



# Mark Scheme (Results)

January 2018

Pearson Edexcel GCSE

In Chemistry (5CH1H)

Paper 01



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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Acceptable answers	Marks
1 (a)	C planet Y		1

Question number	Answer	Acceptable answers	Marks
1 (b)	An explanation linking <ul style="list-style-type: none"> <li>• (planet is) X (1)</li> <li>• (its atmosphere contains) large amount of carbon dioxide / {little/ no} oxygen (1)</li> </ul>		2

Question number	Answer	Acceptable answers	Marks
1 (c) (i)	$2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ (2)  correct formulae only (1) balancing correct formulae (1)	accept multiples	2

Question number	Answer	Acceptable answers	Marks
1 (c) (ii)	Any one from <ul style="list-style-type: none"> <li>• squeaky pop, popping sound (1)</li> <li>• burns with a colourless flame (1)</li> <li>• colourless liquid on sides of the test tube (1)</li> </ul>		1

Question number	Answer	Acceptable answers	Marks
1 (d)(i)	methane / water vapour		1

Question number	Answer	Acceptable answers	Marks
1 (d) (ii)	absorbs/traps heat (radiated from the Earth)	reflects heat back to Earth  reject references to ozone layer	1

**Total for Question 1 = 8 marks**

Question number	Answer	Acceptable answers	Marks
2 (a)	B limestone and chalk		1

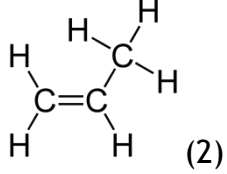
Question number	Answer	Acceptable answers	Marks
2 (b)	An explanation linking any three of the following <ul style="list-style-type: none"> <li>• {magma/lava/molten rock} cools/solidifies (1)</li> <li>• S / large crystals cools slowly (1)</li> <li>• T / small crystals cools quickly (1)</li> </ul>	reject answers explaining metamorphic or sedimentary processes for all marks	3

Question number	Answer	Acceptable answers	Marks
2 (c)	A description including: <ul style="list-style-type: none"> <li>• heat (1)</li> <li>• pressure (1)</li> </ul>	compressed/squashed/compacted	2

Question number	Answer	Acceptable answers	Marks
2 (d)	CaCO <sub>3</sub> → CaO + CO <sub>2</sub> (2) reactant only left hand side (1) products only right hand side (1)	correct multiples ignore state symbols correct formulae in an unbalanced equation maximum 1 mark	2

**Total for Question 2 = 8 marks**

Question number	Answer	Acceptable answers	Marks
3 (a)	<p>An explanation linking the following</p> <ul style="list-style-type: none"> <li>contains carbon (atoms) and hydrogen (atoms) (1)</li> <li>only (1)</li> <li>contains at least one double bond (1)</li> </ul>	<p>reject carbon molecules and hydrogen molecules</p> <p>allow has general formula, <math>C_nH_{2n}</math> (2)</p>	3

Question number	Answer	Acceptable answers	Marks
3 (b) (i)	 <p>one C=C bond in a three consecutive carbon atom molecule (1)</p> <p>rest of structure correct (1)</p>	<p>allow methyl group written as <math>CH_3</math></p> <p>ignore bond angles</p>	2

Question number	Answer	Acceptable answers	Marks
3 (b) (ii)	<p>A description including:</p> <ul style="list-style-type: none"> <li>the mixture turns from orange to colourless (1)</li> <li>propene contains C=C / unsaturated (1)</li> </ul>		2

Question number	Answer	Acceptable answers	Marks
3 (c)	poly(propene)	ignore any numbers, brackets are not required	1

Question number	Answer	Acceptable answers	Marks
3 (d)	$C_4H_8 + 4 O_2 \rightarrow 4 CO + 4 H_2O$ (2) products formulae only (1) balancing of correct formulae (1)	ignore state symbols	2

**Total for Question 3 = 10 marks**

Question number	Answer	Acceptable answers	Marks
4 (a) (i)	electrical (energy) / electricity / direct (electric) current		1

Question number	Answer	Acceptable answers	Marks
4 (a) (ii)	A description including: <ul style="list-style-type: none"> <li>• (blue) litmus (paper)(1)</li> <li>• (turns red then) turns <u>white</u> / <u>bleaches</u> (1)</li> </ul>	allow UI paper  reject further colour changes after bleaching	2

Question number	Answer	Acceptable answers	Marks
4 (a)(iii)	A bleach		1

Question number	Answer	Acceptable answers	Marks
4 (b)(i)	B neutralisation		1

Question number	Answer	Acceptable answers	Marks
4 (b)(ii)	$\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$ (2)  reactants only (1) products only (1)	allow multiples ignore state symbols correct formulae in an unbalanced equation maximum 1 mark	2



Question number	Answer	Acceptable answers	Marks
4 (c)	<p>A description for hydrogen or oxygen or both including any three from</p> <ul style="list-style-type: none"> <li>• as time increases volume of gas increases (1)</li> <li>• volume of gas is (directly) proportional to time (1)</li> <li>• as current increases volume of gas increases (1)</li> <li>• volume of gas is (directly) proportional to current (1)</li> </ul>	<p>as time doubles, the volumes of both gases doubles (2)</p> <p>as current doubles, the volumes of both gases doubles (2)</p>	3

**Total for Question 4 = 10 marks**

Question number	Answer	Acceptable answers	Marks
5 (a)	D produces only water on combustion		1

Question number	Answer	Acceptable answers	Marks
5(b)(i)	An explanation linking <ul style="list-style-type: none"> <li>• sulfur (impurities in fuel) (1)</li> <li>• (sulfur) burned in <b>oxygen</b> (1)</li> </ul>		2

Question number	Answer	Acceptable answers	Marks
5(b)(ii)	$2 \text{H}_2\text{SO}_3 + \text{O}_2 \rightarrow 2 \text{H}_2\text{SO}_4$ (2) correct formulae only (1) balancing of correct formulae (1)	allow multiples ignore state symbols	2

Question number	Answer	Acceptable answers	Marks
5 (b) (iii)	Any one from <ul style="list-style-type: none"> <li>• {harms/kills} {aquatic life/fish} (1)</li> <li>• {harms/kills} {plants/trees} (1)</li> <li>• erodes/damages buildings/statues (1)</li> </ul>		1

Question number		Indicative Content	Marks
QWC	*5c	<p>An evaluation to include some of the following points</p> <p><b>ADVANTAGES OF BIOETHANOL</b></p> <ul style="list-style-type: none"> <li>• (the source) is sustainable/renewable / diesel is finite / takes a long time to form crude oil</li> <li>• crops used to make bioethanol can be regrown quickly/takes a long time to form crude oil</li> <li>• use reduces demand on fossil fuels / conserves diesel/crude oil</li> <li>• photosynthesis (in plants) uses up carbon dioxide / carbon dioxide is removed from air when growing crops (which are used in ethanol production)</li> <li>• photosynthesis (in plants) produces oxygen</li> <li>• no net increase in carbon dioxide / carbon neutral</li> <li>• bioethanol does not contain sulfur/does not release sulfur dioxide when burned</li> <li>• bioethanol burns more completely (diesel does not) / burns more efficiently in air with less carbon monoxide / less soot/smoky flame than diesel</li> </ul> <p><b>DISADVANTAGES OF BIOETHANOL</b></p> <ul style="list-style-type: none"> <li>• less readily available than diesel</li> <li>• growing plants uses up land / lots of crops needed to generate sufficient fuel to replace diesel</li> <li>• less farmland available for growing food crops</li> <li>• loss of biodiversity/ loss of animal and/or plant habitats</li> <li>• low yield of bioethanol from crops</li> </ul> <p>ignore references to cost</p>	6
Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> <li>• a limited description e.g. using bioethanol conserves crude oil deposits</li> <li>• answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
2	3 - 4	<ul style="list-style-type: none"> <li>• a simple description e.g. growing plants gives continuous supply of bioethanol but diesel comes from crude oil which is finite</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>	
3	5 - 6	<ul style="list-style-type: none"> <li>• a detailed description e.g. growing plants remove carbon dioxide from the air but lots of crops are needed to make sufficient bioethanol to replace diesel therefore less land to grow food crops</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>	

**Total for Question 5 = 12 marks**

Question number	Answer	Acceptable answers	Marks
6 (a)	<ul style="list-style-type: none"> <li>• gold is an excellent conductor/better ability to conduct electricity than copper (1)</li> <li>• gold has a high resistance to corrosion /higher resistance to corrosion than copper (1)</li> </ul>		2

Question number	Answer	Acceptable answers	Marks
6 (b)	<p>An explanation linking any three from</p> <ul style="list-style-type: none"> <li>• in pure gold all the atoms are the same (size) (1)</li> <li>• therefore {layers/rows/sheets} of atoms easily slide over each other (1)</li> <li>• in the gold alloy atoms are different sizes (1)</li> <li>• therefore {layers/rows/sheets} of atoms cannot easily slide over each other (1)</li> </ul>	<p>reject the use of the word molecules once only</p> <p>accept ion in place of atom</p>	3

Question number	Answer	Acceptable answers	Marks
6 (c)	loss of oxygen	allow gain of electrons	1

Question Number		Indicative Content	Marks
QWC	*6(d)	<p>A description to include some of the following points</p> <p><b>METHODS OF EXTRACTION</b></p> <ul style="list-style-type: none"> <li>gold is found uncombined</li> <li>iron is extracted by heating with carbon</li> <li>aluminium is extracted by electrolysis</li> </ul> <p><b>JUSTIFICATION</b></p> <p>gold</p> <ul style="list-style-type: none"> <li>gold is at the bottom of the reactivity series / it is unreactive</li> <li>it does not combine with other elements in the Earth's crust (so it found as an uncombined metal)</li> <li>no reaction required to obtain gold</li> </ul> <p>iron</p> <ul style="list-style-type: none"> <li>iron is in the middle of the reactivity series / it is less reactive than aluminium/ it is more reactive than gold</li> <li>it is found combined with other elements</li> <li>can be extracted by heating with carbon</li> <li>electrolysis can be used</li> <li>electrolysis is a more expensive process than heating with carbon / heating with carbon is cheaper</li> </ul> <p>aluminium</p> <ul style="list-style-type: none"> <li>aluminium is near the top of the reactivity series / it is more reactive than iron and gold / it is very reactive</li> <li>it is found combined with other elements</li> <li>its compounds are very stable</li> <li>it cannot be extracted by heating with carbon</li> <li>electrolysis is a more powerful method of reduction</li> <li>but electrolysis is expensive due to cost of electricity needed</li> </ul>	6
<b>Level</b>	<b>0</b>	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> <li>A limited description of a method of extraction linked to a metal or justification in terms of reactivity or cost</li> <li>the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
2	3 - 4	<ul style="list-style-type: none"> <li>A simple description of three methods linked to each metal or two methods and justification in terms of reactivity or cost for one of the metals</li> <li>the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>spelling, punctuation and grammar are used with some accuracy</li> </ul>	
3	5 - 6	<ul style="list-style-type: none"> <li>A detailed description to include all three methods of extraction linked to each metal and justification in terms of reactivity for two metals with a reference to cost</li> <li>the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>spelling, punctuation and grammar are used with few errors</li> </ul>	

**Total for Question 6 = 12 marks**

