

GCSE Chemistry

Worksheet: Reactions of alkenes

TIME 35 min	TOTAL 31 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Reactions of alkenes

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1

When bromine adds across the C=C double bond in an alkene, what type of reaction is this?

Tick (✓) **one** box.

Addition

☐

Substitution

☐

Neutralisation

☐

Thermal decomposition

☐

[1 mark]

0 1 . 2

Bromine water is added to an alkene and shaken.
Give the colour change you would see.

.....

.....

.....

[1 mark]

0 2

0 2 . 1

Ethene reacts with hydrogen.

Name the product.

.....

.....

.....

.....
[1 mark]

0 2 . 2

What is needed for an alkene to react with hydrogen?

.....

.....

[1 mark]

0 2 . 3

What type of reaction happens when bromine reacts with ethene?

Tick (✓) **one** box.

Addition

☐

Displacement

☐

Neutralisation

☐

Thermal decomposition

☐

[1 mark]

0 2 . 4

Alkenes usually burn in air with a smoky flame.

Give the reason for this.

.....

.....

[1 mark]

0 3

0 3 . 1

Which is the functional group of the alkenes?

Tick (✓) **one** box.

C=C

☐

C–C

☐

–OH

☐

–COOH

☐

[1 mark]

0 3 . 2

Ethene reacts with steam to produce ethanol.

What else is needed for this reaction?

.....

.....

[1 mark]

0 3 . 3

Complete the word equation.

propene + chlorine → _____

.....

.....

.....

[1 mark]

0 3 . 4

What happens to the carbon–carbon double bond when an alkene reacts with a halogen?

.....

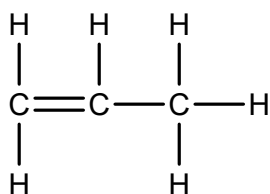
.....

[1 mark]

0 4

Figure 1 shows the displayed formula of propene.

Figure 1



0 4 . 1

Draw the displayed formula of the product when propene reacts with bromine.

.....

.....

.....

.....

[2 marks]

0 4 . 2

Name the product.

.....

.....

.....

.....
[1 mark]

0 4 . 3

Draw the displayed formula of the product when propene reacts with hydrogen.

.....

.....

.....

.....

[1 mark]

0 4 . 4

Give the conditions for the reaction of propene with hydrogen.

.....

.....

[1 mark]

0 5

Ethene, C_2H_4 , is the simplest alkene.

0 5 . 1

Write a balanced equation for the complete combustion of ethene.

.....

.....

.....

.....

[2 marks]

0 5 . 2

Alkenes often burn in air with a smoky flame.

Explain why, and name **one** product of incomplete combustion.

.....

.....

.....

.....

[2 marks]

0 5 . 3

Write a balanced equation for the reaction of ethene with steam.

.....

.....

[1 mark]

0 5 . 4

Give **two** conditions used for the reaction of ethene with steam.

[2 marks]

0 6

A student has a colourless liquid and wants to find out whether it is an alkane or an alkene.

- Method 1: burn a small sample and observe the flame.
- Method 2: add a few drops to bromine water and observe any colour change.

0 6 . 1

Evaluate which method gives more reliable evidence for identifying whether the liquid is an alkane or an alkene.

[3 marks]

0 7

A student is testing an unknown gas to see if it is an alkene.

0 7 . 1

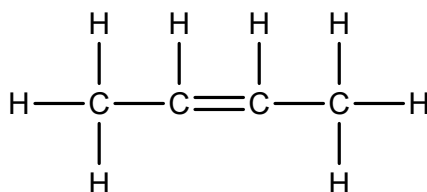
Describe how the student should carry out the test, including a safety precaution.

[3 marks]

0 8

Figure 2 shows the displayed formula of but-2-ene.

Figure 2



0 8 . 1

Draw the displayed formula of the product when but-2-ene reacts with hydrogen, and name the product.

[2 marks]

0 8 . 2

Give the conditions needed for this reaction.

.....

.....

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Chemistry · Worksheet: Reactions of alkenes · 31 marks

Question 1 (2 marks)

01.1 [1 mark]

Correct: Addition

01.2 [1 mark]

Answer: Orange to colourless

- orange to colourless (1)

Notes: Allow brown / yellow for orange. Do not accept 'clear' on its own for colourless.

Question 2 (4 marks)

02.1 [1 mark]

Answer: Ethane

- ethane (1)
-

02.2 [1 mark]

Answer: A catalyst (nickel).

- a catalyst (nickel) (1)
-

02.3 [1 mark]

Correct: Addition

02.4 [1 mark]

Answer: Incomplete combustion.

- incomplete combustion (1)
-

Question 3 (4 marks)

03.1 [1 mark]

Correct: C=C

03.2 [1 mark]

Answer: A catalyst.

- a catalyst (and a high temperature and pressure) (1)
-

03.3 [1 mark]

Answer: dichloropropane

- dichloropropane (1)
-

03.4 [1 mark]

Answer: It becomes a single bond as atoms add across it.

- it becomes a single bond (atoms add across the double bond) (1)
-

Question 4 (5 marks)

04.1 [2 marks]

Answer: CH₂Br–CHBr–CH₃ with all bonds shown.

- three carbon atoms joined by single bonds (1)
 - one Br atom on each of the two carbon atoms that were joined by the double bond, and six H atoms (1)
-

04.2 [1 mark]

Answer: Dibromopropane

- dibromopropane (1)
-

04.3 [1 mark]

Answer: Propane: three carbon atoms and eight hydrogen atoms, all single bonds.

- propane: three C atoms and eight H atoms, all single bonds (1)
-

04.4 [1 mark]

Answer: A nickel catalyst (and heat).

- a (nickel) catalyst (1)
-

Question 5 (7 marks)

05.1 [2 marks]

Answer: $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$

- correct formulae: $\text{C}_2\text{H}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ (1)
- balanced: $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$ (1)

05.2 [2 marks]

Answer: There is not enough oxygen for complete combustion; carbon (soot) forms.

- incomplete combustion (not enough oxygen for all of the carbon to be oxidised) (1)
- carbon (soot) / carbon monoxide (1)

05.3 [1 mark]

Answer: $\text{C}_2\text{H}_4 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_5\text{OH}$

- $\text{C}_2\text{H}_4 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_5\text{OH}$ (1)

Notes: Allow $\rightleftharpoons$. Allow $\text{CH}_3\text{CH}_2\text{OH}$ for ethanol.

05.4 [2 marks]

Answer: A catalyst (phosphoric acid) and a high temperature (about 300 °C).

- a catalyst (e.g. phosphoric acid) (1)
- a high temperature (about 300 °C) (1)
- a high pressure (about 60 to 70 atmospheres) (1)

Any 2 of the points above.

Question 6 (3 marks)

06.1 [3 marks]

Answer: Method 2 (bromine water) is more reliable: a clear colour change from orange to colourless is a definite chemical test specific to the $\text{C}=\text{C}$ double bond in alkenes. Method 1 only gives an indication (long-chain alkanes can also burn with smoky flames), so it cannot reliably distinguish an alkane from an alkene by flame alone.

- bromine water gives a clear colour change (orange to colourless) only with an alkene / it tests for the $\text{C}=\text{C}$ double bond (1)
- a smoky flame does not distinguish them, because long-chain alkanes can also burn with smoky flames (and judging smokiness is subjective) (1)
- so method 2 gives more reliable evidence (1)

Notes: 'Method 2' with no reasons scores 0.

Question 7 (3 marks)

07.1 [3 marks]

Answer: Bubble the gas through (or shake with) a sample of bromine water. If the gas is an alkene, the bromine water changes from orange to colourless. Bromine water is an irritant/harmful, so the student should wear eye protection.

- bubble the gas through (or shake it with) a sample of bromine water (1)
 - the alkene turns the bromine water from orange to colourless (1)
 - wear eye protection, as bromine water is an irritant / harmful (1)
-

Question 8 (3 marks)

08.1 [2 marks]

Answer: Butane: $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$, with all bonds shown as single bonds.

- four carbon atoms joined by single bonds, with ten hydrogen atoms shown (1)
 - butane (1)
-

08.2 [1 mark]

Answer: A nickel catalyst.

- a (nickel) catalyst (1)

Notes: Ignore temperature.
