

# Alkenes

## Question Paper

Level	O Level
Subject	Chemistry
Exam Board	Cambridge International Examinations
Topic	Organic Chemistry
Sub-Topic	Alkenes
Booklet	Question Paper

**Time Allowed:** 28 minutes

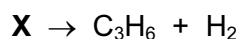
**Score:** /23

**Percentage:** /100

1 How can alkenes be manufactured?

- A by polymerisation reactions
- B by the addition of hydrogen to unsaturated vegetable oils
- C by the combustion of alkanes
- D by the cracking of hydrocarbons

2 When cracked, one mole of a compound, **X**, produces one mole of propene and one mole of hydrogen.



What type of compound is **X**?

- A an alcohol
- B an alkane
- C an alkene
- D a carboxylic acid

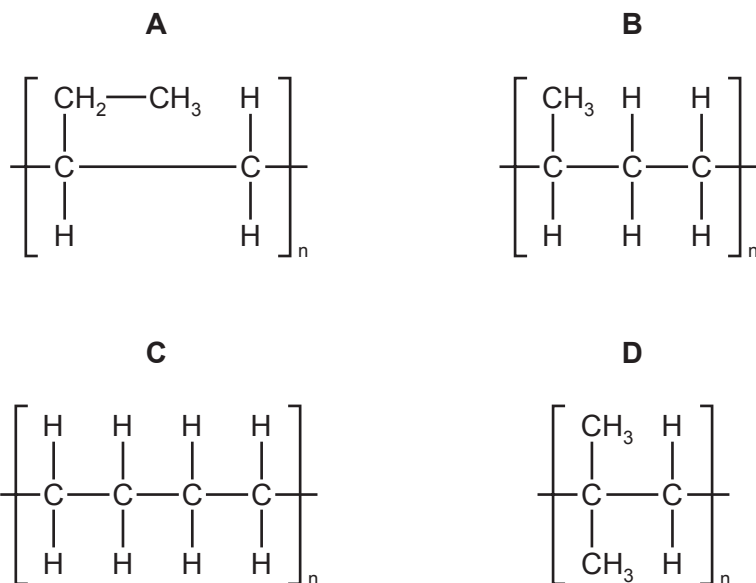
3 Which statement about vegetable oil and the margarine made from it is correct?

- A Both are liquids at room temperature.
- B Both occur naturally.
- C Margarine has the higher melting point.
- D Vegetable oil has fewer carbon-carbon double bonds than margarine.

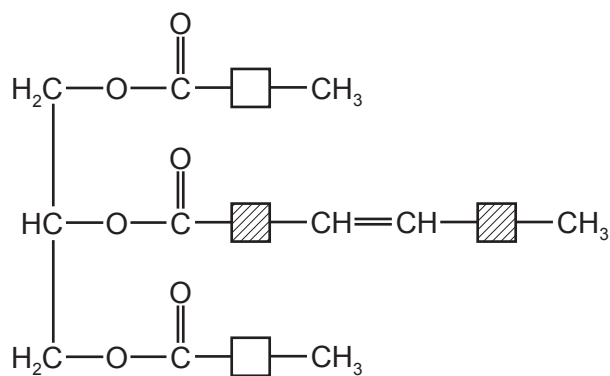
4 Which statement about the hydrocarbon  $\text{C}_2\text{H}_4$  is **not** correct?

- A It contains a double bond.
- B It decolourises bromine water.
- C It forms a condensation polymer.
- D It forms an alcohol when reacted with steam.

5 Which partial structure is correct for the product of polymerisation of butene,  $\text{CH}_2=\text{CHCH}_2\text{CH}_3$ ?



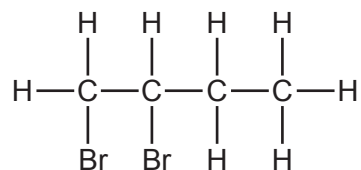
6 The diagram shows a simplified structure of a fat.



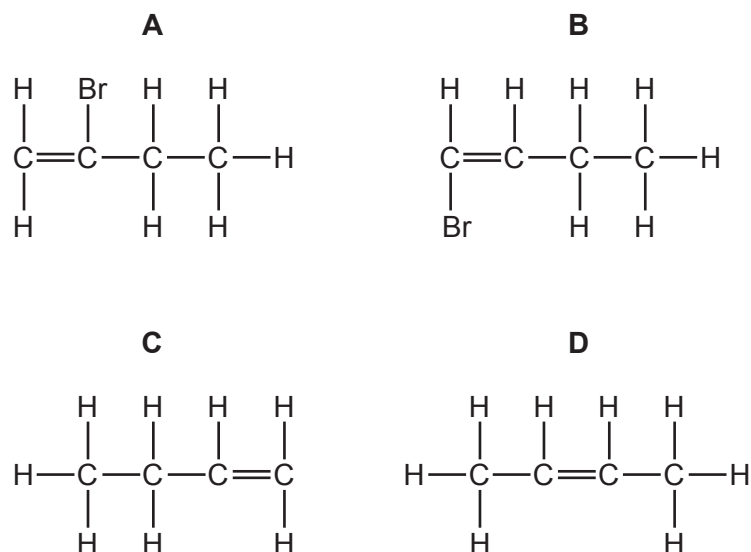
Which compounds in the table have linkages that can be found in this fat? (Do **not** consider C–H or C–C bonds as linkages.)

	ethene	nylon	Terylene
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	x
<b>C</b>	✓	x	✓
<b>D</b>	x	✓	✓

- 7 Compound Q reacts with bromine to form the compound shown.



Which is compound Q?

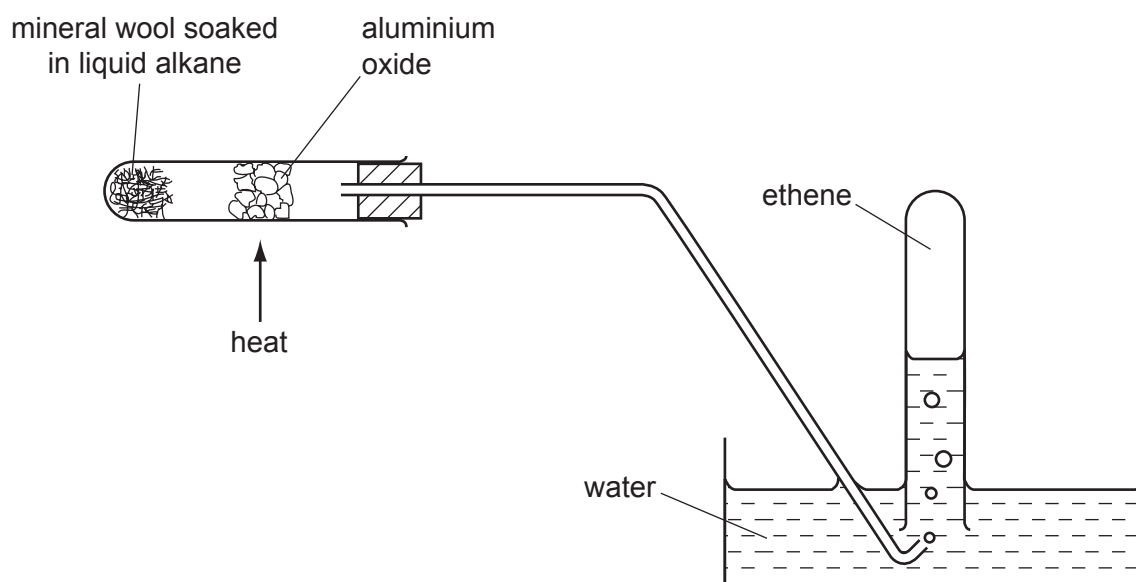


- 8 Compound X is a hydrocarbon. It reacts with steam to form an alcohol.

Which type of compound is X and what would be its effect on bromine water?

	type of compound	effect on bromine water
<b>A</b>	alkane	turns from brown to colourless
<b>B</b>	alkane	turns from colourless to brown
<b>C</b>	alkene	turns from brown to colourless
<b>D</b>	alkene	turns from colourless to brown

- 9 With which substance will ethene react to form more than one product?
- A bromine
  - B hydrogen
  - C oxygen
  - D steam
- 10 Which compound is manufactured by reacting ethene with steam in the presence of a heated catalyst?
- A  $C_2H_6$
  - B  $C_2H_5OH$
  - C  $C_4H_8$
  - D  $C_4H_9OH$
- 11 The diagram shows the breakdown of an alkane to ethene.



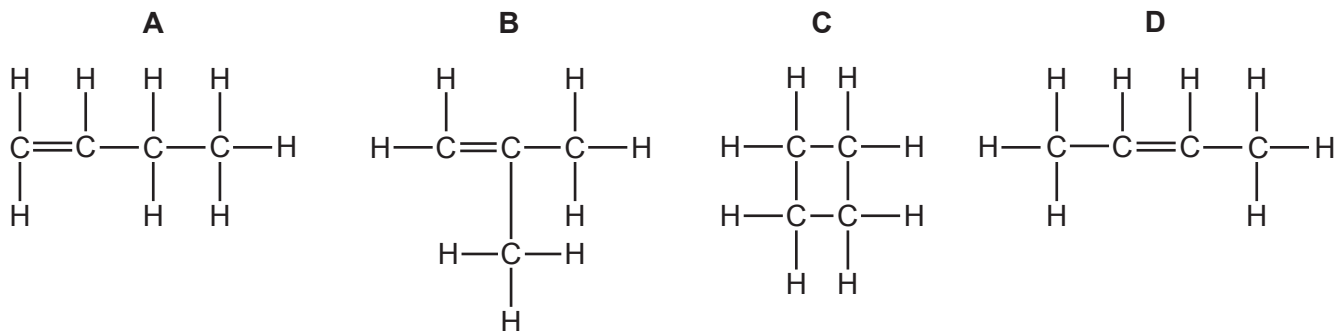
The ethene is then tested with aqueous bromine.

Which information about ethene is correct?

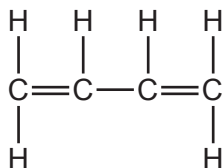
	solubility of ethene gas	action on aqueous bromine
A	insoluble	decolourised
B	insoluble	no reaction
C	soluble	decolourised
D	soluble	no reaction

12 Substance X, molecular formula  $C_4H_8$ , does **not** react with hydrogen.

What is the structural formula of X?



13 The diagram shows the structure of the compound 1,3-butadiene.



How many molecules of hydrogen are needed to saturate one molecule of 1,3-butadiene?

- A** 1                      **B** 2                      **C** 3                      **D** 4

14 Which molecule does **not** undergo an addition reaction with alkenes?

- A** ammonia,  $NH_3$   
**B** bromine,  $Br_2$   
**C** hydrogen,  $H_2$   
**D** steam,  $H_2O$

15 Which statement applies to all three of the compounds ethane, ethene and ethanol?

- A One molecule of each compound contains the same number of carbon atoms.
- B One mole of each compound contains the same number of hydrogen atoms.
- C They all occur in crude oil.
- D They are all liquids at room temperature.

16 A student investigated the reaction of different vegetable oils with hydrogen. 100 cm<sup>3</sup> of hydrogen was passed through 1 g samples of vegetable oils containing a suitable catalyst.

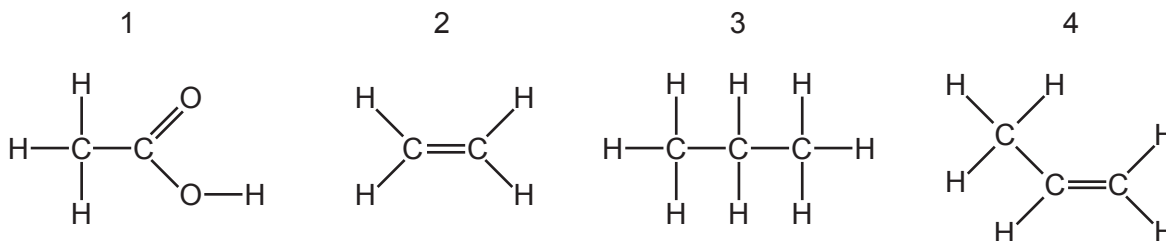
The volume of hydrogen remaining after each reaction was recorded.

vegetable oil	volume of hydrogen remaining / cm <sup>3</sup>
P	100
Q	87
R	63
S	0

Which vegetable oils are unsaturated?

- A P only
- B Q and R only
- C Q, R and S only
- D S only

17 The structures of four organic compounds are shown.



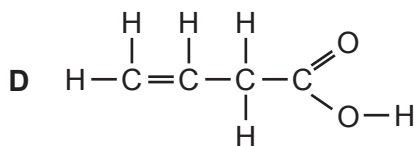
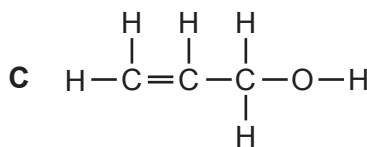
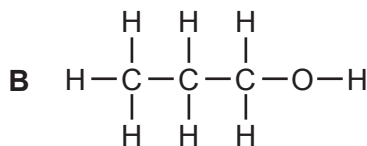
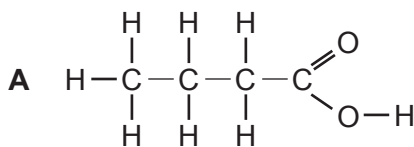
Which compounds decolourise bromine water?

- A 1 and 2
- B 2 and 4
- C 3 only
- D 3 and 4

18 The results of tests on compound **Z** are shown.

test	result
add bromine water	turns colourless
add aqueous sodium carbonate	carbon dioxide formed

What is compound **Z**?



19 What is the structure of the product of the reaction between butene,  $\text{CH}_3\text{-CH}_2\text{-CH=CH}_2$ , and bromine,  $\text{Br}_2$ ?

- A**  $\text{CH}_2\text{Br-CH}_2\text{-CH}_2\text{-CH}_2\text{Br}$
- B**  $\text{CH}_2\text{Br-CH}_2\text{-CHBr-CH}_3$
- C**  $\text{CH}_3\text{-CHBr-CH}_2\text{-CH}_2\text{Br}$
- D**  $\text{CH}_3\text{-CH}_2\text{-CHBr-CH}_2\text{Br}$



20 A student carries out three tests on a gas **X**.

test	results
damp red litmus paper	stays red
aqueous bromine	stays brown
lighted splint	gas burns

Which gas could be **X**?

- A** ammonia
- B** ethene
- C** methane
- D** oxygen

21 A vegetable oil is polyunsaturated.

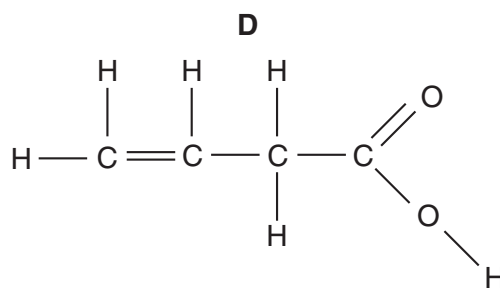
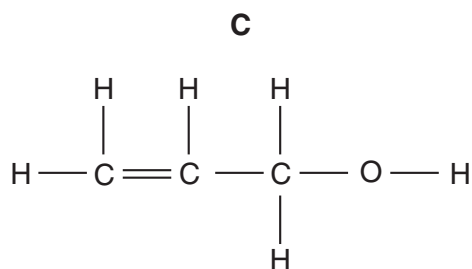
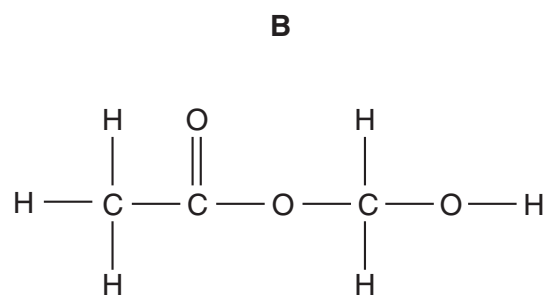
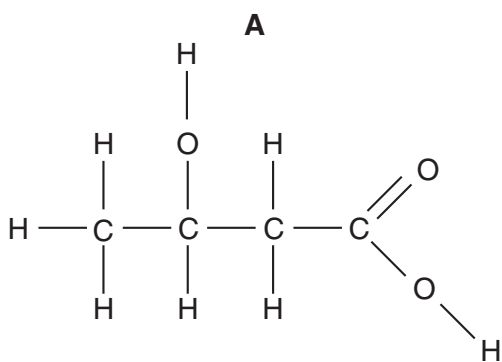
Which statement about this vegetable oil is correct?

- A** It has double bonds between carbon and hydrogen atoms.
- B** It reacts with hydrogen to form a solid compound.
- C** It reacts with steam to form margarine.
- D** It turns aqueous bromine from colourless to brown.

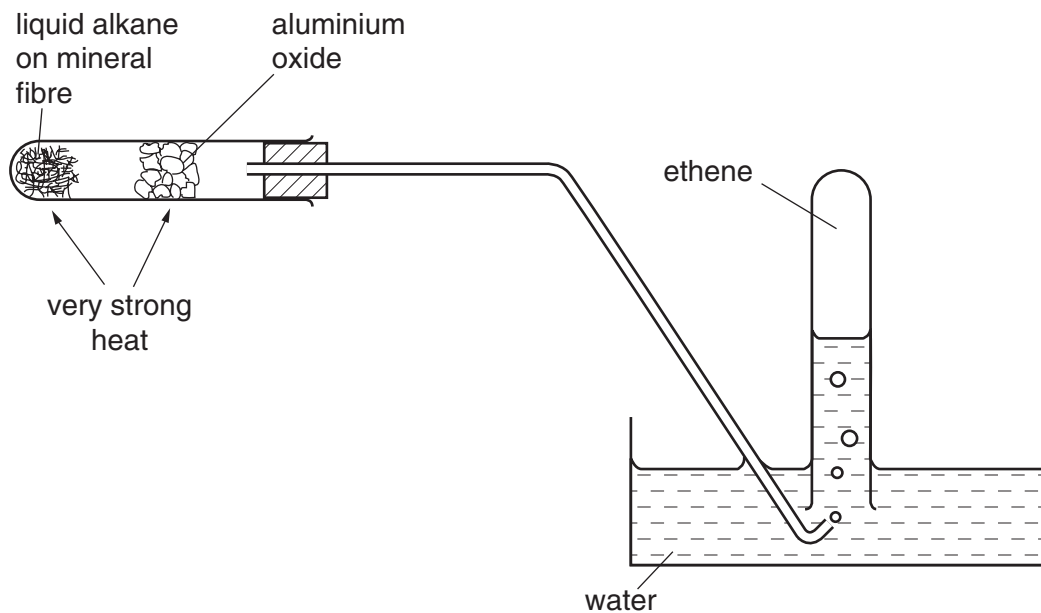
22 The table shows the results of tests carried out on compound X.

test	result
bromine water added	decolourised
sodium carbonate added	colourless gas evolved

Which formula represents compound X?



23 The experiment shown is carried out.



What process occurs?

- A cracking
- B dehydrogenation
- C distillation
- D polymerisation