

14.5 Alkenes

Question Paper

Level	IGCSE
Subject	Chemistry (0620)
Exam Board	Cambridge International Examinations (CIE)
Topic	Organic Chemistry
Sub-Topic	14.5 Alkenes
Booklet	Question Paper

Time Allowed: 32 minutes

Score: /26

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1 Compound Q decolourises bromine water.

Compound Q has two carbon atoms in each molecule.

Which statement about compound Q is correct?

- A** It contains carbon-hydrogen double bonds.
- B** It has six hydrogen atoms per molecule.
- C** It has two carbon-carbon double bonds.
- D** It is produced by cracking alkanes.

2 A hydrocarbon W burns to form carbon dioxide and water.

W decolourises bromine water.

What is the name of W and what is its structure?

	name of W	structure of W
A	ethane	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$
B	ethane	$\begin{array}{c} \text{H} \quad \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \quad \text{H} \end{array}$
C	ethene	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$
D	ethene	$\begin{array}{c} \text{H} \quad \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \quad \text{H} \end{array}$

3 Which reaction is used as a test for alkenes?

- A Alkenes burn in air to give carbon dioxide and water.
- B Alkenes decolourise aqueous bromine.
- C Alkenes form polymers when heated in the presence of a catalyst.
- D Alkenes react with steam to form alcohols.

4 Liquid W burns completely to give carbon dioxide and water.

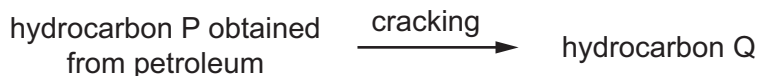
Liquid W is a compound containing carbon, hydrogen and oxygen.

A solution of liquid W in water is pH 7.

What is liquid W?

- A ethanoic acid
- B ethanol
- C gasoline
- D methane

5 Alkenes are manufactured by cracking hydrocarbons obtained from petroleum.



Which row describes the size of the molecules in hydrocarbons P and Q and the effect of Q on aqueous bromine?

	size of P molecules	size of Q molecules	effect of Q on aqueous bromine
A	large	small	decolourises
B	large	small	no effect
C	small	large	decolourises
D	small	large	no effect

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- 6 Hydrocarbons obtained by fractional distillation of petroleum can be cracked to make useful products.

Which substance could **not** be obtained by cracking propane, $M_r 44$?

- A** C_2H_4 **B** C_3H_6 **C** C_4H_8 **D** H_2

- 7 During the process of cracking hydrocarbons, an 1 is converted into an 2

The presence of an 3 can be shown by a visible reaction with 4

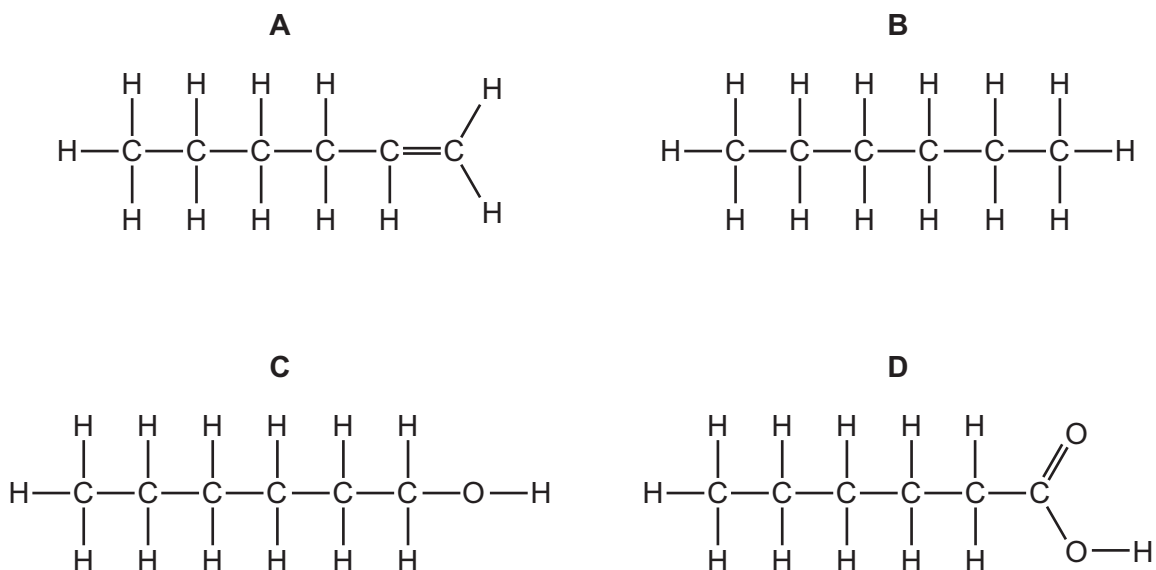
Which words complete gaps 1, 2, 3 and 4?

	1	2	3	4
A	alkane	alkene	alkene	bromine
B	alkane	alkene	alkene	steam
C	alkene	alkane	alkane	bromine
D	alkene	alkane	alkane	steam

- 8 Which statement about alkenes is **not** correct?

- A** They are hydrocarbons.
B They are saturated.
C They contain a C=C bond.
D They form polymers.

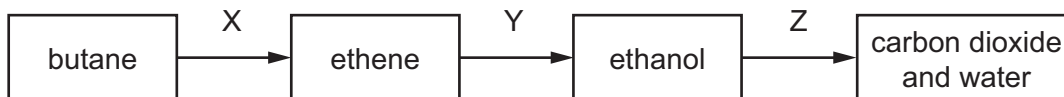
9 Which molecular structure shows hexene?



10 Which statement about alkenes is **not** correct?

- A** The functional group is C=C.
- B** The structural difference between one member and the next is $-\text{CH}_3-$.
- C** They form a homologous series.
- D** They turn aqueous bromine from brown to colourless.

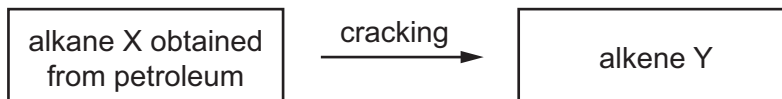
11 The diagram shows a reaction sequence.



Which row names the processes X, Y and Z?

	X	Y	Z
A	cracking	fermentation	respiration
B	cracking	hydration	combustion
C	distillation	fermentation	respiration
D	distillation	hydration	combustion

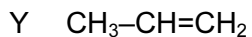
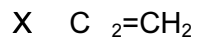
- 12 Alkenes are manufactured by cracking hydrocarbons obtained from petroleum.



Which row describes the process of cracking?

	size of X molecules	size of Y molecules	catalyst required	temperature required
A	large	small	no	low
B	large	small	yes	high
C	small	large	no	low
D	small	large	yes	high

- 13 X, Y and Z are three hydrocarbons.

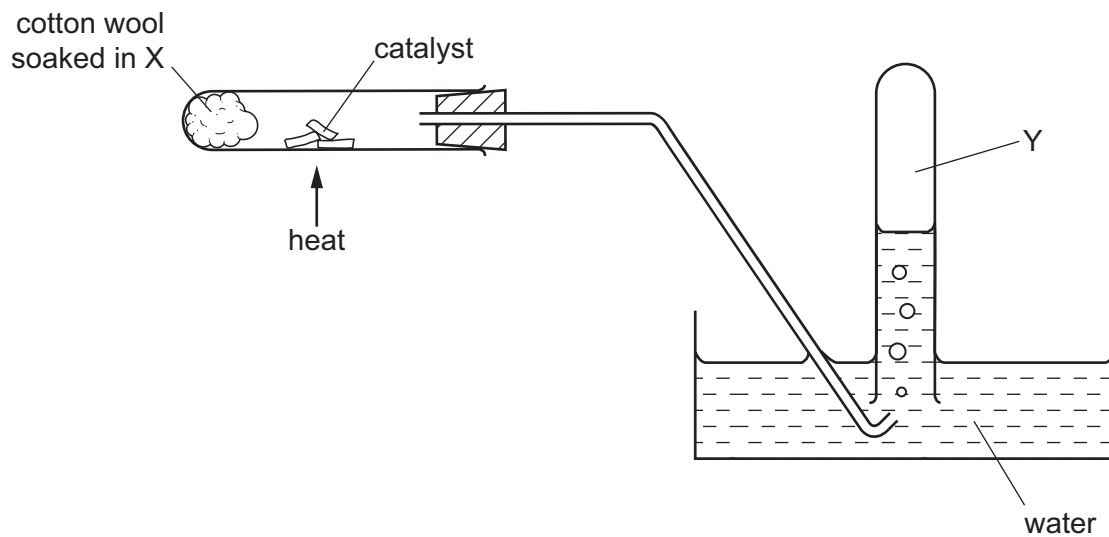


What do compounds X, Y and Z have in common?

- 1 They are all alkenes.
- 2 They are all part of the same homologous series.
- 3 They all have the same boiling point.

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

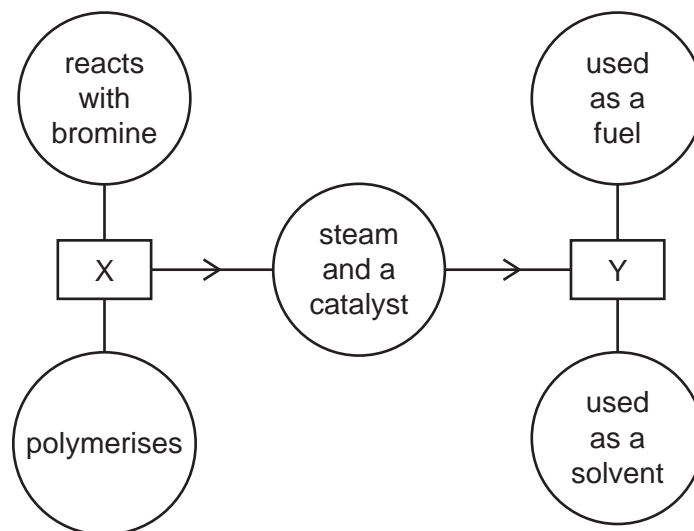
14 The diagram shows the cracking of substance X.



Which type of organic compound is found in Y, which is **not** present in X?

- A acid
- B alcohol
- C alkane
- D alkene

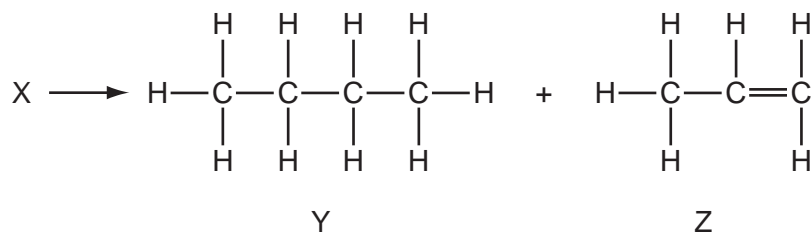
15 The diagram shows some properties of two organic compounds X and Y.



What are X and Y?

	X	Y
A	ethane	ethanoic acid
B	ethane	ethanol
C	ethene	ethanoic acid
D	ethene	ethanol

- 16 A chemist carried out a cracking reaction on a hydrocarbon, X, and obtained two products, Y and Z.



The chemist then wrote the following statements in his notebook.

- 1 A molecule of X has 7 carbon atoms.
- 2 Y is unsaturated.
- 3 Z will decolourise bromine water.

Which statements are correct?

- A** 3 only **B** 1 and 2 **C** 1 and 3 **D** 1, 2 and 3

- 17 Molecule X is both an alkene and a carboxylic acid.

Which row describes X?

	saturated	–COOH present
A	no	no
B	no	yes
C	yes	no
D	yes	yes

- 18 Which hydrocarbon reacts with steam to produce ethanol?

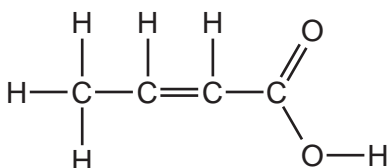
- A** C₂H₄ **B** C₂H₆ **C** C₃H₆ **D** C₃H₈

19 Alkenes have the general formula C_nH_{2n} .

Which of the following is an alkene?

- A** CH_2 **B** CH_4 **C** C_3H_6 **D** C_6H_6

20 The structure of a compound is shown.



Which functional groups are present in this compound?

	alcohol	alkene	carboxylic acid
A	✓	✓	✓
B	✓	x	x
C	x	✓	✓
D	x	x	✓

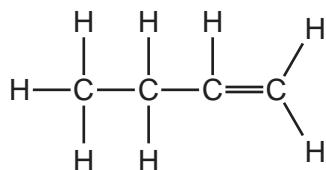
21 When a long chain hydrocarbon is cracked, the following products are produced.

- 1 C_3H_8
- 2 C_2H_4
- 3 C_3H_6
- 4 C_2H_6

Which products would decolourise bromine water?

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

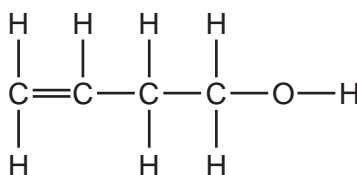
22 Butene is an alkene which is manufactured by cracking hydrocarbons.



Which hydrocarbon can be cracked to make butene?

- A ethane, C_2H_6
- B decane, $\text{C}_{10}\text{H}_{22}$
- C methane, CH_4
- D propane, C_3H_8

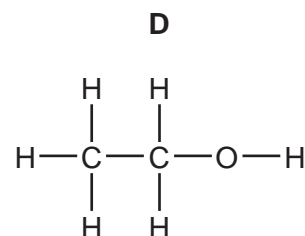
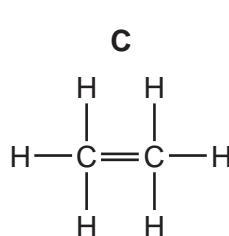
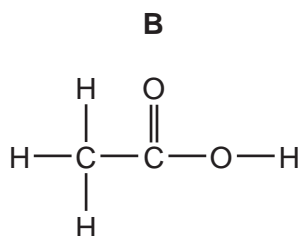
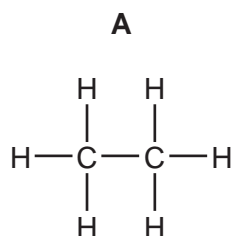
23 The diagram shows the structure of a compound.



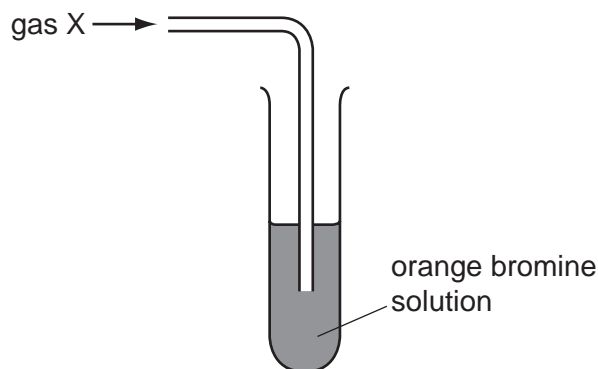
To which classes of compound does this molecule belong?

	alkane	alkene	alcohol
A	no	no	no
B	no	yes	yes
C	yes	no	yes
D	yes	yes	yes

24 Which structure is **incorrect**?

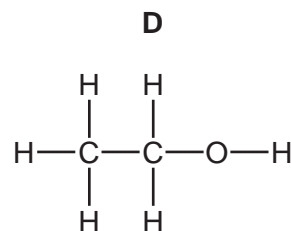
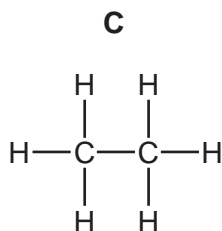
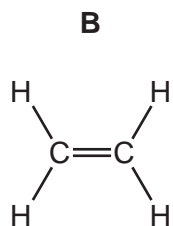
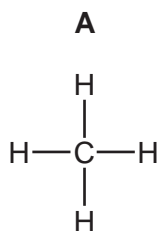


25 The apparatus shows an experiment used to test gas X.



The bromine solution quickly becomes colourless.

What is the structure of gas X?



26 Which element is **not** added to a fertiliser?

- A** aluminium
- B** nitrogen
- C** phosphorus
- D** potassium