

Alkanes

Question Paper

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

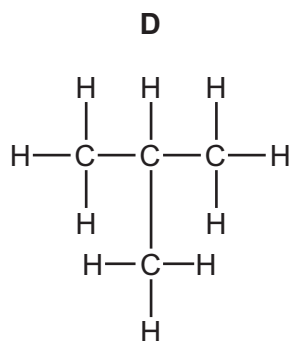
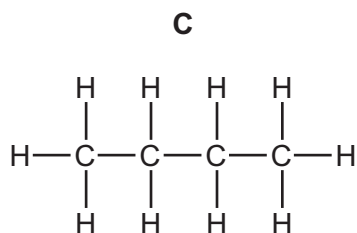
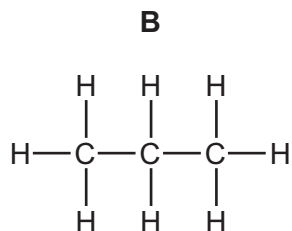
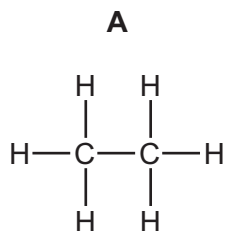
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Score: /28

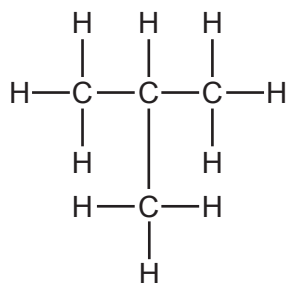
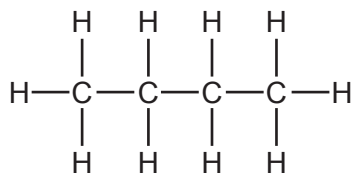
Percentage: /100

- 1 Which statement about alkanes is correct?
- A Ethane reacts with chlorine in an addition reaction.
 - B Propane has a higher boiling point than butane.
 - C The molecule of the alkane that contains 99 carbon atoms has 200 hydrogen atoms.
 - D There are three isomers with the formula C_4H_{10} .
- 2 Which is a correct definition of isomers?
- A atoms with the same relative atomic mass and different structures
 - B compounds with the same molecular formula and different structures
 - C compounds with the same molecular mass and different structures
 - D elements with the same molecular mass and the same structures
- 3 Which statement about the properties of propane and hexane is correct?
- A Propane has a higher boiling point than hexane.
 - B Propane has a higher relative molecular mass than hexane.
 - C Propane has more isomers than hexane.
 - D Propane is more flammable than hexane.
- 4 Methane is the first member of the alkane series of hydrocarbons. The second member is ethane.
- Which statements about ethane are correct?
- 1 Ethane has the formula C_2H_4 .
 - 2 Ethane has a higher boiling point than that of methane.
 - 3 Ethane has the same molecular formula as methane.
 - 4 Ethane has chemical properties very similar to those of methane.
- A 1, 2 and 3 B 1 and 4 C 2 and 4 D 3 only

- 5 Which alkane, when any one hydrogen atom is substituted by a chlorine atom, will **not** produce isomers?



- 6 The diagram shows two compounds.



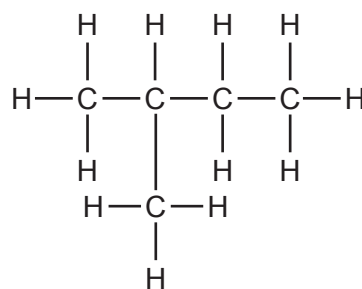
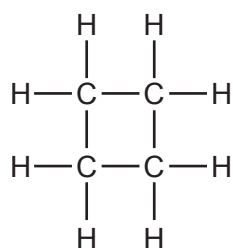
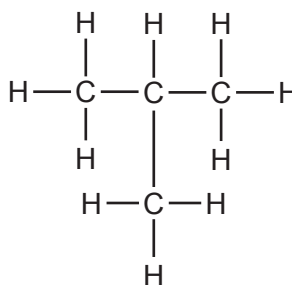
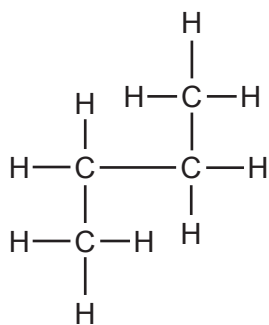
It can be predicted from their formulae that the compounds have the same

- A** boiling point.
- B** composition by mass.
- C** melting point.
- D** structural formula.

- 7 Which statement concerning isomers is true?
- A Diamond and graphite are isomers of each other.
 - B Isomers have the general formula C_nH_{2n+2} .
 - C Isomers have the same molecular formula.
 - D Macromolecules are isomers of the small molecules from which they are made.
- 8 Compounds X and Y are both alkanes. Compound X has a higher boiling point than compound Y. What could be the formulae of compounds X and Y?

	compound X	compound Y
A	C_8H_{16}	C_9H_{18}
B	C_8H_{18}	C_9H_{20}
C	C_9H_{18}	C_8H_{16}
D	C_9H_{20}	C_8H_{18}

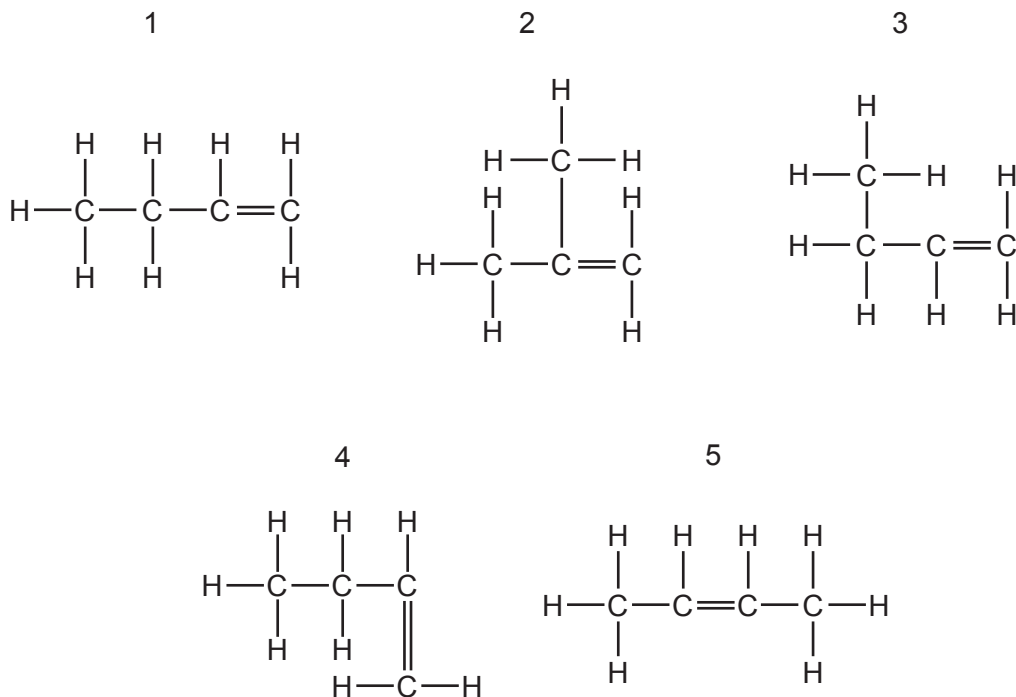
9 Four hydrocarbon structures are shown.



Which hydrocarbons are isomers of each other?

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

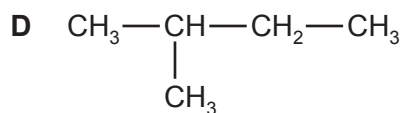
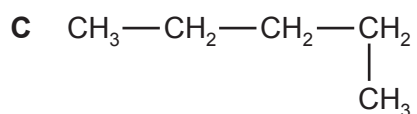
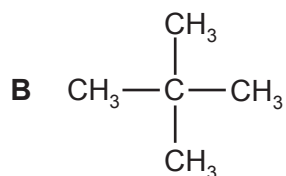
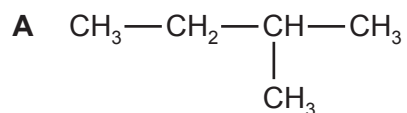
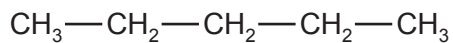
10 Five structures are shown.



Which structures represent identical molecules?

- A 1 and 3 only
- B 2 and 3 only
- C 1, 3 and 4 only
- D 1, 3 and 5 only

11 Which structure is **not** an isomer of the structure shown?

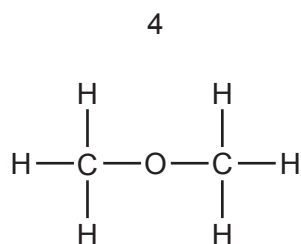
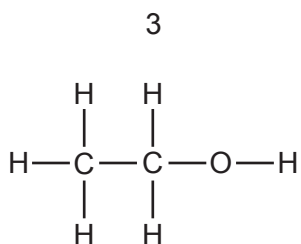
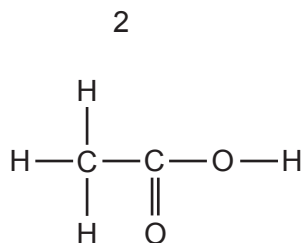
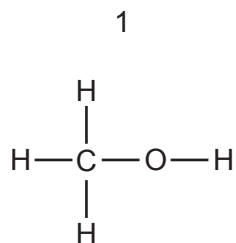


12 A mixture of four gases, methane, ethane, propane and butane is cooled until the first drop of liquid is formed.

What compound is most likely to be present in this drop?

- A** butane
- B** ethane
- C** methane
- D** propane

13 Which two compounds are members of the same homologous series?



A 1 and 2

B 1 and 3

C 1 and 4

D 2 and 4

14 Alkanes are a homologous series of organic compounds.

Which statement about alkanes is correct?

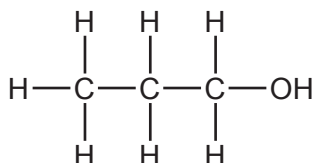
A Their boiling points increase as the length of the carbon chain increases.

B Their general formula is C_nH_{2n} .

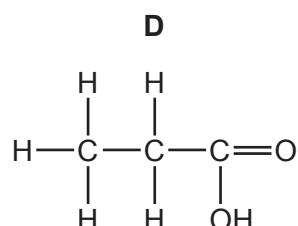
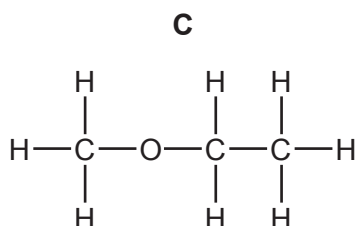
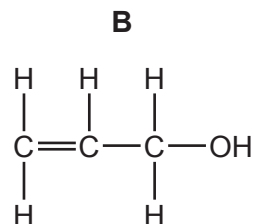
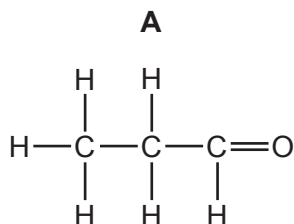
C They are unsaturated hydrocarbons.

D They take part in addition reactions.

15 This is the structure of propan-1-ol.



Which of the following is an isomer of propan-1-ol?

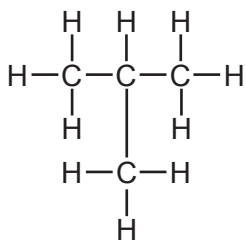


16 Which statement applies to all three of the compounds ethane, ethene and ethanol?

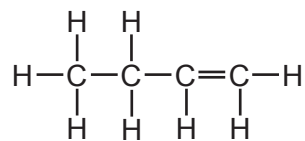
- A** One molecule of each compound contains the same number of carbon atoms.
- B** One mole of each compound contains the same number of hydrogen atoms.
- C** They all occur in crude oil.
- D** They are all liquids at room temperature.

17 The diagrams show four structures.

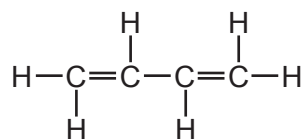
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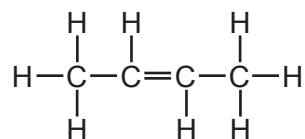
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3



4



Which structures are isomeric butenes?

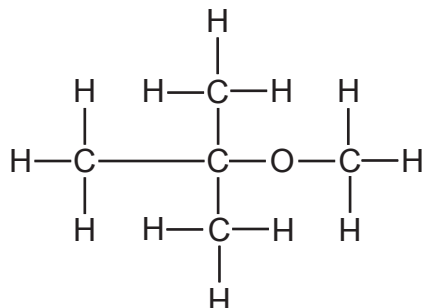
A 1 and 2

B 2 and 3

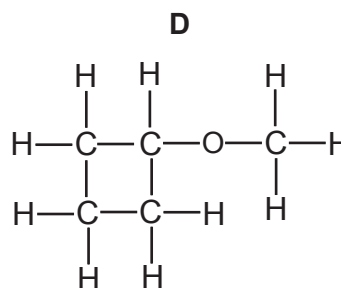
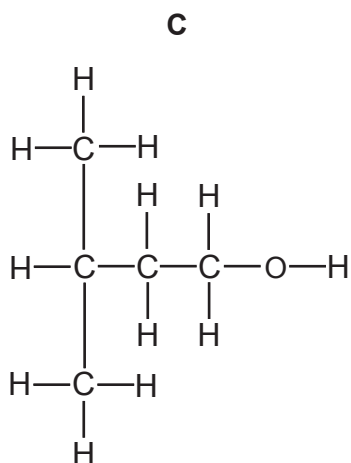
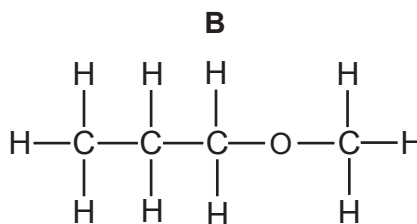
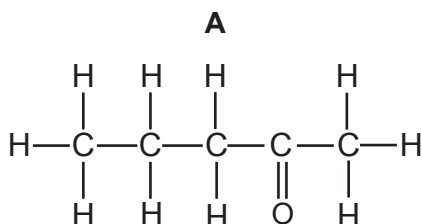
C 3 and 4

D 2 and 4

- 18 A compound known in industry as 'MTBE' is used as an additive in 'lead-free' petrol. The structural formula of MTBE is shown.

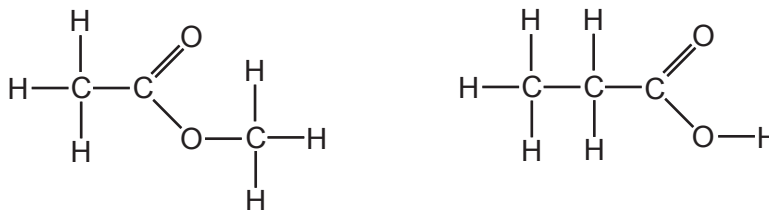


Which compound is an isomer of MTBE?



- 19 Which property of the alkanes does **not** increase as relative molecular mass increases?
- A boiling point
 - B flammability
 - C melting point
 - D viscosity

20 The displayed formulae of two compounds are shown.



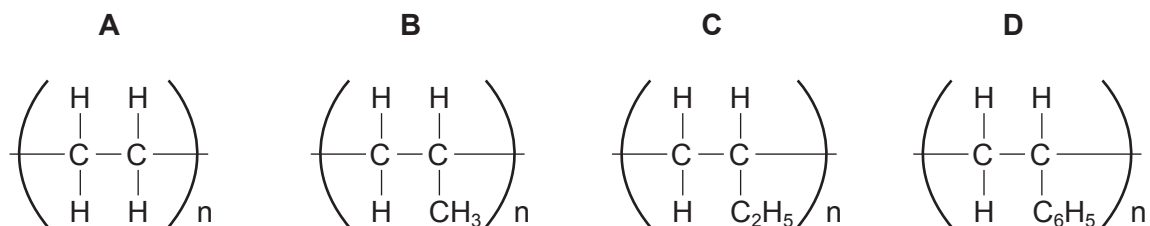
What are the similarities and differences between the two compounds?

	similarities	differences
A	molecular formulae	reactions
B	molecular formulae	relative molecular masses
C	structures	molecular formulae
D	structures	relative molecular masses

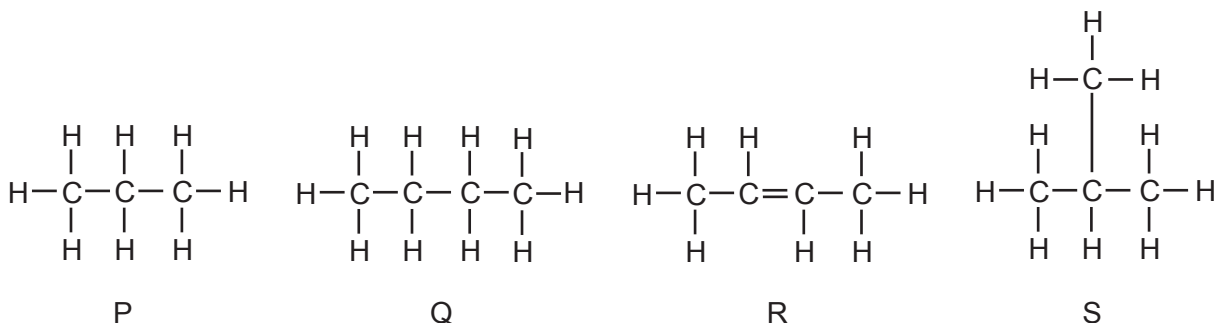
21 In which of the following are all the compounds members of the same homologous series?

- A** CH₄ C₂H₆ C₃H₆
B CH₄ C₂H₆ C₃H₈
C C₂H₄ C₃H₆ C₄H₁₀
D C₃H₄ C₃H₆ C₃H₈

22 Which polymer has the empirical formula CH?



23 The diagrams show four hydrocarbons P, Q, R and S.



Which two hydrocarbons are isomers of each other?

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

24 Methane, CH_4 , the first member of the alkane homologous series, has a boiling point of -161°C .

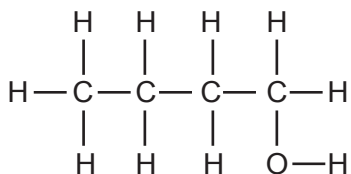
Which molecular formula and boiling point could be correct for another alkane?

	molecular formula	boiling point/ $^\circ\text{C}$
A	C_2H_4	-88
B	C_2H_6	-185
C	C_3H_6	-69
D	C_3H_8	-42

25 Which compound has an addition reaction with chlorine?

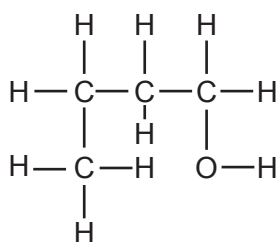
- A** C_2H_4 **B** C_2H_6 **C** $\text{C}_2\text{H}_5\text{OH}$ **D** $\text{CH}_3\text{CO}_2\text{H}$

26 Compound **Q** has the structure shown.

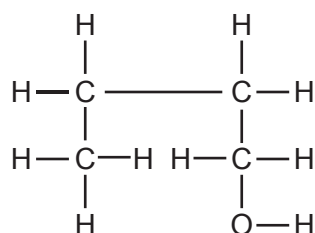


Which structure is an isomer of **Q**?

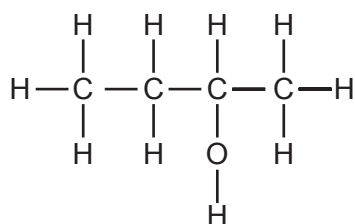
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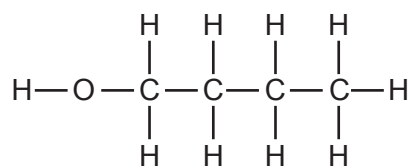
B



C



D



27 When 1 volume of gas X reacts with exactly 5 volumes of oxygen it forms carbon dioxide and water only.

What is gas X?

- A** methane, CH_4
- B** ethane, C_2H_6
- C** propane, C_3H_8
- D** butane, C_4H_{10}

28 Butane and methylpropane are isomers.

Which formula is different for the two isomers?

- A empirical formula
- B general formula
- C molecular formula
- D structural formula