

AQA A-Level Chemistry

Aldehydes and ketones

Questions only

All 8 aldehydes and ketones questions

Questions

8

Total marks

44

Time allowed

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

For marking

Q	Source	Marks	Score
1	2024 A-level P2 Q8	12	
2	2024 A-level P2 Q5	5	
3	2024 A-level P3 Q24	1	
4	2024 A-level P3 Q27	1	
5	2021 A-level P3 Q3	11	
6	2023 A-level P2 Q3	12	
7	2017 A-level P3 Q23	1	
8	2018 A-level P3 Q28	1	

Total _____ / 44 Percentage _____ %

Questions from AQA past papers, 2017–2024, reproduced for revision. Practise these topics online, with instant marking:

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

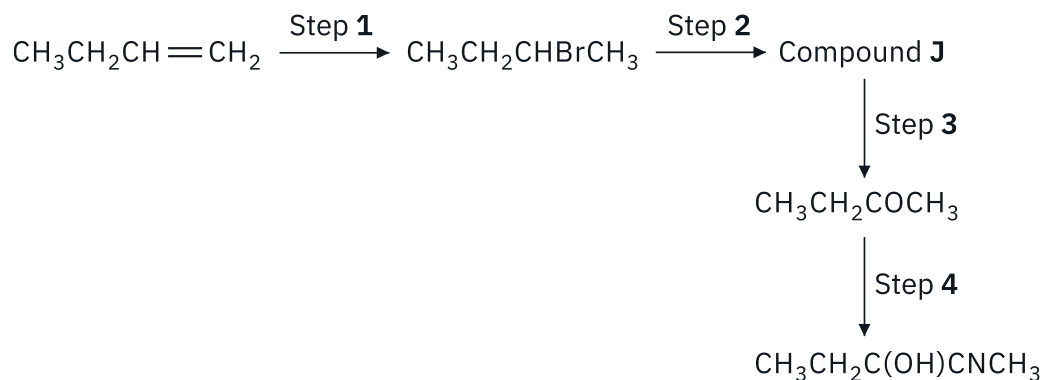
Questions

Aldehydes and ketones · 8 questions · 44 marks · time allowed 57 min

Q1 · June 2024 · Paper 2 · Q8 · [12 marks]

This question also needs Alkenes and Halogenoalkanes.

This question is about an organic synthesis.



(a) Name the mechanism in Step 1.

State the reagent(s) used for Step 1.

[2 marks]

Name of mechanism

Reagent(s)

(b) Identify compound J.

State the reagent(s) and conditions needed for Step 2.

[2 marks]

Compound J

Reagent(s) and conditions

(c) State the reagent(s) used for Step 4.

Outline the mechanism for Step 4.

[5 marks]

Reagent(s)

Mechanism

(d) Explain why Step 4 produces a racemic mixture.

[3 marks]

Q2 · June 2024 · Paper 2 · Q5 · [5 marks]

This question also needs Alcohols, Carboxylic acids and Halogenoalkanes.

This question is about simple test-tube reactions to identify organic liquids.

(a) Silver nitrate solution can be used to distinguish between propanoyl chloride and 1-chloropropane.

Give the observations you would expect when a few drops of silver nitrate solution are added to separate samples of propanoyl chloride and 1-chloropropane.

[2 marks]

Observation with propanoyl chloride

Observation with 1-chloropropane

(b) Three unlabelled bottles are known to contain either propan-1-ol, propanal, or propanone.

A sample of each liquid is warmed with a few drops of Fehling's solution.

Identify the liquid that reacts with Fehling's solution and give the expected observation.

Suggest a further simple test-tube reaction that can be used to distinguish between the remaining two liquids.

Give the expected observation with the liquid that reacts.

[3 marks]

Liquid that reacts with Fehling's solution

Observation

Further test

Observation

Q3 • June 2024 • Paper 3 • Q24 • [1 mark]

In which conversion does a nucleophile attack the organic reactant?

Tick (✓) one box.

- ☐ **A** $\text{CH}_3\text{CH}_2\text{CH}_3 \rightarrow \text{CH}_3\text{CHClCH}_3$
- ☐ **B** $\text{CH}_3\text{CH}=\text{CH}_2 \rightarrow \text{CH}_3\text{CHBrCH}_3$
- ☐ **C** $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} \rightarrow \text{CH}_3\text{CH}=\text{CH}_2$
- ☐ **D** $\text{CH}_3\text{CH}_2\text{CHO} \rightarrow \text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CN}$

Q4 · June 2024 · Paper 3 · Q27 · [1 mark]

What is the product when 3-methylbutan-2-one reacts with acidified KCN?

Tick (✓) one box.

- ☐ **A** 2-hydroxy-2,3-dimethylbutanenitrile
- ☐ **B** 3-hydroxy-2,3-dimethylbutanenitrile
- ☐ **C** 2-hydroxy-3-methylpentanenitrile
- ☐ **D** 3-hydroxy-2-methylpentanenitrile

Q5 · November 2021 · Paper 3 · Q3 · [11 marks]

This question is about ketones.

(a) Solution X reacts with liquid ketones to form a crystalline solid.

This reaction can be used to identify a ketone if the crystalline solid is separated, purified by recrystallisation, and the melting point determined.

Describe how the crystalline solid is separated and purified.

[5 marks]

[illegible]

(b) Propanone (CH_3COCH_3) reacts with the weak acid HCN to form a hydroxynitrile.

This hydroxynitrile is usually made by reaction of propanone with KCN followed by dilute acid, instead of with HCN

State the hazard associated with the use of KCN

Suggest a reason, other than safety, why KCN is used instead of HCN.

[2 marks]

Hazard

Why KCN is used

(c) Outline the mechanism for the reaction of propanone with KCN followed by dilute acid.

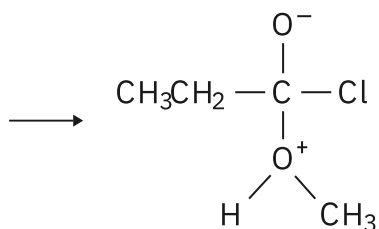
[4 marks]

Q6 · June 2023 · Paper 2 · Q3 · [12 marks]

This question is about intermediates in reaction mechanisms.

(a) Figure 1 shows an intermediate formed in the first step of a nucleophilic addition–elimination mechanism.

Figure 1



Complete Figure 1 to show the structures of the two reactant species with curly arrows and relevant lone pairs of electrons involved in the formation of the intermediate.

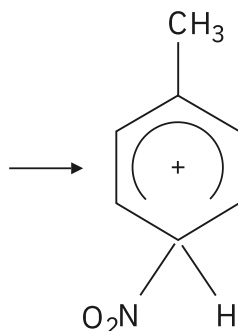
Draw curly arrows and relevant lone pairs of electrons on the intermediate to show how the final products are formed.

[4 marks]

Draw your answer on the figure above.

(b) Figure 2 shows an intermediate formed in the first step of a reaction mechanism of methylbenzene.

Figure 2



Complete Figure 2 to show the reactant species and any curly arrows involved in the formation of the intermediate.

Draw a curly arrow on the intermediate to show how the product is formed.

Give the name of the reaction mechanism.

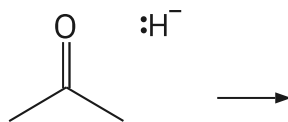
Name of mechanism

[4 marks]

Draw your answer on the figure above.

(c) Figure 3 shows the reactant species involved in the first step of a mechanism.

Figure 3



Complete Figure 3 to show the structure of the intermediate formed with curly arrows involved in its formation.

Give the name of the reaction mechanism.

Name of mechanism

[4 marks]

Draw your answer on the figure above.

Q7 • June 2017 • Paper 3 • Q23 • [1 mark]

Which alcohol could not be produced by the reduction of an aldehyde or a ketone?

Tick (✓) one box.

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

Q8 · June 2018 · Paper 3 · Q28 · [1 mark]

How many structural isomers with the molecular formula $C_5H_{10}O$ react with Tollens' reagent?

Tick (✓) one box.

☐ **A** 3

☐ **B** 4

☐ **C** 5

☐ **D** 6

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Mark scheme:

whiteboardchemistry.com/revision/aqa-a-level-chemistry/exam-questions/pdf/aldehydes-and-ketones-mark-scheme.pdf