

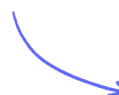
Exam Questions

Reactions of Alkenes & Alcohols

Alkenes / Combustion of Alkenes / Addition Reactions of Alkenes / Alcohols / Carboxylic Acids / Carboxylic Acids as Acids

Easy (5 questions)	/36
Medium (6 questions)	/22
Hard (7 questions)	/46
Total Marks	/104

Scan here to return to the course
or visit [savemyexams.com](https://www.savemyexams.com)

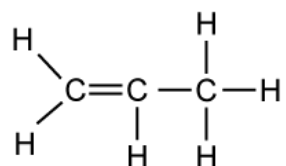


Easy Questions

1 (a) This question is about alkenes.

The structure of propene is shown in **Figure 1**.

Figure 1



What is the molecular formula of propene?

..... (1 mark)

(b) Which **two** statements are correct about alkenes?

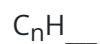
Tick (✓) **two** boxes.

Alkenes are saturated	
Alkenes are unsaturated	
Alkenes have covalent bonds	
Alkenes are unreactive	

..... (2 marks)

(c) The beginning of the general formula of alkenes is written below.

Complete the general formula of alkenes.



..... (1 mark)

(d) Alkenes can undergo incomplete combustion.

What is meant by incomplete combustion?

..... (1 mark)

(e) The following equation shows the incomplete combustion of ethene.

Name the **two** products formed in this reaction.

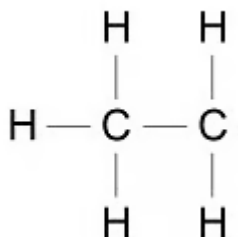


.....
..... (2 marks)

2 (a) This question is about ethanol.

Ethanol belongs to the homologous series, alcohols.

Complete the structure of ethanol.



(1 mark)

(b) Ethanol can be used in alcoholic drinks.

Tick (✓) **two** other uses of ethanol.

As fuels	
As polymers	
As solvents	
As perfumes	

(2 marks)

(c) Why can ethanol not be referred to as a hydrocarbon?

.....
.....
.....

(2 marks)

(d) Ethanol is made by a process called fermentation.

Use the words in the box to complete the sentences on fermentation.

cool	energy	yeast	warm
------	--------	-------	------

high	oxygen	carbon dioxide
------	--------	----------------

During fermentation, sugar is converted to ethanol by adding _____.

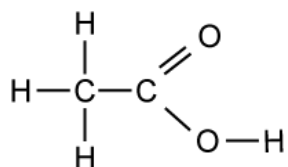
The reaction takes place at a _____ temperature in the absence of _____.

(3 marks)

3 (a) This question is about carboxylic acids.

The structure of ethanoic acid is shown in **Figure 1**.

Figure 1



Circle the functional group of ethanoic acid.

(1 mark)

(b) Ethanoic acid can be formed from ethanol.

Which element does ethanol react with to form ethanoic acid?

Circle the correct answer.

oxygen	carbon	hydrogen
--------	--------	----------

(1 mark)

(c) Ethanoic acid will react with sodium carbonate in a neutralisation reaction.

Complete the word equation for this reaction:

ethanoic acid + sodium carbonate → sodium ethanoate + _____ + _____

(2 marks)

(d) Ethanoic acid can dissolve in water.

Tick (✓) **two** statements which correctly describe this reaction.

Ethanoic acid partially ionises in water	
Ethanoic acid releases OH^- ions	
Ethanoic acid forms a solution with a pH of 1	
Ethanoic acid is a weak acid	

(2 marks)

(e) Ethanoic acid will react with ethanol to form an ester.

Name the ester formed from this reaction.

Tick (✓) **one** box.

Ethene	
Ethyl ethanoate	
Ethane	

..... (1 mark)

4 (a) This question is about the reactions of alkenes.

Which substance is an alkene?

Tick (✓) **one** box.

C_5H_{12}	
C_7H_{14}	
$C_{12}H_{20}$	

..... (1 mark)

(b) Alkenes are produced from the cracking of long chain hydrocarbons.

Give **one** use of the alkenes produced by this reaction.

..... (1 mark)

(c) Ethene can react with hydrogen, water and chlorine due to the presence of the double bond.

Draw **one** line to show the displayed formula of the product formed when ethene reacts with hydrogen, water and chlorine.

	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C} \begin{array}{l} \nearrow \text{O} \\ \searrow \text{O}-\text{H} \end{array} \\ \\ \text{H} \end{array} $
Water	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} $
Hydrogen	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $
Chlorine	$ \begin{array}{c} \text{H} \quad \text{Cl} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{Cl} \quad \text{H} \end{array} $
	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} $

(3 marks)

(d) Name the type of reaction that occurs when alkenes react with each substance in 4c.

Circle **one** answer.

Substitution	Decomposition	Addition	Neutralisation
--------------	---------------	----------	----------------

(1 mark)

5 (a) This question is about organic chemistry.

Draw **one** line from each homologous series to the correct functional group.

Ester

C = C

Alkene

- OH

Carboxylic acid

- COOH

Alcohol

- COO

(4 marks)

(b) Complete each sentence about organic compounds by circling the correct word.

To test for the presence of an alkene you add

limewater. bromine water. litmus paper.

When sodium is added to ethanol

oxygen carbon dioxide hydrogen

is produced.

Propanoic acid will dissolve in water to give a solution with a pH of

4. 7. 13.

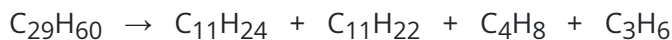
Esters, such as ethyl ethanoate are used

as fuels.
in perfumes.
as solvents.

(4 marks)

Medium Questions

- 1 (a) The equation shows the cracking of a long chain hydrocarbons.



One of the products formed is a different type of hydrocarbon to the other products.

Give the formula for this product and explain why the chemical formula of this compound is different to the others.

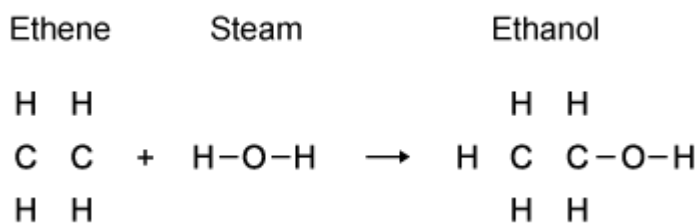
You should include the name of the family of compounds.

(3 marks)

- (b) Ethanol is produced from the reaction of ethene and steam in the presence of a hot catalyst.

Add the missing bonds to complete the displayed structures in **Figure 1**.

Figure 1



(4 marks)

- (c) Ethanol can also be produced by the fermentation of sugars from plants.

Draw a ring around the temperature that is most suitable for this process.

10 °C	25 °C	350 °C
-------	-------	--------

(1 mark)

- (d) Ethanol produced by fermentation is often added to petrol to create a biofuel.

Explain why increasing the use of biofuels may cause food shortages.

(2 marks)

- (e) Burning biofuels contributes less to climate change than burning fossil fuels.

Explain why.

(2 marks)

- 2 Which of the following molecules is an alkene?

A. C_6H_{10}

B. C_4H_{10}

C. C_5H_{10}

D. C_6H_{14}

(1 mark)

- 3 What gas is formed when sodium is added to propanol?

A. Carbon dioxide

B. Hydrogen

C. Carbon Monoxide

D. Ethene

(1 mark)

4 (a) This question is about the reactions of alkenes and carboxylic acids.

Halogens react with alkenes.

Name this type of reaction.

..... (1 mark)

(b) Name **two** other substances which also react with alkenes in this way.

..... (2 marks)

(c) Butanoic acid is a carboxylic acid with the formula $\text{CH}_3\text{CH}_2\text{CH}_2\text{CO}_2\text{H}$.

Write down the functional group of the carboxylic acids.

..... (1 mark)

(d) Butanoic acid reacts with magnesium carbonate to form magnesium butanoate and two other products.

Complete and balance the equation for the reaction.



..... (2 marks)

5 Which is **not** true about carboxylic acids?

- A. Solutions of carboxylic acids have a higher pH than solutions of strong acids of the same concentration
- B. Carbonates fizz vigorously in solutions of carboxylic acids
- C. Carboxylic acids are volatile
- D. They react with alcohols to make esters

(1 mark)

6 Which is of these is true about the manufacture of ethanol?

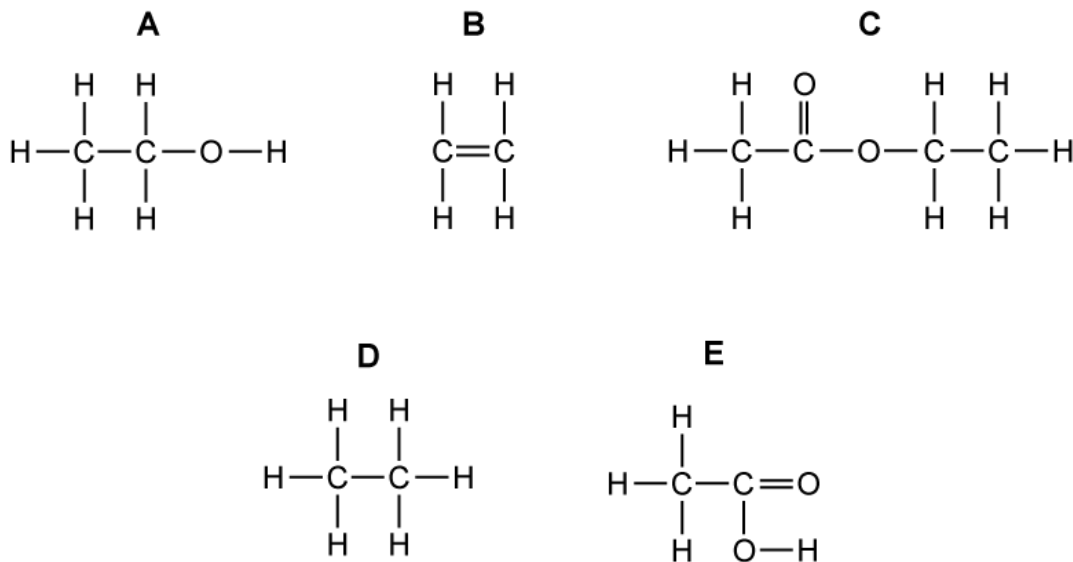
- A.** Fermentation has a 100% atom economy
- B.** The hydration of ethene has a 100% atom economy
- C.** Fermentation produces pure ethanol
- D.** Alkenes are reactive so the hydration of ethene occurs readily at room temperature

(1 mark)

Hard Questions

1 (a) This question is about the reactions of organic compounds **A** - **E** shown in **Figure 1**.

Figure 1



Name compound **C**.

..... (1 mark)

(b) Name the products formed when **E** reacts with sodium.

.....
..... (2 marks)

(c) Which compound reacts with compound **A** to produce compound **C**?

..... (1 mark)

(d) Give the catalyst needed for the reaction that produces compound **D** from compound **B**.

..... (1 mark)

(e) Which compound dissolves in water to produce a neutral solution?

..... (1 mark)

2 (a) This question is about carboxylic acids.

The table below shows information about three carboxylic acids.

Complete the table.

Name	Formula
Ethanoic acid	CH_3COOH
	$\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
Propanoic acid	

(2 marks)

(b) Solutions of ethanoic acid and hydrochloric acid have different pH levels at the same concentration.

Explain the difference in pH levels between the two acids

.....

.....

(3 marks)

(c) A student adds sodium to a solution of ethanoic acid in an open flask on a balance.

Explain what happens to the mass of the flask and its contents during the reaction.

.....

.....

(3 marks)

(d) In a separate reaction, a student adds ethanoic acid to zinc carbonate.

Describe and give the result of a test the student would do to identify the gas produced.

(2 marks)

3 Which two substances react together to form potassium propanoate?

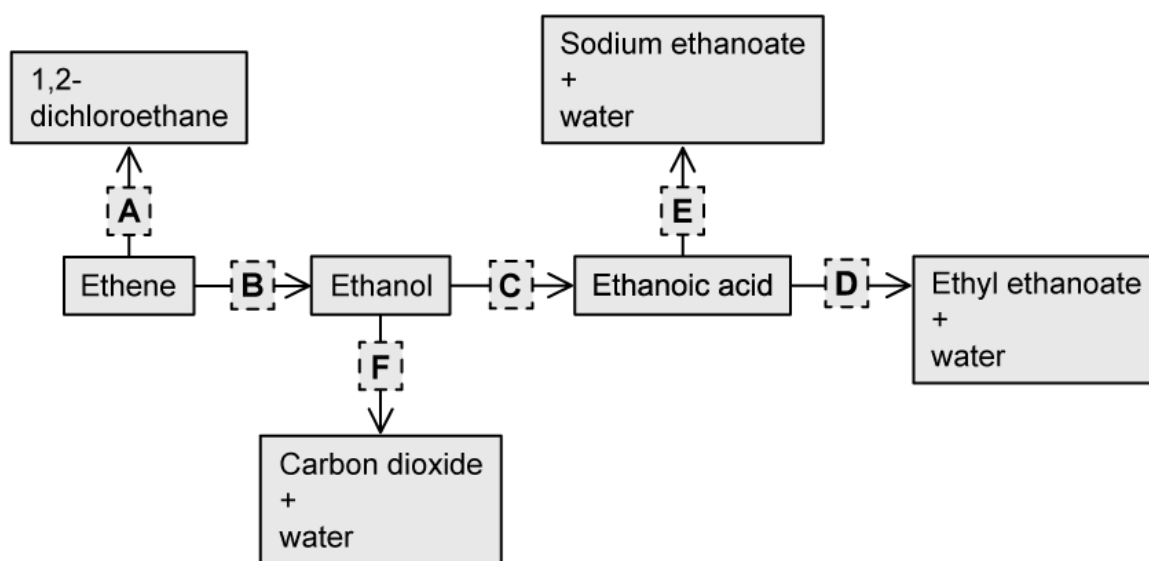
	Reactant 1	Reactant 2
A	propanol	potassium
B	propene	potassium iodide
C	propanoic acid	potassium carbonate
D	ethyl propanoate	potassium

(1 mark)

4 (a) This question is about the reactions of organic compounds.

A flow chart of different reactions involving organic compounds is shown in **Figure 1**.

Figure 1



Name the type of reaction which occurs at:

A: _____

B: _____

C: _____

D: _____

E: _____

F: _____

.....

.....

.....

.....

.....

.....

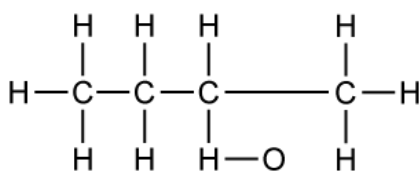
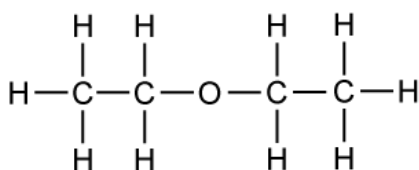
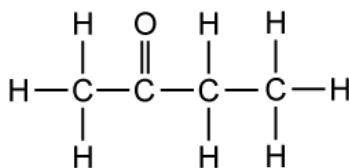
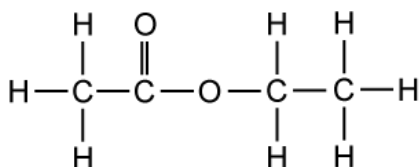
(6 marks)

(b) What type of chemical is used as a catalyst in reaction **D**?

..... (1 mark)

(c) Which is the correct structure of ethyl ethanoate?

Tick (✓) **one** box.

☐☐☐☐

..... (1 mark)

(d) Why can ethyl ethanoate be described as volatile?

..... (1 mark)

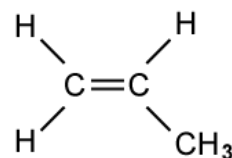
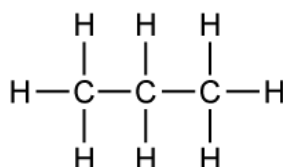
5 (a) This question is about alkenes.

Draw the displayed formulae of butene.

(1 mark)

(b) The structures of an alkane and an alkene are shown below.

Compare the structures and reactions of propene with propane.



.....

.....

.....

.....

.....

.....

.....

.....

(6 marks)

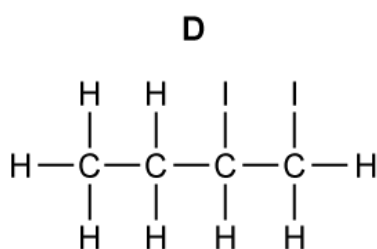
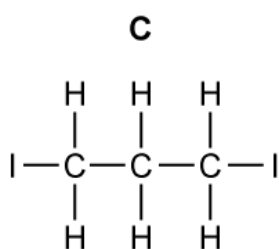
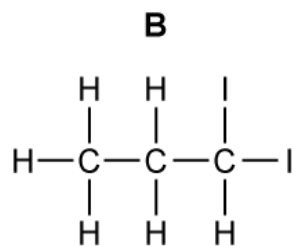
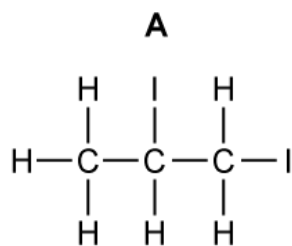
(c) Write a balanced symbol equation for the incomplete combustion of ethene to form carbon monoxide and water.

.....

.....

(2 marks)

6 Which of the following shows the product of the reaction between propene and iodine?



(1 mark)

7 (a) This question is about alcohols.

Alcohols have the general formula $C_nH_{2n+1}OH$.

Draw the displayed formula of propanol.

(1 mark)

(b) Alcohols undergo combustion reactions.

Write a balanced symbol equation for the complete combustion of butanol.

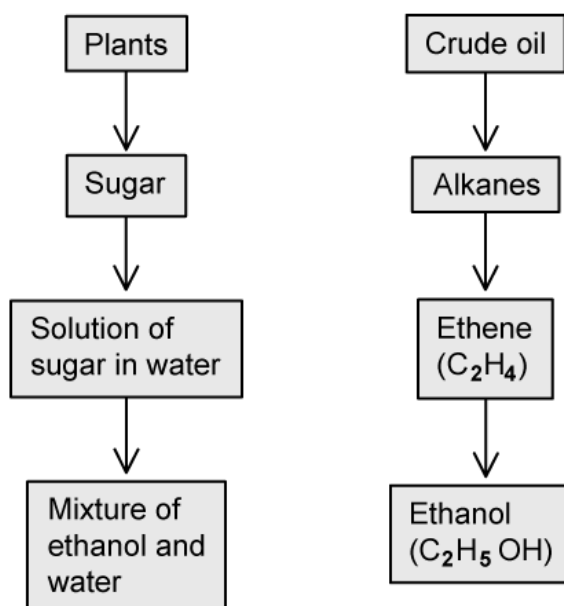
.....

.....

..... (3 marks)

(c) **Figure 1** shows two methods of ethanol production.

Figure 1



Explain how ethanol is made from sugar solution.

Give the name of the process.

.....

.....

..... (3 marks)

(d) Describe the conditions needed to convert ethene to ethanol.

.....

.....

..... (3 marks)