

AQA A-Level Chemistry

Alcohols

Questions only

The newest questions, about an hour. All 32 are in the exam generator.

Questions

11

Total marks

46

Time allowed

1 h

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 AQA Data Sheet.
- Print the separate mark scheme when you are ready to mark your answers.

For marking

Q	Source	Marks	Score
1	2022 A-level P2 Q5	12	
2	2022 A-level P3 Q31	1	
3	2023 A-level P3 Q32	1	
4	2023 AS P2 Q22	1	
5	2024 A-level P3 Q29	1	
6	2022 A-level P3 Q24	1	
7	2025 AS P2 Q11	1	
8	2025 AS P2 Q13	1	
9	2025 AS P2 Q6	16	
10	2025 A-level P3 Q24	1	
11	2025 A-level P3 Q5	10	

Total _____ / 46 Percentage _____ %

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

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

Questions

Alcohols · 11 questions · 46 marks · time allowed 1 h

Q1 · June 2022 · Paper 2 · Q5 · [12 marks]

This question also needs Amount of substance.

This question is about the preparation of hexan-2-ol.

Hexan-2-ol does not mix with water and has a boiling point of 140 °C

Hexan-2-ol can be prepared from hex-1-ene using this method.

- a Measure out 11.0 cm³ of hex-1-ene into a boiling tube in an ice bath.
- b Carefully add 5 cm³ of concentrated phosphoric acid to the hex-1-ene.
- c After 5 minutes add 10 cm³ of distilled water to the mixture and transfer the boiling tube contents to a separating funnel.
- d Shake the mixture and allow it to settle.
- e Discard the lower (aqueous) layer.
- f Add a fresh 10 cm³ sample of distilled water and repeat steps d and e.
- g Transfer the remaining liquid to a beaker.
- h Add 2 g of anhydrous magnesium sulfate and allow to stand for 5 minutes.
- i Filter the mixture under reduced pressure.

j Distil the filtrate and collect the distillate that boils in the range 130–160 °C

(a) It is important to wear eye protection and a lab coat when completing this experiment.

Suggest, with a reason, one other appropriate safety precaution for this experiment.

[2 marks]

Precaution

Reason

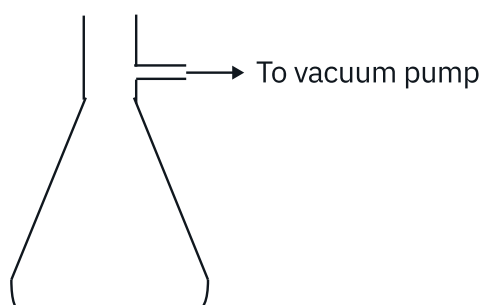
(b) Give a reason for adding the distilled water in steps c and f.

[1 mark]

(c) Give a reason for adding anhydrous magnesium sulfate in step h.

[1 mark]

(d) Complete and label the diagram of the apparatus used to filter the mixture under reduced pressure in step i.



[2 marks]

Draw your answer on the figure above.

(e) Identify the most likely organic impurity, other than hex-1-ene, in the distillate collected in step j.

Suggest one reason why it could be difficult to remove this impurity.

[2 marks]

Impurity

Reason

(f) Calculate the mass, in g, of hexan-2-ol formed from 11.0 cm^3 of hex-1-ene if the yield is 31.0%

Give your answer to 1 decimal place.

Density of hex-1-ene = 0.678 g cm^{-3}

Mass g

[4 marks]

Q2 • June 2022 • Paper 3 • Q31 • [1 mark]

This question also needs Aldehydes and ketones, Carboxylic acids and Halogenoalkanes.

Which pair of reagents does not produce ethanol?

Tick (✓) one box.

- ☐ **A** $\text{CH}_3\text{CH}_2\text{Br}$ and NaOH(aq)
- ☐ **B** $\text{CH}_3\text{COOCH}_3$ and NaOH(aq)
- ☐ **C** $\text{HCOOCH}_2\text{CH}_3$ and NaOH(aq)
- ☐ **D** CH_3CHO and $\text{NaBH}_4\text{(aq)}$
-

Q3 • June 2023 • Paper 3 • Q32 • [1 mark]

Which is a correct equation for the oxidation of 1-phenylethanol? [O] represents oxygen from an oxidising agent.

Tick (✓) one box.

- ☐ **A** $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{OH} + 2 [\text{O}] \rightarrow \text{C}_6\text{H}_5\text{CH}_2\text{COOH} + \text{H}_2\text{O}$
- ☐ **B** $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{OH} + [\text{O}] \rightarrow \text{C}_6\text{H}_5\text{CH}_2\text{CHO} + \text{H}_2\text{O}$
- ☐ **C** $\text{C}_6\text{H}_5\text{CH(OH)CH}_3 + [\text{O}] \rightarrow \text{C}_6\text{H}_5\text{CH}_2\text{CHO} + \text{H}_2\text{O}$
- ☐ **D** $\text{C}_6\text{H}_5\text{CH(OH)CH}_3 + [\text{O}] \rightarrow \text{C}_6\text{H}_5\text{COCH}_3 + \text{H}_2\text{O}$
-

Q4 • June 2023 • AS Paper 2 • Q22 • [1 mark]

The alcohol $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ can be oxidised. Which compound cannot be produced by oxidation of this alcohol?

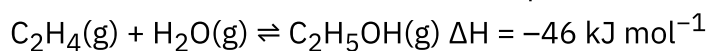
Tick (✓) one box.

- ☐ **A** CO_2
- ☐ **B** CH_3COCH_3
- ☐ **C** $\text{CH}_3\text{CH}_2\text{CHO}$
- ☐ **D** $\text{CH}_3\text{CH}_2\text{COOH}$

Q5 • June 2024 • Paper 3 • Q29 • [1 mark]

This question also needs Chemical equilibria.

Which statement about the industrial production of ethanol from ethene at 300 °C is correct?



Tick (✓) one box.

- ☐ **A** The use of an acid catalyst increases the yield of ethanol.
- ☐ **B** The reaction is slower than fermentation.
- ☐ **C** An increase in temperature, at constant pressure, increases the value of K_p .
- ☐ **D** An increase in pressure, at constant temperature, increases the equilibrium yield of ethanol.

Q6 • June 2022 • Paper 3 • Q24 • [1 mark]

Which statement is not correct for both primary and secondary alcohols?

Tick (✓) one box.

- ☐ **A** They are easily oxidised to carboxylic acids by acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution.
- ☐ **B** They can be formed from bromoalkanes by hydrolysis.
- ☐ **C** They form esters with carboxylic acids.
- ☐ **D** They show hydrogen bonding in the liquid state.

Q7 • June 2025 • AS Paper 2 • Q11 • [1 mark]

Which compound produces $(\text{CH}_3)_2\text{CHCOCH}_3$ on oxidation?

Tick (✓) one box.

- ☐ **A** 2-methylpropan-1-ol
- ☐ **B** 2,2-dimethylpropan-1-ol
- ☐ **C** 2-methylbutan-2-ol
- ☐ **D** 3-methylbutan-2-ol

Q8 · June 2025 · AS Paper 2 · Q13 · [1 mark]

2-Methylpentane-1,2,4-triol is refluxed with an excess of acidified potassium dichromate(VI).

What is the molecular formula of the main organic product?

Tick (✓) one box.

☐ **A** $C_6H_8O_4$

☐ **B** $C_6H_{10}O_3$

☐ **C** $C_6H_{10}O_4$

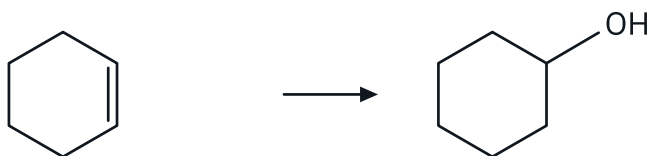
☐ **D** $C_6H_{12}O_3$

Q9 · June 2025 · AS Paper 2 · Q6 · [16 marks]

This question also needs Amount of substance.

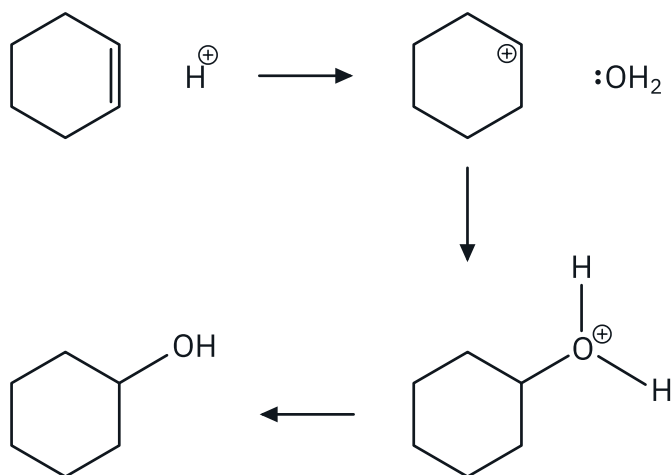
Cyclohexanol can be made in the laboratory by the hydration of cyclohexene using concentrated phosphoric acid as a catalyst at low temperature. The cyclohexanol is purified by distillation.

06.1 Complete the equation for the conversion of cyclohexene to cyclohexanol in this reaction.



[1 mark]

06.2 Complete the mechanism for this reaction by adding curly arrows in the relevant places.



[3 marks]

Draw your answer on the figure above.

06.3 Concentrated phosphoric acid (H_3PO_4) has a density of 1.69 g cm^{-3}

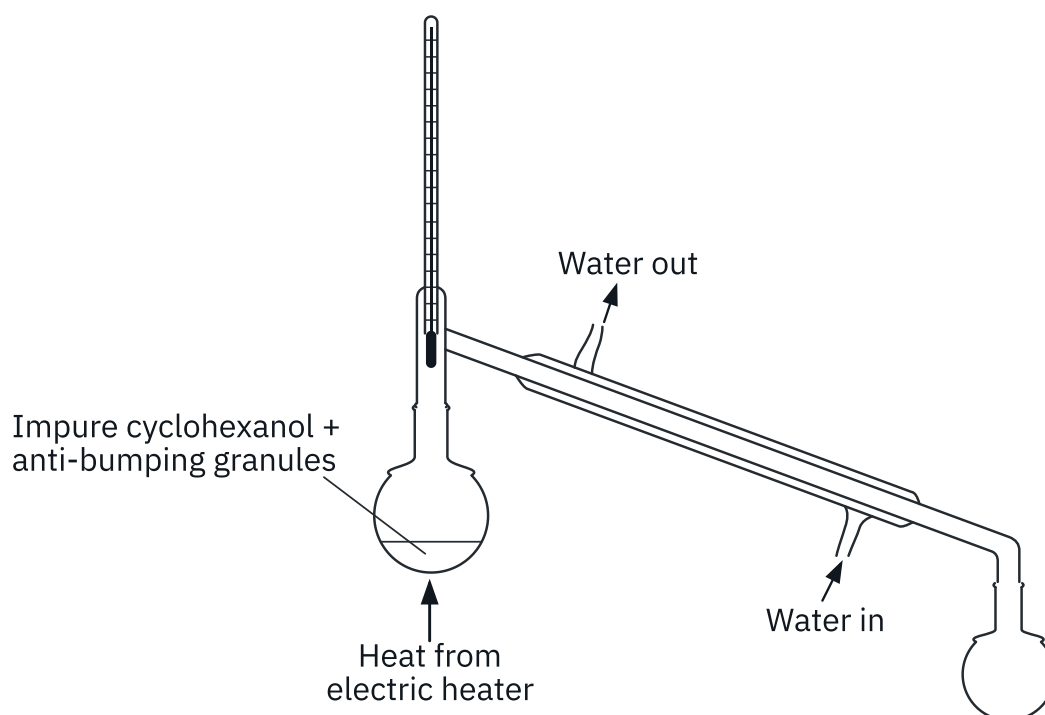
The concentrated acid contains 85% phosphoric acid and 15% water by mass.

Calculate the amount, in mol, of phosphoric acid in 6.0 cm^3 of concentrated phosphoric acid.

Amount of phosphoric acid mol

A student sets up the apparatus shown in Figure 2 to purify the cyclohexanol by distillation. Suitable clamps are used to hold the apparatus firmly in place.

Figure 2



[2 marks]

06.4 Explain why the condenser in Figure 2 is connected so that water enters at the bottom and not at the top.

[2 marks]

06.5 The flask heated in Figure 2 contains anti-bumping granules.

State why these are used.

[1 mark]

06.6 Suggest why the flask in Figure 2 is heated with an electric heater, rather than a Bunsen burner.

[1 mark]

06.7 State why the apparatus set up in Figure 2 is dangerous.

State how this problem could be solved.

[2 marks]

Why the apparatus is dangerous

How to solve the problem

06.8 The cyclohexanol can be dehydrated to re-form cyclohexene by heating with concentrated phosphoric acid.

Name the mechanism for this reaction.

Cyclohexanol biofuel can be made from waste biomass materials such as rice and straw.

Cyclohexanol biofuel can be mixed with diesel and used as fuel in cars.

[1 mark]

06.9 Give an equation for the complete combustion of cyclohexanol ($C_6H_{11}OH$).

[1 mark]

06.10 The use of cyclohexanol biofuel mixed with diesel in cars is not carbon-neutral.

State the meaning of the term carbon-neutral.

Give a reason why the use of this mixture as a fuel is not carbon-neutral.

[2 marks]

Carbon-neutral meaning

Why the fuel is not carbon-neutral

Q10 · June 2025 · Paper 3 · Q24 · [1 mark]

Ethanol biofuel can be produced by fermentation.

Which statement about this process is correct?

Tick (✓) one box.

- ☐ **A** It is aerobic and the ethanol is separated by filtration.
- ☐ **B** It is aerobic and the ethanol is separated by fractional distillation.
- ☐ **C** It is anaerobic and the ethanol is separated by filtration.
- ☐ **D** It is anaerobic and the ethanol is separated by fractional distillation.

Q11 · June 2025 · Paper 3 · Q5 · [10 marks]

This question also needs Organic analysis.

This question is about oxidation.

05.1 A student has separate unlabelled samples of propan-1-ol and propan-2-ol but does not know which sample is which alcohol.

The student plans a series of steps to identify the alcohols.

Step 1 Oxidise each sample, distilling off the organic product as it is formed.

Step 2 Identify the organic products using a simple chemical test.

Step 3 Confirm the identities using the infrared spectrum of each original sample.

Give further details of each step in the plan. In your answer include

- an appropriate oxidising agent used in Step 1
- equations, using [O] to represent the oxidising agent, for each reaction in Step 1
- a suitable test and expected observations in Step 2
- how the infrared spectra can be used to confirm the identities.

[6 marks]

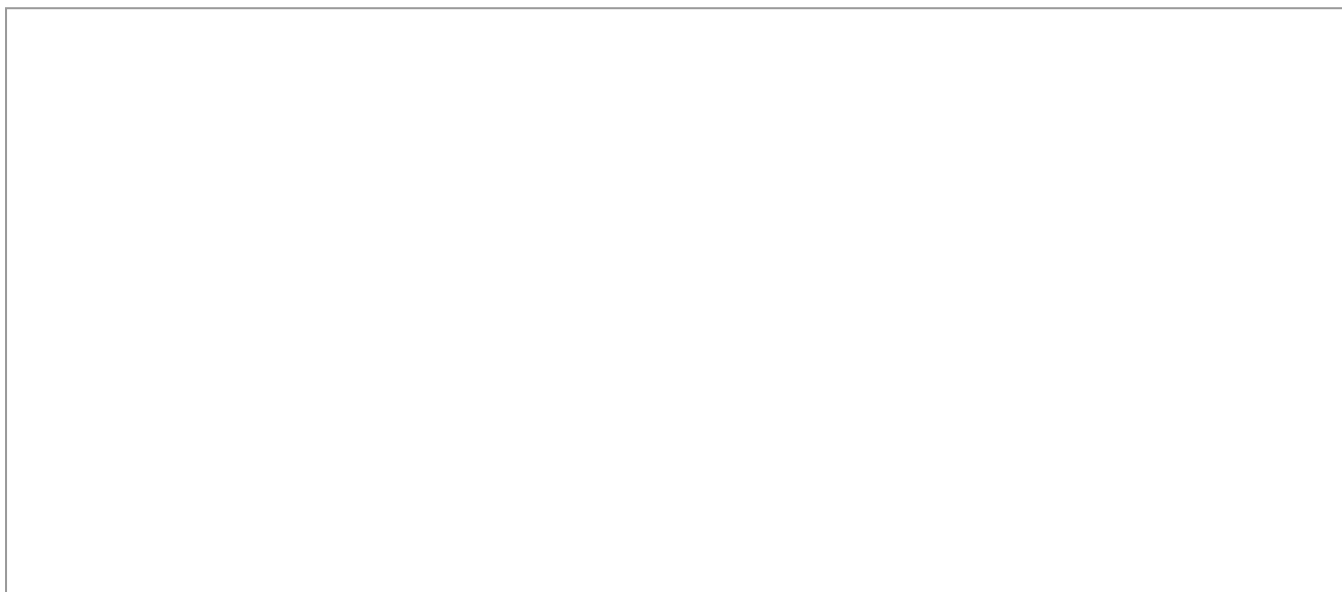
05.2 A primary alcohol can be oxidised to form a carboxylic acid using an excess of the oxidising agent in Question 05.1.

Give the condition needed for this reaction.

Complete the diagram, adding labels, to show how the apparatus would be set up.

Condition

[3 marks]



05.3 During oxidation reactions, anti-bumping granules are often added to the pear-shaped flask containing the reactants.

State why anti-bumping granules are used.

[1 mark]

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Mark scheme:

whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions/pdf/alcohols-mark-scheme.pdf