

**Petroleum Distillation, Alkanes and Alkenes Past Paper Answers AQA**  
**Chemistry GCSE -Higher**

1.

question	answers	extra information	mark
(a)	heat to vaporise (the crude oil)	do <b>not</b> accept cracking / burning	1
	vapours condense		1
	at different temperatures	allow they have different boiling points	1
(b)	(alkanes) are hydrocarbons <b>or</b> are compounds of hydrogen and carbon <b>only</b> .		1
	alkanes are saturated <b>or</b> have only (carbon-carbon) single bonds	accept have no (carbon-carbon) double bonds accept general formula is $C_nH_{2n+2}$ for <b>2</b> marks	1

2.

question	answers	extra information	mark
(a)(i)	(1)	all numbers in the correct order gains both marks  any two numbers in the correct position gains <b>1</b> mark	2
	5		
	3		
	(6)		
	4		
	2		
(a)(ii)	water	ignore formula if correct name given accept hydrogen oxide allow $H_2O$	1
	carbon dioxide	allow $CO_2$  accept carbon monoxide / CO <b>or</b> carbon / C	1

3.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	formulation		1	AO1 4.8.1.2
2	$\frac{23.3}{265.5 + 23.3 + 3.0 + 1.5} (\times 100)$ <p>= 7.9 (%)</p>	<p>an answer of 7.9 (%) scores 2 marks</p> <p>allow <math>\frac{23.3}{293.3} (\times 100)</math></p> <p>allow 7.944084555 (%) rounded correctly</p>	<p>1</p> <p>1</p>	AO2 4.8.1.2
3	to deter consumption / drinking (by people)		1	AO3 4.7.2.3
4	<p>any <b>one</b> from:</p> <ul style="list-style-type: none"> <li>• fuel</li> <li>• solvent</li> <li>• antiseptic</li> </ul>	<p>do <b>not</b> accept as an alcoholic drink</p> <p>allow specific uses eg</p> <ul style="list-style-type: none"> <li>• fuel additive</li> <li>• cleaning products</li> <li>• hand-sanitisers</li> </ul>	1	AO2 4.7.2.3
5	<p>ferment(ation)</p> <p>add yeast</p> <p>anaerobic (conditions)</p> <p><b>or</b></p> <p>warm</p>	<p>ignore distillation</p> <p>allow in the absence of oxygen</p> <p>allow a temperature value in range 5 – 45 °C inclusive</p> <p>allow room temperature</p> <p>ignore hot / heat</p> <p>ignore high temperature</p>	<p>1</p> <p>1</p> <p>1</p>	AO1 4.7.2.3

tion	Answers	Extra information	Mark	AO1 Spec. Ref.
6	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$	allow $\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{OH} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$	1	AO1 4.7.2.3
7	hydrogen	allow H <sub>2</sub>	1	AO1 4.7.2.3
8	oxidising (agent)	allow permanganate / dichromate ions allow [O]  ignore oxygen	1	AO1 4.7.2.3
<b>al</b>			<b>11</b>	

4.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	$C_6H_{14}$		1	AO2/1 4.7.1.1, 4
2	A		1	AO1/1 4.7.1.3
3	B		1	AO2/1 4.7.2.2, 4 4.9.3.1
4	C		1	AO1/1 4.7.2.4
5	Propanol		1	AO2/1 4.7.2.3

5.

Question	Answers	Extra information	Mark
(a)(i)	exothermic	accept combustion allow burning <b>or</b> oxidation <b>or</b> redox	1
(a)(ii)	carbon monoxide / CO (is produced)	allow monoxide (is produced) ignore carbon oxide	1
	because there is incomplete / partial combustion (of the fuel)	accept because there is insufficient oxygen / air (to burn the fuel)	1

question	Answers	extra information	Mark
3(b)	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5.		6
0 marks	<b>Level 1 (1-2 marks)</b>	<b>Level 2 (3-4 marks)</b>	<b>Level 3 (5-6 marks)</b>
No relevant content.	There is a statement that crude oil is heated <b>or</b> that substances are cooled. However there is little detail and any description may be confused or inaccurate.	There is some description of heating / evaporating crude oil <b>and either</b> fractions have different boiling points <b>or</b> there is an indication of a temperature difference in the column.	There is a reasonable explanation of how petrol is or fractions are separated from crude oil using evaporating <b>and</b> condensing.
<p>If cracking is given as a preliminary or subsequent process to fractional distillation then ignore.</p> <p>However, if cracking / catalyst is given as part of the process, maximum is <b>level 2</b></p> <p><b>examples of chemistry points made in the response could include:</b></p> <ul style="list-style-type: none"> <li>• Some / most of the hydrocarbons (or petrol) evaporate / form vapours or gases</li> <li>• When some of / a fraction of the hydrocarbons (or petrol) cool to their boiling point they condense</li> <li>• Hydrocarbons (or petrol) that have (relatively) low boiling points and are collected near the top of the fractionating column or hydrocarbons with (relatively) high boiling points are collected near the bottom of the fractionating column</li> <li>• The process is fractional distillation</li> <li>• Heat the crude oil / mixture of hydrocarbons or crude oil / mixture is heated to about 350°C</li> <li>• Some of the hydrocarbons remain as liquids</li> <li>• Liquids flow to the bottom of the fractionating column</li> <li>• Vapours / gases rise up the fractionating column</li> <li>• Vapours / gases cool as they rise up the fractionating column</li> <li>• The condensed fraction (or petrol) separates from the vapours / gases and flows out through a pipe</li> <li>• Some of the hydrocarbons remain as vapours / gases</li> <li>• Some vapours / gases rise out of the top of the fractionating column</li> <li>• There is a temperature gradient in the fractionating column or the fractionating column is cool at the top and hot at the bottom</li> </ul>			
<b>Total</b>			<b>9</b>