Mark Scheme (Results)

Pearson Edexcel

Additional Sample Assessment Materials GCSE 9-1
Combined Science
Paper 4: Chemistry 2
1SC0/2CH

First examination 2018

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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.

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

Paper 1SC0/2CH

Question number	Answer	Mark
1(a)	**D** 11 12 10	**(1)**

Question number	Answer	Additional guidance	Mark
1(b)	• {1 pair of/two} electrons shared between two fluorine atoms (1) • rest of structure correct (1)	ignore inner shells	**(2)**

Question number	Answer	Mark
1(c)	2 Na + **F₂** → **2** NaF (2) F₂ (1) 2 (1)	**(2)**

Question number	Answer	Mark
1(d)(i)	An answer that provides a description by making reference to: • one electron (transferred) (1) • transferred from sodium to fluorine (1)	**(2)**

Question number	Answer	Mark
1(d)(ii)	An explanation that combines identification - understanding (1 mark) and reasoning/justification - understanding (1 mark): • (both solid and molten) contained charged particles/ions (1) • (ions) free to move in molten but not in solid (1)	**(2)**

(Total for Question 1 = 9 marks)

Question number	Answer	Mark
2(a)(i)	value in the range 60 - 64 (s)	(1)

Question number	Answer	Mark
2(a)(ii)	all magnesium is used up	(1)

Question number	Answer	Additional guidance	Mark
2(a)(iii)	volume of hydrogen = 48 (1) rate = $\frac{48}{20}$ (1) = or 2.4 $(cm^3 \, s^{-1})$	2.4 only (2) incorrect volume/20 1 mark only	(2)

Question number	Answer	Mark
2(a)(iv)	curved line to the left of curve (1) same final volume (which is the maximum volume) (1)	(2)

Question number	Answer	Mark
2(a)(v)	C no change, no change	(1)

Question number	Answer	Mark
2(b)	$Mg + 2HCl \rightarrow MgCl_2 + H_2$ LHS (1) RHS (1)	(2)

(Total for Question 2 = 9 marks)

Question number	Answer	Additional guidance	Mark
3(a)	360/100 (1) = 3.6 78 x 3.6 = 281 (1)	allow full marks for correct answer with no working	(2)

Question number	Answer	Mark
3(b)	An answer that combines knowledge (1 mark) and understanding (2 marks) to provide a logical description: • radiation from the sun heats the surface of the Earth (1) • the gases absorb heat radiated from the Earth (1) • heat is released back to the Earth (1)	(2)

Question number	Answer	Additional guidance	Mark
3(c)(i)	An answer that combines the following points of understanding to provide a logical description: • glowing splint (1) • relights (1)	second mark is dependant on first	(2)

Question number	Answer	Mark
3(c)(ii)	49.7 - 42.5 (1) = 7.2 7.2/49.7 x 100 (1) = 14.486 14.5 (1) (to 3 sig figs)	(3)

(Total for Question 3 = 9 marks)

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

Question number	Answer	Mark
4(a)(ii)	**D** petrol	**(1)**

Question number	Answer	Mark
4(a)(iii)	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (2 marks): • (sulfur burns to form) sulfur dioxide (1) • gas dissolves in rain and forms acid / {sulfurous /sulfuric} acid (1) • (acid rain/sulfuric acid) {harms/kills} fish / damages {buildings/statues} /{damages/kills} plants(1)	**(3)**

Question number	Indicative content	Mark
4(b)	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlines in the generic mark scheme.	**(6)**
	The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.	
	- plenty of air means complete combustion of methane - harmful products produced by incomplete combustion - complete combustion produces only carbon dioxide and water - incomplete combustion produces carbon/soot - soot may cause blocked jets in the boiler - soot causes health problems - incomplete combustion produces carbon monoxide - carbon monoxide is a colourless gas - therefore danger because it cannot be seen - carbon monoxide is odourless - therefore danger because it cannot be smelt - carbon monoxide is a toxic/poisonous gas - it combines with haemoglobin - and prevents blood carrying oxygen	

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) • The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. (AO2)
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) • The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. (AO2)
Level 3	5–6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. (AO2)

(Total for Question 4 = 11 marks)

Question number	Answer	Additional guidance	Mark
5(a)	An answer that provides a description by making reference to: • (damp blue) litmus (1) • (turns red) then {bleaches/white} (1)	second mark is dependent on first	(2)

Question number	Answer	Mark
5(b)(i)	(liquid changes from colourless to) yellow / orange/ brown / red	(1)

Question number	Answer	Mark
5(b)(ii)	$Cl_2 + 2I^- \rightarrow 2Cl^- + I_2$ LHS (1) RHS (1) balancing of correct species (1)	(3)

Question number	Answer	Mark
5(b)(iii)	An explanation that combines identification - understanding (1 mark) and reasoning/justification - understanding (1 mark): • when chlorine and iodine react, their atoms gain an electron (1) • electron attracted into chlorine atom more strongly than into an iodine atom (1) • because chlorine atom is smaller / outer electrons in chlorine atom closer to the nucleus / more shielding between nucleus of iodine atom and outer electrons (1)	(2)

Question number	Answer	Additional guidance	Mark
5(b)(iv)	An explanation that combines identification - understanding (1 mark) and reasoning/justification - understanding (1 mark): • iodide ion loses an electron (1) • oxidation is loss of electrons / iodine is oxidised (1) • chlorine atom gains an electron (1) • reduction is gain of electrons / chlorine is reduced (1)	if no reference made to gain or loss of electrons, allow (1) for redox reaction involves both oxidation and reduction	(4)

(Total for Question 5 = 12 marks)

Question number	Answer	Mark
6 (a)(i)	An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark): • temperature increases (1) • heat energy is released (1)	(2)

Question number	Answer	Mark
6 (a)(ii)	Diagram showing • reactants line above products line (1) • products line drawn to right of reactants line (1)	(2)

Question number	Answer	Mark
6 (a)(iii)	Any one from use a lid / polystyrene beaker / insulated container / insulation / draught shield	(1)

Question number	Answer	Mark
6 (a)(iv)	C heat energy is required heat energy is released	(1)

Question number	Answer	Additional guidance	Mark
6 (b)	heat energy change when bonds broken = 413 + 243 (1) heat energy change when bonds formed = 346 + 432 (1) overall heat energy change = (346 + 432) − (413 + 243) or vice versa (1) = 122 (or -122) (kJ mol^{-1}) more heat released than required therefore reaction exothermic (1) **OR** heat energy change when bonds broken = (4 x 413) + 243 (1) heat energy change when bonds formed = (3 x 413) + 346 + 432 (1) overall heat energy change = ((3 x 413) + 346 + 432) − ((4 x 413) + 243) (1) = 122 (or -122) (kJ mol^{-1}) more heat released than required therefore reaction exothermic (1)	allow full marks for correct numerical answer without working	**(4)**

(Total for Question 6 = 10 marks)