

OCR A-Level Chemistry A

Alcohols and haloalkanes

Questions only

The newest questions, about an hour. All 23 are in the exam generator.

Questions

9

Total marks

39

Time allowed

53 min

Name

Class or teacher

Date

Instructions

- Answer all questions in the spaces provided.
- Use black ink. Show your working for every calculation.
- You may use a scientific calculator and the OCR Data Sheet.
- Print the separate mark scheme when you are ready to mark your answers.

For marking

Q	Source	Marks	Score
1	2022 P2 Q1	1	
2	2022 P3 Q3	10	
3	2023 P2 Q17	14	
4	2024 P2 Q3	1	
5	2024 P2 Q5	1	
6	2024 P2 Q6	1	
7	2025 P2 Q19	9	
8	2025 P2 Q4	1	
9	2025 P2 Q7	1	

Total _____ / 39 Percentage _____ %

Questions from OCR past papers, 2022–2025, reproduced for revision. Practise these topics online, with instant marking:

whiteboardchemistry.com/revision/exam-questions/ocr-a-level-chemistry/?topics=alcohols-and-haloalkanes&len=0

Questions

Alcohols and haloalkanes · 9 questions · 39 marks · time allowed 53 min

Q1 · June 2022 · Paper 2 (Synthesis and analytical techniques) · Q1 · [1 mark]

Which statement is correct for the different rates of hydrolysis of RCl and RBr?

Tick (✓) one box.

- ☐ **A** RBr is hydrolysed faster because Cl is more electronegative than Br.
- ☐ **B** RBr is hydrolysed faster because the C–Cl bond enthalpy is greater than C–Br.
- ☐ **C** RCl is hydrolysed faster because Cl is more electronegative than Br.
- ☐ **D** RCl is hydrolysed faster because the C–Br bond enthalpy is greater than C–Cl.

Q2 · June 2022 · Paper 3 (Unified chemistry) · Q3 · [10 marks]

This question also needs Organic synthesis, IR and mass spectra.

Information about 1-bromobutane and butan-1-ol is shown in the table.

Compound	Melting point / °C	Boiling point / °C	Density / g cm ⁻³
1-bromobutane	–113	102	1.268
butan-1-ol	–90	118	0.810

A student prepares a sample of 1-bromobutane by refluxing 9.25 g of butan-1-ol with sodium bromide and sulfuric acid.

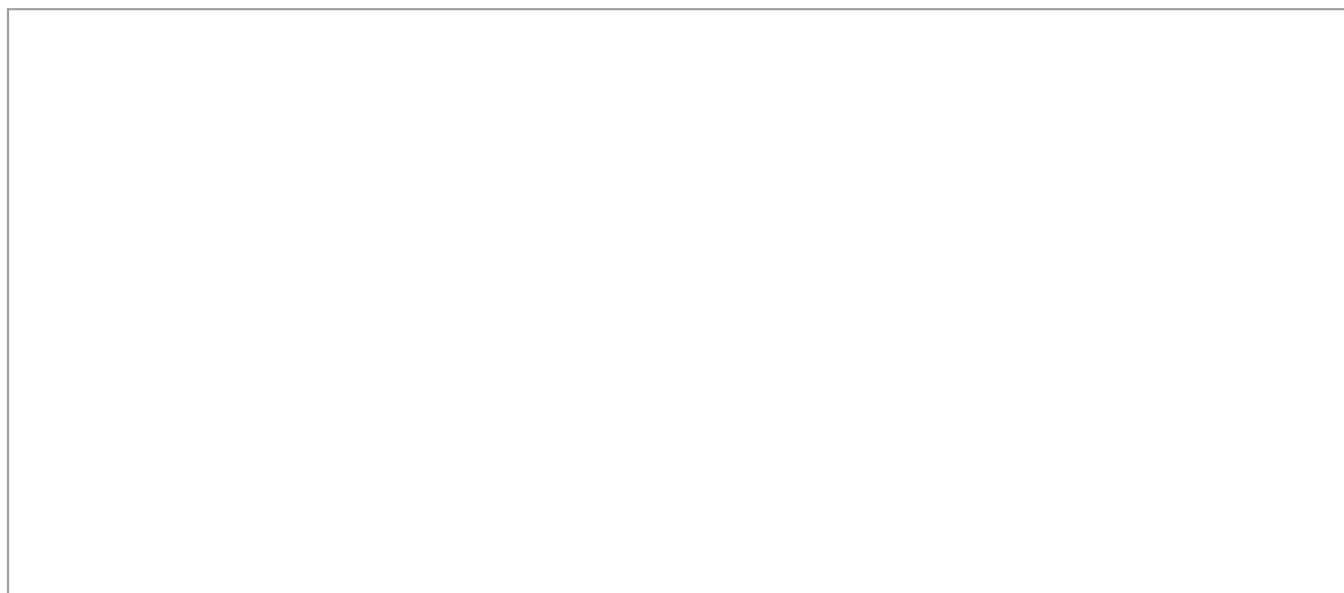
After reflux, the reaction mixture is purified.

The student obtains 6.10 cm^3 of pure 1-bromobutane.

3(a) Draw a diagram to show how the student would have carried out the reflux and calculate the percentage yield of 1-bromobutane that the student obtains.

Describe how the student could have obtained pure 1-bromobutane from the reaction mixture obtained after reflux.

[6 marks]



3(b) Butan-1-ol reacts with sodium bromide and sulfuric acid to form 1-bromobutane by nucleophilic substitution.

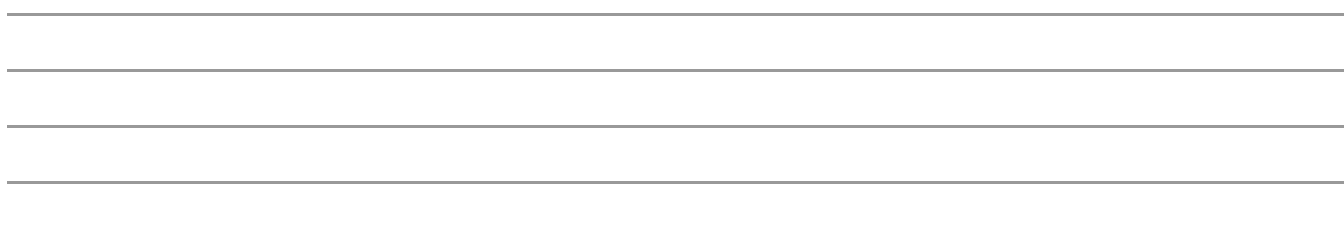
The mechanism for this reaction takes place by two steps.

Step 1 The oxygen atom of the alcohol group accepts a proton to form a positively-charged intermediate.

Step 2 Bromide ions react with the intermediate from Step 1 by nucleophilic substitution to form 1-bromobutane.

Show both steps in this mechanism.

[4 marks]



Q3 · June 2023 · Paper 2 (Synthesis and analytical techniques) · Q17 · [14 marks]

This question also needs NMR spectroscopy.

This question is about alcohols.

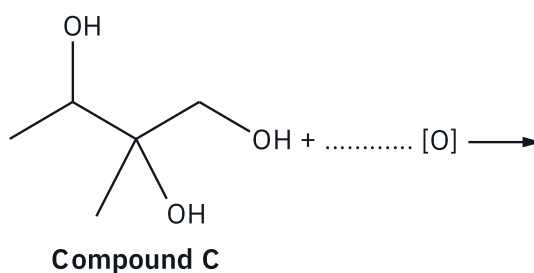
17(a) An **unsaturated** alcohol has 6 carbon atoms and contains **one** C=C bond.

Construct an equation for the complete combustion of this alcohol.

[2 marks]

17(b) Compound C, shown below, is refluxed with excess acidified potassium dichromate(VI) to form a single organic product and one other product.

Complete the equation for this reaction.



[3 marks]

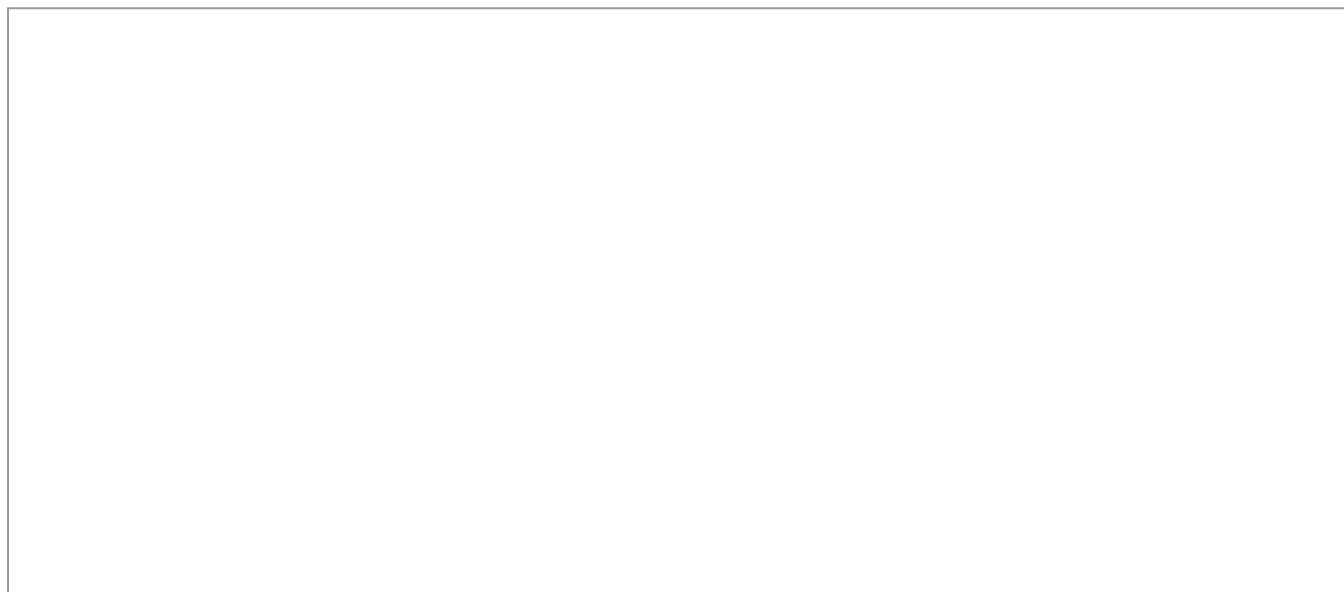
Compound D, shown below, is refluxed with H_2SO_4 , as an acid catalyst, to form a mixture of three isomers with the molecular formula C_7H_{10} .



Compound D

17(c)(i) Draw the structures of the **three** isomers of C_7H_{10} formed from compound D.

[3 marks]



17(c)(ii) A student converts compound D into a diiodoalkane.

Suggest suitable reagents for this reaction.

[1 mark]

17(d) There are 4 structural isomers of $C_4H_{10}O$ that are alcohols.

A student predicts that these structural isomers could be distinguished using carbon-13 NMR spectroscopy.

Explain whether the student is correct.

In your answer, show how the peaks in the carbon-13 NMR spectra are linked to the structure of each alcohol isomer.

[5 marks]

Q4 · June 2024 · Paper 2 (Synthesis and analytical techniques) · Q3 · [1 mark]

This question also needs Group 2 and the halogens.

A student investigates the rate of hydrolysis of different iodoalkanes using aqueous silver nitrate in ethanol.

What colour of precipitate is seen?

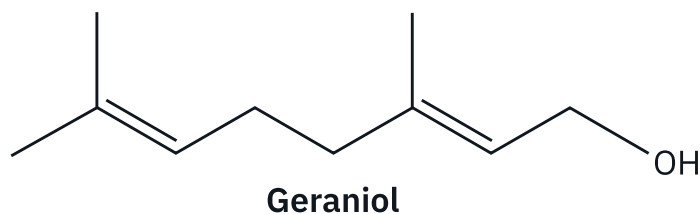
Tick (✓) one box.

- ☐ **A** Brown
- ☐ **B** Cream
- ☐ **C** White
- ☐ **D** Yellow

Q5 • June 2024 • Paper 2 (Synthesis and analytical techniques) • Q5 • [1 mark]

This question also needs Alkenes and addition polymers.

Geraniol, shown below, is a component in many natural oils.



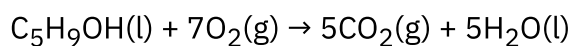
Which pair of reagents identifies both functional groups in geraniol?

Tick (✓) one box.

- ☐ **A** Acidified dichromate(VI) and 2,4-dinitrophenylhydrazine.
- ☐ **B** Bromine water and 2,4-dinitrophenylhydrazine.
- ☐ **C** Bromine water and acidified dichromate(VI).
- ☐ **D** Tollens' reagent and aqueous silver nitrate in ethanol.

Q6 • June 2024 • Paper 2 (Synthesis and analytical techniques) • Q6 • [1 mark]

4.30 g of the alcohol C_5H_9OH , ($M_r = 86.0$), is burned in oxygen.



Which volume of oxygen gas is needed, in dm^3 , for this complete combustion of C_5H_9OH , at RTP?

Tick (✓) one box.

- ☐ **A** 1.2
- ☐ **B** 2.4
- ☐ **C** 5.8
- ☐ **D** 8.4

Q7 • June 2025 • Paper 2 (Synthesis and analytical techniques) • Q19 • [9 marks]

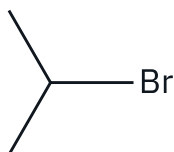
This question also needs Organic synthesis, IR and mass spectra.

This question is about reactions of haloalkanes.

Haloalkanes can react with potassium cyanide to form new carbon–carbon bonds.

19(a)(i) Outline the mechanism for the reaction of 2-bromopropane with cyanide ions.

Show curly arrows, relevant dipoles and products.



[3 marks]

19(a)(ii) Name this type of mechanism.

[1 mark]

The table below shows the boiling points of propan-1-ol and 1-bromopropane.

	Propan-1-ol	1-Bromopropane
Boiling point / °C	97	71

Propan-1-ol can be reacted to form 1-bromopropane.

19(b)(i) Suggest suitable reagents for this reaction.

[1 mark]

19(b)(ii) The reaction to form 1-bromopropane from propan-1-ol is carried out in a flask.

After the reaction, the flask contains a mixture of an organic layer (density = 1.35 g cm^{-3}) and an aqueous layer (1.04 g cm^{-3}).

Describe how to obtain pure **1-bromopropane** from the mixture.

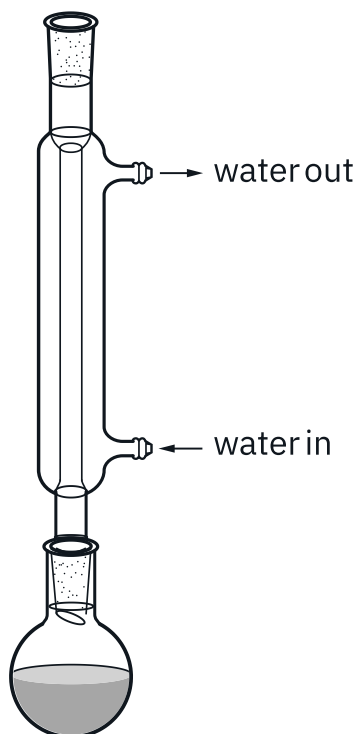
[4 marks]

Q8 · June 2025 · Paper 2 (Synthesis and analytical techniques) · Q4 · [1 mark]

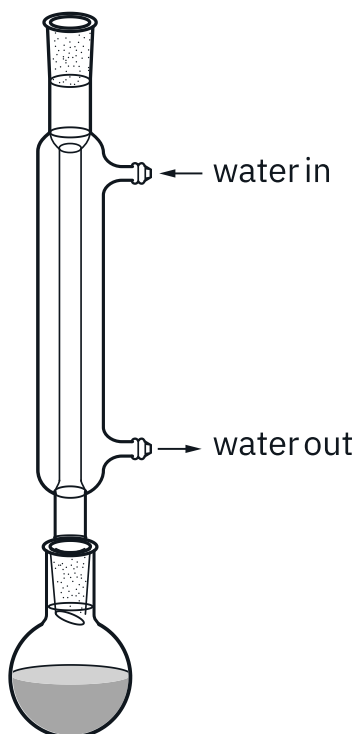
Which diagram shows the correct way to set up apparatus for converting ethanol to ethanoic acid?

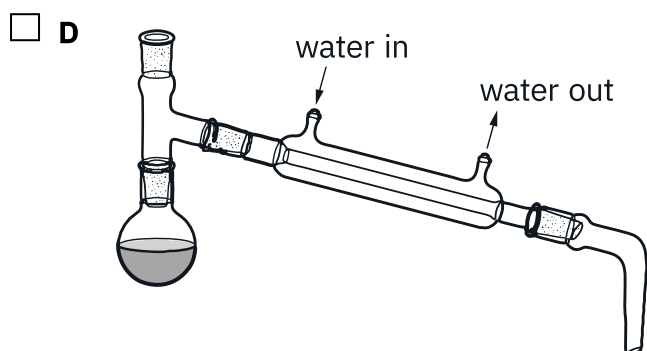
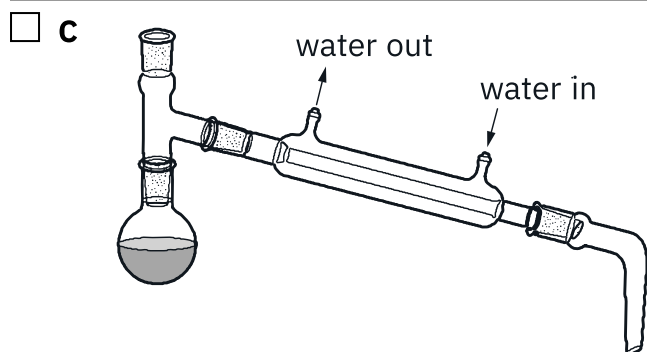
Tick (✓) one box.

☐ **A**



☐ **B**





Q9 · June 2025 · Paper 2 (Synthesis and analytical techniques) · Q7 · [1 mark]

What are the **organic** products of the **acid** hydrolysis of $\text{CH}_3\text{CH}_2\text{CONHCH}_3$?

Tick (✓) one box.

- ☐ A $\text{CH}_3\text{CH}_2\text{COO}^- + \text{CH}_3\text{NH}_3^+$
- ☐ B $\text{CH}_3\text{CH}_2\text{COOH} + \text{CH}_3\text{NH}_3^+$
- ☐ C $\text{CH}_3\text{CH}_2\text{COOH} + \text{CH}_3\text{NH}_2$
- ☐ D $\text{CH}_3\text{CH}_2\text{COO}^- + \text{CH}_3\text{NH}_2$

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Mark scheme:

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