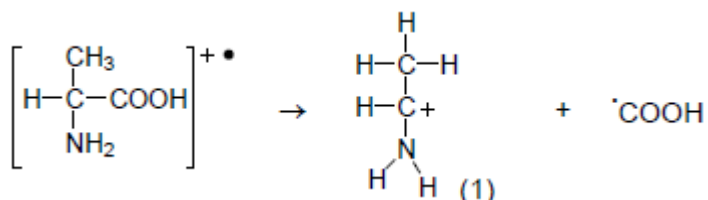


Allow CO_2CH_3 .

Allow $-\text{NH}_3^+$ or $-\text{H}_2\text{N}$.

1

(c)



1 for displayed formula of fragment ion.

1 for molecular ion of alanine AND radical.

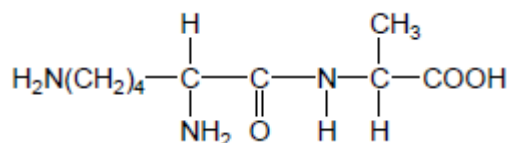
Allow molecular ion without brackets and fragment ion in brackets with outside +.

Allow dot anywhere on radical.

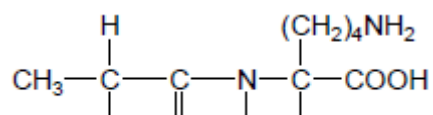
Allow $[\text{C}_3\text{H}_7\text{NO}_2]^+ \cdot$ for molecular ion.

2

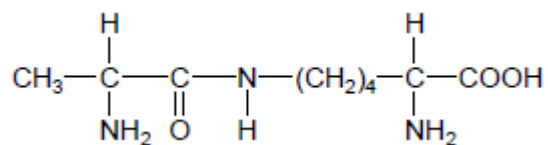
(d)



OR



OR



Dipeptide, not repeating unit /.

Allow CO₂H Allow -H₂N.

Allow -CONH-.

1

(e) M1 In acid lysine has double positive or more positive charge

1

M2 (Lysine ion) has greater affinity / greater attraction / adheres better /
sticks better to polar / stationary phase

M2 only scores after a correct M1.

Ignore greater retention time.

1

[9]

Q3.

- (a) (i) Two rings only around nitrogen or sulfur
Lose this mark if more than 2 atoms are ringed.
Do not allow two atoms at the same end of the ion. 1
- (ii) 275.8
Accept this answer only. Do not allow 276 1
- (iii) Carboxylate / COO^-
Allow salt of carboxylic acid or just carboxylic acid. 1
- (b) $(32.1 / 102.1) = 31.4\%$
Do not penalise precision but do not allow 1 significant figure. 1
- (c) Zineb is mixed with a solvent / water
Max=2 if M1 missed 1
- Use of column / paper / TLC
Lose M1 and M2 for GLC 1
- Appropriate collection of the ETU fraction
OR Appropriate method of detecting ETU
Allow ETU is an early fraction in a column or collecting a range of samples over time, lowest retention time / travels furthest on paper or TLC (allow 1 mark for having the longest retention time in GLC). 1
- Method of identification of ETU (by comparison with standard using chromatography)
If method completely inappropriate, only M1 is accessible 1

[8]