Homologous series

Question Paper 1

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

Time Allowed: **33 minutes**

Score: **/27**

Percentage: **/100**

Grade Boundaries:

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

1 Butene and hexene belong to the same homologous series.

What is the same for butene and hexene?

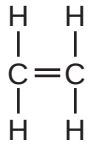
A boiling point

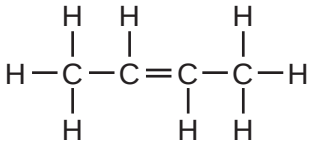
B functional group

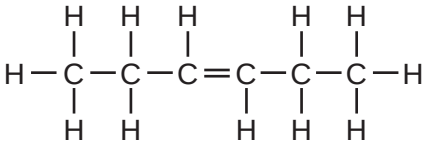
C number of hydrogen atoms per molecule

D relative molecular mass

2 The structures of three compounds are shown.







Why do these substances all belong to the same homologous series?

A They all contain an even number of carbon atoms.

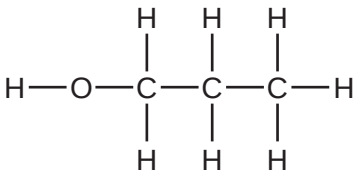
B They all contain the same functional group.

C They are all hydrocarbons.

D They are all saturated.

3 Which structures show compounds that are members of the same homologous series?

1



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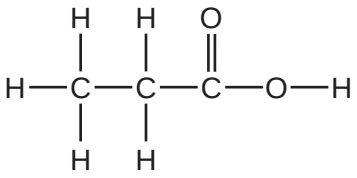

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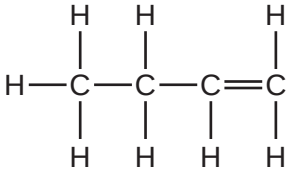

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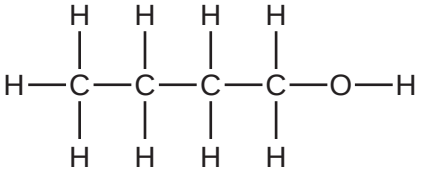
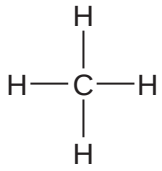


A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

4 Which structure shows a compound that belongs to a **different** homologous series to propane?

A



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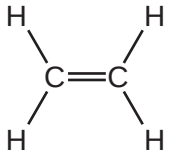

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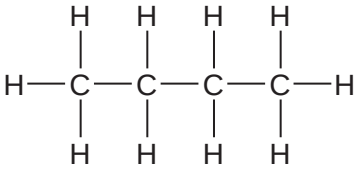

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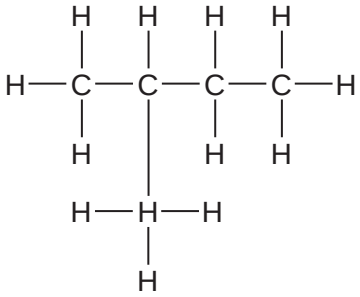
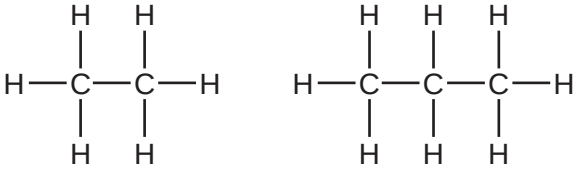


5 Which pair of compounds are members of the same homologous series?

A



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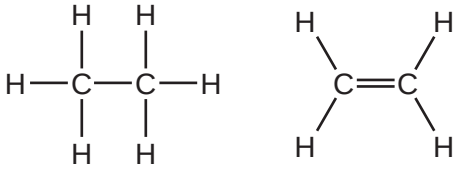

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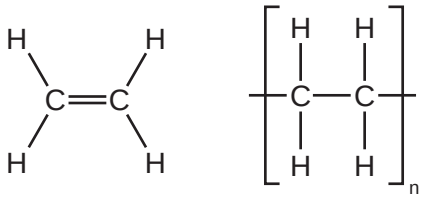
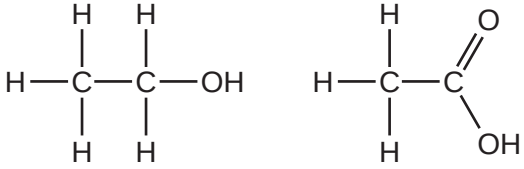
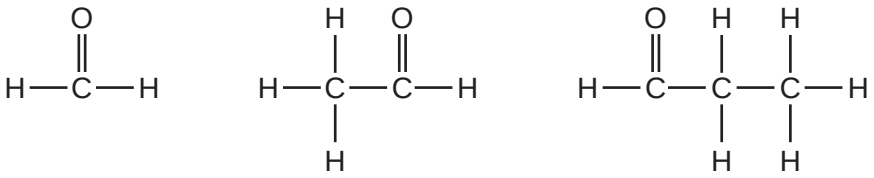


D



6 The diagram shows the structures of three compounds.



Why do these three compounds belong to the same homologous series?

A They all contain carbon, hydrogen and oxygen.

B They all contain the same functional group.

C They are all carbon based molecules.

D They are all flammable liquids.

7 A hydrocarbon X is cracked to make Y and hydrogen.

Compound Z is formed by the addition polymerisation of Y.

To which homologous series do X, Y and Z belong?

	alkane	alkene
A	X, Y and Z	–
B	X and Y	Z
C	X and Z	Y
D	Y and Z	X

8 Which group of compounds is part of a homologous series?

A CH_4, C_2H_4, C_3H_8

B C_3H_6, C_3H_8, C_3H_7OH

C CH_3OH, C_2H_5OH, C_3H_7OH

D CH_3CO_2H, CH_3CH_2OH, HCO_2H

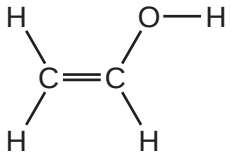
9 A hydrocarbon A is cracked to make B and hydrogen.

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

10 PVA is a polymer. The monomer has the structure shown.



To which homologous series does this compound belong?

	alcohols	alkenes
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

11 Ethanol is a fuel used in cars. It can be made from petroleum.

$C_4H_{10} \rightarrow C_2H_4 + C_2H_6$ cracking

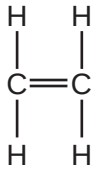
$C_2H_4 + H_2O \rightarrow C_2H_5OH$ producing ethanol

$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ burning

Compounds of how many homologous series appear in these equations?

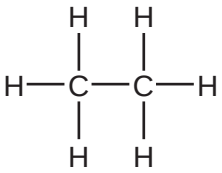
A 1 **B** 2 **C** 3 **D** 4

12 The diagram represents ethene.



Which compound has chemical properties similar to those of ethene?

A



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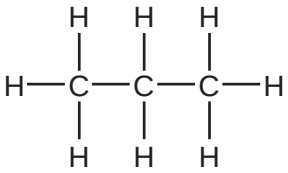
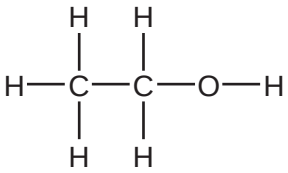


C



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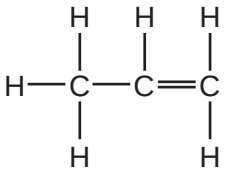
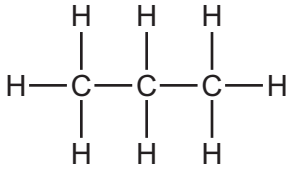
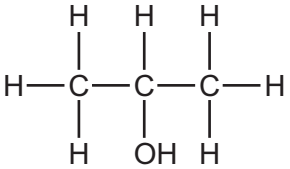
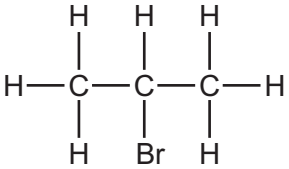


13 Which row represents compounds in the same homologous series?

A







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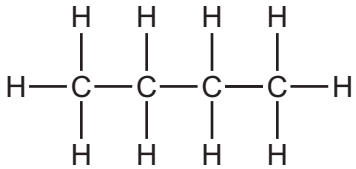
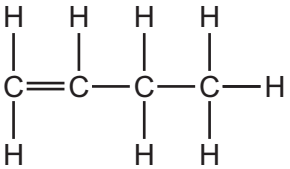
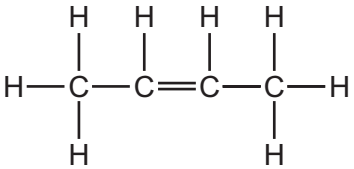
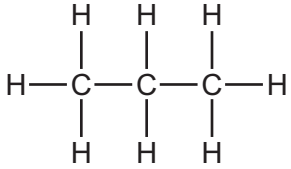
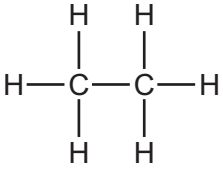


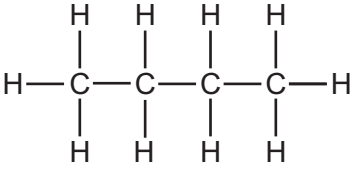




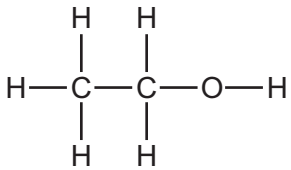
C

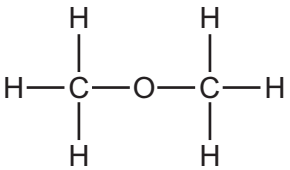


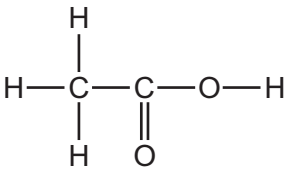




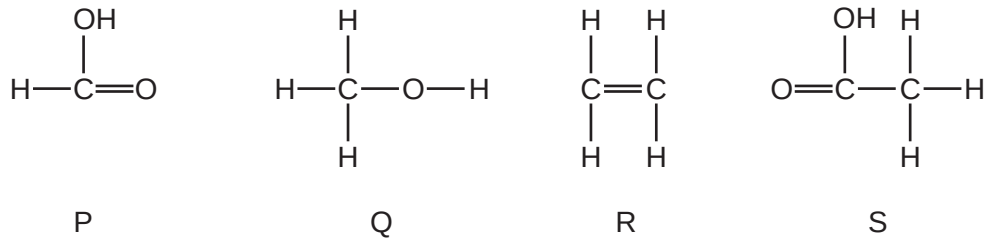
D







14 The structures of four molecules are shown.



P Q R S

Which two molecules belong to the same homologous series?

A P and Q **B** P and S **C** Q and R **D** R and S

15 The main constituent of natural gas is hydrocarbon X.

To which homologous series does X belong and how many **atoms** are in one molecule of X?

	homologous series	number of atoms in one molecule
A	alkane	1
B	alkane	5
C	alkene	1
D	alkene	5

16 In which reaction could one of the products belong to the same homologous series as the organic reactant?

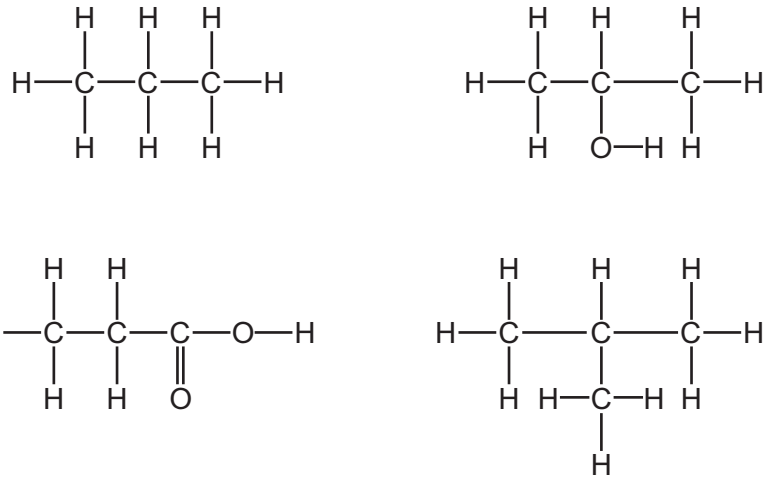
A addition of steam to ethene

B combustion of an alkane

C cracking of an alkane

D polymerisation of ethene

17 Which homologous series is **not** represented in the compounds shown below?



A alcohols

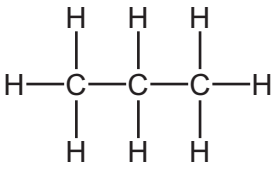
B alkanes

C alkenes

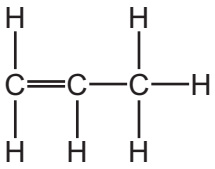
D carboxylic acids

18 The structures of four compounds are shown.

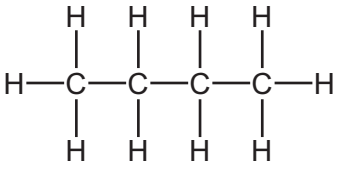
W



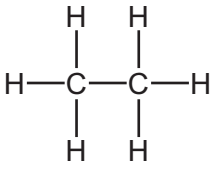
X



Y



Z



Which are members of the same homologous series?

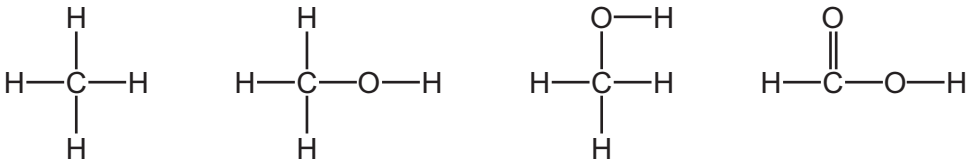
A W, X, Y and Z

B W and X only

C W, Y and Z only

D X and Z only

19 The structures of four different organic compounds are shown.



How many different homologous series are represented by these compounds?

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

20 Ethene, propene and butene are all members of the same homologous series.

Which statement explains why ethene, propene and butene have similar chemical properties?

A They all have the same functional group.

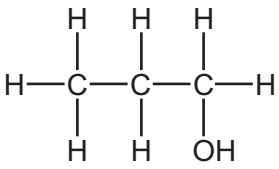
B They are all gases at room temperature.

C They are all hydrocarbons.

D They are all organic.

21 The structures of four molecules are shown.

1



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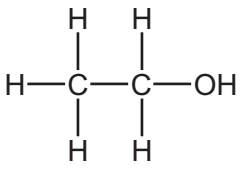

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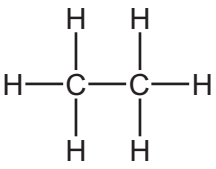
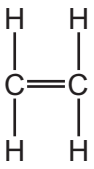


4



Which molecules belong to the same homologous series?

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

22 Which of the compounds shown are in the same homologous series?

1 CH_3OH

2 CH_3CH_2OH

3 CH_3COOH

4 $CH_3CH_2CH_2OH$

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

23 Which compound is **not** an alkane, C_nH_{2n+2}?

A $CH_3CH_2CH_2CH_3$

B $(CH_3)_2CHCH_3$

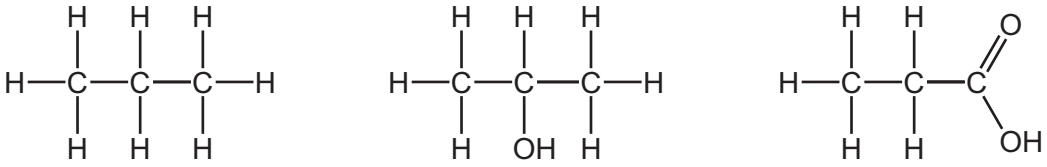
C $CH_3CHCHCH_3$

D $(CH_3)_3CH$

24 Which compound does **not** belong to the same homologous series as the other three compounds?

A CH_3OH **B** C_2H_5COOH **C** C_2H_5OH **D** $C_7H_{15}OH$

25 The structures of three molecules are shown.



Which homologous series is **not** represented?

A alcohols

B alkanes

C alkenes

D carboxylic acids

26 X, Y and Z are three hydrocarbons.

X $CH_2=CH_2$ 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

27 Which statement about homologous series is **not** correct?

A Alkenes have the same general formula, C_nH_{2n+2}.

B Each member of the homologous series of alkanes differs from the next by CH_2.

C The members of a homologous series all have similar chemical properties.

D The members of a homologous series all have the same functional group.