

Organic Chemistry (H)

1. What is the formula of the functional group in **alcohols**?

- A $-\text{CH}_3$
- B $-\text{COOH}$
- C $-\text{CO}_2$
- D $-\text{OH}$

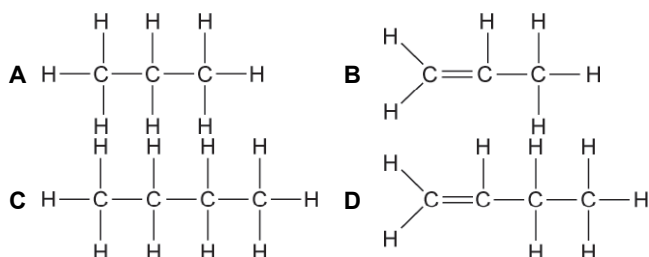
Your answer

[1]

2. A student reacts a hydrocarbon with bromine water.

The formula of the product is $\text{C}_3\text{H}_6\text{Br}_2$.

Which is the displayed formula of the hydrocarbon?



Your answer

[1]

3. Which of these homologous series can react together to form addition polymers?

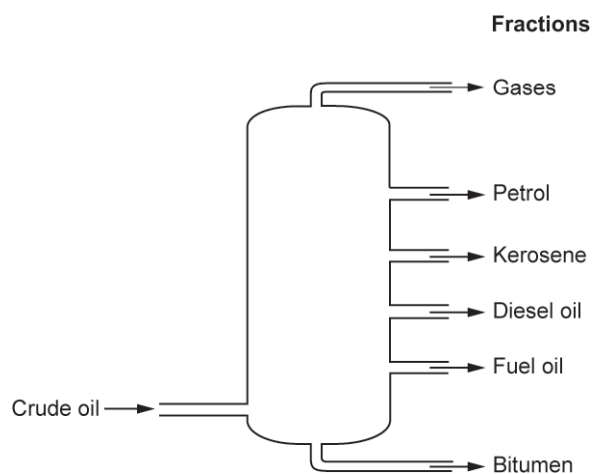
- A Alcohols and carboxylic acids
- B Alkenes only
- C Alkenes and alkanes
- D Carboxylic acids only

Your answer

[1]

4. Crude oil is separated into fractions by fractional distillation.

Look at the diagram of the fractions made in fractional distillation.



Which of these fractions has the **strongest** intermolecular forces?

- A Bitumen
- B Diesel oil
- C Gases
- D Kerosene

Your answer

[1]

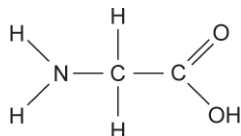
5. What is the **general formula** of the fractions produced by the fractional distillation of crude oil?

- A C_nH_{2n}
- B C_nH_{2n+2}
- C $C_2H_{2n+1}OH$
- D $C_{2n+2}H_2$

Your answer

[1]

6. Look at the structure of glycine.



Glycine is a monomer that reacts to form proteins.

Glycine contains **two** different functional groups that allow it to undergo polymerisation.

What are the two functional groups?

- A -NH_2 and -C=O
- B -NH_2 and $\text{-CH}_2\text{-}$
- C -NH_2 and -OH
- D -NH_2 and -COOH

Your answer

[1]

7. A hydrogen-oxygen fuel cell produces electricity.

Hydrogen reacts with oxygen to produce water.

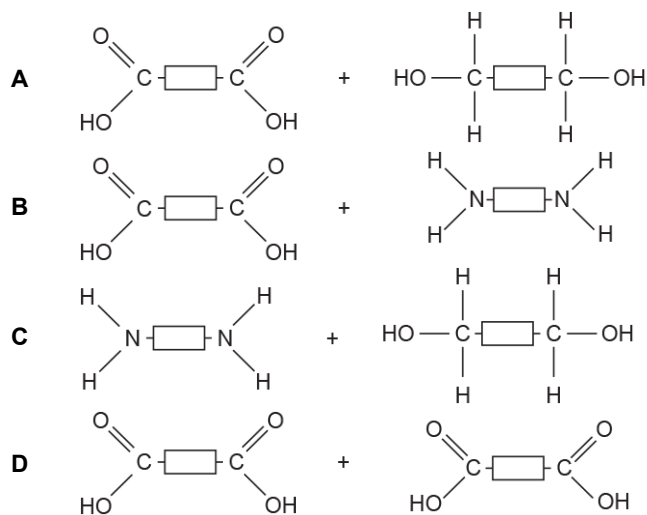
What is the equation for the reaction that happens at the **anode**?

- A $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$
- B $4\text{H}^+(\text{aq}) + 4\text{e}^- \rightarrow 2\text{H}_2(\text{g})$
- C $2\text{H}_2(\text{g}) \rightarrow 4\text{H}^+(\text{aq}) + 4\text{e}^-$
- D $4\text{H}^+(\text{aq}) + \text{O}_2(\text{g}) + 4\text{e}^- \rightarrow 2\text{H}_2\text{O}(\text{g})$

Your answer

[1]

8. Which pairs of molecules would react to form a **polyester**?



Your answer

[1]

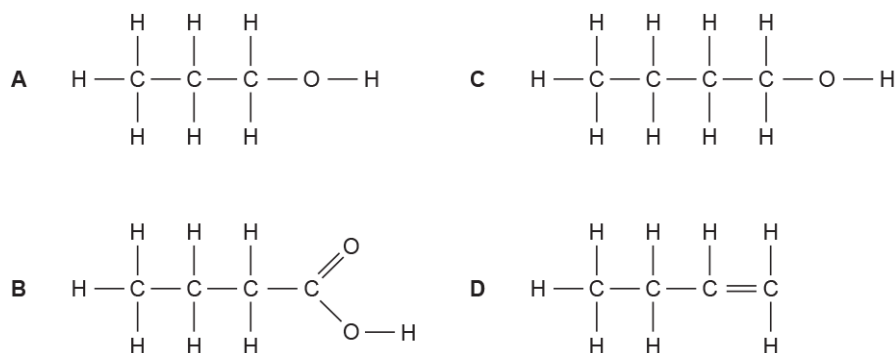
9. Which statement explains why **polyamides** are condensation polymers?

- A** A molecule of water forms each time a hydroxyl link forms.
- B** A molecule of water forms each time an ester link forms.
- C** A molecule of water forms each time an amine group reacts with a carboxylic acid group.
- D** A molecule of water forms each time an alcohol group reacts with a carboxylic acid group.

Your answer

[1]

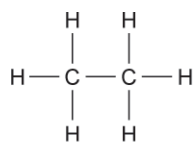
10. Which displayed formula shows butanol?



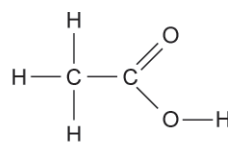
Your answer

[1]

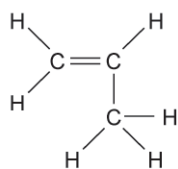
11 (a). Look at the displayed formulae of some compounds.



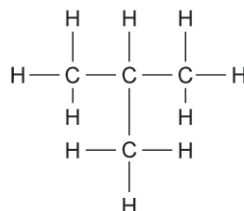
Compound A



Compound B



Compound C



Compound D

i. Which **two** compounds are members of the same **homologous series**?

..... and

ii. Write down **two** reasons for your answer in (i).

1

2

[3]

(b). Many molecules of compound **C** react together to form a polymer.

This reaction is called **addition polymerisation**.

i. Draw the **displayed formula** of the polymer formed by compound **C**.

[2]

ii. Another type of polymerisation is **condensation polymerisation**.

Describe one **difference** between addition polymerisation and condensation polymerisation.

[1]

(c). * A student has unlabelled samples of three liquids.

The student knows that the three liquids are:

- pentane, C_5H_{12}
- pentene, C_5H_{10}
- ethanoic acid, CH_3COOH .

Describe tests that the student should do to identify each of the three liquids.

Include **balanced symbol** equations for the reactions described.

[6]

12 (a). DNA and proteins are biological polymers.

- i. How many **different** monomers are found in a DNA polymer?

----- [1]

- ii. What are the monomers in **proteins** called?

----- [1]

(b). An alcohol, **X**, has the formula C_3H_7OH .

Alcohol **X** can be oxidised to a compound, **Y**, with the molecular formula $C_3H_6O_2$.

- i. Compound **Y** is **not** an alcohol but is a member of another homologous series. Write down the name of this homologous series.

----- [1]

- ii. Draw the **displayed formula** of a molecule of alcohol **X** and of a molecule of compound **Y**.

Show all the covalent bonds.

Alcohol **X**

Compound **Y**

[2]

(c). Look at the monomers shown in the table.

Monomer	Structure
Ethene	$ \begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} = \text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array} $
Ethane-1,2-diol	$ \begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H} - \text{O} - \text{C} - \text{C} - \text{O} - \text{H} \\ & \\ \text{H} & \text{H} \end{array} $
Ethanedioic acid	$ \begin{array}{c} & \text{O} \\ & \\ \text{HO} - \text{C} & - \text{C} - \text{OH} \\ & \\ \text{O} & \end{array} $

Two of the monomers from the table react to form a polymer which is a **polyester**.

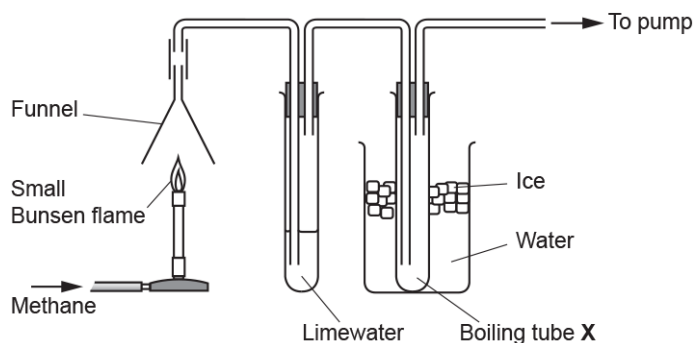
Explain, using the appropriate monomers from the table, how the polyester is formed.

Include the **type of polymerisation** and an **equation for the reaction** in your answer.

[4]

(d). A student did an experiment to prove that methane gas, CH_4 , produces carbon dioxide and water when it burns.

Look at the diagram of her experiment.



The limewater turned milky showing that carbon dioxide had been formed.

A small amount of a colourless liquid condensed in boiling tube X. The student said that this proved that burning methane produced water.

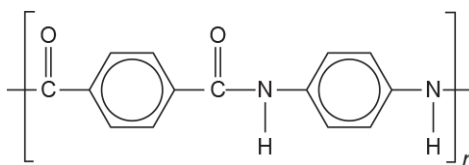
The teacher said that the experiment had been set up incorrectly.

The teacher said that the student's conclusion about water was not valid.

Describe and explain how the student could change how the experiment is set up to prove that water is produced **by burning methane**.

[2]

13. Look at the structure of Kevlar®.



What type of molecule is Kevlar®?

----- [1]

14. A condensation polymer is made from two monomers.

One of the monomers has two –OH groups in its molecules.

The other monomer has two –COOH groups in its molecule.

Which one of the following is the polymer?

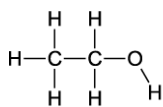
- A. polyamide
- B. poly(chloroethene)
- C. polyester
- D. DNA

Your answer

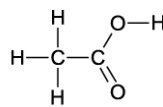
[1]

15. A student heats compound X with acidified potassium manganate(VII) solution.

The product of the reaction is compound Y.



X



Y

What is the colour change seen during this reaction?

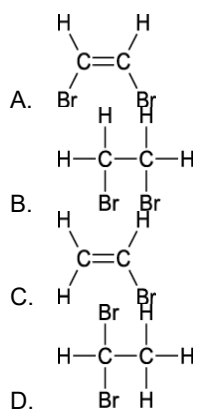
- A. colourless to orange
- B. colourless to purple
- C. orange to colourless
- D. purple to colourless

Your answer

[1]

16. A student bubbles ethene gas into bromine water.

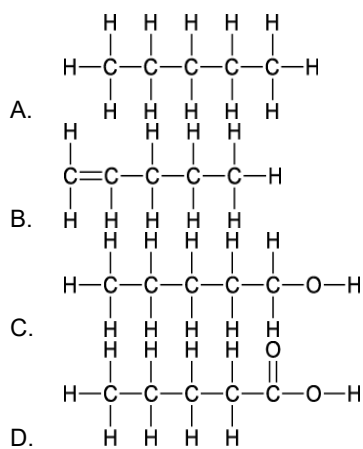
Which displayed formula shows the product of this reaction?



Your answer

[1]

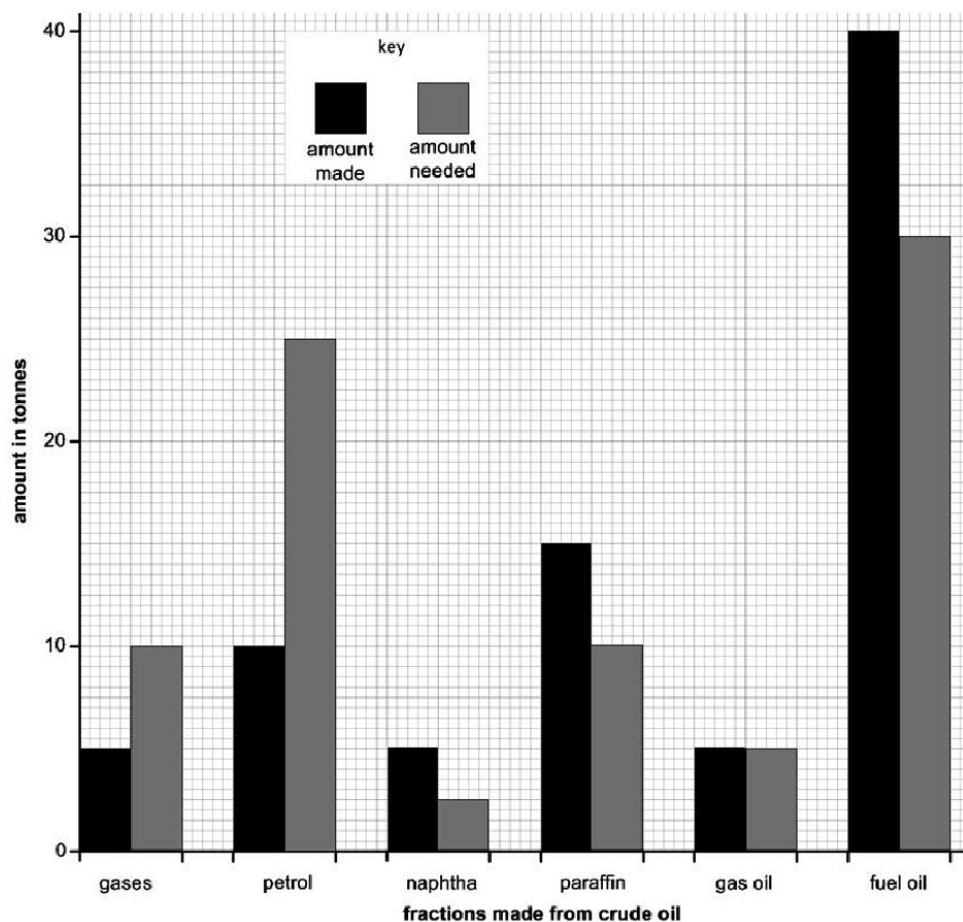
17. Which displayed formula includes the functional group of an alcohol?



Your answer

[1]

18. The bar chart shows the amount of some of the fractions made from 100 tonnes of crude oil by fractional distillation.



It also shows the amount of each fraction needed for everyday uses.

Cracking converts large molecules into smaller more useful molecules to make the supply match the demand.

Which fractions are most likely to be cracked to make the supply match the demand?

- A. gas oil and fuel oil
- B. gas oil and petrol
- C. naphtha, paraffin and fuel oil
- D. petrol and gases

Your answer

[1]

