AQA A-Level Chemistry

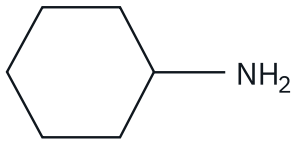
Amines mark scheme · goes with “Amines” · whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions

Mark schemes

Amines · 9 questions

Q1 · June 2023 · Paper 3 · Q34 · [1 mark]

Answer: **A**



Q2 · November 2020 · Paper 2 · Q5 · [9 marks]

(a) M1 The (relative) tendency of an atom to attract a pair of electrons/ the electrons/ electron density in a covalent bond

[1 mark]

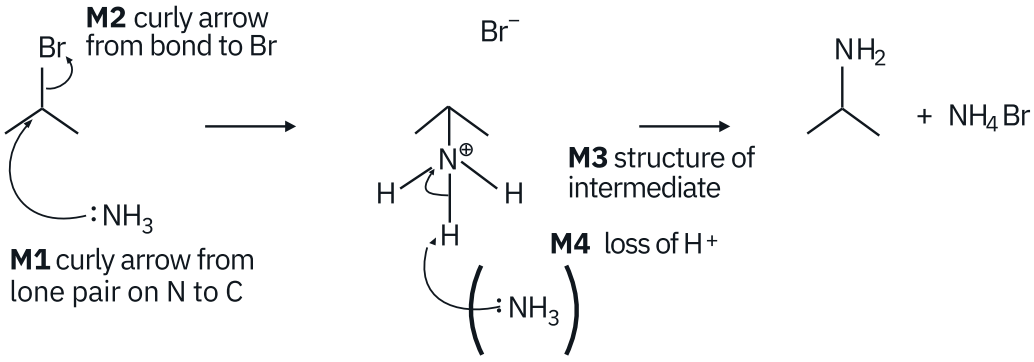
M2 Br is more electronegative than C (or vice versa)

[1 mark]

M3 So Br is δ- and C is δ+

[1 mark]

(b)

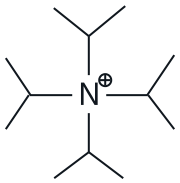


M4 Penalise loss of H^+ using Br^-

Allow S_N1

[4 marks]

(c) M1



Allow + outside square brackets

[1 mark]

M2 Use: (Hair) conditioner / (Cationic) surfactant / disinfectant

Allow fabric softener

[1 mark]

Q3 · June 2022 · Paper 2 · Q10 · [10 marks]

(a) Step 1 Conc HNO_3

Step 1 Conc H_2SO_4

If conc missing in both allow 1 for HNO_3 and H_2SO_4

Step 2 Sn and HCl

Allow Fe and HCl or Ni and H_2

[3 marks]

(b) (nucleophilic) addition-elimination

[1 mark]

(c) Chlorine

Allow Cl_2

UV (light)

Allow sunlight / High temp (above 300°C)

[2 marks]

(d) In Step 5 further substitution / gives other amine products

[1 mark]

In Step 2 only one amine

[1 mark]

(e) In B Alkyl group is electron donating or positive inductive effect

Or In A lone pair (on N partially) delocalised

[1 mark]

Lone pair on N more available

Lone pair on N less available

[1 mark]

Q4 · June 2024 · Paper 2 · Q9 · [9 marks]

(a) M1 CH_3NH_2 Shown as displayed or abbreviated structural formula

M2 N-methyl ethylamine or N-methyl ethanamine

For M2 allow alkyl groups reversed

For M2

Allow N-methyl aminoethane

OR

N-methyl N-ethylamine

OR

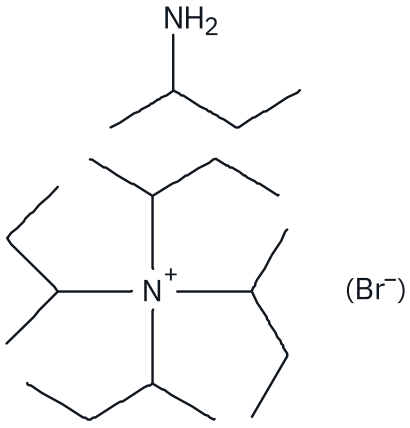
Methyl ethylamine

OR

Methyl ethanamine.

[2 marks]

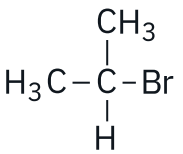
(b) M1



Note: If answers are non-skeletal penalise once only

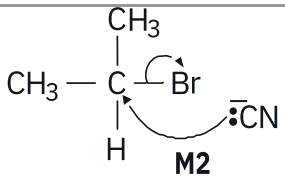
[2 marks]

(c) M1 For structure of 2 bromo propane



M1

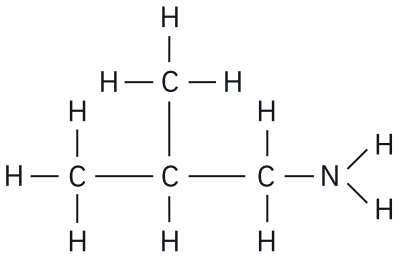
M2 For TWO correct curly arrows



M2

Step **1** → $(CH_3)_2CHCN + Br^-$

$(CH_3)_2CHCN + 2H_2$ —Step **2**→



M3 Amine **G**

M3 Amine G has a <u>fully displayed</u> structure of Amine G

[3 marks]

(d) M1 The <u>lone pair on nitrogen</u> in P is more available or more able to accept protons/H^+

M2 More alkyl groups are electron releasing/donating

OR

greater (positive) inductive effect (of the alkyl groups).

[2 marks]

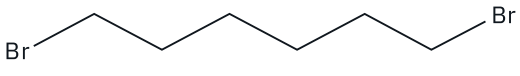
Q5 · June 2018 · Paper 3 · Q24 · [1 mark]

Answer: **C**

Q6 · June 2019 · Paper 2 · Q1 · [12 marks]

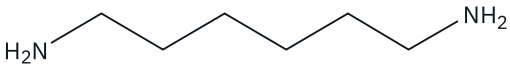
01.1

OR



+ $4NH_3$

→



+ $2NH_4Br$

$Br\text{-}(CH_2)_6\text{-}Br + 4NH_3 \rightarrow H_2N\text{-}(CH_2)_6\text{-}NH_2 + 2NH_4Br$

M1 both organic compounds correct

(not molecular formulae)

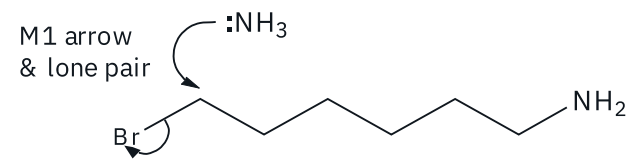
Allow one correct structural formula and the other

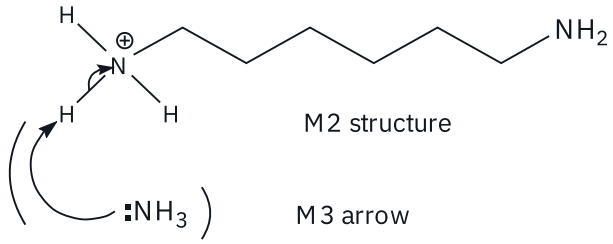
correct molecular formula of type $XC_6H_{12}X$

M2 balanced

[2 marks]

01.2

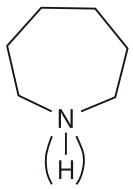




M2 structure

M3 arrow

NH_3 removal need not be shown but penalise Br^- removal



Impurity

(or as structural formula)

Or with structural formulae, $Br(CH_2)_6NH_2$ etc

Allow S_N1

Penalise incorrect partial charges in M1

allow

allow

[4 marks]

01.3

M1 Stage 1 reagent KCN or NaCN

M2 Stage 1 condition aqueous alcohol

M3 Stage 2 reagent & condition H_2 and Ni or Pt or Pd

Not HCN this loses M1 and M2

Any mention of acid loses M1 & M2

M2 dependent on correct M1 (allow condition if only

CN^- ions)

M3 only accessible if a cyanide is used in stage 1

Allow $LiAlH_4$ (in dry ether) – acidic/aqueous = CE,

but allow followed by acid.

NOT $NaBH_4$ NOT Sn/HCl or Fe/HCl

Ignore heat and reflux and pressure

Apply list principle to incorrect reagents/conditions

[3 marks]

01.4

In 3-aminopentane

Lone pair on N more available or Lone pair on N accepts H^+ better

because of alkyl electron pushing /inductive effect

Allow converse for ammonia

Or greater stability of protonated N

Mark independently

[2 marks]

01.5

No carbon (atom is) attached to 4 different groups

Allow central carbon has two alkyl groups

Allow symmetrical molecule

[1 mark]

Q7 · June 2019 · Paper 3 · Q27 · [1 mark]

Answer: **D**

Q8 · June 2025 · Paper 3 · Q35 · [1 mark]

Answer: **A**

$[C_{16}H_{33}N(CH_3)_3]Br$

Q9 · June 2025 · Paper 3 · Q7 · [1 mark]

Answer: **B**

$(C_2H_5)_3N^+CH_3$

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