Alkenes

Question Paper 1

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	Organic chemistry
Sub-Topic	Alkenes
Booklet	Question Paper 1

Time Allowed: **53 minutes**

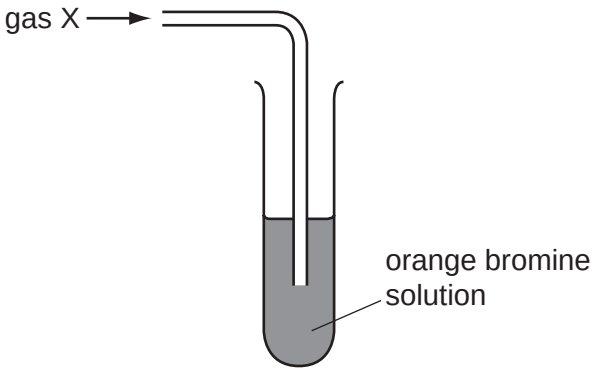
Score: **/44**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	53%	48%	40%	33%	<25%

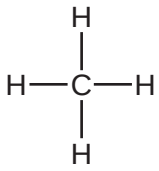
1 The apparatus shows an experiment used to test gas X.



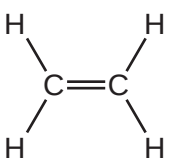
The bromine solution quickly becomes colourless.

What is the structure of gas X?

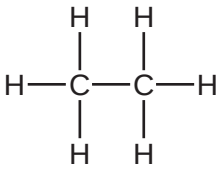
A



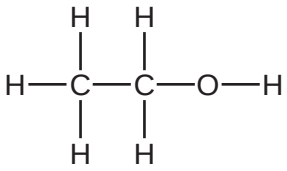
B



C



D

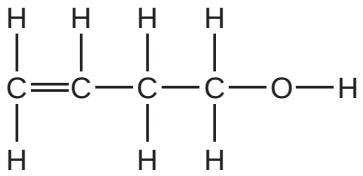


2 A compound has the formula $CH_3CH_2CH=CH_2$.

Which row in the table shows the type of compound and the colour change when aqueous bromine is added?

	type of compound	colour change
A	saturated	brown to colourless
B	saturated	colourless to brown
C	unsaturated	brown to colourless
D	unsaturated	colourless to brown

3 The diagram shows the structure of a compound.

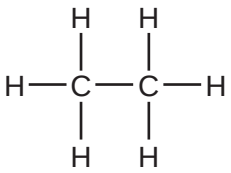


To which classes of compound does this molecule belong?

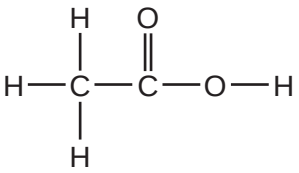
	alkane	alkene	alcohol
A	no	no	no
B	no	yes	yes
C	yes	no	yes
D	yes	yes	yes

4 Which structure is **incorrect**?

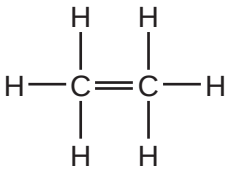
A



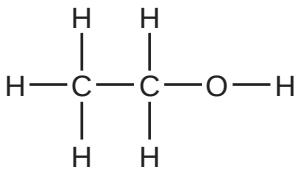
B



C



D

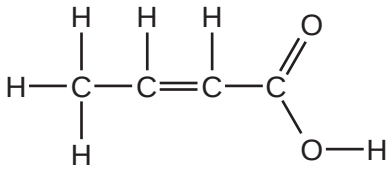


5 Alkenes have the general formula C_nH_{2n}.

Which of the following is an alkene?

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

6 The structure of a compound is shown.



Which functional groups are present in this compound?

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

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

1 C_3H_8

2 C_2H_4

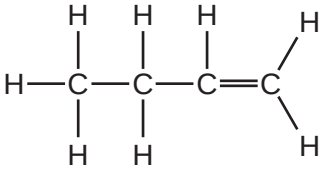
3 C_3H_6

4 C_2H_6

Which products would decolourise bromine water?

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

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



Which hydrocarbon can be cracked to make butene?

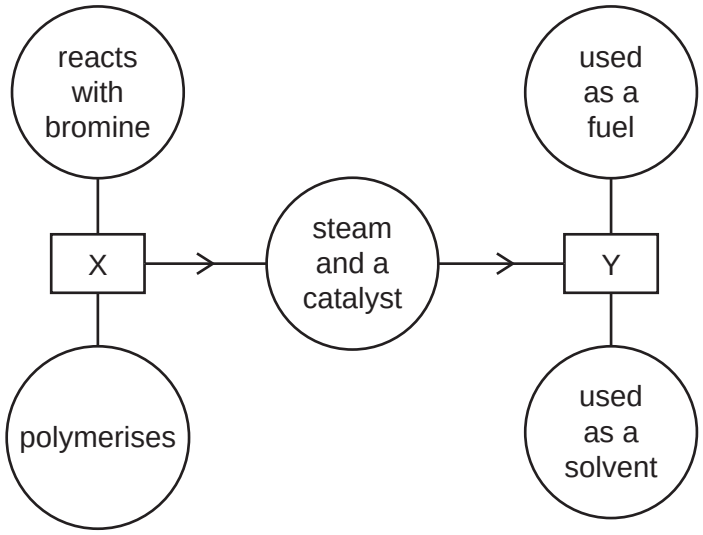
A ethane, C_2H_6

B decane, $C_{10}H_{22}$

C methane, CH_4

D propane, C_3H_8

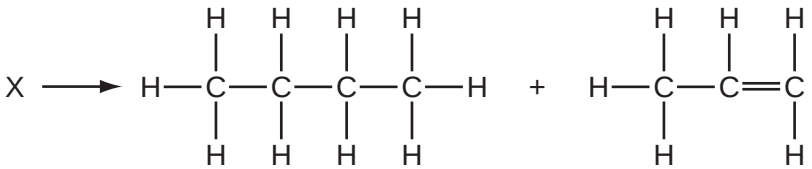
9 The diagram shows some properties of two organic compounds X and Y.



What are X and Y?

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

10 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

11 Molecule X is both an alkene and a carboxylic acid.

Which row describes X?

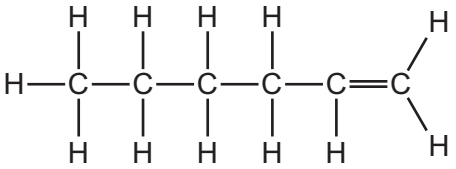
	saturated	–COOH present
A	no	no
B	no	yes
C	yes	no
D	yes	yes

12 Which hydrocarbon reacts with steam to produce ethanol?

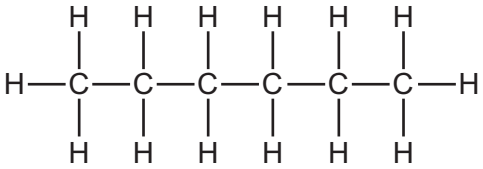
A C_2H_4 **B** C_2H_6 **C** C_3H_6 **D** C_3H_8

13 Which molecular structure shows hexene?

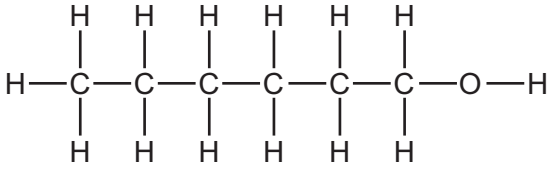
A



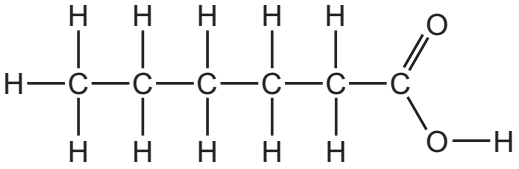
B



C



D



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

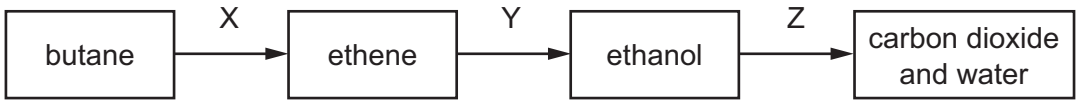
A The functional group is C=C.

B The structural difference between one member and the next is $-CH_3-$.

C They form a homologous series.

D They turn aqueous bromine from brown to colourless.

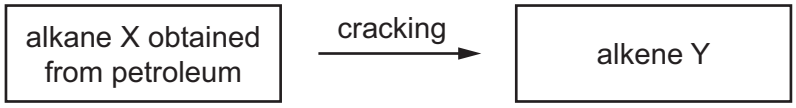
15 The diagram shows a reaction sequence.



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

16 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

17 X, Y and Z are three hydrocarbons.

X C $_2$=CH_2 Y CH_3–CH=CH_2 Z CH_3–CH_2–CH=CH_2

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

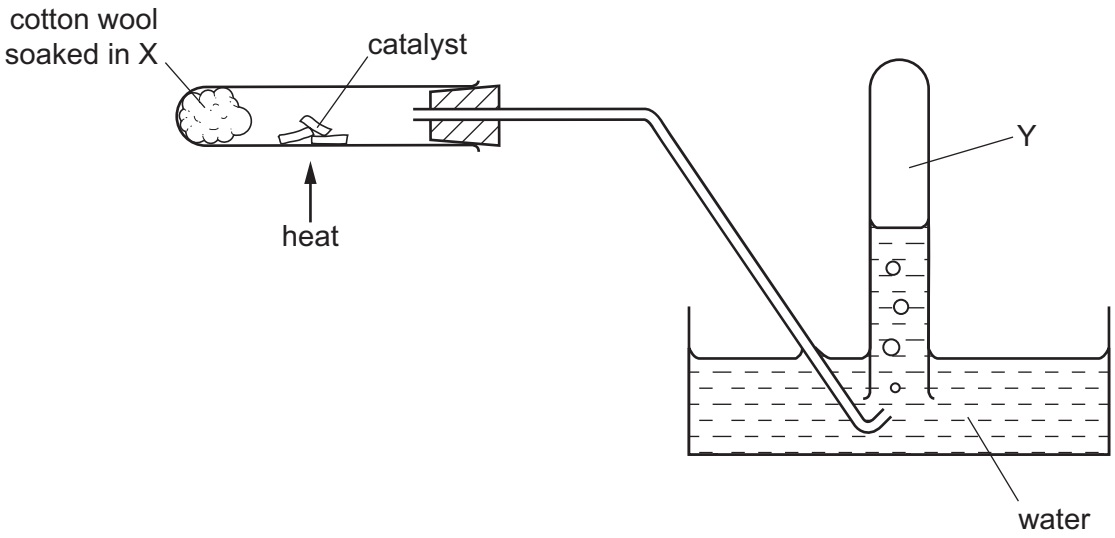
1 They are all alkenes.

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

18 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

19 Alkenes are manufactured by cracking hydrocarbons obtained from petroleum.

hydrocarbon P obtained from petroleum $\xrightarrow{\text{cracking}}$ hydrocarbon Q

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

20 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

21 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

22 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.

23 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.

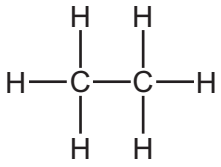
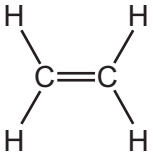
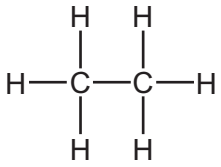
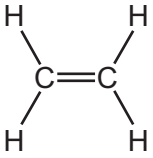
C It has two carbon-carbon double bonds.

D It is produced by cracking alkanes.

24 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	
B	ethane	
C	ethene	
D	ethene	

25 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.

26 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?

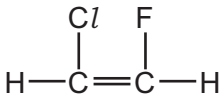
A ethanoic acid

B ethanol

C gasoline

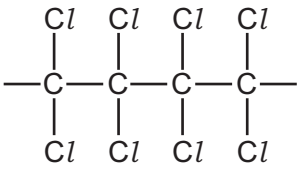
D methane

27 The structure of a monomer is shown.

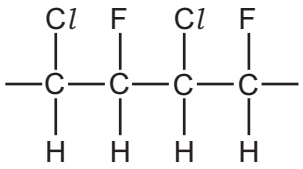


Which polymer can be made from this monomer?

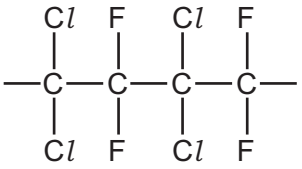
A



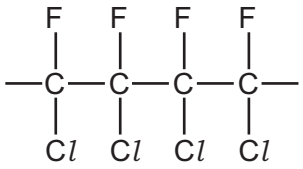
B



C

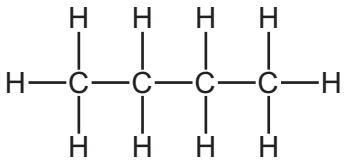


D

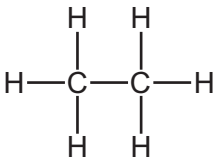


28 The structures of four organic compounds are shown.

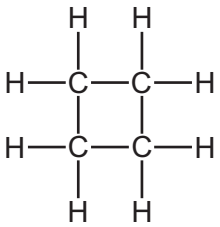
S



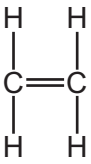
T



U



V



Which compounds are unsaturated?

A S only **B** T and U **C** U only **D** V only

29 Cracking is an important process in the petroleum industry.

The products of cracking include .....1..... and an .....2..... of .....3..... relative molecular mass than the .....4..... that was cracked.

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

	1	2	3	4
A	hydrogen	alkane	greater	alkene
B	hydrogen	alkene	smaller	alkane
C	steam	alkane	greater	alkene
D	steam	alkene	smaller	alkane

30 Which compound rapidly decolourises aqueous bromine?

A ethane

B ethanoic acid

C ethanol

D ethene

31 Two reactions are shown.

1 butane → ethene

2 ethene → ethanol

Which terms describe reactions 1 and 2?

	1	2
A	cracking	addition
B	cracking	combustion
C	distillation	addition
D	distillation	combustion

32 Ethene is a hydrocarbon.

Which row shows the type of bond between the carbon atoms in ethene, and the effect of ethene on aqueous bromine?

	type of bond	effect of ethene on aqueous bromine
A	single bond	colour changes from brown to colourless
B	single bond	colour changes from colourless to brown
C	double bond	colour changes from brown to colourless
D	double bond	colour changes from colourless to brown

33 Which process produces alkenes from alkanes?

A combustion

B cracking

C fermentation

D polymerisation

34 Poly(ethene) is made from ethene.

Ethene is .....1..... hydrocarbon because it contains a carbon to carbon .....2..... bond.

The general name given to small molecules that undergo polymerisation is .....3..... .

Which words complete gaps 1, 2 and 3?

	1	2	3
A	an unsaturated	double	monomers
B	an unsaturated	single	alkenes
C	a saturated	double	alkenes
D	a saturated	single	monomers

35 Which type of hydrocarbon reacts rapidly with aqueous bromine and what is the colour change of the aqueous bromine?

	type of hydrocarbon	colour change of the aqueous bromine
A	alkane	brown to colourless
B	alkane	colourless to brown
C	alkene	brown to colourless
D	alkene	colourless to brown

36 Which reaction of ethene is **not** an addition reaction?

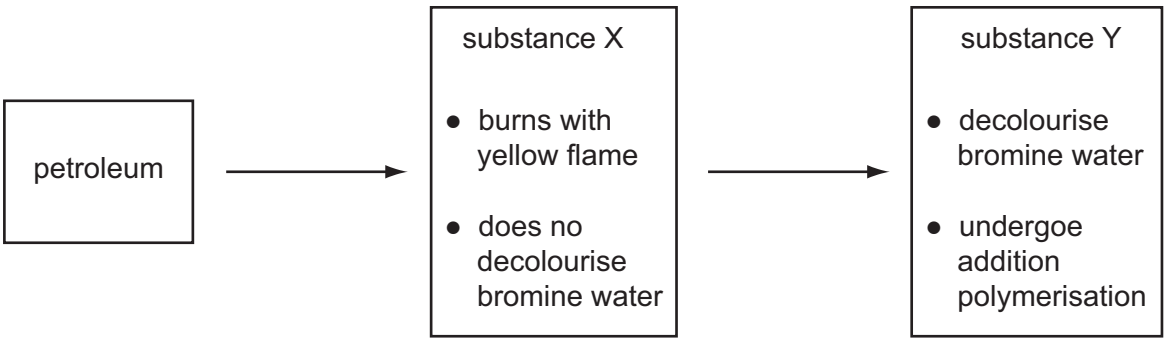
A reaction with bromine

B reaction with hydrogen

C reaction with oxygen

D reaction with steam

37 The diagram shows a flow diagram.



Which type of organic compounds are X and Y?

	substance X	substance Y
A	alcohol	alkane
B	alkane	alkene
C	alkene	alkane
D	alkane	alcohol

38 Which columns describe the hydrocarbons ethane and ethene?

	1	2	3	4
state at room temperature	gas	gas	liquid	liquid
reaction with oxygen	burns	burns	burns	burns
reaction with aqueous bromine	no reaction	decolourises bromine	no reaction	decolourises bromine

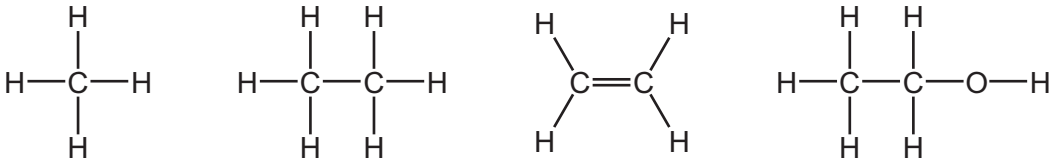
A 1 (ethane) and 2 (ethene)

B 1 (ethane) and 4 (ethene)

C 2 (ethene) and 3 (ethane)

D 3 (ethane) and 4 (ethene)

39 The structures of four organic compounds are shown.



Which statement is **not** correct?

A Only one of the compounds is an alcohol.

B Only one of the compounds is an alkane.

C Only one of the compounds is unsaturated.

D Only three of the compounds are hydrocarbons.

40 A hydrocarbon A is cracked to make B and hydrogen.

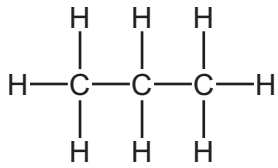
Compound C is formed by the addition polymerisation of B.

To which homologous series do A, B and C belong?

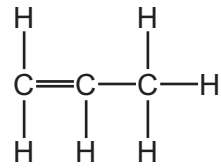
	alkene	alkane
A	A	B and C
B	B	A and C
C	C	A and B
D	–	A and C

41 The structures of four compounds are shown.

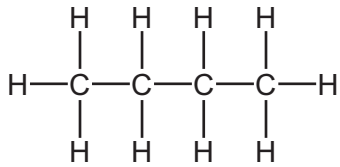
W



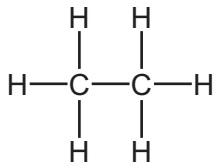
X



Y



Z



Which are members of the same homologous series?

A W, X, Y and Z

B W and X only

C W, Y and Z only

D X and Z only

42 Ethane and ethene are both hydrocarbons.

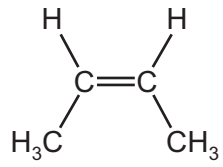
Ethane reacts with chlorine and ethene reacts with bromine.

Which row describes the type of reaction that ethane and ethene undergo?

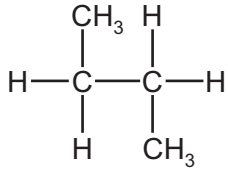
	ethane	ethene
A	addition	addition
B	addition	substitution
C	substitution	substitution
D	substitution	addition

43 The structures of some organic molecules are shown.

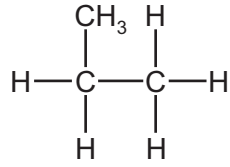
1



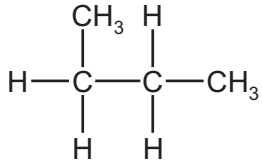
2



3



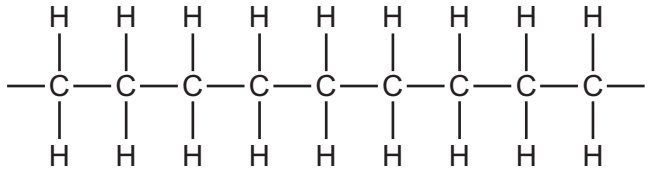
4



Which structures represent an alkane with four carbon atoms?

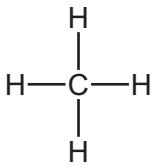
A 1 only **B** 2 and 3 **C** 2 and 4 **D** 3 and 4

44 The diagram shows part of the molecule of a polymer.

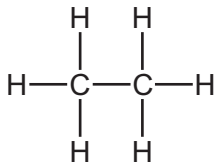


Which diagram shows the monomer from which this polymer could be manufactured?

A



B



C