a

What is crude oil made up of?

_____

List four alkanes.

_____

_____

_____

_____

Draw the following alkanes:

C_2H_6 C_4H_{10}

What is the formula for alkanes?

_____

b

Describe how crude oil is made.

_____

_____

_____

_____

What are the uses of crude oil?

_____

_____

_____

c

Complete the combustion equation.

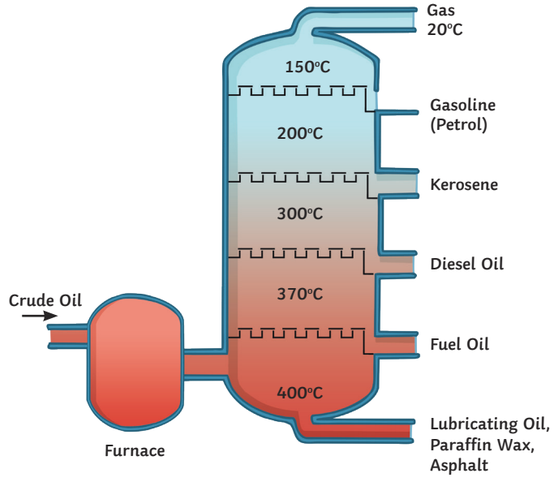
hydrocarbon + oxygen ➔

Complete the balanced symbol equation.

$CH_4 + O_2$ ➔

d

Describe the process of fractional distillation. Use the diagram to help.



Keywords: **mixture, hydrocarbon, boiling point, temperature, long-chain, short-chain.**

_____

_____

_____

_____

e

How does the length of the hydrocarbon affect the boiling point?

_____

_____

_____

f

What is bromine water a test for? Choose the correct answer.

a. alkane
b. alkene

What colour does it go?

_____

g

How does **increasing** the length of the hydrocarbon chain affect the viscosity? Choose one answer.

a. more viscous
b. less viscous
c. stays the same

h

Cracking is the breaking down of large chain _____ into shorter chains.
It produces _____ that have a double _____.

Draw a diagram of an alkene.

What is the formula for alkenes?

_____

Show the cracking of a long chain molecule.

i

What are the two methods of cracking? Describe the two processes in detail.

1. _____

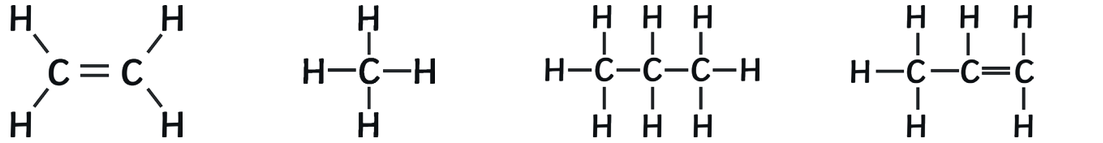
_____

2. _____

_____

a

Circle the alkenes from the molecules shown below.



Are alkene molecules described as unsaturated or saturated? Explain your answer.

_____

_____

_____

b

Fill in the missing words.

_____ react with _____ in combustion reactions in the same way as other hydrocarbons. However, they often burn in air with smoky flames and produce _____ because of _____ combustion.

c

Finish the balanced equation to show the products of the complete combustion of methane.

$CH_4 + 2O_2 \longrightarrow$ _____ + _____

d

Finish the balanced equation to show the products of the incomplete combustion of ethane.

$C_2H_6 + 2O_2 \longrightarrow$ _____ + _____ + _____

e

Fill in the missing words.

Alcohols dissolve in water to produce a _____ solution. Alcohol molecules do not form any _____.

When an alcohol reacts with sodium, it produces a _____ and _____.

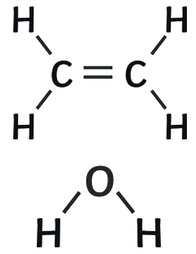
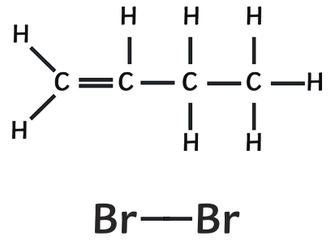
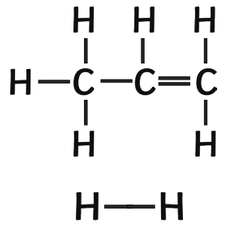
e.g. ethanol + sodium ⟶ _____ + _____

When an alcohol is burned with oxygen, it produces _____ and _____.

e.g. methanol + oxygen ⟶ _____ + _____

f

Complete the table by drawing the displayed formula of the product of each of the reactions described.

Reaction	Product
ethene + water 	
butene + bromine 	
propene + hydrogen 	

g

What is the functional group of...

1. alcohols? _____
2. carboxylic acids? _____

h

When carboxylic acids dissolve in water, they produce ions.

- Which type of ions do they produce? _____
- What does this tell you about the pH? _____

a

Complete the general equation below:

carboxylic acid + metal carbonate ⟶ _____ + _____ + _____

b

How is an ester made?

_____

_____

_____

c

Complete the diagram below to show addition polymerisation of ethene.

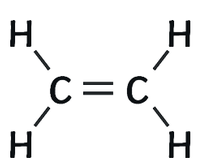
Monomer:

ethene

Polymer:

_____

n



d

What is the difference between strong and weak acids?

_____

_____

_____

_____

_____

e

Compare addition polymerisation with condensation polymerisation.

_____

_____

_____

_____

_____

f

Complete the equation to show the formation of polyester.

g

Complete the table.

Name	Formula	Structural Formula	Displayed Formula
methanol	_____	CH_3OH	
_____	C_2H_5OH	_____	
_____	C_3H_7OH	_____	
butanol	_____	$CH_3CH_2CH_2CH_2OH$	

h

What is DNA?

_____

_____

_____

Describe the structure of the DNA polymer.

_____

_____

_____

Name three other naturally occurring polymers, not including DNA.

_____

i

Complete the sentence.

Amino acids react by _____

_____ to produce

_____.

How is a protein produced?

_____

_____

a

What is crude oil made up of?

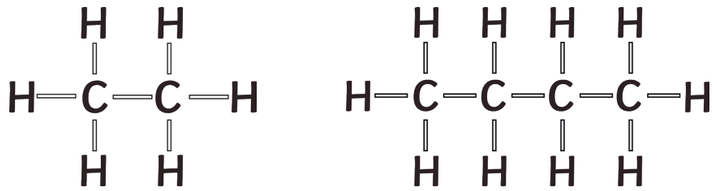
Different-length Hydrocarbons.

List four alkanes.

methane, ethane, propane, butane

Draw the following alkanes:

C_2H_6 C_4H_{10}



What is the formula for alkanes?

$C_n + H_{2n+2}$

b

Describe how crude oil is made.

From the remains of dead plankton and other animals and plants that fall to the bottom of the sea and get covered in mud.

What are the uses of crude oil?

Fuel for transport e.g. petrol and diesel.

Used to make other compounds such as polymers, lubricants, solvents, detergents.

c

Complete the combustion equation.

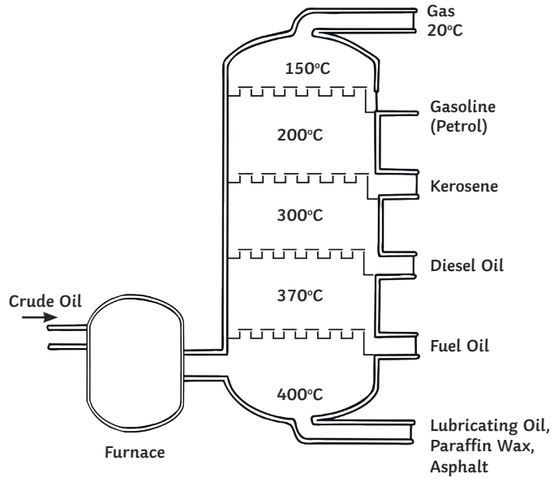
hydrocarbon + oxygen → **carbon dioxide + water**

Complete the balanced symbol equation.

$CH_4 + 2O_2 \rightarrow \mathbf{CO_2 + 2H_2O}$

d

Describe the process of fractional distillation. Use the diagram to help.



Keywords: **mixture, hydrocarbon, boiling point, temperature, long-chain, short-chain.**

Crude oil is a mixture of hydrocarbons and they are heated until they form a gas.

They all have different boiling points so separate out at different temperatures.

Long-chain hydrocarbons have high boiling points, short-chain molecules have low boiling points.

e

How does the length of the hydrocarbon affect the boiling point?

The longer the hydrocarbon, the higher the boiling point - more energy is needed to break up the molecules.

f

What is bromine water a test for? Choose the correct answer.

a. alkane

b. alkene

What colour does it go?

colourless

g

How does **increasing** the length of the hydrocarbon chain affect the viscosity? Choose one answer.

a. more viscous

b. less viscous

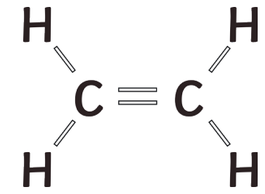
c. stays the same

h

Cracking is the breaking down of large chain **hydrocarbons** into shorter chains.

It produces **alkenes** that have a double **bond**.

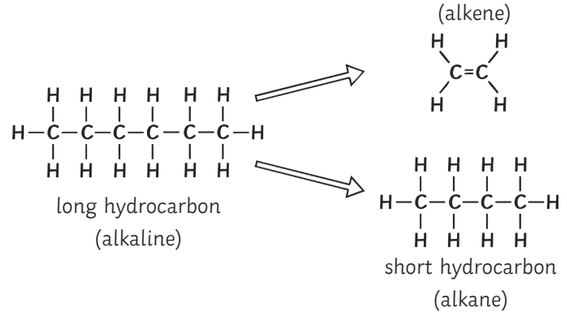
Draw a diagram of an alkene.



What is the formula for alkenes?

C_nH_{2n}

Show the cracking of a long chain molecule.



i

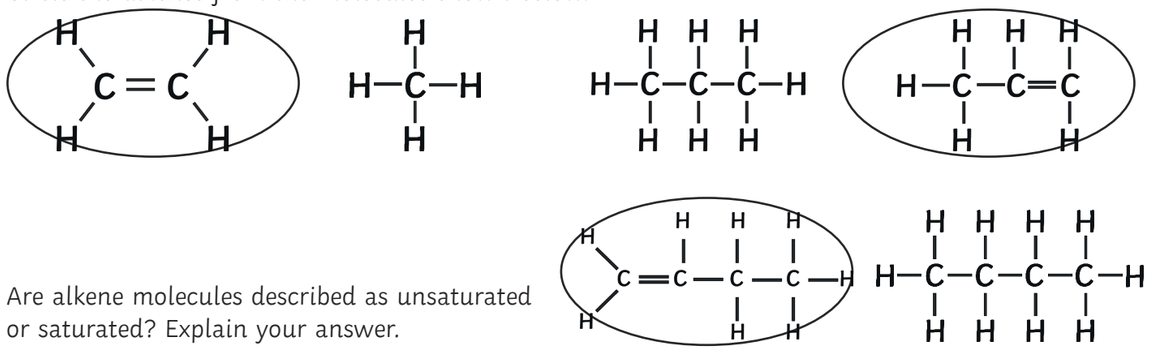
What are the two methods of cracking? Describe the two processes in detail.

Steam – heated into a vapour, mixed with steam, heated at very high temperature.

Catalytic – heated into a gas, passed over aluminium oxide catalyst, molecules split.

a

Circle the alkenes from the molecules shown below.



Are alkene molecules described as unsaturated or saturated? Explain your answer.

Unsaturated – alkenes contain a C=C double bond. There are fewer H atoms in an alkene molecule than there are in an alkane of the same length. More H atoms can be added by breaking the C=C double bond.

b

Fill in the missing words.

Alkenes react with **oxygen** in combustion reactions in the same way as other hydrocarbons. However, they often burn in air with smoky flames and produce **soot/carbon** because of **incomplete** combustion.

c

Finish the balanced equation to show the products of the complete combustion of methane.

$CH_4 + 2O_2 \longrightarrow$ **CO_2 +$2H_2O$**

d

Finish the balanced equation to show the products of the incomplete combustion of ethane.

$C_2H_6 + 2O_2 \longrightarrow$ **CO + C +$3H_2O$**

e

Fill in the missing words.

Alcohols dissolve in water to produce a **neutral** solution. Alcohol molecules do not form any **ions**.

When an alcohol reacts with sodium, it produces a **salt** and **hydrogen**.

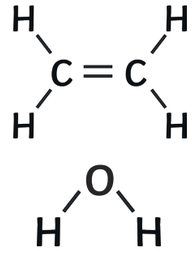
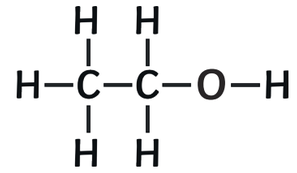
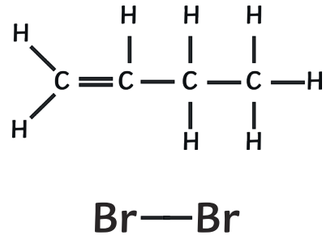
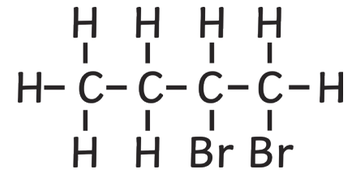
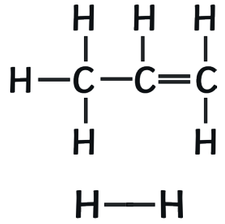
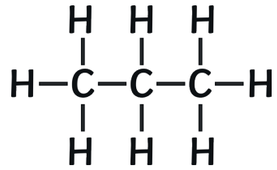
e.g. ethanol + sodium ⟶ **sodium ethoxide** + **hydrogen**

When an alcohol is burned with oxygen, it produces **carbon dioxide** and **water**.

e.g. methanol + oxygen ⟶ **carbon dioxide** + **water**

f

Complete the table by drawing the displayed formula of the product of each of the reactions described.

Reaction	Product
ethene + water 	
butene + bromine 	
propene + hydrogen 	

g

What is the functional group of...

1. alcohols? **-OH**
2. carboxylic acids? **-COOH**

h

When carboxylic acids dissolve in water, they produce ions.

- Which type of ions do they produce? **H^+/hydrogen ions**
- What does this tell you about the pH? **They are acidic.**

a

Complete the general equation below:

carboxylic acid + metal carbonate ⟶ **metal salt** + **carbon dioxide** + **water**

b

How is an ester made?

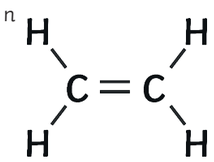
By reacting an alcohol with a carboxylic acid.

c

Complete the diagram below to show addition polymerisation of ethene.

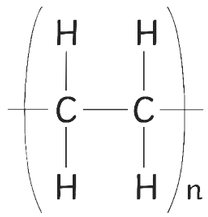
Monomer:

ethene



Polymer:

poly(ethene)



d

What is the difference between strong and weak acids?

- **Strong acids have a pH 1 or 2;**
- **weak acids have a pH 3 or 4;**
- **in strong acids, all the molecules produce H^+/hydrogen ions;**
- **in weak acids, not all the molecules produce H^+/hydrogen ions.**

e

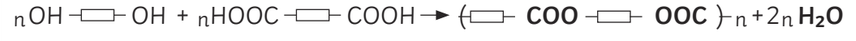
Compare addition polymerisation with condensation polymerisation.

Addition polymerisation occurs when many small molecules join to form a chain. C=C represents the functional group in the monomers.

Condensation polymerisation occurs when monomers with two functional groups join and lose small molecules e.g. water.

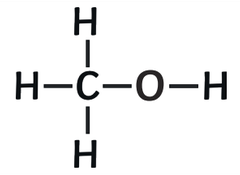
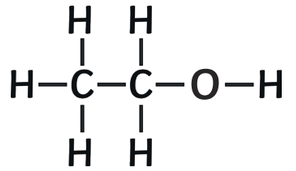
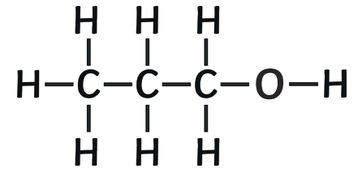
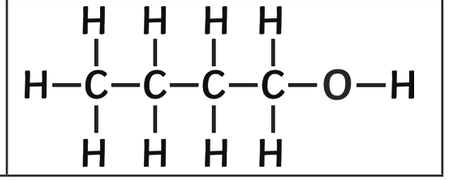
f

Complete the equation to show the formation of polyester.



d

Complete the table.

Name	Formula	Structural Formula	Displayed Formula
methanol	**CH_3OH**	CH_3OH	
ethanol	C_2H_5OH	**CH_3CH_2OH**	
propanol	C_3H_7OH	**$CH_3CH_2CH_2OH$**	
butanol	**C_4H_9OH**	$CH_3CH_2CH_2CH_2OH$	

h

What is DNA?

DNA is a large molecule of genetic instructions for the growth and development of living organisms.

Describe the structure of the DNA polymer.

Two polymer chains that are made from four different monomers. These monomers are called nucleotides and are in the form of a double helix.

Name three other naturally occurring polymers, not including DNA.

Proteins, starch and cellulose.

i

Complete the sentence.

Amino acids react by **condensation polymerisation** to produce **polypeptides**.

How is a protein produced?

Different amino acids combine in the same chain to form proteins.