



# Mark Scheme (Results)

January 2018

Pearson Edexcel GCSE  
In Chemistry (5CH2H)  
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	Notes	Marks
1(a)(i)	to remove the solid / precipitate (1)		1

Question number	Answer	Notes	Marks
1(a)(ii)	An explanation to include <ul style="list-style-type: none"> <li>remove sodium nitrate solution / impurities (1)</li> <li>tap water is not pure water / contains dissolved solids (1)</li> </ul>		2

Question number	Answer	Notes	Marks
1(a)(iii)	to dry the solid (1)		1

Question number	Answer	Notes	Marks
1(b)	B does not conduct / conducts / conducts		1

Question number	Answer	Notes	Marks
1(c)(i)	B soluble / insoluble / soluble		1

Question number	Answer	Notes	Marks
1(c)(ii)	$\text{Cu}(\text{NO}_3)_2$	reject lower case n or o reject incorrect subscripts eg O3, O <sup>3</sup>	1

Question number	Answer	Notes	Marks
1(c)(iii)	blue-green / green-blue	do not allow 'blue', 'green'	1

Total for Question 1 = 8 marks

Question number	Answer	Notes	Marks
2(a)	A form coloured compounds		1

Question number	Answer	Notes	Marks
2(b)	<p>A description including three from</p> <ul style="list-style-type: none"> <li>• regular arrangement / layers (1)</li> <li>• (of) positive ions / cations (1)</li> <li>• surrounded by {delocalised / sea of} electrons (1)</li> <li>• (ions / cations) held together by strong attractive forces (1)</li> </ul>		3

Question number	Answer	Notes	Marks
2(c)	<p>An explanation linking</p> <ul style="list-style-type: none"> <li>• (sea of / delocalised) electrons</li> <li>• move (to carry the current)</li> </ul>	reject ions move	2

Question number	Answer	Notes	Marks
2(d)	<p>An explanation linking any three of</p> <ul style="list-style-type: none"> <li>• increasing {size / radius (of atom) / number of shells} (1)</li> <li>• outer electron further from nucleus (1)</li> <li>• increased shielding (of outer electron) (1)</li> <li>• less attraction for (outer) electron (1)</li> </ul>	easier to remove (outer) electron	3

**Total for Question 2 = 9 marks**

Question number	Answer	Notes	Marks
3(a)(i)	B 5		1

Question number	Answer	Notes	Marks
3(a)(ii)	C 6		1

Question number	Answer	Notes	Marks
3(a)(iii)	A 3		1

Question number	Answer	Notes	Marks
3(b)(i)	An explanation linking <ul style="list-style-type: none"> <li>(different) atoms {of the same element / with same number of protons} (1)</li> <li>different numbers of neutrons (1)</li> </ul>	allow different (relative) atomic masses / mass numbers	2

Question number	Answer	Notes	Marks
3(b)(ii)	$\frac{19.7 \times 10}{100} (1) = 1.97$ $\frac{80.3 \times 11}{100} (1) = 8.833$ $1.97 + 8.833 (1) = 10.8$		3

Question number	Answer	Notes	Marks
3(c)	relative formula mass $B_2O_3 =$ $(2 \times 11) + (3 \times 16) (1) = 70$  $\% B = \frac{(2 \times 11)}{70} (1) \times 100 (1) = 31.4$		3

Total for Question 3 = 11 marks

Question number	Answer	Notes	Marks
4(a)(i)	$\frac{3.25}{5.0}$ (1) (= 0.65)  (0.65) x 100 (1) (= 65)	65(%) without working = 2 marks	2

Question number	Answer	Notes	Marks
4(a)(ii)	any two from: <ul style="list-style-type: none"> <li>incomplete reaction (1)</li> <li>competing / unwanted / side reactions (1)</li> <li>practical losses during the experiment (1)</li> </ul>		2

Question number	Answer	Notes	Marks
4(a)(iii)	2x56 or 112 → 2x162.5 or 325 (1)  44.8 g Fe → 44.8 x $\frac{325}{112}$ (1) (= 130) (g)	130 (g) without working = 2 marks	2

Question number	Answer	Notes	Marks
4(b)	$\frac{3.36}{56} =$ and $\frac{1.28}{16} =$ (1)  0.06 : 0.08 or 3:4 (1)  Fe <sub>3</sub> O <sub>4</sub> (1)		3

Total for Question 4 = 9 marks

Question number	Answer	Notes	Marks
5(a)(i)	An explanation linking <ul style="list-style-type: none"> <li>shared electrons (between atoms) (1)</li> <li>{pair of / two} (electrons) (1)</li> </ul>		2

Question number	Answer	Notes	Marks
5(a)(ii)	Diagram showing one germanium and four chlorine atoms <ul style="list-style-type: none"> <li>four pairs of electrons shared between the germanium and chlorine atoms (1)</li> <li>fully correct (1)</li> </ul>		2

Question number	Answer	Notes	Marks
5(b)	An explanation linking <ul style="list-style-type: none"> <li>layers can slide (over each other) (1)</li> <li>(because) weak forces between layers (of atoms) (1)</li> </ul>		2



Question Number		Indicative Content	Marks
<b>QWC</b>	<b>*5(c)</b>	<p>An explanation linking some of the following points</p> <p><b>silicon oxide</b></p> <ul style="list-style-type: none"> <li>made of silicon and oxygen atoms</li> <li>giant structure / lattice</li> <li>covalent (bonds)</li> <li>strong bonds between {atoms/particles}</li> <li>a lot of (heat) energy needed to separate {atoms/particles} / a lot (heat) energy needed to break bonds</li> <li>therefore melting point is very high</li> </ul> <p><b>oxygen</b></p> <ul style="list-style-type: none"> <li>oxygen molecules</li> <li>covalent bonds between oxygen atoms</li> <li>simple molecular / simple covalent</li> <li>discrete molecules</li> <li>weak (intermolecular) forces between molecules</li> <li>not much (heat) energy needed to separate molecules</li> <li>therefore boiling point is very low</li> </ul>	<b>6</b>
<b>Level</b>	<b>0</b>	No rewardable content	
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>a limited explanation e.g. oxygen contains simple molecules</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>	
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>a simple explanation e.g. silicon oxide has a giant lattice of silicon and oxygen atoms but oxygen has a simple molecular structure of oxygen molecules</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>	
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>a detailed explanation e.g. silicon oxide has a giant lattice of silicon and oxygen atoms with strong bonds between atoms but oxygen has a simple molecular structure of oxygen molecules with weak forces between molecules</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	Notes	Marks
6(a)	$\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ LHS (1) RHS (1) balancing of correct formulae (1)	ignore lower case o ignore incorrect subscripts eg CO2, CO <sup>2</sup>	3

Question number	Answer	Notes	Marks
6(b)	An explanation linking <ul style="list-style-type: none"> <li>• temperature increases (1)</li> <li>• (so process) exothermic (1)</li> </ul>		2

Question Number		Indicative Content	Marks
QWC	*6(c)	<p>A description including some of the following points</p> <p><b>general points</b></p> <ul style="list-style-type: none"> <li>• reactions occur when particles collide</li> </ul> <p><b>concentration</b></p> <ul style="list-style-type: none"> <li>• experiment 2 higher/triple concentration of acid</li> <li>• so more particles (in same volume)</li> <li>• so more frequent collisions between particles</li> <li>• therefore increased rate of reaction</li> </ul> <p><b>temperature</b></p> <ul style="list-style-type: none"> <li>• experiment 2 higher temperature</li> <li>• particles move faster</li> <li>• so more frequent collisions between particles</li> <li>• therefore increased rate of reaction</li> <li>• particles have more energy</li> <li>• so more energetic collisions between particles</li> <li>• more collisions have enough energy for reaction</li> <li>• therefore increased rate of reaction</li> </ul>	6
Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> <li>• a limited description e.g. temperature is higher so particles move faster so reaction is faster</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 e.g. when concentration is higher there will be more particles so more frequent collisions so faster reaction</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. higher concentration of acid so more particles so more frequent collisions so faster reaction and higher temperature so particles have more energy so more successful collisions so faster reaction</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 = 11 marks

