AQA A-Level Chemistry

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

Mark schemes

Carboxylic acids · 11 questions

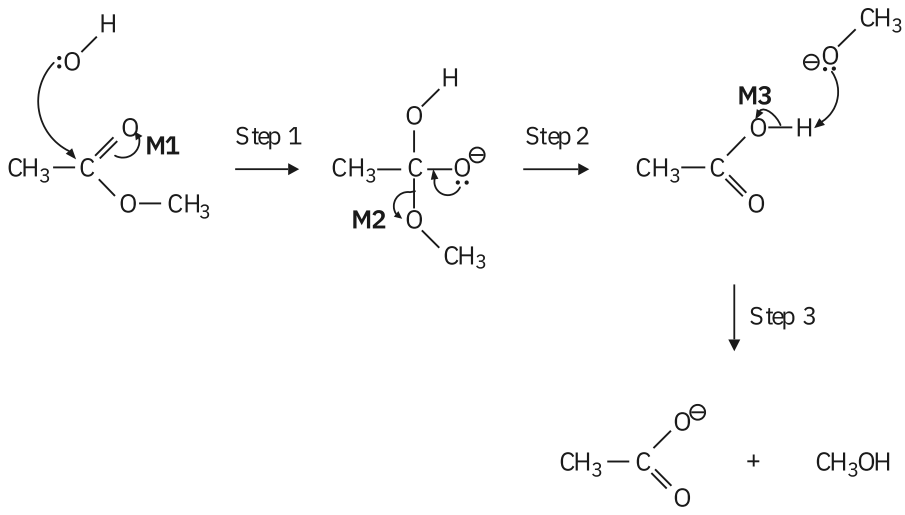
Q1 · June 2022 · Paper 3 · Q26 · [1 mark]

Answer: **B**

$CH_3CONHCH_2CH_3$

Q2 · June 2022 · Paper 2 · Q7 · [6 marks]

(a)



M1: Arrow from C=O bond to O

M2: Arrow from correct C-O bond to O

M3: Arrow from O-H bond to O

[3 marks]

(b) (Alkaline/base) hydrolysis

[1 mark]

(c) Base

Allow proton acceptor

Ignore ref to Bronsted Lowry

[1 mark]

(d) Soap only

[1 mark]

Q3 · June 2024 · Paper 3 · Q30 · [1 mark]

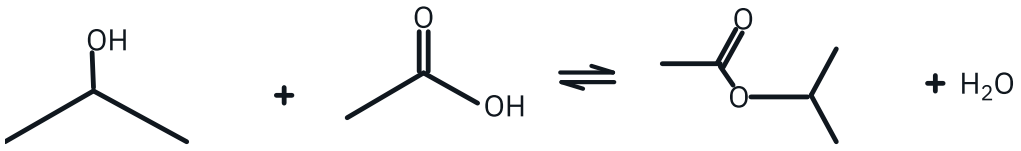
Answer: **D**

C_6H_5COOH

Q4 · June 2024 · Paper 2 · Q4 · [13 marks]

(a) M1 $CH_3CH(OH)CH_3 + CH_3COOH \rightleftharpoons CH_3COOCH(CH_3)_2 + H_2O$

M2 Methyl ethyl ethanoate.



Allow ECF from incorrect 5 carbon ester

Allow other valid names

1-methylethyl ethanoate

Isopropyl ethanoate

2-propyl ethanoate

Propan-2-yl ethanoate

[2 marks]

(b)

This question is marked using Levels of Response.

Level 3 5-6 marks	**All stages are virtually complete (virtually complete means one from stage 1 and two from stages 2 and 3). Answer communicates the whole explanation, including equations, coherently and shows a logical progression through all three stages.**
Level 2 3-4 marks	All stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies (covered means one from a stage) OR two stages virtually complete (virtually complete means one from stage 1 or two from stages 2 and 3). Answer is coherent and shows some progression through all three stages. Some steps in each stage may be incomplete.
Level 1 1-2 marks	Two stages are covered (covered means one from a stage) but the explanation of each stage may be incomplete or may contain inaccuracies OR only one stage is virtually complete (virtually complete means one from stage 1 or two from stages 2 and 3). Answer shows some progression between two stages.
0 mark	Insufficient correct chemistry to gain a mark.

Indicative Chemistry Content

Stage 1

1a Measuring cylinder(s) for the propan-2-ol and ethanoic acid (size not required but if specified should be between 10 - 100 cm^3)

Allow 10cm^3 / graduated pipette or burette

1b (Dropping/teat) pipette for sulfuric acid (NOT graduated or other qualification for pipette)

Stage 2 Diagram e.g. below to include

2a Labelled condenser shown vertical and open at top and bottom i.e. in cross section

2b Labelled water in at the bottom and water out at the top of the vertical condenser

2c Labelled reaction flask recognisable as either pear shaped or round bottomed

Stage 3 Safety

Needs precaution AND reason for each suggestion

3a Use a fume cupboard/fume hood/well-ventilated lab space

AND to avoid breathing in harmful/toxic/corrosive compounds

3b Wear gloves

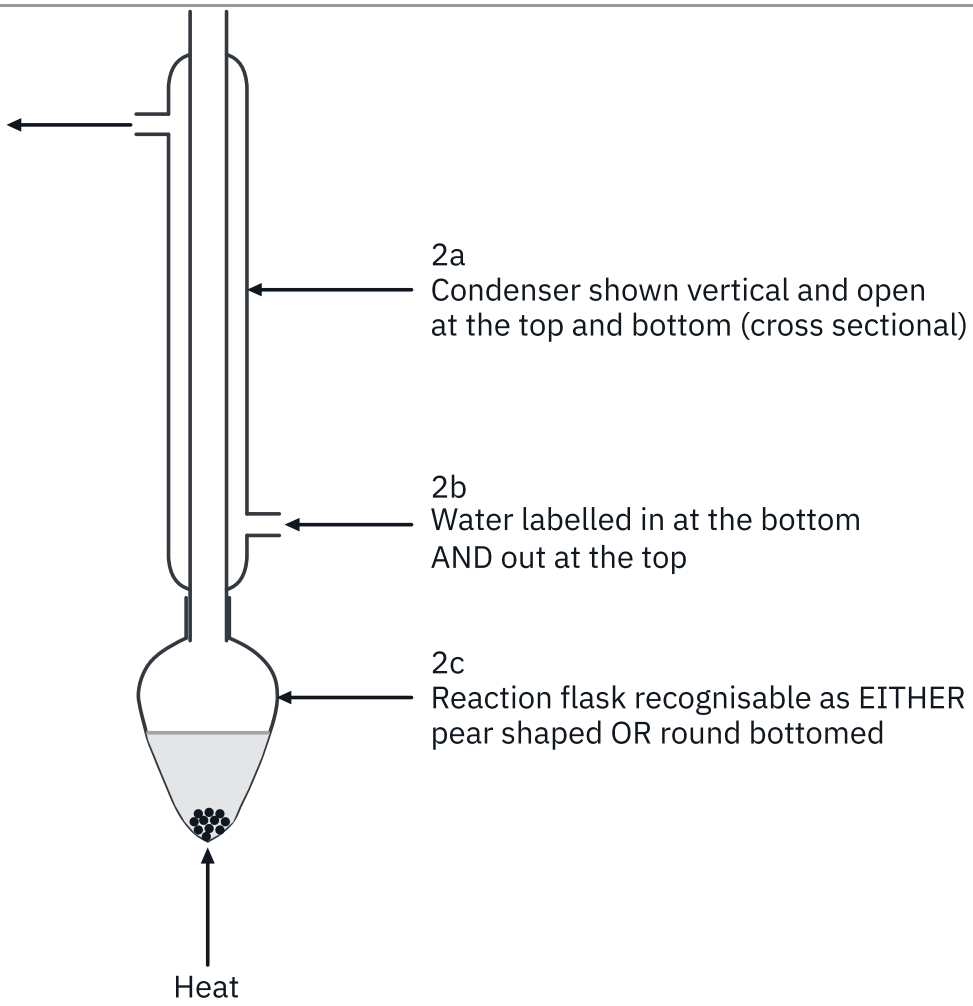
AND as compounds are corrosive

3c Add glass beads/chips (to the mixture before heating)/labelled as anti-bumping granules/chips

AND to ensure smooth boiling/reduce size of bubbles

3d Use an electric heater/water bath

AND as compounds are flammable



[6 marks]

(c) M1 To neutralise/remove/react with (excess) acid

M2 Remove stopper/bung OR tip the funnel upside down and open the tap

M3 There will be a build up of pressure/gas/carbon dioxide

M3 must be linked to their precaution in M2

OR

M2 Allow add stopper

M3 To prevent spillage

[3 marks]

(d) Drying agent/To remove water

Not dehydrating agent

[1 mark]

(e) Compare boiling point to a data book/known value

Boils at sharp boiling point/over a narrow temp range

[1 mark]

Q5 · June 2024 · Paper 3 · Q25 · [1 mark]

Answer: **D**

Propyl propanoate

Q6 · November 2021 · Paper 3 · Q31 · [1 mark]

Answer: **D**

$(CH_3CO)_2O$

Q7 · November 2021 · Paper 3 · Q28 · [1 mark]

Answer: **D**

ethanoyl chloride

Q8 · November 2021 · Paper 3 · Q17 · [1 mark]

Answer: **B**

It can form hydrogen bonds.

Q9 · June 2025 · Paper 2 · Q4 · [14 marks]

04.1

N_2O is unknown so should be treated as a toxic

or N_2O can cause respiratory problems

Allow N_2O / cyclohexanol / methanol / nitric acid is harmful / irritant / corrosive / toxic

[1 mark]

04.2

Oxidising agent

[1 mark]

04.3

M1 Dissolve in minimum / small volume of hot methanol/solvent

M2 Hot Filtration (not Buchner)

M3 Cool/ leave (to crystallise)

M4 Filter (under reduced pressure)

M5 Dry between filter papers or in a warm place

M1 allow Dissolve in hot methanol/solvent to

make saturated solution

[5 marks]

04.4

(Use of water at room temperature) dissolves product

OR Use of ice cold water prevents / reduces amount of product that dissolves

[1 mark]

04.5

Mistake: Water is being used to warm sample

Problem caused: Temperature will not reach high enough (to melt sample)

Mistake: Sample is much higher than bottom of thermometer

Problem caused: Temperature of sample will be lower / different than reading on the thermometer

Mistake: no stirrer is in the boiling tube or boiling tube used instead of D-tube / Thiele tube

Problem caused: variation in temperature

[4 marks]

04.6

Reason process is more sustainable:

Any one from

- Glucose is a renewable resource / feedstock
- Biological reactant / E. coli bacteria is renewable
- Pt catalyst can be re-used
- Higher atom economy

Reason process is less sustainable:

Any one from

- Synthesis is a 2-stage process
- Hydrogen gas is a non-renewable
- High pressures (are required in Stage 2)
- Uses a Pt catalyst that has been mined from the earth

[2 marks]

Q10 · June 2025 · Paper 3 · Q18 · [1 mark]

Answer: **C**

$CH_3CHClCH=C(CH_3)COOH$

Q11 · June 2025 · Paper 3 · Q6 · [6 marks]

06.1

E-Z (isomerism)

ALLOW Z / geometric / cis-trans / cis

[1 mark]

06.2

M1 9

M2 four

M3 biodiesel / biofuel

[3 marks]

06.3

M1 $C_{18}H_{31}O_2Na$ / $C_{17}H_{31}COONa$

M2 soaps / anionic surfactant

ALLOW $C_{18}H_{31}O_2^-$ / $C_{17}H_{31}COO^-$

ALLOW any unambiguous formula/structure

ALLOW CHCH for CH=CH in structural formula

NOT O–Na i.e. covalent bond between O & Na

NOT cationic surfactant / detergents / shampoo

[2 marks]

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