AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.7.2.3

Alcohols

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**34**
Available paper years	**2007–2023**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.7.2.3 Alcohols

Answer 01 · Mark scheme

March 2007 | CHY1A | Original Q8 | Legacy

Eight	**3**	**2**	**3**	**3**

Answer 02 · Mark scheme

March 2007 | CHY1B | Original Q3 | Legacy

Three	**A**	ethanol	**2**
	B	ethene	**4**
	C	helium	**1**
	D	poly(propene)	**3**

Answer 03 · Mark scheme

June 2007 | CHY1B | Original Q9 | Legacy

Nine	**3**	**4**	**2**	**3**

4.7.2.3 Alcohols

Answer 04 · Mark scheme

Question 5

question	answers	extra information	mark
(a)	either: calculations: all correct (ethanol = 6, methanol = 3, peanut oil = 10, vegetable oil = 15) **or** implication of correct calculation (vegetable oil) gives largest temperature / heat increase per gram (owtte)	ignore repetition of data from table unqualified allow 'produced most heat in proportion to the fuel used' owtte for **1** mark	2
(b)	any **one** from: • smoke • soot • carbon • carbon monoxide • carbon dioxide • global warming / climate change / greenhouse gases • (air) pollution • harmful/poisonous	owtte ignore references to crops/food	1
	scrub / wash the gases owtte	filter / remove (gases / fumes / appropriate named substance) owtte (add extra oxygen) can burn more efficiently owtte use a cleaner fuel owtte plant more trees or similar linked to CO_2 any sensible answer 'don't burn so much fuel' insufficient alone ignore extractor fans / air conditioning	1

continued…

4.7.2.3 Alcohols

CHY3F

Question 5 continued…

question	answers	extra information	mark
(c)(i)	A		1
(c)(ii)	B		1
total			6

4.7.2.3 Alcohols

Answer 04 · Mark scheme

January 2008 | CHY3F | Original Q5 | Legacy

CHY3F

Answer 05 · Mark scheme

June 2008 | CHY1AP | Original Q9 | Legacy

Nine	**2**	**4**	**2**	**2**

Answer 06 · Mark scheme

June 2008 | CHY1BP | Original Q6 | Legacy

Six	**A**	catalysis	**2**
	B	polymerisation	**3**
	C	combustion	**4**
	D	thermal decomposition	**1**

	A	**B**	**C**	**D**

4.7.2.3 Alcohols

Answer 07 · Mark scheme

June 2008 | CHY3F | Original Q4 | Legacy

question	answers	extra information	mark
4(a)(i)	fats		1
4(a)(ii)	100	accept 4 ×25	1
4(a)(iii)	kilojoules		1
4(b)(i)	chips contain fat / oil fat / oil has high energy content		1 1
4(b)(ii)	(could lead to) obesity / high cholesterol / heart disease / clogs arteries	allow gains weight etc. ignore any reference to fat ignore veins	1
Total			**6**

4.7.2.3 Alcohols

Answer 07 · Mark scheme June 2008 | CHY3F | Original Q4 | Legacy

COMPONENT NUMBER: CHY3F

COMPONENT NAME: Chemistry

STATUS: Final

DATE: June 2008

Answer 08 · Mark scheme November 2008 | CHY1AP | Original Q8 | Legacy

Eight	**4**	**2**	**3**	**3**

Answer 09 · Mark scheme November 2008 | CHY1BP | Original Q3 | Legacy

Three	**A**	argon	**1**
	B	bromine	**3**
	C	ethanol	**2**
	D	nickel	**4**

4.7.2.3 Alcohols

Answer 10 · Mark scheme

June 2009 | CHY1F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)(i)	C_2H_4		1
5(a)(ii)	poly(ethene)		1
5(b)(i)	is not biodegradable		1
5(b)(ii)	not enough landfill sites / space	accept landfill sites are filling up **or** plastics remain for years **or** plastics not broken down ignore cost / waste of resources / not biodegradable / wildlife	1
5(b)(iii)	less (crude) oil / fuels / energy used	accept (crude) oil is a non-renewable resource	1
Total			**5**

4.7.2.3 Alcohols

Answer 10 · Mark scheme June 2009 | CHY1F | Original Q5 | Legacy

CHY1F

Answer 11 · Mark scheme June 2010 | CHY1AP | Original Q4 | Legacy

Four	**A**	LPG	**1**
	B	Diesel	**4**
	C	Ethanol	**3**
	D	Hydrogen	**2**

4.7.2.3 Alcohols

Answer 12 · Mark scheme

Question 6

question	answers	extra information	mark
6(a)(i)	straight line through the 'points' and extended to C_8H_{18}	do **not** accept multiple lines	1
6(a)(ii)	5500	range 5400 *to* 5600 accept ecf from their graph	1
6(a)(iii)	it is a straight line graph	allow directly proportional accept constant difference between (energy) values accept C_5H_{12} close to values on the graph **or** C_5H_{12} comes in middle of the graph ignore 'fits the pattern' unqualified ignore 'line of best fit' ignore 'positive correlation'	1
6(a)(iv)	expected ranges for working are: (5400 to 5600) – (2800 to 2900) = (2500 to 2800) **or** their value from (a)(ii) – a value from 2800 to 2900 **or** (5400 to 5600) / their (a)(ii) divided by 2 **or** a value from 2800 to 2900 × 2 no / not quite / almost / yes	accept correct numerical answer as evidence of working this mark is only awarded on evidence from their correct working	1 1

4.7.2.3 Alcohols

6(b)(i)	incorrect / no **or** partially correct bio-ethanol produces least energy **or** bio-ethanol produces 29 kJ	ignore references to hydrogen mark independently	1 1
6(b)(ii)	any **two** from: • hydrogen produces only H_2O • coal produces SO_2 • coal produces smoke • both renewable and non-renewable fuels produce CO_2 • (both) the non-renewable fuels produce CO_2 • (both) renewable fuels produce no smoke • (both) renewable fuels produce no SO_2	ignore incorrect / correct accept hydrogen does not produce harmful gases / CO_2 / SO_2 allow coal causes acid rain / respiratory problems allow coal causes global dimming accept bio-ethanol and natural gas / coal produce CO_2 / global warming accept coal and natural gas produce CO_2 / global warming accept hydrogen and bio-ethanol do not produce smoke / global dimming accept hydrogen and bio-ethanol do not produce SO_2 / acid rain	2
Total			**9**

4.7.2.3 Alcohols

Answer 13 · Mark scheme

Question 2

question	answers	extra information	mark
2(a)	any **two** from • shorter / quicker soaking time • takes less time / quicker to dry **or** faster evaporation • dissolves quicker / better in methanol	assume it = methanol allow converse for water allow it is quicker	2
2(b)(i)	CH_4O		1
2(b)(ii)	covalent		1
2(c)	it is made of small molecules		1
Total			**5**

4.7.2.3 Alcohols

Answer 13 · Mark scheme

January 2011 | CHY2F | Original Q2 | Legacy

CHY2F

4.7.2.3 Alcohols

Answer 14 · Mark scheme

January 2011 | CHY3F | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	A = energy / enthalpy change / difference	allow heat change **or** ΔH allow energy released	1
	B = activation energy / EA	allow definition of activation energy	1
	C = carbon dioxide and water	accept products	1
7(b)	exothermic	allow combustion / redox / oxidation ignore reduction / burning	1
Total			**4**

4.7.2.3 Alcohols

Answer 15 · Mark scheme

March 2011 | CHY1BP | Original Q5 | Legacy

Five	**A** Formula **A**	**2**		
	B Formula **B**	**3**		
	C Formula **C**	**1**		
	D Formula **D**	**4**		
	A	**B**	**C**	**D**

Answer 16 · Mark scheme

June 2011 | CHY1AP | Original Q9 | Legacy

Nine	**4**	**2**	**2**	**2**

4.7.2.3 Alcohols

Answer 17 · Mark scheme

January 2012 | CH1FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	fermentation		1
4(a)(ii)	cloudy there is carbon dioxide / CO_2	accept milky / white accept calcium carbonate forms allow a (white) solid / precipitate forms	1 1
4(b)(i)	 (the amount of ethanol used) increases (from 1970) to 1989 then it decreases from 1989 (to 2000)	if no year(s) or incorrect year(s) indicated then max **1** correct year(s) only needs to be indicated once to gain full marks accept values in range 1987-1992	 1 1
4(b)(ii)	any **one** from: • Brazil had more oilfields • cost of crude oil had decreased • cost of ethanol / sugar (cane) had increased • demand for ethanol / sugar (cane) had increased • availability of ethanol / sugar (cane) had decreased • climate change affects growing sugar (cane)	 accept availability of land to grow sugar (cane) had decreased	1
Total			**6**

4.7.2.3 Alcohols

Answer 17 · Mark scheme

January 2012 | CH1FP | Original Q4 | Legacy

CH1FP

4.7.2.3 Alcohols

Answer 18 · Mark scheme

June 2012 | CH1FP | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)	6 oxygen		1 1
6(b)(i)	heating the hydrocarbon to a high temperature the presence of a catalyst		1 1
6(b)(ii)	all bonds correct four C—H bonds **and** one C=C bond		1
6(b)(iii)	water	accept hydrogen oxide/steam allow H_2O	1
6(c)(i)	carbon dioxide	allow CO_2	1
6(c)(ii)	by filtering/decanting/centrifuging (to remove yeast) (fractional) distillation (to separate ethanol from water)	ignore sieving accept a description of (fractional) distillation	1 1
Total			**9**

4.7.2.3 Alcohols

Answer 18 · Mark scheme

June 2012 | CH1FP | Original Q6 | Legacy

CH1FP

4.7.2.3 Alcohols

Answer 19 · Mark scheme

question	answers	extra information	mark
5(a)	Methane has the lowest melting point and icosane has the highest boiling point Decane and icosane are liquid at 100°C		1 1
5(b)	water / H_2O carbon dioxide / CO_2	either order allow hydrogen oxide	1 1
5(c)(i)	fermentation		1
5(c)(ii)	any **two** from: • sugar cane/plants absorb carbon dioxide • growing sugar cane/plants reduces global warming • renewable resource/sustainable	ignore oxygen released allow ethanol from plants is carbon neutral accept conserves fossil fuels / petrol	2
5(c)(iii)	any **two** from: • destruction of habitats/forests (to grow sugar cane/crops) • fermentation releases carbon dioxide • production plants cause visual pollution • pollution from the transportation of sugar cane / Ethanol • growing sugar cane / plants uses a lot of land		2
Total			**9**

4.7.2.3 Alcohols

Answer 19 · Mark scheme

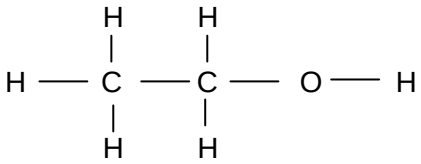
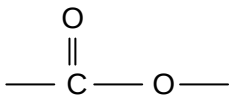
January 2013 | CH1FP | Original Q5 | Legacy

CH1FP

4.7.2.3 Alcohols

Answer 20 · Mark scheme

Question 8

question	Answers	extra information	Mark
8(a)(i)		allow other arrangements provided connectivity is correct allow —— OH	1
8(a)(ii)	oxygen oxidation	accept O_2 allow O allow oxidisation / oxidising / oxidised allow redox	1 1
8(b)(i)	ring around 		1
8(b)(ii)	ester(s)	do **not** allow ether(s)	1
8(b)(iii)	propanol	accept propan-1-ol allow propyl alcohol	1
Total			**6**

4.7.2.3 Alcohols

Answer 21 · Mark scheme

June 2014 | CH1FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
7(a)(i)	reaction with water / steam	allow add water / steam *(to produce ethanol)* *allow H_2O or hydrogen oxide for water* *ignore mix*	1	1 / 1.5.3a	E
7(a)(ii)	filter / decant (to remove the yeast)	*allow answers in either order* *accept description of decanting* *ignore sieve*	1	2 / 1.5.3b	E
	(fractional) distillation / distil	*accept evaporation then condensation*	1		

7(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, and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	There is a stated advantage **or** disadvantage of using biodiesel ***or*** petroleum diesel.	There is a stated advantage **or** disadvantage of using biodiesel **or** petroleum diesel with a linked consequence.	There is at least one stated advantage **and** at least one stated disadvantage of using biodiesel **or** petroleum diesel with a linked consequence for each.

1+2+3 / 1.4.3e

E

Examples of points made in the response could include:

Advantages *of biodiesel*:

- Produces less carbon dioxide
- Produces no sulfur dioxide
- Produces less particulates
- Sustainable / renewable
- Growing crops absorb carbon dioxide
- Carbon neutral
- Produces less acid rain
- Conserves the limited amount of petroleum diesel

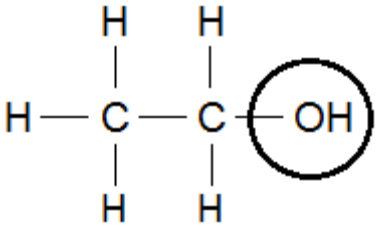
Disadvantages *of biodiesel*:

- Produces more nitrogen oxides
- Deforestation for land
- Destruction of habitats for land
- Uses land that could be used for food crops
- Creates food shortages
- Crops are not reliable

Total			**9**

4.7.2.3 Alcohols

Answer 22 · Mark scheme June 2014 | CH3FP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
8(a)(i)			1	1 / 3.6	G
8(a)(ii)	ethanol	*allow ethyl alcohol* *do **not** accept ethanal* *ignore all formulae*	1	1 / 3.3.1a	G
8(b)(i)	any **two** from: • lid • *metal* calorimeter • insulation (around sides of beaker) • excluding draughts • stirrer	 allow *metal* beaker do **not** allow flammable insulation / beaker *allow stirring*	2	3 / 3.3.1a	E

4.7.2.3 Alcohols

Answer 22 · Mark scheme

June 2014 | CH3FP | Original Q8 | Legacy

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th><th>ID</th></tr>
<tr><td colspan="4">8(b)(ii) 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, and apply a ‘best-fit’ approach to the marking.

<table>
<tr><th>0 marks</th><th>Level 1 (1–2 marks)</th><th>Level 2 (3–4 marks)</th><th>Level 3 (5–6 marks)</th></tr>
<tr><td>No relevant content</td><td>There is a description of part of an experimental method or a measurement which should be taken.</td><td>There is a description of some parts of an experimental method and a measurement which should be taken.</td><td>There is a description of an experimental method and measurements which should be taken.</td></tr>
</table>
Examples of the point that may be made in the response

• light ethanol and heat water
• extinguish ethanol
• after suitable temperature rise or after a suitable time
• stir water
• measure mass / volume of water
• measure initial temperature of water
• measure final temperature of water
• measure temperature rise
• measure initial mass of ethanol (and burner)
• measure final mass of ethanol (and burner)
• measure change in mass of ethanol</td><td></td><td>1 + 3 / 3.3.1a</td><td>E</td></tr>
<tr><td>Total</td><td></td><td></td><td>9</td><td></td><td></td></tr>
</table>

4.7.2.3 Alcohols

Answer 23 · Mark scheme

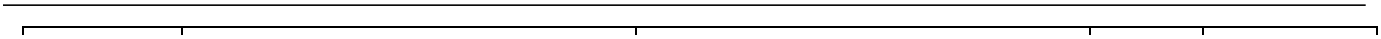
June 2015 | CH3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	oxygen	allow correct answer shown in box if answer line blank	1	**AO2** 3.6.1.b
5(b)	vinegar	allow correct answer shown in box if answer line blank	1	**AO1** 3.6.1.c
5(c)	C		1	**AO1** 3.6.2.a
5(d)	Ester		1	**AO2** 3.6.3.a
5(e)	pleasant smell volatile	 allow low boiling point / evaporates	1 1	**AO1** 3.6.3.a
Total			**6**	

4.7.2.3 Alcohols

Answer 23 · Mark scheme

June 2015 | CH3FP | Original Q5 | Legacy



4.7.2.3 Alcohols

Answer 24 · Mark scheme

June 2016 | CH1FP | Original Q4 | Legacy

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	fermentation		1	AO1 1.5.3b
4(a)(ii)	hydration		1	AO1 1.5.3a
4(a)(iii)	resources of crude oil are non-renewable producing ethanol from plants uses less energy		1 1	AO3 1.4.3e; 1.5.3b
4(b)(i)	turns cloudy / milky / white because carbon dioxide is produced	ignore bubbles allow CO_2 produced	1 1	AO1 1.2.1e
4(b)(ii)	filter paper		1	AO3 1.5.3b; 4.3
4(c)(i)	vegetable oils cook foods at higher temperatures than boiling water		1	AO1 1.6.1c
4(c)(ii)	(flask **A**) vegetable oil and water do not mix or are immiscible **or** vegetable oil does not dissolve in water (flask **B**) vegetable oil, water and an emulsifier form an emulsion **or** a suspension or a stable mixture	 allow correct description using hydrophilic and/or hydrophobic	1 1	AO2+AO3 1.6.2a
Total			**10**	

4.7.2.3 Alcohols

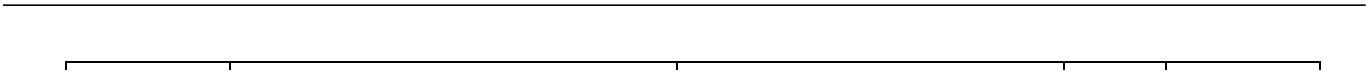
Answer 25 · Mark scheme June 2016 | CH3FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
3(a)	water / H_2O	allow steam or hydrogen oxide	1	AO1 3.3.1i
3(b)(i)	A		1	AO2 3.3.1d
3(b)(ii)	exothermic products (energy) lower than reactants (energy)		1 1	AO2/AO3 3.3.1d,e
3(b)(iii)	1860 (kJ)		1	AO2 3.3.1d
3(c)(i)	22.5 38.7 16.2	 allow ecf for correct subtraction	1 1 1	AO2 3.3.1a
3(c)(ii)	50 (g)		1	AO2 3.3.1a
3(c)(iii)	20.1 (kJ)	allow propanol ignore 3	1	AO3 3.3.1a
3(c)(iv)	as the number of carbon atoms (in one molecule of alcohol) increases the heat energy given out increases (when the alcohol is burned)		1	AO3 3.3.1a
3(c)(v)	any **two** from: • no lid • no insulation • no draught shield • incomplete combustion • inaccurate measurement • no repeats (to calculate a mean)	Allow heat / energy loss to surroundings for any one of these marks	2	AO3 3.3.1a
3(c)(vi)	-O-H		1	AO1 3.6.1a
Total			**14**	

4.7.2.3 Alcohols

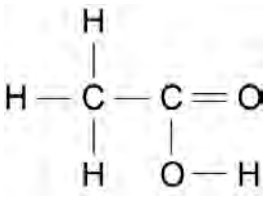
Answer 25 · Mark scheme

June 2016 | CH3FP | Original Q3 | Legacy



4.7.2.3 Alcohols

Answer 26 · Mark scheme June 2016 | CH3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
5(a)(i)	fizz / effervescence / bubbles	allow calcium carbonate decreases in size or dissolves	1	AO2/AO3 3.4.1d, 3.6.2b
	because carbon dioxide produced / released	allow because gas produced / released	1	
	limewater turns cloudy / milky / white		1	
	because (a precipitate of or solid) calcium carbonate forms	allow because of carbon dioxide if not already credited	1	
5(a)(ii)		allow –OH do not allow lower case 'h'	1	AO1 3.6.2a
5(a)(iii)	acid	must be in this order ignore any name of an acid	1	AO1 3.6.2b
	ester(s)		1	
5(b)	white (precipitate) no change no change no change	all four correct 2 marks any two correct 1 mark	2	AO2 3.4.1e,f
5(c)(i)	lilac red	must be in this order allow purple	1 1	AO1 3.4.1a
5(c)(ii)	colours are masked / changed by each flame colour		1	AO3 3.4.1a
Total			12	

4.7.2.3 Alcohols

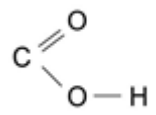
Answer 26 · Mark scheme

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / SpecRef</th></tr>
<tr><td>6</td><td></td><td></td><td>6</td><td rowspan="6">2AO1 / 3AO2 / 1AO3
3.4.1g</td></tr>
<tr><td colspan="4">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 and apply a ‘best-fit’ approach to the marking.</td></tr>
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<tr><th>0 marks</th><th>Level 1 (1–2 marks)</th><th>Level 2 (3–4 marks)</th><th>Level 3 (5–6 marks)</th></tr>
<tr><td>No relevant content.</td><td>There is a simple description of using some of the apparatus.</td><td>There is a description of an experimental method including addition of acid to alkali which may include an indicator or colour change and may include a measurement of volume.</td><td>There is a description of titrations that would allow a comparison to be made between the two solutions of hydrochloric acid.</td></tr>
</table></td></tr>
<tr><td colspan="4">examples of chemistry points made in the response could include:
• acid in burette or flask
• alkali/sodium hydroxide or acid in burette or flask
• volume of acid or alkali measured using the pipette
• indicator in flask
• white tile under the flask
• slow addition
• swirling/mixing
• colour change of indicator
• burette volume measured</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Total</td><td></td><td></td><td>6</td><td></td></tr>
</table>

4.7.2.3 Alcohols

Answer 27 · Mark scheme

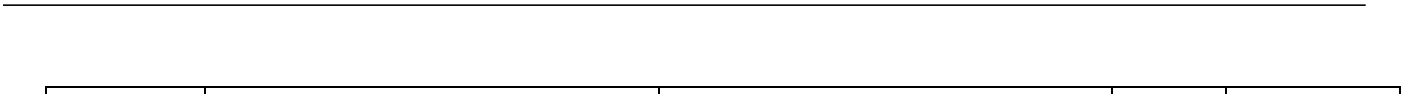
June 2017 | CH3FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1 (a)(i)	numbers	allow number allow numbers circled in the box	1	AO1 3.1.2b
1 (a)(ii)	electrons	allow electron allow electrons circled in the box	1	AO1 3.1.2b
1 (b)(i)	Cl/chlorine	allow CL / cL / cl	1	AO1 3.1.3f
1 (b)(ii)	Cu/copper	allow CU / cU / cu	1	AO2 3.1.3c
1 (b)(iii)	7/seven		1	AO1 3.1.3e
1(c)(i)	tick (✓) by: displacement		1	AO1 3.1.3g
1(c)(ii)	tick (✓) by: Fluorine		1	AO3 3.1.3g
1(d)	tick (✓) by: yellow		1	AO1 3.4.1e
1(e)(i)	circle around: 		1	AO2 3.6.2a
1(e)(ii)	carbon dioxide	allow carbon dioxide circled in the box	1	AO2 3.6.2b
1(e)(iii)	esters	allow esters circled in the box allow ethers	1	AO2 3.6.2b
Total			11	

4.7.2.3 Alcohols

Answer 27 · Mark scheme

June 2017 | CH3FP | Original Q1 | Legacy



4.7.2.3 Alcohols

Answer 28 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)	tick (✓) by: CH_3OH		1	**AO2** 3.6.1a
6(b)	tick (✓) by: C		1	**AO2** 3.3.1d
6(c)(i)			6	**AO1** **AO2** **AO3** 3.3.1a

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 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
no relevant content	some of the steps for a method **or** measurements are stated	a method **and** some measurements are described	a method **and** measurements are described which would allow a comparison to be made between the two alcohols

Examples of chemistry points made in response:

- measure mass or volume of water
- measure initial mass of ethanol (and burner)
- measure initial temperature of water
- ignite alcohol to heat the water
- stir water
- after a suitable temperature rise **or** time (or after a given volume is burned)
- extinguish the flame
- measure final temperature of water
- measure final mass of ethanol (and burner)
- repeat with next alcohol
- calculate the energy released and compare or compare temperature rise (for given mass of alcohol burnt or for given time of burning).

4.7.2.3 Alcohols

Answer 28 · Mark scheme

6(c)(ii)	lid **or** lagging **or** windshield **or** copper/metal container (so that) less energy lost (to surroundings) OR stir(rer) (1) (so that) energy distributed (1)	M2 dependent on M1 ignore digital thermometer ignore evaporation	1 1	**AO3** 3.3.1a
Total			**10**	

4.7.2.3 Alcohols

Answer 29 · Mark scheme

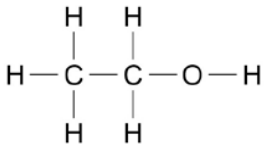
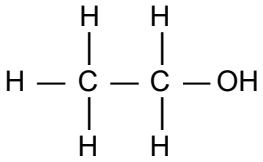
June 2018 | 8462/2F | Original Q9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	formulation		1	AO1 4.8.1.2
09.2	$\frac{23.3}{265.5 + 23.3 + 3.0 + 1.5}$ (× 100) = 7.9 (%)	an answer of 7.9 (%) scores **2** marks allow $\frac{23.3}{293.3}$ (× 100) allow 7.944084555 (%) rounded correctly	 1 1	AO2 4.8.1.2
09.3	to deter consumption / drinking (by people)		1	AO3 4.7.2.3
09.4	any **one** from: • fuel • solvent • antiseptic	do **not** accept as an alcoholic drink allow specific uses eg • fuel additive • cleaning products • hand-sanitisers	 1	AO2 4.7.2.3
09.5	ferment(ation) add yeast anaerobic (conditions) **or** warm	ignore distillation allow in the absence of oxygen allow a temperature value in range 5 – 45 °C inclusive allow room temperature ignore hot / heat ignore high temperature	1 1 1	AO1 4.7.2.3

4.7.2.3 Alcohols

Answer 29 · Mark scheme

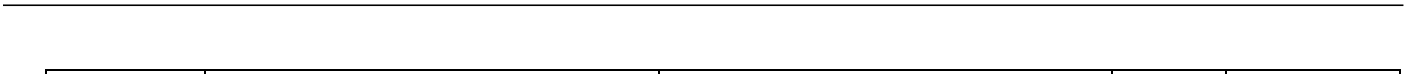
June 2018 | 8462/2F | Original Q9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.6		allow 	1	AO1 4.7.2.3
09.7	hydrogen	allow H_2	1	AO1 4.7.2.3
09.8	oxidising (agent)	allow permanganate / dichromate ions allow [O] ignore oxygen	1	AO1 4.7.2.3
Total			11	

4.7.2.3 Alcohols

Answer 29 · Mark scheme

June 2018 | 8462/2F | Original Q9

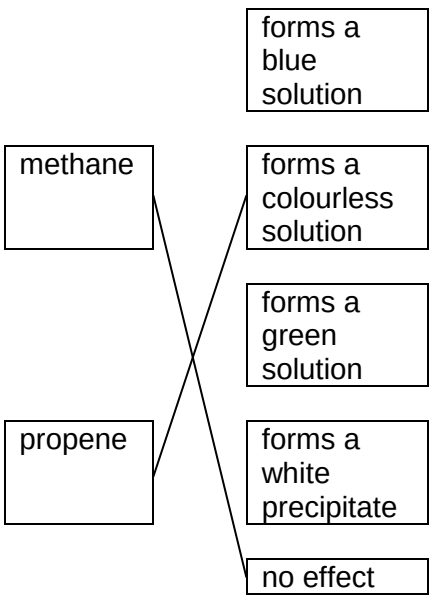


4.7.2.3 Alcohols

Answer 30 · Mark scheme

June 2019 | 8462/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	nitrogen **and** methane	in either order, both required for mark allow phonetic spellings allow N_2 for nitrogen allow CH_4 for methane	1	AO2 4.9.1.1
04.2	nitrogen bar to 78% oxygen bar to 21%	ignore width of bars ignore additional bars	1 1	AO2 4.9.2.2
04.3	Titan's atmosphere contains too little carbon dioxide.		1	AO3 4.9.1.3
04.4	long wavelength radiation is reflected back to the surface of Titan.		1	AO1 4.9.2.1
04.5		an extra line from a gas to an effect on bromine water negates that mark	1 1	AO1 4.7.1.4

4.7.2.3 Alcohols

Answer 30 · Mark scheme

June 2019 | 8462/2F | Original Q4

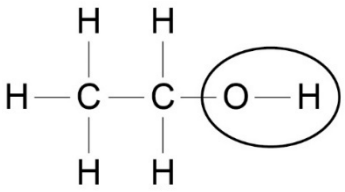
04.6	$\frac{7 \times 21}{3}$ = 49 (g)	an answer of 49 (g) scores **2** marks.	1 1	AO2 4.7.2.2
Total			**9**	

4.7.2.3 Alcohols

Answer 31 · Mark scheme

November 2020 | 8462/2F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1			1	AO1 4.7.2.3
07.2	<table><tr><th>Name of element</th><th>Symbol for element</th><th>Number of atoms in one molecule of ethanol</th></tr><tr><td>carbon</td><td>C</td><td>2</td></tr><tr><td>hydrogen</td><td>H</td><td>6</td></tr><tr><td>oxygen</td><td>O</td><td>1</td></tr></table>	ignore O_2	1 1 1	AO1 AO1 AO2 4.1.1.1 4.7.2.3
07.3	a solvent		1	AO2 4.7.2.3
07.4	sugar	allow named sugar allow saccharide	1	AO3 4.7.2.3
07.5	yeast		1	AO1 4.7.2.3
07.6	ethyl ethanoate		1	AO1 4.7.2.4

Question 7 (continued)

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	water	ignore H_2O	1	AO1 4.1.1.1 4.2.2.2 4.7.2.4
07.8	400 cm^3 = 0.40 dm^3 $\frac{1.00}{0.40}$ × 20 = 50 (g) **alternative approach:** 1.0 dm^3 = 1000 cm^3 (1) $\frac{1000}{400}$ × 20 (1) = 50 (g) (1)	 allow correct use of incorrectly converted or unconverted volume allow correct use of incorrectly converted or unconverted volume	1 1 1	AO2 4.7.2.4
Total			**12**	

4.7.2.3 Alcohols

Answer 32 · Mark scheme

November 2021 | 8462/2F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	fuel		1	AO1 4.7.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	propene		1	AO2 4.7.2.1 4.7.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	(percentage yield =) $\frac{380}{400} \times 100$ = 95 (%)		1 1	AO2 4.3.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	some ethanol changes back into ethene and steam some ethanol escapes from the apparatus		1 1	AO2 4.3.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	C_2H_5OH + **3** O_2 → 3 H_2O + 2 CO_2	allow multiples	1	AO2 4.1.1.1 4.3.1.1 4.7.2.3

Question 7 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	(advantages) (fermentation) low energy usage (fermentation) uses renewable raw materials (disadvantages) (fermentation) produces impure ethanol (fermentation) slow rate of reaction		 1 1 1 1	AO3 4.7.2.2 4.7.2.3 4.10.1.1

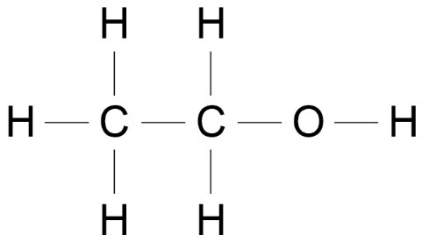
Total			**11**

4.7.2.3 Alcohols

Answer 33 · Mark scheme

June 2022 | 8462/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1			1	AO1 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	in hand gel to kill microbes		1	AO1 4.7.2.3

4.7.2.3 Alcohols

Answer 33 · Mark scheme

June 2022 | 8462/2F | Original Q4

Question	Answers	Mark	AO / Spec. Ref.
04.3	**Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	3–4	AO1 4.8.1.3 RPA6
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content • **draw** pencil **start line** • **place spot of ink on start line** • name suitable solvent • place solvent in beaker • **place paper in solvent so solvent is below start line** • use a lid • **allow solvent / dyes to travel up paper** (until near top) • dry • count spots		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	yeast		1	AO1 4.7.2.3

4.7.2.3 Alcohols

Answer 33 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	(mass =) $\frac{4.4 \times 5}{100}$		1	AO2 4.7.1.3 4.7.2.3
	= 0.22 (kg)		1	
	(conversion 0.22 kg =) 220 (g)	allow a correct conversion of an incorrectly calculated mass	1	
	alternative approach: (conversion 4.4 kg =) 4400 g (1)			
	(mass =) $\frac{4400 \times 5}{100}$ (1)	allow correct use of an incorrectly converted mass		
	= 220 (g) (1)			

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6		allow converse argument for E5		AO3 4.9.1.3 4.9.2.2 4.9.2.4
	E10 contains more ethanol (produced from sugar than E5)		1	
	(so) more sugar is used	allow (so) more plants are grown	1	
	(so more) carbon dioxide is absorbed by plants (when growing)	allow (so more) carbon dioxide is used in photosynthesis (by plants)	1	

4.7.2.3 Alcohols

Answer 33 · Mark scheme

June 2022 | 8462/2F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	(E10 has) less energy (in a fixed mass)	allow cannot travel as far (on a full tank of E10)	1	AO3 4.7.1.3 4.7.2.3

Total Question 4		14

4.7.2.3 Alcohols

Answer 34 · Mark scheme

June 2023 | 8462/2F | Original Q9

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	(mass =) $\frac{39.8}{29.6}$ (× 1) = 1.34 (g)	 allow 1.34459459 (g) correctly rounded to at least 2 significant figures	1 1	AO2 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	all six points plotted correctly	allow a tolerance of ± ½ a small square allow **1** mark for four or five points plotted correctly	2	AO2 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.3	40.6 (kJ)	allow a value in the range 40.4 – 40.8 (kJ) allow a value consistent with the plotted points	1	AO2 4.7.2.3

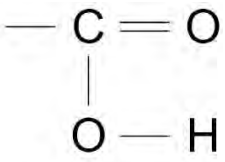
Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	calcium hydroxide		1	AO1 4.8.2.3

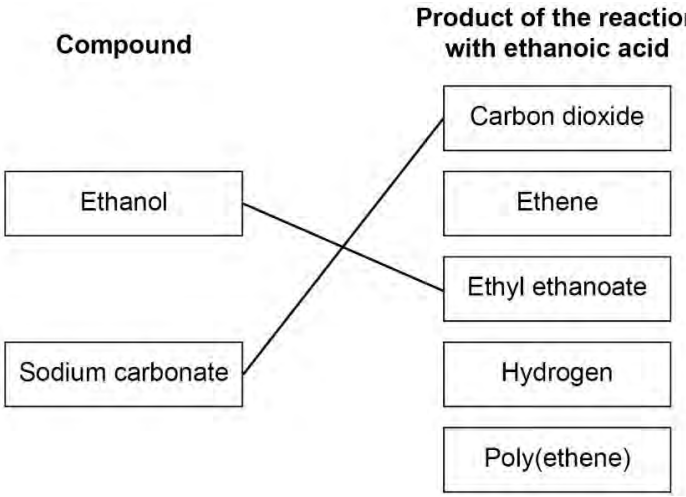
Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	(limewater turns) milky / cloudy	allow white precipitate (formed) allow calcium carbonate is produced	1	AO1 4.8.2.3

4.7.2.3 Alcohols

Answer 34 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.6	an oxidising agent		1	AO1 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.7			1	AO1 4.7.2.4

Question	Answers	Mark	AO / Spec. Ref.
09.8	 do **not** accept more than **one** line from a box on the left	1 1	AO1 4.7.2.4

Total Question 9	11

Answer 29 · Examiner comments

June 2018 | 8462/2F | Original Q9

Question 9 (standard demand)

09.1 2% of students recognised a formulation from this part of the specification.

09.2 This was a more difficult calculation as there were lots of numbers given in the question. It appeared to presented little difficulty for some students, however.

09.3 Reading the stem would have avoided answers such as ‘to make it more attractive to drink’. 14% of students realised that it was to warn people not to drink it.

09.4 Uses of ethanol, and therefore methylated spirits, as a solvent, steriliser and fuel were well known with 42% of students achieving the mark.

09.5 Very few students knew about the production of ethanol from sugar solution by fermentation. Some knew the name of the process but could give no correct detail. 8% of students achieved two or three marks.

09.6 3% of students could complete the displayed formula for ethanol. Ethane was the most common answer, but more students did not attempt this question.

09.7 12% of students knew that hydrogen would be the gas produced.

09.8 Even fewer knew that an oxidising agent was required.

4.7.2.3 Alcohols

Answer 33 · Examiner comments

June 2022 | 8462/2F | Original Q4

Question 4 (Low and standard demand)

04.1 Around 40% of students were able to complete the displayed structural formula. Others added double bonds or even extra atoms.

04.2 Over 70% of the students gained a mark for their knowledge of hand gels as a use of ethanol. A sizeable minority chose testing for hydrogen.

04.3 This was an extended response question on chromatography and was quite well answered, with most students gaining at least two marks. However access to level 2 was often restricted by missing out one or more of the key steps, without which the investigation would not work. Around a quarter of the students gained all four marks, and around one-third gained two.

04.4 Students found this question challenging, with fewer than 15% of students recognising that yeast must be added.

04.5 This was a more challenging calculation which also needed a unit conversion. About 25% students gained full marks, with just under half gaining at least 1 mark.

04.6 Many students answered in terms of petrol, which cannot possibly remove carbon dioxide from the atmosphere. Many answered in terms of E10 containing more ethanol, without going on to give a further explanation. The ideas of more sugar or plants being needed to carry out more photosynthesis to remove more carbon dioxide were needed. Only around 10% of the students gained all three marks.

04.7 Around 30% of the students realised that E10 produced less energy than E5.

4.7.2.3 Alcohols

Answer 34 · Examiner comments

June 2023 | 8462/2F | Original Q9

Question 9 (Standard demand)

09.1 The calculation discriminated well. More than 25% of students successfully completed the calculation, usually showing full details of their working. Students need to be sufficiently familiar with their calculator to understand when it is appropriate to include a recurring dot over one or more digits, and also when it is not. Weaker responses included rounding errors.

09.2 Around half of students obtained both marks for correctly plotting all the points. Over 20% of students incorrectly plotted at least two of the points, with the most frequently seen error being to incorrectly identify the number of carbon atoms present, for example, plotting ethanol as having one carbon atom. If a line of best fit was drawn, this was ignored, as this was not required and is inappropriate in the context of a discrete variable on the x-axis.

09.3 Over 40% of students gained this mark. Any line of best fit drawn was ignored. The answer, within the tolerances stated in the mark scheme, was estimated from the plotted points alone and was as stated in the mark scheme unless misplotted points (usually for hexanol and/or heptanol) suggested otherwise.

09.4 Over 30% of students gained this mark, but the other three distractors were all popular.

09.5 Over 40% of students gained this mark. A small number asserted that the limewater became colourless or clear.

09.6 Less than one third of students gained this mark. ‘Water’ was not a popular distractor, but ‘a halogen’ and ‘an alkali metal’ were both frequently selected.

09.7 The carboxylic acid functional group was not well known.
Less than 2% of students were able to successfully complete the displayed structural formula for this functional group. Many students completed a square of points around the 4 atoms provided.

09.8 Over 20% of students gained both marks and a further 40% gained 1 mark. A number of students drew multiple lines from the boxes on the left.