

Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE

In Chemistry (5CH1H) Paper 1H



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General Marking Guidance

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- 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)	A description to include any two of • {water vapour / steam} (1) • the Earth cooled (1) • {water vapour / steam} condensed / changed to liquid (1)		**(2)**

Question number	Answer	Acceptable answers	Marks
1 (b) (i)	A description to include any two of • marine organisms /sea creatures absorb/take in carbon dioxide (1) • (and use the carbon dioxide) to form shells /calcium carbonate (1) • (shells) form **sedimentary** (rocks) (1)	reject incorrect references to metamorphic (heat and pressure/ igneous rock formation allow limestone/chalk	**(2)**

Question number	Answer	Marks
1 (b) (ii)	**A** calcium carbonate **The only correct answer is A** **B** is not correct because sodium chloride is not formed from dissolved carbon dioxide **C** is not correct because calcium hydroxide is not formed from dissolved carbon dioxide **D** is not correct because iron oxide is not formed from dissolved carbon dioxide	**(1)**

Question number	Answer	Acceptable answers	Marks
1 (c)	An explanation linking • plants photosynthesise (1) **M1** • so reducing/decreasing/ lowering carbon dioxide levels (1)	allow plants take in carbon dioxide and release oxygen ignore reference to respiration/ breathing for **M1** Ignore remove must reference to lowering/reduction	**(2)**

Question number	Answer	Acceptable answers	Marks
1 (d)	methane + oxygen → carbon dioxide + water LHS (1) RHS (1)	ignore air allow water vapour ignore heat/energy allow reactants on LHS and products on RHS in either order allow $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ (2) ignore state symbols allow = for →	**(2)**

(Total for question 1 = 9 marks)

Question number	Answer	Marks
2 (a)	**D** a salt + water **The only correct answer is D** **A** is not correct because a metal oxide reacting with acid would not produce carbon dioxide as one of the products **B** is not correct because a metal oxide reacting with acid would not produce hydrogen as one of the products **C** is not correct because a metal oxide reacting with acid would not produce oxygen as one of the products	**(1)**

Question number	Answer	Acceptable answers	Marks
2 (b)	A description to include • effervesces/fizzes/bubbles (1) • (solid) disappears / (colourless) solution (formed) (1)	ignore gas/carbon dioxide evolved /steam/smoke reject ppt /any colour allow (solid) dissolves/decreases in size /clear Ignore disintegrate/breaks up	**(2)**

Question number	Answer	Acceptable answers	Marks
2 (c) (i)	An explanation including • decomposing / breaking down of (compounds/ substance/ electrolyte) (1) • direct current / d.c. supply / using electrical energy / electricity (1) (mark independently)	allow splitting up/breaking up ignore separate reject thermal decomposition reject breaking down of elements/atoms/molecules/ metals/bonds reject a.c. supply	**(2)**

Question number	Answer	Acceptable answers	Marks
2 (c) (ii)	A description to include • a glowing splint (1) **M1** • relights (1) **M2** **M2** dependent on **M1**	allow smouldering/ embering splint (1) ignore blown out reject unlit splint reject other tests lighted splint burns brighter (2)	**(2)**

Question number	Answer	Acceptable answers	Marks
2 (c) (iii)	A description including the following: • lighted/lit splint / ignite gas (1) **M1** • gas burns / with (squeaky) pop (if air present) (1) **M2** **M2** dependent on **M1**	allow flame	**(2)**

(Total for question 2 = 9 marks)

Question number	Answer	Acceptable answers	Marks
3 (a) (i)	An explanation linking **EITHER** • no because a hydrocarbon contains carbon and hydrogen (1) • only (1) **OR** • no because this molecule contains chlorine/ fluorine/ other elements (1) • as well as carbon and hydrogen (1)	reject mixture for the 1st mark reject reference to carbon or hydrogen molecules allow H and C for 1st mark ignore fluoride/chloride/ substance(s) allow Cl / F allow H and C for 2nd mark reject reference to carbon or hydrogen molecules	**(2)**

Question number	Answer	Acceptable answers	Marks
3 (a) (ii)	molecule {is saturated/ has no double (or multiple) bond}	allow has only single bonds ignore 'spare bonds' ignore it is an alkane / not an alkene ignore reference to number of hydrogen atoms attached	**(1)**

Question number	Answer	Acceptable answers	Marks
3 (b) (i)	(Earth's) temperature may rise/ temperature increases / may get warmer (1)	reject references to ozone layer ignore pollution allow global warming/climate change allow melting of ice/ sea levels rise / increase in flooding allow alteration in areas available for crop growing/damage wildlife habitats allow more extreme weather conditions likely	**(1)**

Question number	Answer	Marks
3 (b) (ii)	**D** water vapour **The only correct answer is D** **A** is not correct because argon is not a greenhouse gas **B** is not correct because nitrogen is not a greenhouse gas **C** is not correct because oxygen is not a greenhouse gas	**(1)**

Question number	Answer	Acceptable answers	Marks
3 (c)	$(2CHClF_2) \rightarrow \mathbf{C_2F_4} + 2\mathbf{HCl}$ (1) formulae (1) balancing correct formulae (1)	ignore state symbols	**(2)**

Question number	Answer	Acceptable answers	Marks
3 (d) (i)	polymerisation / addition /addition polymerisation		**(1)**

Question number	Answer	Acceptable answers	Marks
3 (d) (ii)	poly(tetrafluoroethene)/ PTFE (1)	allow Teflon™ allow polytetrafluoroethene reject poly(tetrafluoroeth**a**ne)	**(1)**

(Total for question 3 = 9 marks)

Question number	Answer	Acceptable answers	Marks
4 (a) (i)	$(2Fe_2O_3) + (3\ C) \rightarrow$ **4** (Fe) + **3** (CO_2) **4** (1) **3** (1)		**(2)**

Question number	Answer	Marks
4 (a) (ii)	**D carbon is oxidised and iron oxide is reduced** **The only correct answer is D** **A** is not correct because carbon is not reduced **B** is not correct because iron oxide is not oxidised **C** is not correct because neither is carbon reduced nor is iron oxide oxidised	**(1)**

Question number	Answer	Acceptable answers	Marks
4 (b)	An explanation linking **two** from • 24-carat is pure gold / 18-carat is the alloy (1) • alloy is stronger / less easily damaged/worn away/ bent out of shape/ less malleable /withstand forces ORA (1) • alloy is cheaper / has lower cost ORA(1)	allow harder	**(2)**

Question number	Answer	Acceptable answers	Marks
4 (c) (i)	electrolysis		**(1)**

Question number	Answer	Acceptable answers	Marks
4 (c) (ii)	an explanation to include two of the following • sodium compounds are very stable / sodium is a very reactive metal (1) • electrolysis is a strong / powerful method (of reduction extraction) (1) • aluminium is extracted by electrolysis so sodium must be extracted by electrolysis / sodium needs more energy to be reduced (1) • carbon does not react with sodium compounds (1) **ignore answer to part (i)**	allow sodium is more reactive than /higher in the reactivity series than aluminium (1) allow sodium is more reactive than/higher in the reactivity series than carbon (1)	**(2)**

Question number	Answer	Acceptable answers	Marks
4 (d)	An explanation including • (an alloy that) returns to its original shape (1) • with a change of temperature / with an electric current (1)	 ignore remembers allow 'normal' shape allow when heated/cooled	 **(2)**

(Total for question 4 = 10 marks)

Question number	Answer	Marks
5 (a)	**A** bitumen **The only correct answer is A** **B** is not correct because diesel oil is likely to be used as a fuel and more likely to be used as a fuel when compared to bitumen **C** is not correct because kerosene is likely to be used as a fuel and more likely to be used as a fuel when compared to bitumen **D** is not correct because gases are likely to be used as a fuel and more likely to be used as a fuel when compared to bitumen	**(1)**

Question number	Answer	Acceptable answers	Marks
5 (b) (i)	A description to include • (thermal) decomposition / breaking down /splitting (of long/large hydrocarbons molecules) (1) • to form {shorter molecules / alkene(s)} (1)	fractional distillation = 0 ignore 'chains of molecules/hydrocarbons' allow smaller molecules /shorter hydrocarbons/ shorter chains / more useful	**(2)**

Question number	Answer	Acceptable answers	Marks
5 (b) (ii)	Any one of the correct structural formula showing all covalent bonds of • methane, CH_4 • ethene, $H_2C=CH_2$ • ethane, CH_3CH_3 • propene, $CH_3CH=CH_2$ • propane, $CH_3CH_2CH_3$ • butene, $CH_2=CHCH_2CH_3$ / $CH_3CH=CHCH_3$ a structure with the correct number of hydrogen and carbon atoms shown (1) **M1** rest of structure correct showing all covalent bonds conditional on the 1st mark (1) **M2**	 ignore names allow correct molecular formula for **M1** allow CH_3- for methyl and CH_3CH_2- for ethyl groups for **M2**	**(2)**

Question Number		Indicative Content	Mark
QWC	***5c**	An explanation to include some of the following points **advantages** • only water is produced (as waste) • water is harmless/non-toxic / water from combustion of hydrogen has an insignificant effect on global warming • no carbon dioxide emitted • less greenhouse gas emissions/less global warming • no carbon monoxide emitted • carbon monoxide is toxic • no oxides of nitrogen/sulfur dioxide emitted /does not release toxic gases • does not contribute to acid rain • water/hydrogen is renewable/sustainable • plentiful supply of water/raw material • the product of combustion is the source of more hydrogen fuel • raw material/water for fuel is renewable/sustainable **disadvantages** • hydrogen more difficult to store/transport • needs storing/transporting under pressure/in heavy tanks • hydrogen may be produced by electrolysis • using electricity made via fossil fuels/which is costly • carbon dioxide will be produced in the manufacture, transportation and storage of hydrogen • more greenhouse gas emissions/more global warming • hydrogen less available on market • few hydrogen filling-stations/costly to convert existing stations • hydrogen car more expensive to run • cars made to use hydrogen are more expensive than cars made to use petrol • hydrogen is a gas/explosive (when mixed with oxygen and ignited) • leaks are difficult to detect	**(6)**

Level	**0**	No rewardable content
1	**1 - 2**	• A limited explanation of an advantage or a disadvantage of hydrogen OR an advantage and a disadvantage with no explanation e.g. no carbon dioxide emitted, only water produced • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	**3 - 4**	• A simple explanation of an advantage/disadvantage and an identification of an advantage/disadvantage OR identification of three advantages/disadvantages • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	**5 - 6**	• A detailed explanation of at least an advantage and a disadvantage • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

(Total for question 5 = 11 marks)

Question number	Answer	Marks
6 (a)	**D PVC** **The only correct answer is D** **A** is not correct because the process of making cement does use calcium carbonate **B** is not correct because the process of making concrete does use calcium carbonate **C** is not correct because the process of making glass does use calcium carbonate	**(1)**

Question number	Answer	Acceptable answers	Marks
6 (b) (i)	A suggestion to include • (re)heat (the solid) (1) • re-weigh (solid) /re-determine mass of solid / pass any gas through limewater (1) • mass after heating remains the same/constant mass / limewater remains colourless (1)	heat (solid) to constant mass (3)	**(3)**

Question number	Answer	Acceptable answers	Marks
6 (b) (ii)	$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$ LHS with no numbers in front of formulae (1) RHS with no numbers in front of formulae (1)	allow correct multiples allow $Ca(HO)_2$ incorrect balancing of all correct formulae 1 mark max allow reactants on LHS and products on RHS in either order allow = for → reject incorrect use of cases and non-subscripts ignore state symbols	**(2)**

Question Number		Indicative Content	Mark
QWC	***6 (c)**	A explanation to include some of the following points **IGNEOUS ROCKS** **<u>basalt</u>** • lava /magma /molten rock • forced up • cools <u>quickly</u> to form <u>small</u> crystals • solidifies • at the surface/extrusive **<u>granite</u>** • magma /molten rock • forced up • cools <u>slowly</u> to form <u>large</u> crystals • solidifies • under the ground/intrusive **SEDIMENTARY ROCKS** **l<u>imestone</u>** • formed from <u>layers</u> of sediments and/or <u>sea shells</u> • sediments fall to bottom of sea • over long time period • compacted/squashed • by pressure • particles cemented together **METAMORPHIC ROCKS** **<u>marble</u>** • limestone {changed/metamorphosed} • by heat • (from) magma/molten rock • and pressure • (from) rocks above/buried deep underground	**(6)**

Level	**0**	No rewardable content
1	**1 - 2**	• A limited explanation of how at least one of the rocks was formed, e.g. molten rock cools quickly forming basalt • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	**3 - 4**	• A simple explanation of how at least three of the rocks were formed, e.g. molten rock cools quickly to form basalt and cools slowly to form granite. Marble was formed by heat and pressure. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	**5 - 6**	• A detailed explanation of how the four rocks were formed e.g. limestone was changed by heat and pressure to form marble. Granite was formed when molten rock cooled slowly to form large crystals, whereas basalt was formed when molten rock cooled quickly to form small crystals. Limestone was formed when layers of sediment build up on sea bed and are compacted over a long time to form rock. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

(Total for question 6 = 12 marks)

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