AQA A-Level Chemistry

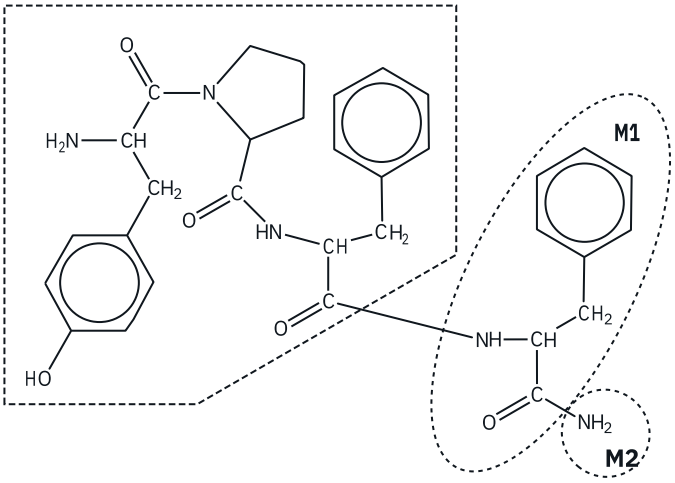
Chromatography mark scheme · goes with “Chromatography” · whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions

Mark schemes

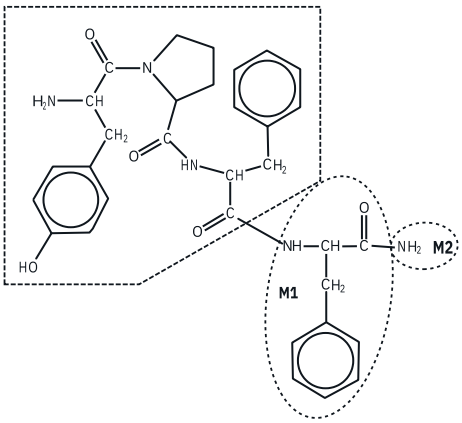
Chromatography · 6 questions

Q1 · June 2023 · Paper 3 · Q3 · [12 marks]

(a)



Alternative form

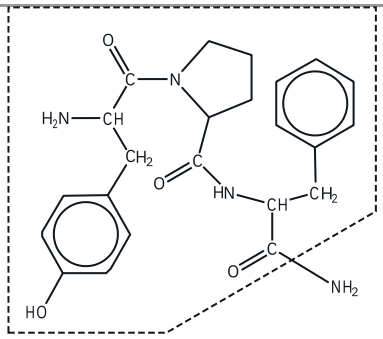


M1 Phe structure drawn with correct peptide link

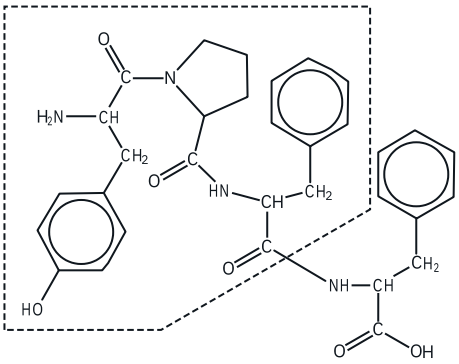
M2 amide group shown on end

M1 if Phe drawn with COOH or $CONH_2$

M2 ALLOW if no Phe drawn i.e. if NH_2 only attached directly to C=O on diagram



Scores M2 for ending in amide group

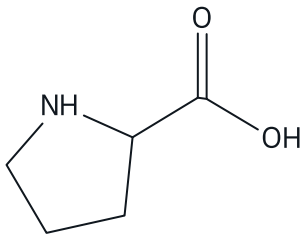


Scores M1 for Phe group

M1 H needed on N of peptide link drawn unless C–CH-CH_2 drawn skeletal

[2 marks]

(b)



ALLOW *zwitterion*

ALLOW *-NH_2^+ and/or COO^-*

ALLOW *with C shown in COOH group*

ALLOW *without H on N*

ALLOW *N–H*

NOT *N–*

[1 mark]

(c) M1 (aqueous) HCl/hydrochloric acid

Name or formula of any strong acid or alkali

M2 reflux/heat

ALLOW *warm / hot / high temperature for heat*

NOT *T>200°C*

IGNORE *conc as condition with acid/alkali*

IGNORE *pressure*

Alternative

M1 protease/(poly)peptidase/peptase/named protease

IGNORE *enzyme*

M2 warm

NOT *hot / high temperature / T>50°C*

[2 marks]

(d) M1 lid/cover (on beaker)

Then any 2 from these 3

- prevents escape of vapour (from beaker) / evaporation of solvent (from beaker)
- so atmosphere in beaker is saturated with solvent vapour owtte
- to reduce evaporation from the plate

ALLOW *(for bullet point 3) so solvent can rise up plate*

ALLOW *(for bullet point 3) to avoid plate drying out*

[3 marks]

(e) Difference in the balance between solubility in solvent/mobile phase and attraction to/retention on stationary phase

ALLOW *difference between (relative) affinity/attraction for solvent and stationary phase*

ALLOW *absorption/adsorption for retention on stationary phase*

[1 mark]

(f) M1 ninhydrin

M2 amino acids are colourless / to make the amino acids visible

ALLOW *iodine*

IGNORE *UV*

IGNORE *stated final colour e.g. "turns the amino acids purple" is not enough on its own*

IGNORE *clear*

[2 marks]

(g) 0.54

ALLOW *0.53 - 0.55 (to min two sig figs)*

[1 mark]

Q2 · November 2021 · Paper 3 · Q2 · [4 marks]

(a) M1 $\frac{27}{80} = 0.34$

M1 some relevant working is needed to arrive at 0.325 - 0.35

[1 mark]

M2 glycine

no ECF based on M1

[1 mark]

(b) use uv lamp or ninhydrin

allow *developing / locating agent / iodine*

[1 mark]

(c) each amino acid has different (relative) affinity/attraction to/solubility in stationary and mobile phases

allow *reference to different solubility in solvent OR different affinity for stationary phase*

[1 mark]

Q3 · June 2024 · Paper 3 · Q34 · [1 mark]

Answer: **B**

Q4 · June 2017 · Paper 2 · Q8 · [12 marks]

08.1

$HNO_3 + 2H_2SO_4 \rightarrow NO_2^+ + H_3O^+ + 2HSO_4^-$

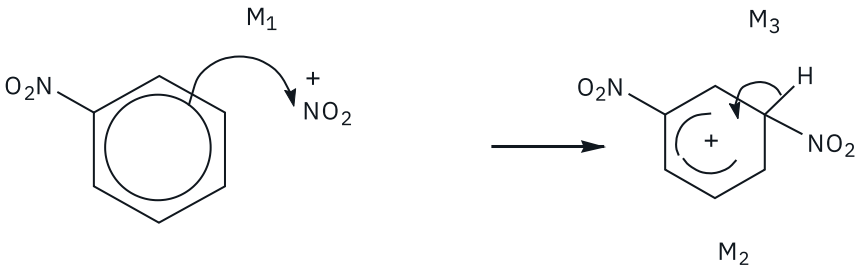
Allow $H_2SO_4 + HNO_3 \rightarrow NO_2^+ + HSO_4^- + H_2O$

Allow a combination of equations which produce NO_2^+

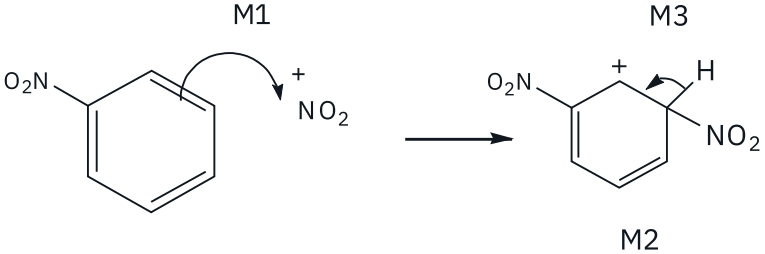
Penalise equations which produce SO_4^{2-}

[1 mark]

08.2



OR Kekule



Electrophilic substitution.

Ignore nitration

M1 Arrow from inside hexagon to N or + on N (Allow NO_2^+)

M2 Structure of intermediate

- horseshoe centred on C1 and must not extend beyond C2 and C6, but can be smaller
- + in intermediate not too close to C1 (allow on or “below” a line from C2 to C6)

M3 Arrow from bond into hexagon (Unless Kekule)

- Allow M3 arrow independent of M2 structure
- + on H in intermediate loses M2 not M3

[4 marks]

08.3

D

[1 mark]

08.4

(Balance between) solubility in moving phase and retention by stationary phase

OR (relative) affinity for stationary/solid and mobile/liquid/solvent (phase)

[1 mark]

08.5

Solvent depth must be below start line

Ignore safety

[1 mark]

08.6

1,2- is more polar OR 1,4- is less polar

OR 1,2 is polar, 1,4- is non-polar

1,4- (or Less/non polar is) less attracted to (polar) plate / stationary phase / solid

OR (Less/non polar is) more attracted to / more soluble in (non-polar) solvent / mobile phase / hexane

M2 dependent on correct M1

If M1 is blank then read explanation for possible M1 and M2

Allow converse argument for 1,2

[2 marks]

08.7

No CE = 0

Yes - mark on but there is NO MARK FOR YES

Solvent (more) polar or ethyl ethanoate is polar

Polar isomer more attracted to / more soluble in / stronger affinity to the solvent (than before)

Mark independently following yes

Penalise bonded to mobile phase in M2

[2 marks]

Q5 · June 2019 · Paper 2 · Q9 · [4 marks]

09.1

Conc HCl

Allow concentrations of 5M or higher

Allow conc sulfuric or conc strong alkalis

[1 mark]

09.2

Using ninhydrin or ultraviolet light

Allow I_2 (vapour)

[1 mark]

09.3

7 or seven

[1 mark]

09.4

Some of the amino acids did not separate/dissolve with the first/either solvent

OR

Some amino acids have the same R_f value or have the same affinity with the first/either solvent

Not amino acids have different R_f values in different solvents

[1 mark]

Q6 · June 2025 · Paper 3 · Q33 · [1 mark]

Answer: **C**

U and V

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