

WJEC EDUQAS AS CHEMISTRY • COMPONENT 2

CHEMISTRY



EXAM QUESTION PACK

2.4 ORGANIC COMPOUNDS

SCORE

/52

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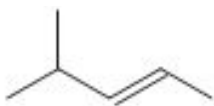
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1. The skeletal formula of a hydrocarbon is shown below.



Give the **systematic name** of this hydrocarbon.

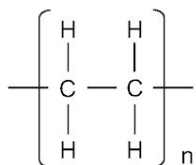
(Total 1)

2. The following table shows information about some organic compounds.

Name	Molecular formula	Structural formula
ethene	C_2H_4	$ \begin{array}{c} H & & H \\ & \diagdown & / \\ & C = C \\ & / & \diagdown \\ H & & H \end{array} $
propane	C_3H_8	
hexane		$ \begin{array}{cccccc} H & H & H & H & H & H \\ & & & & & \\ H-C & -C & -C & -C & -C & -C-H \\ & & & & & \\ H & H & H & H & H & H \end{array} $
	CH_4	$ \begin{array}{c} H \\ \\ H-C-H \\ \\ H \end{array} $

(a) Complete the table by filling all **three** empty boxes. [3]

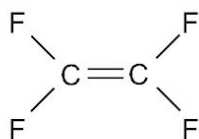
(b) (i) Name the compound from the table above that can be used to form the polymer represented by the following structure. [1]



Compound

(ii) Small reactive molecules, such as alkenes, that join together to form polymers are known as [1]

(c) Another polymer can be formed from the following compound.



(i) Choose from the box below the name of the polymer produced from this compound. [1]

polyethene	polypropene	polyvinylchloride
polytetrafluoroethene	polystyrene	

Polymer

(ii) Draw the repeating unit for this polymer. [1]

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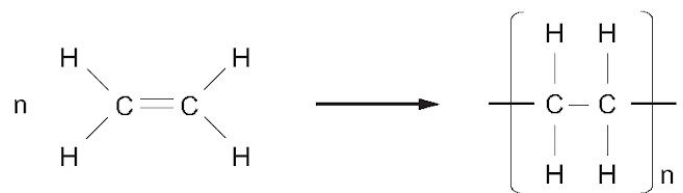
3.

The following table shows some information about four organic compounds.

Name	Molecular formula	Structural formula	Family of hydrocarbons
methane		$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array} $	
butane	C_4H_{10}		alkane
ethene	C_2H_4	$ \begin{array}{ccc} \text{H} & & \text{H} \\ & \diagdown \quad \diagup & \\ & \text{C}=\text{C} & \\ & \diagup \quad \diagdown & \\ \text{H} & & \text{H} \end{array} $	
	C_3H_6	$ \begin{array}{ccccc} & \text{H} & & \text{H} & & \text{H} \\ & & & & & \\ \text{H} & -\text{C} & - & \text{C} & = & \text{C} \\ & & & & & \\ & \text{H} & & & & \text{H} \end{array} $	alkene

(a) Complete the table. [4]

(b) Ethene undergoes polymerisation to form polythene. The following equation shows the reaction taking place.



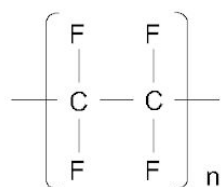
Describe what happens during this process. [2]

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(c) Another polymer is PTFE. Its repeating unit is shown below.



Draw the structure of the monomer used to produce PTFE.

[1]

4.

- (a) The table below shows the names, molecular formulae and the structural formulae of the first two members of the alkene series. Complete the table by giving the structural formula of butene, C_4H_8 . [1]

Name	Molecular formula	Structural formula
ethene	C_2H_4	$ \begin{array}{cc} H & H \\ & \\ C & = C \\ & \\ H & H \end{array} $
propene	C_3H_6	$ \begin{array}{ccccc} & H & & & H \\ & & & & \\ H & - C & - & C & = C \\ & & & & \\ & H & & H & H \end{array} $
butene	C_4H_8	

- (b) Explain how polypropene is formed from propene. [4]

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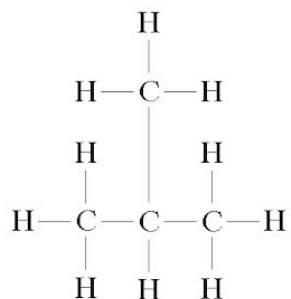
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5.

- (a) Give the **molecular** formula of the substance with the structural formula shown below.



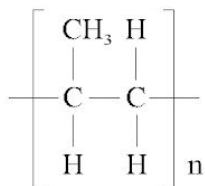
Molecular formula [1]

- (b) Give the name and the **structural** formula of the hydrocarbon with the molecular formula C_3H_8 . [2]

Name

Structural formula

- (c) Polypropene is represented as shown below.



Give the **molecular** formula of the monomer used to make polypropene. [1]

Molecular formula

6.

Organic substances are arranged in families of compounds with similar properties.

- (a) The table below shows the first four members of two families of organic compounds, alkanes and alcohols.

Alkanes	Alcohols
methane CH_4	methanol CH_3OH
ethane C_2H_6	ethanol $\text{C}_2\text{H}_5\text{OH}$
propane C_3H_8	propanol $\text{C}_3\text{H}_7\text{OH}$
butane C_4H_{10}	butanol $\text{C}_4\text{H}_9\text{OH}$

The general formula for members of the alkane family is $\text{C}_n\text{H}_{2n+2}$.

Give the general formula for members of the alcohol family. [1]

-
- (b) Isomers are compounds which have the same molecular formula but different structural formulae.

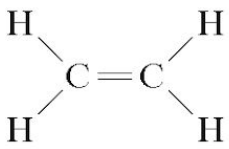
Propanol has two isomers. Draw the two positional isomers of propanol. [2]

Isomer 1	Isomer 2
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(c) Another family of organic compounds is the alkene family.

Complete the table below.

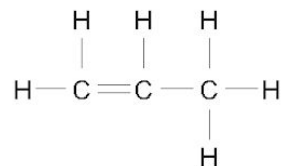
[2]

Name	Molecular formula	Structural formula
ethene	C_2H_4	
	C_3H_6	

5

7.

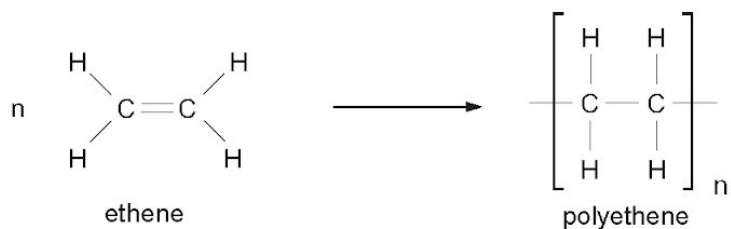
- (a) The following diagram shows the structural formula of propene.



Give the molecular formula of propene. [1]

- (b) An alkane contains three carbon atoms and eight hydrogen atoms. Draw its structural formula. [1]

- (c) The equation below shows the formation of polyethene from ethene.



Describe what happens to ethene molecules during the formation of polyethene. [3]

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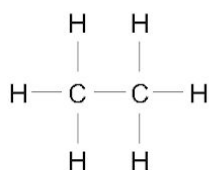
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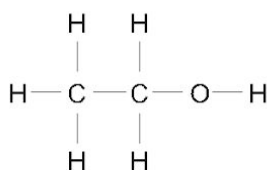
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8.

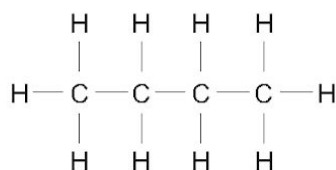
(a) The structural formulae of some organic compounds are shown below.



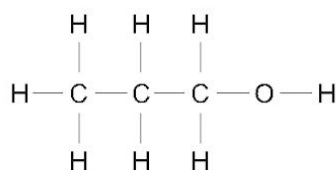
A



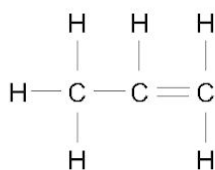
B



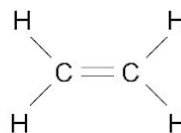
C



D



E



F

(i) Give the letters, **A-F**, of **two** alkanes and **two** alcohols.

[2]

Alkanes and

Alcohols and

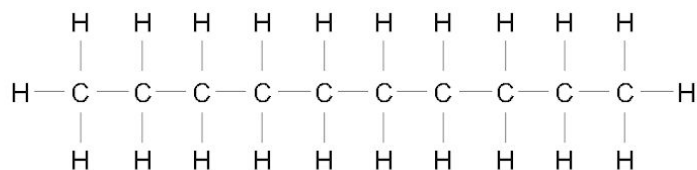
(ii) State which compound, **A-F**, has the molecular formula C_3H_6 .

[1]

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(b) Give the molecular formula of decane.

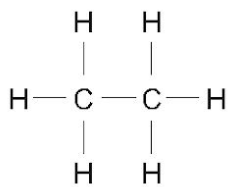
[1]



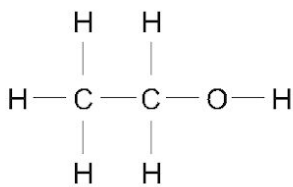
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9.

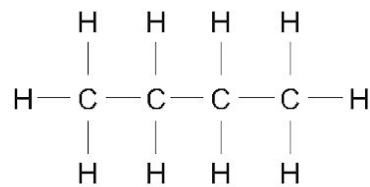
The following diagram shows the structures of six organic compounds.



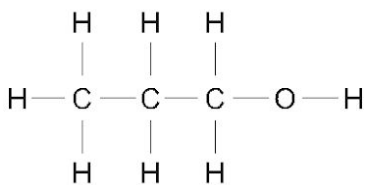
A



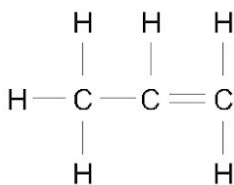
B



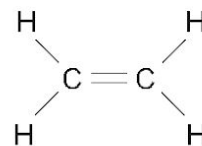
C



D



E



F

- (a) Name the family to which each of the following pairs of compounds belong. [2]

B and D

E and F

- (b) Describe a chemical test that could be carried out to distinguish between compounds **C** and **E**. Give the expected result for both compounds. [2]

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(c) Compound C is one of two isomers that have the molecular formula C_4H_{10} .

(i) Give the meaning of the term *isomer*.

[1]

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(ii) Draw in the space below the structure of the other isomer of C_4H_{10} .

[1]

(d) Give the letter, **A-F**, of **one other** compound that has an isomer. Draw the structure of its isomer. [2]

Compound

Structure

10.

- (a) (i) The table below shows the names, molecular formulae and structural formulae of some alkanes.

Complete the table.

[2]

Name	Molecular formula	Structural formula
methane	CH_4	
ethane		<pre> H H H — C — C — H H H </pre>
propane	C_3H_8	<pre> H H H H — C — C — C — H H H H </pre>
butane	C_4H_{10}	<pre> H H H H H — C — C — C — C — H H H H H </pre>

- (ii) Octane contains 8 carbon atoms. Give the molecular formula for octane.

[1]

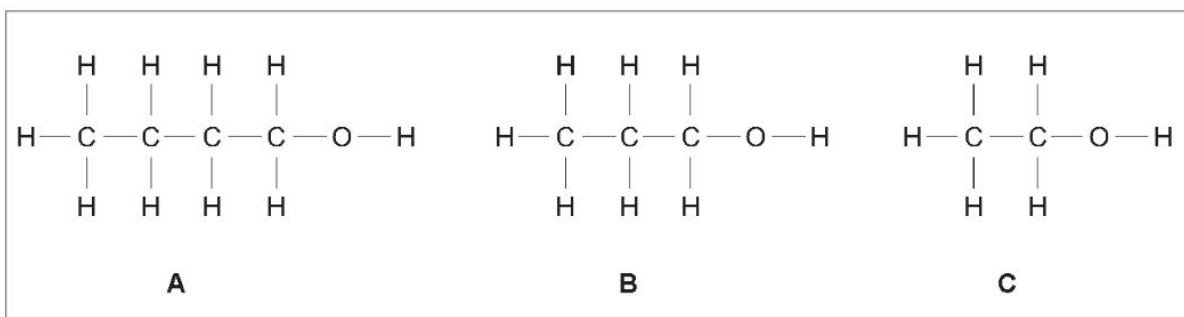
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- (b) (i) Compound X is made by a process called fermentation. The equation below shows the reaction that occurs.



Give the name of compound X. [1]

- (ii) Choose from the box below the structural formula, **A**, **B** or **C**, of compound X. [1]



Letter

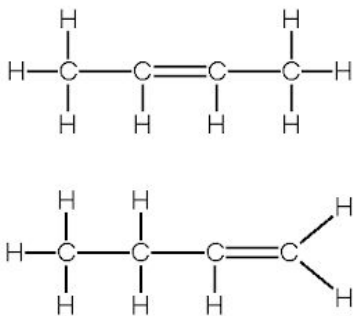
- (iii) Give one everyday use of compound X. [1]

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6

3

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	4	<i>Name</i> propene (1) <i>Molecular formula</i> CH₄ (1) <i>Structural formula</i> $ \begin{array}{cccc} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{C} - \text{H} \\ & & & & \\ & \text{H} & \text{H} & \text{H} & \text{H} \end{array} \quad (1) $ <i>Family of hydrocarbons</i> – both needed (1) alkane alkene			
(b)	2	double bond breaks / changes to single bond (1) many ethene molecules join together / form long chain or polymer (1)			
(c)	1	$ \begin{array}{cc} \text{F} & \text{F} \\ & \\ \text{C} & = \text{C} \\ & \\ \text{F} & \text{F} \end{array} $ ignore 'n' and any brackets used			

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	either of following 	correct structure for 2-methylpropene		
(b)			4	double bonds open (1R) Reserved mark - propene molecules join together / form chains (1) (addition) polymerisation (1) - repeat unit $\left[\text{C}_3\text{H}_6 \right]_n \quad (1)$ - any 2 of high temp / high pressure / catalyst (1) any 3 up to 3 max			condensation polymerisation

5

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	C_4H_{10}			
(b)			2	propane (1) $\begin{array}{ccccc} & H & & H & & H \\ & & & & & \\ H & - C & - & C & - & C & - H \\ & & & & & \\ & H & & H & & H \end{array}$ (1)			
(c)			1	C_3H_6			

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	$C_nH_{2n+1}OH$	$C_nH_{2n+2}O$		
(b)			2	$\begin{array}{ccccccc} & H & H & H & & & \\ & & & & & & \\ H & -C & -C & -C & -O & -H \\ & & & & & & \\ & H & H & H & & & \end{array}$ (1) $\begin{array}{ccccccc} & H & H & H & & & \\ & & & & & & \\ H & -C & -C & -C & -H \\ & & & & & & \\ & H & OH & H & & & \end{array}$ (1)	$CH_3CH_2CH_2OH$ $CH_3CH_2CH_3$ $\quad $ $\quad OH$		
(c)			2	propene (1) $\begin{array}{ccccccc} & H & H & H & & & \\ & & & & & & \\ H & -C & =C & -C & -H \\ & & & & & & \\ & & & H & & & \end{array}$ (1)			

7

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	C_3H_6		CH_2CHCH_3	
(b)			1	$ \begin{array}{ccccc} & H & & H & & H \\ & & & & & \\ H & -C & - & C & - & C & -H \\ & & & & & \\ & H & & H & & H \end{array} $			
(c)			3	- double bond opens (1) R - ethene molecules join together - long chain / single chain formed / polymer formed - addition reaction/ addition polymerisation any two for (1) each		becomes single bond loses double bond 'additional'	

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		2	A and C - both needed (1) B and D - both needed (1)	correct formulae/names for both correct formulae/names for both		
	(ii)		1	E	propene		
(b)			1	C ₁₀ H ₂₂	H ₂₂ C ₁₀		

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	alcohols (1) alkenes (1)			
(b)			2	add bromine water (1) stays brown/orange/no reaction with C and E turns from brown/orange to colourless (1)	add bromine		red
(c)	(i)		1	same molecular formula but different structure	same type and number of atoms but arranged differently	same atoms	same compound
	(ii)		1	$ \begin{array}{ccccc} & \text{H} & & \text{H} & & \text{H} \\ & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - \text{H} \\ & & & & & \\ & \text{H} & & & & \text{H} \\ & & & & & \\ & & & \text{H} - \text{C} - \text{H} \\ & & & \\ & & & \text{H} \end{array} $			
(d)			2	D (1) $ \begin{array}{ccccc} & \text{H} & & \text{OH} & & \text{H} \\ & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - \text{H} \\ & & & & & \\ & \text{H} & & \text{H} & & \text{H} \end{array} $ (1)	ether isomer of B or D		

10

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		2	$ \begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{H} \\ \\ \text{H} \end{array} \quad (1) $ C_2H_6 (1)			
	(ii)		1	C_8H_{18}			
(b)	(i)		1	ethanol		alcohol	
	(ii)		1	C			
	(iii)		1	wine / beer / alcoholic drinks fuels / biofuels solvents antibacterial gels perfumes / aftershaves any one for (1)		alcohol / drinking / drinks / medicine / cleaning	