

Name:

Date:

C7 - Test 1  
ORGANIC CHEMISTRY  
Beginner

**GCSE**

CHEMISTRY

AQA - Triple Science

Mark

Grade

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### Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

### Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

### Information

- The marks for the questions are shown in brackets

1.

Natural gas is mainly a hydrocarbon called methane.

(a) Use **one** word from the box to complete the sentence.

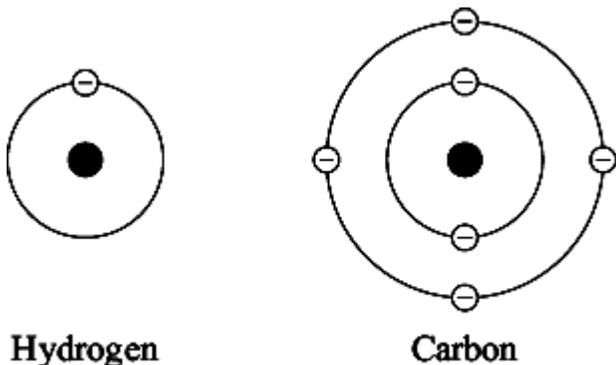
<b>compounds</b>	<b>elements</b>	<b>molecules</b>
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Hydrocarbons contain hydrogen and carbon only.

Hydrogen and carbon are \_\_\_\_\_.

(1)

(b) The diagrams represent atoms of hydrogen and carbon.



Draw a ring around the correct answer to complete the sentences.

(i) The centre of each atom is called the

bond.
nucleus.
symbol.

(1)

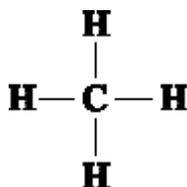
(ii) The hydrogen atom has one electron and the carbon atom has

three
four
six

electrons.

(1)

(c) A molecule of methane can be represented as



Draw a ring around the correct answer to complete the sentences.

(i) The formula of methane is

CH
CH <sub>4</sub>
C <sub>4</sub> H <sub>4</sub>

(1)

(ii) The line between C—H is called a

bond.
molecule.
nucleus.

(1)

(d) Methane burns to produce carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O).

(i) Draw a ring around the correct answer to complete the sentence.

When methane burns it reacts with

carbon.
nitrogen.
oxygen.

(1)

(ii) Hydrogen (H<sub>2</sub>) can be used as a fuel.

Suggest why burning hydrogen would be less harmful to the environment than burning methane.

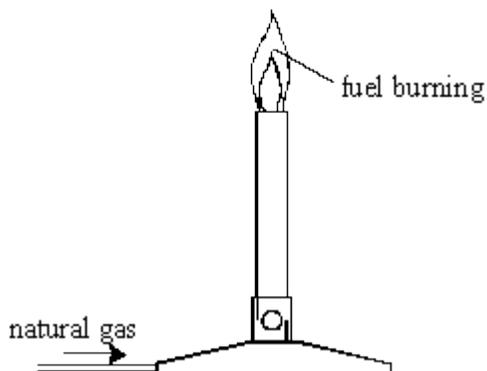
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(1)

(Total 7 marks)

**2.** Natural gas is a fuel.



(a) Complete these sentences.

When the fuel burns completely, we cannot see the new substances produced because they are mainly colourless \_\_\_\_\_ .

The energy of the fuel is released as \_\_\_\_\_ .

(3)

(b) Choose words from this list to complete the sentence below.

- |        |                 |              |          |
|--------|-----------------|--------------|----------|
| carbon | carbon dioxide  | hydrogen     | nitrogen |
| oxygen | sulphur dioxide | water vapour |          |

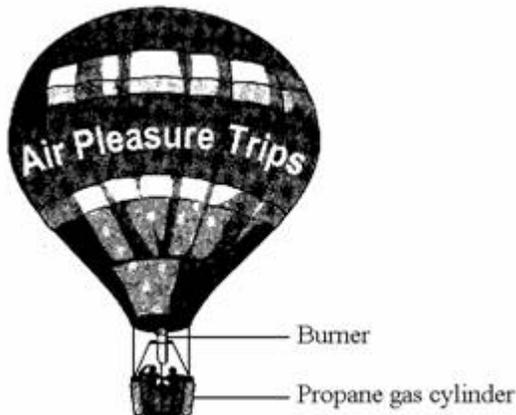
**Three** gases which can be produced when fuels burn are:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

(3)

(Total 6 marks)

**3.** Hot air balloons are used mainly for pleasure trips.



- (a) Air is a mixture of gases. Complete the table. (Carbon dioxide has been done for you.)

Gas	Chemical formula	% in air
nitrogen		78
oxygen	O <sub>2</sub>	
argon		0.9
carbon dioxide	CO <sub>2</sub>	0.03

(3)

- (b) The air in the balloon is heated using a propane burner. Propane, C<sub>3</sub>H<sub>8</sub>, is a *hydrocarbon* that burns in air forming carbon dioxide, CO<sub>2</sub>, and water, H<sub>2</sub>O.

- (i) What does *hydrocarbon* mean?

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(1)

- (ii) Which gas, in the air, reacts with propane when it burns?

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(1)

- (iii) What type of chemical reaction happens when a hydrocarbon burns?

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(1)

- (iv) The formation of more carbon dioxide causes global problems. Explain why.

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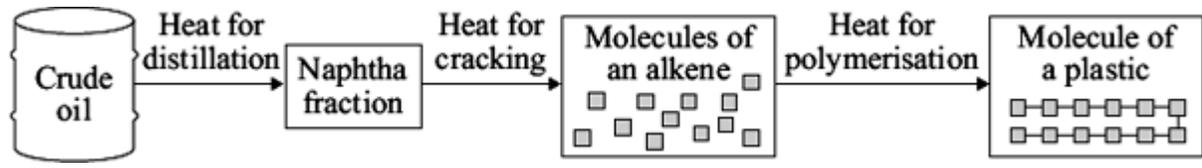
(2)

(Total 8 marks)

4.

Crude oil is used to make plastics.

(a) To make a plastic from crude oil involves many processes.



(i) How do alkene molecules form a molecule of a plastic?

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(1)

(ii) Suggest **one** of the main costs of making a plastic from crude oil.

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(1)

(iii) Suggest **two** problems caused by the disposal of plastics in landfill sites.

1. \_\_\_\_\_

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2. \_\_\_\_\_

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(2)

(b) Some companies are using bio-plastics made from plants such as corn.  
Less fossil fuel is used to make bio-plastics than is used to make plastics from crude oil.

Plastics made from plants would be more environmentally friendly than plastics made from crude oil.

Explain why.

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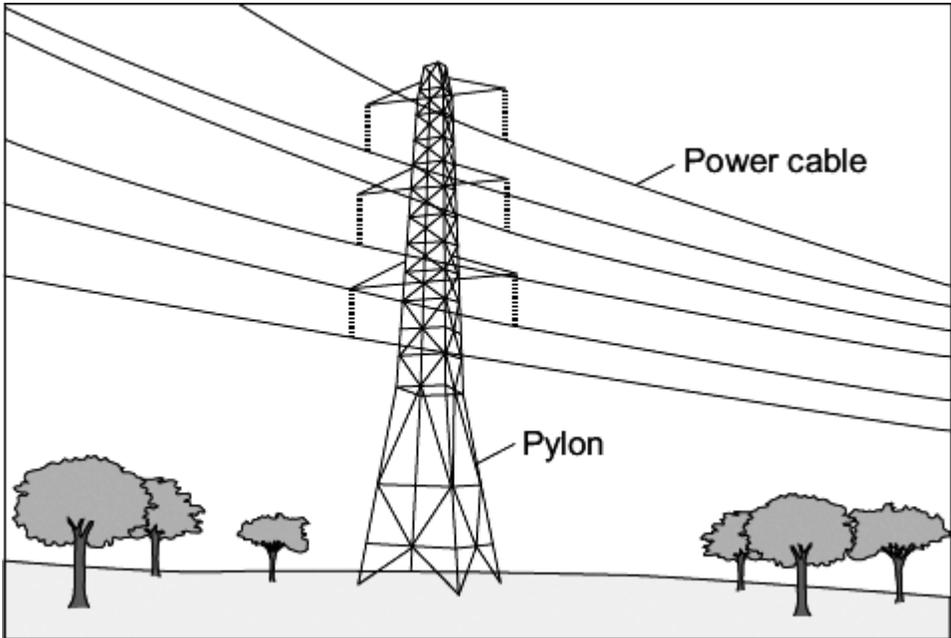
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(2)

(Total 6 marks)

5.

Metals are used in the manufacture of pylons and overhead power cables.



(a) Suggest **one** reason why iron (steel) is used to make pylons.

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(1)

(b) The table shows some of the properties of two metals.

Metal	Density in g per cm <sup>3</sup>	Melting point in °C	Percentage(%) relative electrical conductivity	Percentage(%) abundance in Earth's crust
copper	8.92	1083	100	0.007
aluminium	2.70	660	60	8.1

Use the information in the table to suggest why aluminium and **not** copper is used to conduct electricity in overhead power cables.

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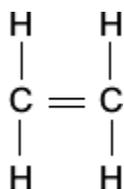
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(2)

- (c) A polymer can be used to cover and insulate power cables.

The polymer is made from the alkene:



Draw a ring around the correct answer to complete each of the sentences.

- (i) The chemical formula of this alkene is

CH  
CH<sub>4</sub>  
C<sub>2</sub>H<sub>4</sub>

(1)

- (ii) The two lines between the carbon atoms are called a

double bond.  
nucleus.  
single bond.

(1)

- (iii) The name of the polymer formed when many of these alkene molecules join

together is

poly(ethene).  
poly(ethenol).  
poly(propene).

(1)

(Total 6 marks)

6.

This question is about hydrocarbons.

- (a) The names and formulae of three hydrocarbons in the same homologous series are:

Ethane	C <sub>2</sub> H <sub>6</sub>
Propane	C <sub>3</sub> H <sub>8</sub>
Butane	C <sub>4</sub> H <sub>10</sub>

The next member in the series is pentane.

What is the formula of pentane?

(1)

(b) Which homologous series contains ethane, propane and butane?

Tick **one** box.

Alcohols

Alkanes

Alkenes

Carboxylic acids

(1)

(c) Propane (C<sub>3</sub>H<sub>8</sub>) is used as a fuel.

Complete the equation for the complete combustion of propane.



(2)

(d) Octane (C<sub>8</sub>H<sub>18</sub>) is a hydrocarbon found in petrol.

Explain why octane is a hydrocarbon.

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(2)

- (e) The table below gives information about the pollutants produced by cars using diesel or petrol as a fuel.

Fuel	Relative amounts of pollutants		
	Oxides of Nitrogen	Particulate matter	Carbon dioxide
Diesel	31	100	85
Petrol	23	0	100

Compare the pollutants from cars using diesel with those from cars using petrol.

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(3)

(f) Pollutants cause environmental impacts.

Draw **one** line from each pollutant to the environmental impact caused by the pollutant.

Pollutant	Environmental impact caused by the pollutant
	Acid rain
Oxides of nitrogen	Flooding
	Global dimming
Particulate matter	Global warming
	Photosynthesis

(2)  
(Total 11 marks)

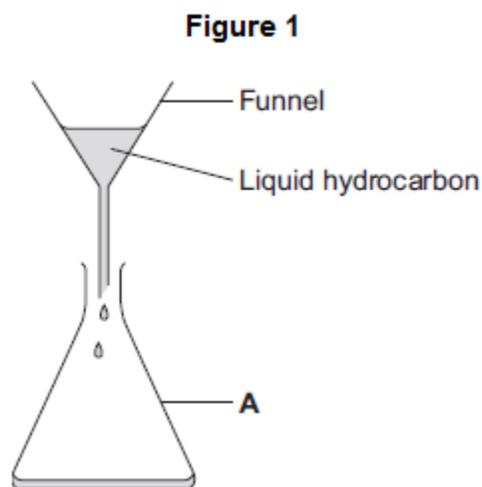
7.

A student investigated the viscosity of liquid hydrocarbons.

A viscous liquid is a liquid that flows slowly.

The student used this method.

- Measure  $50 \text{ cm}^3$  of the liquid hydrocarbon.
- Pour the liquid hydrocarbon into the funnel, as shown in **Figure 1**.



- Time how long it takes for all of the liquid hydrocarbon to run out of the funnel.
- Repeat the experiment for other liquid hydrocarbons.

(a) (i) Give the name of apparatus **A** in **Figure 1**.

\_\_\_\_\_

(1)

(ii) Name the apparatus that could be used to measure  $50 \text{ cm}^3$  of liquid hydrocarbon.

\_\_\_\_\_

(1)

- (b) The student's results for six liquid hydrocarbons are shown in **Table 1**.

**Table 1**

Formula of liquid hydrocarbon	Time for liquid hydrocarbon to run out of the funnel in seconds			Mean time in seconds
	Experiment 1	Experiment 2	Experiment 3	
C <sub>5</sub> H <sub>12</sub>	12	11	13	12
C <sub>6</sub> H <sub>14</sub>	14	15	15	15
C <sub>7</sub> H <sub>16</sub>	19	20	18	
C <sub>8</sub> H <sub>18</sub>	27	26	28	27
C <sub>10</sub> H <sub>22</sub>	46	48	24	47
C <sub>12</sub> H <sub>26</sub>	65	67	69	67

- (i) The student did the experiment three times with each liquid hydrocarbon.

Give **two** reasons why.

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(2)

- (ii) Use the data in **Table 1** to calculate the mean time, in seconds, for C<sub>7</sub>H<sub>16</sub>

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Mean time = \_\_\_\_\_ seconds

(1)

- (iii) Complete the sentence.

As the number of carbon atoms in a molecule of liquid hydrocarbon increases, the time taken for the liquid hydrocarbon to run out of the funnel

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(1)

(iv) A ring has been drawn around one result in **Table 1**.

This result has **not** been used to calculate the mean time for  $C_{10}H_{22}$

Suggest why this result was not used.

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(1)

(v) Suggest **one** error the student may have made to get the ringed result.

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(1)

(c) The student investigated the effect of temperature on the viscosity of one of the liquid hydrocarbons.

The liquid hydrocarbon he was using had the hazard symbols shown in **Figure 2**.

**Figure 2**



(i) Suggest why the student warmed the liquid hydrocarbon using warm water and **not** a Bunsen flame.

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(1)

(ii) The student wore safety glasses.

Give **one** other safety precaution the student should take, and give a reason for this safety precaution.

Safety precaution \_\_\_\_\_

Reason \_\_\_\_\_

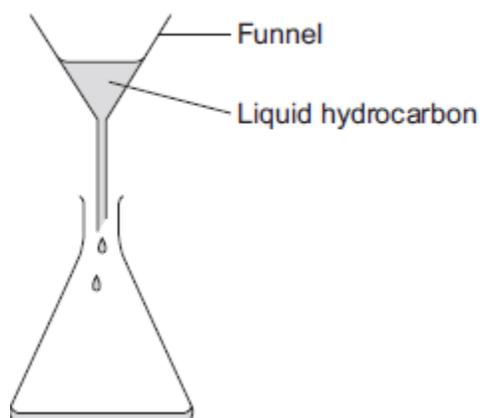
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(2)

(d) This is the method the student used to investigate the effect of temperature on the viscosity of one of the liquid hydrocarbons.

- Measure 50 cm<sup>3</sup> of the liquid hydrocarbon and pour it into a beaker.
- Stand the beaker of liquid hydrocarbon in a heated water bath.
- Leave for a few minutes.
- Measure the temperature of the liquid hydrocarbon.
- Pour the liquid hydrocarbon into the funnel, as shown in **Figure 3**.

**Figure 3**



- Time how long it takes for all of the liquid hydrocarbon to run out of the funnel.
- Repeat the experiment at different temperatures.

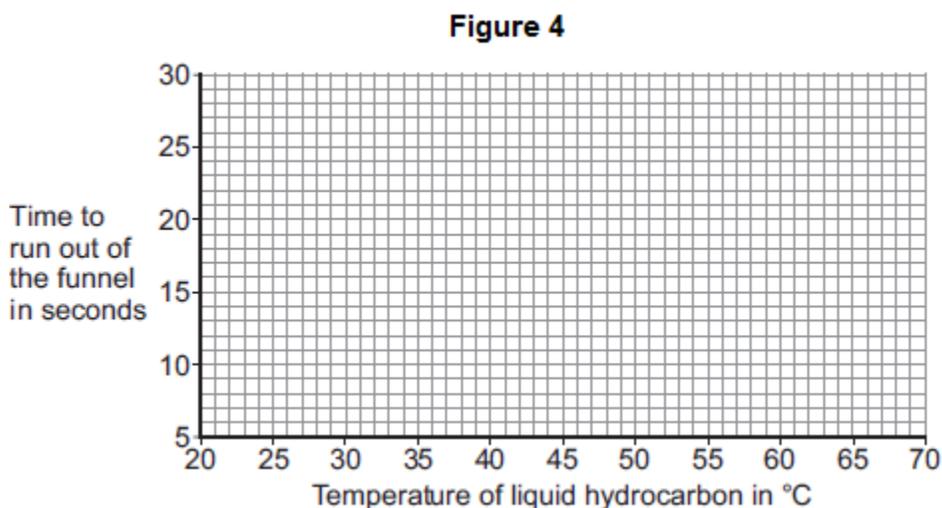
(i) The student's results are shown in **Table 2**.

**Table 2**

Temperature of liquid hydrocarbon in °C	Time to run out of the funnel in seconds
23	27
30	21
37	17
46	16
55	11
65	9

Plot the results shown in **Table 2** on the graph in **Figure 4**.

Draw a curve of best fit.



(3)

- (ii) One of the points is anomalous.

Draw a ring around the anomalous point on your graph.

(1)

- (iii) Predict how long it will take the liquid hydrocarbon to run through the funnel at 70 °C.

Show your working on your graph.

Time = \_\_\_\_\_ seconds

(2)

- (iv) Describe the relationship between the temperature of the liquid hydrocarbon and the viscosity of the liquid hydrocarbon.

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(3)

- (v) The apparatus the student used in **Figure 2** could lead to a systematic error in the results.

Identify **one** source of systematic error, and describe how the student could avoid or reduce the error.

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(2)

(Total 22 marks)

8.

This question is about fuels.

Octane ( $C_8H_{18}$ ) is a hydrocarbon in petrol.

- (a) Cracking breaks down large hydrocarbon molecules into smaller hydrocarbon molecules.

Which hydrocarbon molecule can be cracked to produce octane,  $C_8H_{18}$ ?

Tick **one** box.

$C_4H_8$

$C_4H_{10}$

$C_8H_{16}$

$C_{12}H_{26}$

(1)

(b) What type of carbon compound is octane,  $C_8H_{18}$ ?

Tick **one** box.

Alcohol

Alkane

Carboxylic acid

Ester

(1)

(c) Oxygen is needed to burn fuels.

Name the source of the oxygen needed to burn fuels.

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(1)

(d) Particulates and sulfur dioxide are pollutants produced when some fuels burn.

Draw **one** line from each pollutant to the polluting effect.

Pollutant	Polluting effect
Particulates	Acid rain
Sulfur dioxide	Global dimming
	Global warming
	Landfill
	Sewage sludge

(2)

(e) Which **two** gases are produced when fuels burn in car engines?

Tick **two** boxes.

- Ammonia
- Carbon dioxide
- Carbon monoxide
- Nitrogen
- Oxygen

(f) Vehicles produce most of the atmospheric pollution in cities.

How could the atmospheric pollution in cities be reduced?

Tick **two** boxes.

Build more roads in cities

Build new car factories

Develop fuel efficient engines

Make car tax cheaper

Use electric cars

**(2)**  
**(Total 9 marks)**