

AQA A-Level Chemistry

Alkenes

Questions only

The newest questions, about an hour. All 22 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	2021 AS P2 Q5	8	
2	2021 AS P2 Q18	1	
3	2022 AS P2 Q11	1	
4	2022 AS P2 Q10	1	
5	2023 AS P2 Q4	10	
6	2023 AS P2 Q9	1	
7	2024 AS P2 Q4	14	
8	2020 AS P2 Q12	1	
9	2020 AS P2 Q15	1	
10	2025 A-level P2 Q2	7	
11	2025 A-level P3 Q36	1	

Total _____ / 46 Percentage _____ %

Questions from AQA past papers, 2020–2025, reproduced for revision. Practise these topics online, with instant marking:

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

Questions

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

Q1 · November 2021 · AS Paper 2 · Q5 · [8 marks]

This question is about poly(propene).

(a) The three key steps in the manufacture of poly(propene) from crude oil are shown.



Naphtha is a mixture of alkanes with 6 to 12 carbon atoms per molecule.

For each step, name the process and state briefly the purpose of the process that leads to the formation of poly(propene).

[6 marks]

Step 1

Name

Purpose

Step 2

Name

Purpose

Step 3

Name

Purpose

(b) Poly(propene) is not biodegradable because it is unreactive.

Explain why poly(propene) is unreactive.

[1 mark]

(c) Scientists are developing new polymers, including some that are biodegradable.

Suggest why it is beneficial for some polymers to be biodegradable.

[1 mark]

Q2 • November 2021 • AS Paper 2 • Q18 • [1 mark]

Which compound reacts with hydrogen bromide to give 2-bromo-3-methylbutane as the major product?

Tick (✓) one box.

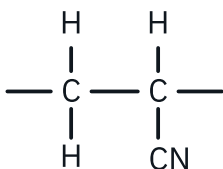
- ☐ **A** $(\text{CH}_3)_2\text{C}=\text{CHCH}_3$
- ☐ **B** $(\text{CH}_3)_2\text{C}=\text{CH}_2$
- ☐ **C** $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{CH}_3$
- ☐ **D** $(\text{CH}_3)_2\text{CHCH}=\text{CH}_2$

Q3 • June 2022 • AS Paper 2 • Q11 • [1 mark]

A polymer is formed from the monomer $\text{CH}_2 = \text{CHCN}$ Which statement is not correct?

Tick (✓) one box.

- ☐ **A** The monomer is propanenitrile.
- ☐ **B** The monomer is unsaturated.
- ☐ **C** The polymer is an addition polymer.
- ☐ **D** The polymer has the repeating unit

**Q4 • June 2022 • AS Paper 2 • Q10 • [1 mark]**

Which statement about poly(ethene) is correct?

Tick (✓) one box.

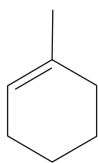
- ☐ **A** It has a lower relative molecular mass than ethene.
- ☐ **B** It has a lower density than ethene at standard temperature and pressure.
- ☐ **C** It has a higher melting point than ethene.
- ☐ **D** It decolourises bromine water.

Q5 · June 2023 · AS Paper 2 · Q4 · [10 marks]

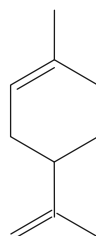
1-Methylcyclohexene and limonene are cyclic alkenes with a citrus smell.

1-Methylcyclohexene is manufactured and used in the chemical industry.

Limonene is found naturally in orange peel.



1-methylcyclohexene



limonene

(a) 1-Methylcyclohexene reacts with HBr to form two structural isomers.

The major product is 1-bromo-1-methylcyclohexane.

Name and outline the mechanism for the formation of this major product.

[5 marks]

Name of mechanism

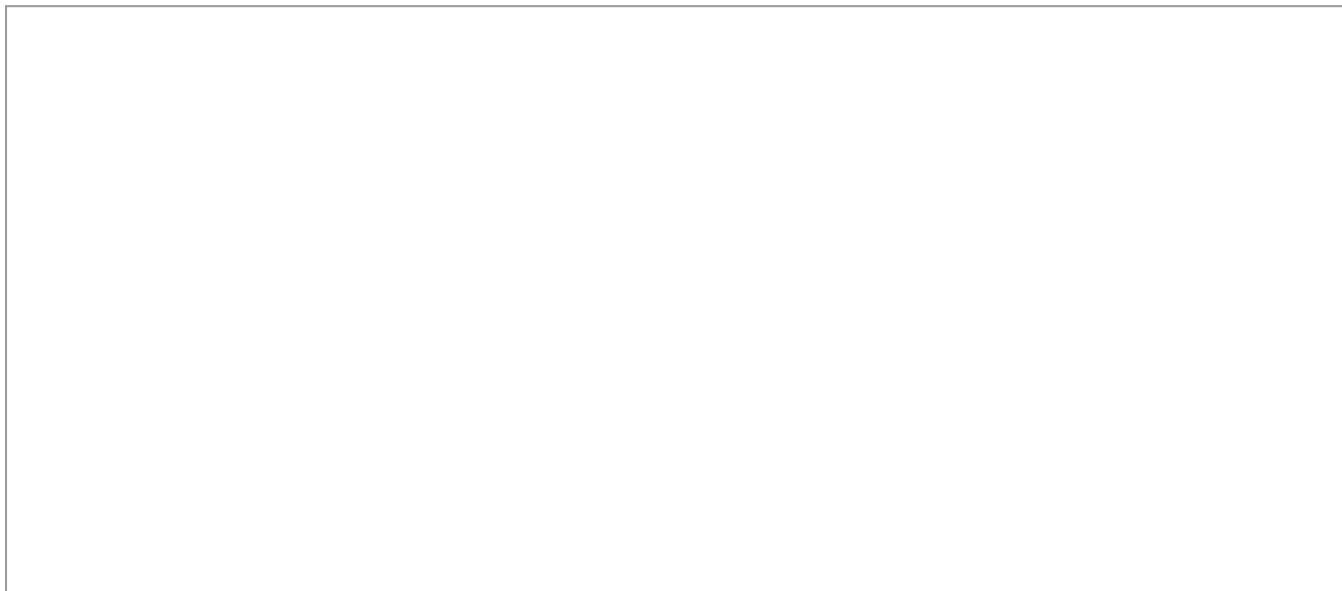
Outline of mechanism

(b) Draw the skeletal formula of the minor product formed in the reaction in part (a).

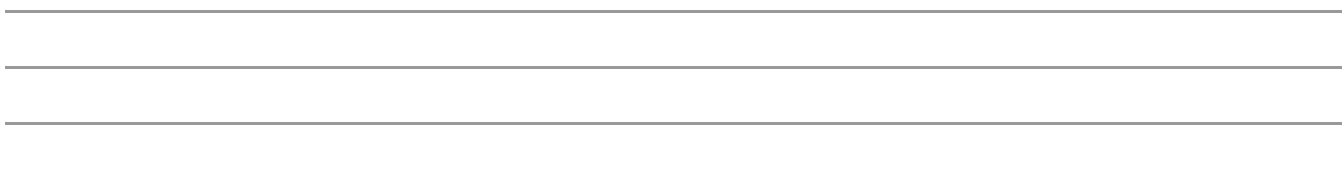
Explain why the products are formed in different amounts.

[4 marks]

Skeletal formula

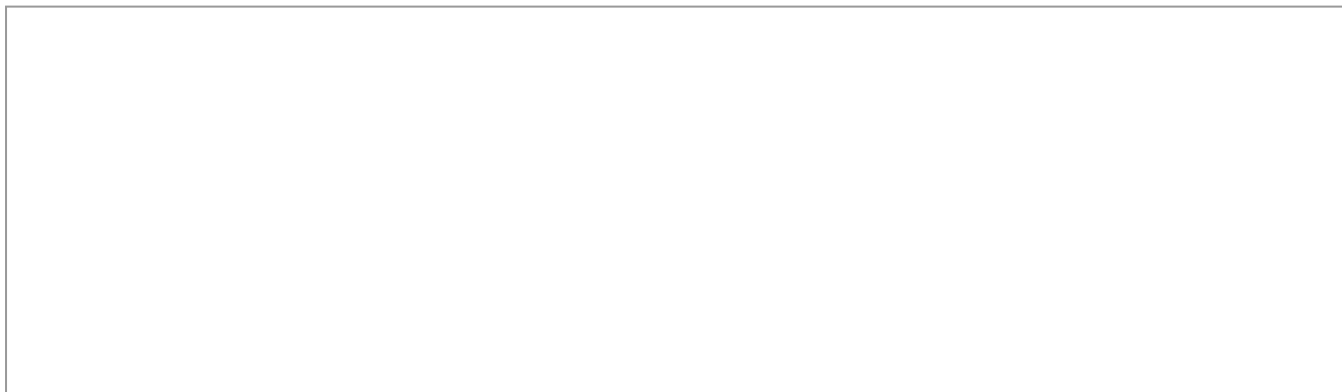


Explanation



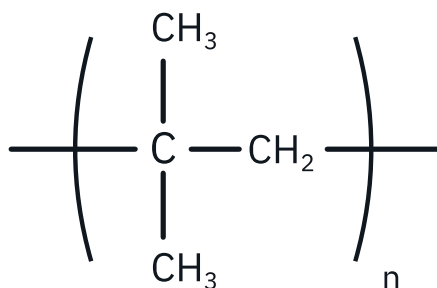
(c) Draw the structure of the major product when an excess of HBr reacts with limonene.

[1 mark]



Q6 · June 2023 · AS Paper 2 · Q9 · [1 mark]

Which monomer forms this polymer?



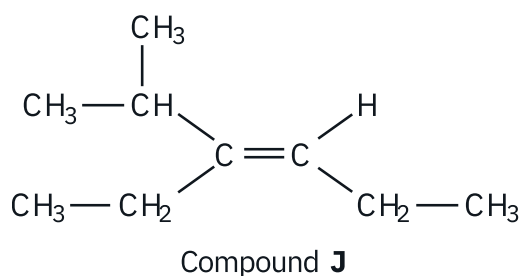
Tick (✓) one box.

- ☐ **A** but-1-ene
- ☐ **B** E-but-2-ene
- ☐ **C** Z-but-2-ene
- ☐ **D** methylpropene

Q7 · June 2024 · AS Paper 2 · Q4 · [14 marks]

This question also needs Intro to organic.

(a) Compound J is one of a pair of stereoisomers.

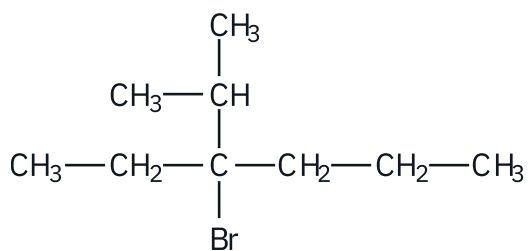


Explain:

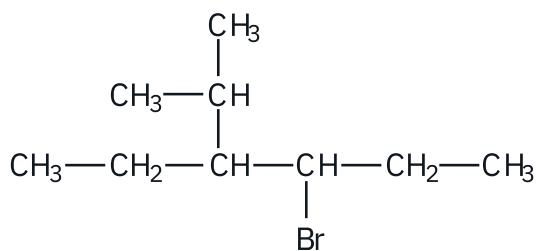
- what stereoisomers are
- how E-Z stereoisomerism occurs
- how the Cahn-Ingold-Prelog rules can be used to decide whether compound J is an E or Z isomer.

[6 marks]

(b) Compound J reacts with hydrogen bromide to form compounds K and L.



Compound **K**



Compound **L**

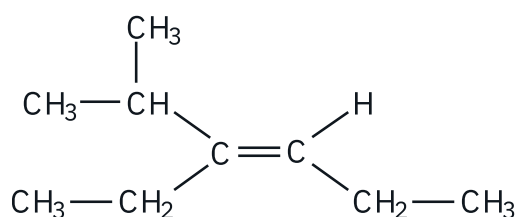
K is the major product.

Name and outline the mechanism for the formation of K.

[5 marks]

Name of mechanism

Outline of mechanism



(c) Explain why compound K is the major product in the reaction in part (b).

[3 marks]

Q8 • November 2020 • AS Paper 2 • Q12 • [1 mark]

What is the IUPAC name of the major product of the reaction between 2-ethylbut-1-ene and hydrogen bromide?

Tick (✓) one box.

- ☐ **A** 1-bromo-2-ethylbutane
- ☐ **B** 2-bromo-2-ethylbutane
- ☐ **C** 2-bromo-2-methylpentane
- ☐ **D** 3-bromo-3-methylpentane

Q9 • November 2020 • AS Paper 2 • Q15 • [1 mark]

In which reaction does the inorganic reagent act initially as an electrophile?

Tick (✓) one box.

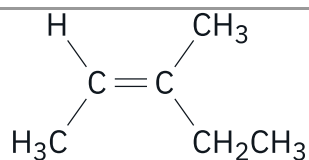
- ☐ **A** bromoethane with ethanolic potassium hydroxide
- ☐ **B** chloroethane with aqueous sodium hydroxide
- ☐ **C** ethane with chlorine
- ☐ **D** ethene with concentrated sulfuric acid

Q10 • June 2025 • Paper 2 • Q2 • [7 marks]

This question also needs Intro to organic.

This question is about isomerism.

Compound L has this structure.



02.1 Use IUPAC rules to name L.

Explain why L exists as stereoisomers.

[3 marks]

Name

Explanation

02.2 Compound M has the same carbon chain as L but the double bond is in a different position.

M also exists as stereoisomers.

Draw the structural formula of M.

Explain why M exists as stereoisomers.

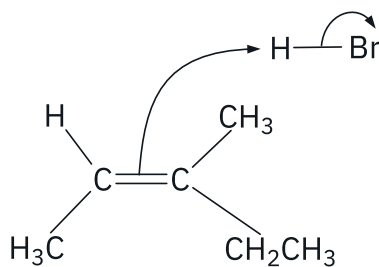
[2 marks]

Structural formula

Explanation

02.3 Figure 1 shows part of the mechanism when L reacts with hydrogen bromide.

Figure 1



Complete Figure 1 to show the next step in the mechanism that gives the major product.

[2 marks]

Draw your answer on the figure above.

Q11 · June 2025 · Paper 3 · Q36 · [1 mark]

The hydration of 1-methylcyclopent-1-ene uses a catalyst of sulfuric acid and produces a mixture of products.

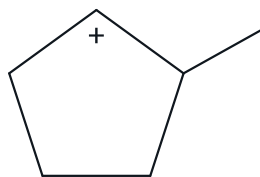
Which ion is formed during the mechanism for this reaction to give the major product?

Tick (✓) one box.

☐ **A**



☐ **B**



☐ **C** SO_3H^-

☐ **D** OH^-

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Mark scheme:

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