Mark Scheme (Results)

Pearson Edexcel

Additional Sample Assessment Materials GCSE 9-1
Combined Science
Paper 3: Chemistry 1
1SC0/1CH

First examination 2018

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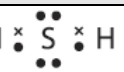
Summer 2017

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.

Pearson Edexcel Leve1 1/Level 2 GCSE (9-1) Combined Science

Paper 1SC0/1CH – Mark scheme

Question number	Answer	Mark
1(a)(i)	**B** 	**(1)**

Question number	Answer	Mark
1(a)(ii)	**C** low low poor conductor	**(1)**

Question number	Answer	Mark
1(b)(i)	(formula showing) simplest ratio of atoms (of each element in a substance)	**(1)**

Question number	Answer	Additional guidance	Mark
1(b)(ii)	no. S atoms : no. F atoms = $\frac{4.8}{32}$ (0.15) : $\frac{17.1}{19}$ (0.9) (1) = $\frac{0.15}{0.15}$ (1) : $\frac{0.9}{0.15}$ (6) (1) empirical formula SF_6 (1)	correct formula with no working scores 1	**(3)**

Question number	Answer	Additional guidance	Mark
1(c)	relative formula mass SO_2 =32.0 + (2x16.0) = 64.0 (1) amount of SO_2 = $\frac{48.0}{64.0}$ (1) number of molecules = $\frac{48.0}{64.0}$ x 6.02×10^{23} = 4.52×10^{23} (1)	4.52×10^{23} without working – 3 marks	**(3)**

(Total for question 1 = 9 marks)

Question Number	Answer	Additional guidance	Mark
2(a)(i)	**C** neutral (1)		**(1)**

Question Number	Answer	Mark
2(a)(ii)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (1 mark) • to react all the (nitric) acid in the solution (1) • so that the calcium nitrate solution is pure (1)	**(2)**

Question Number	Answer	Mark
2(a)(iii)	$CaCO_3 + 2HNO_3 \rightarrow Ca(NO_3)_2 + H_2O + CO_2$ (3) left hand side formulae (1) right hand side formulae (1) balancing correct formulae (1)	**(3)**

Question Number	Answer	Mark
2(b)	• Ca^{2+} (1) • NO_3^- (1)	**(2)**

Question Number	Answer	Mark
2(c)	{sodium/ potassium / ammonium} carbonate (solution) / any soluble sulfate (solution) / sulfuric acid	**(1)**

(Total for question 2 = 9 marks)

Question Number	Answer	Mark
3(a)(i)	chlorine (1)	**(1)**

Question Number	Answer	Mark
3(a)(ii)	A description to include • lighted splint / ignite gas (1) • gas burns / (squeaky) pop (if air is present) (1)	**(2)**

Question Number	Answer	Mark
3(b)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (1 mark): • sodium and chloride ions present (1) • these ions can move (in solution) (1)	**(2)**

Question Number	Answer	Mark
3(c)	An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark) • solution is alkaline (1) • excess hydroxide ions are present / sodium and hydroxide ions in solution / sodium hydroxide solution formed (1)	**(2)**

Question Number	Answer	Mark
3(d)	$2H^+ + 2e \rightarrow H_2$ (2) correct species (1) balancing of correct species (1)	**(2)**

(Total for question 3 = 9 marks)

Question Number	Answer	Mark
4(a)	**B** 2.8.8.2 (1)	**(1)**

Question Number	Answer	Mark
4(b)	element on left hand side of periodic table (1)	**(1)**

Question Number	Answer	Mark
4(c)	An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (2 marks) • (lattice of) positive ions in a sea of electrons (1) • strong forces of attraction (between metal ions and electrons) (1) • therefore large amount of heat energy needed to melt (1)	**(3)**

Question Number	Answer	Mark
4(d)(i)	<table><tr><th>isotope</th><th>mass number</th><th>number of protons</th><th>number of neutrons</th></tr><tr><td>magnesium-24</td><td>24</td><td>12</td><td>12</td></tr><tr><td>magnesium-25</td><td>25</td><td>**12**</td><td>**13**</td></tr><tr><td>magnesium-26</td><td>26</td><td>**12**</td><td>**14**</td></tr></table> all four numbers correct (2) any two numbers correct (1)	**(2)**

Question Number	Answer	Mark
4(d)(ii)	total mass of Mg-24 atoms = 78.60 x 24 = 1886.4 total mass of Mg-25 atoms = 10.11 x 25 = 252.75 total mass of Mg-26 atoms = 11.29 x 26 = 293.54 mass of 100 atoms = (78.60 x 24) + (10.11 x 25) + (11.29 x 26) (1) relative atomic mass = $\frac{(78.60 \times 24) + (10.11 \times 25) + (11.29 \times 26)}{100}$ (1) = 24.3 (2) allow (1) only for any other number of significant figures	**(4)**

(Total for question 4 = 11 marks)

Question Number	Answer	Mark
5(a)(i)	An explanation that combines identification - knowledge (1 mark) and reasoning/justification - understanding (1 mark) • allow air/oxygen to enter (1) • (so) more magnesium reacts (1)	**(2)**

Question Number	Answer	Mark
5(a)(ii)	**C** 0.36 0.56 0.20	**(1)**

Question Number	Answer	Mark
5(a)(iii)	An explanation that combines identification - improvement of the experimental procedure (1 mark) and justification/reasoning which must be linked to the improvement (1 mark) • reheat the crucible and contents (1) • redetermine the mass / mass is constant (1)	**(2)**

Question Number	Indicative content	Mark
***5(b)**	An explanation that combines identification - knowledge (3 marks) and reasoning/justification - understanding (3 marks) • each magnesium atom loses electrons • two (electrons) • to form magnesium cation / Mg^{2+} • $Mg \rightarrow Mg^{2+} + 2e^{(-)}$ • electrons transferred from magnesium atoms to oxygen atoms • each oxygen atom gains electrons • two (electrons) • to form oxide anion / O^{2-} • $O + 2e^{(-)} \rightarrow O^{2-}$ • ionic bonds form • (ionic bonds form) between oppositely charged ions • strong electrostatic forces • between oppositely charged ions • regular arrangement of ions / lattice structure • require large amounts of energy to separate (hence high melting point)	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	• Demonstrates elements of chemical understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates chemical understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

(Total for question 5 = 11 marks)

Question Number	Answer	Mark
6(a)	An answer that combines knowledge (1 mark) and understanding (2 marks) to provide a logical description • use of a pH (probe and) meter / suitable universal indicator paper (1) • (after each addition of calcium oxide) stir (1) • record pH after each addition (1)	**(3)**

Question Number	Answer	Mark
6(b)	$H^+ + OH^- \rightarrow H_2O$ (2) left hand side (1) right hand side (1)	**(2)**

Question Number	Answer	Mark
6(c)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (1 mark) • acid is diluted 10 times (1) • causes increase in pH by 1 / pH of diluted solution is 2 (1)	**(2)**

Question Number	Answer	Mark
6(d)	An explanation that combines identification - application of knowledge (2 marks) and reasoning/justification - application of understanding (2 marks) • hydrochloric acid is (almost) fully dissociated into ions (1) • ethanoic acid is only slightly dissociated into ions (1) • but the concentration of acid in the hydrochloric acid is lower (1) • so the concentration of hydrogen ions in the hydrochloric acid is lower (1)	**(4)**

(Total for question 6 = 11 marks)