Pearson Edexcel

Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE
Combined Science – Paper 3
Chemistry 1 (1SC0_1CF)

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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.

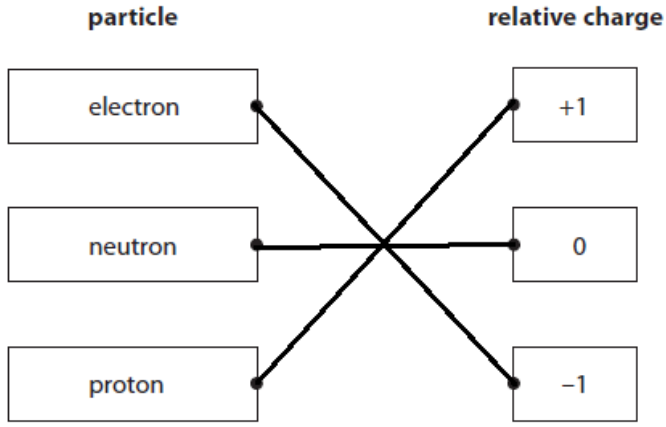
Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.

Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.

When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

Assessment Objective		**Command Word**	
Strand	**Element**	**Describe**	**Explain**
AO1*		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

*there will be situations where an AO1 question will include elements of recall of knowledge directly from the specification (up to a maximum of 15%). These will be identified by an asterisk in the mark scheme.

Question Number	Answer	Additional guidance	Mark
1(a)(i)	 3 correct = 2 marks 1 correct = 1 mark	do not allow more than 1 line from any particle	**(2)** AO 2 1

Question Number	Answer	Mark
1(a)(ii)	**C** 1 **The only correct answer is C** ***A*** *is not correct because mass is 1* ***B*** *is not correct because this is relative mass of electron* ***D*** *is not correct because mass cannot be negative*	**(1)** AO 2 1

Question Number	Answer	Mark
1(b)	**C** magnesium **The only correct answer is C** ***A*** *is not correct because this element is in period 4* ***B*** *is not correct because this element is in period 4* ***D*** *is not correct because this element is in period 5*	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
1(c)	A description to include • both have 18 electrons/2.8.8 (in shells /orbits) (1) • both have 18 protons (in the nucleus) (1) • argon-38 has 20 neutrons AND argon-40 has 22 neutrons (in the nucleus) (1)	allow argon 40 has **two** more neutrons than argon 38 / ORA ignore generic definition of an isotope	**(3)** AO 1 1

(Total for Question 1 = 7 marks)

Question Number	Answer	Mark
2(a)	**B** CH_2 **The only correct answer is B** ***A*** *is not correct because there are not equal C and H* ***C*** *is not correct because it is not simplest ratio* ***D*** *is not correct because it is not simplest ratio*	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
2(b)	56 with or without working (2) OR (4 x 12) + (8 x 1) = (1) = 56 (1)	allow for ONE mark correctly evaluated expression of form: (4 x 12)+(Y x 1) = … (X x 12)+(8 x 1) = … OR (8 x 12) + (4 x 1) = 100 [In each case working and correctly evaluated answer required]	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
2(c)(i)	$C_4H_8 + 6O_2 \rightarrow 4CO_2 + 4H_2O$ $4CO_2$ (1) $4H_2O$ (1)		**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	A description linking • (bubble gas through) limewater (1) • (limewater) turns {milky / cloudy / white precipitate} (1)	second mark dependent on first ignore lit splint goes out	**(2)** AO 1 1

Question Number	Answer	Mark
2(d)	**A** -6 low **The only correct answer is A** ***B*** *is not correct because bpt is too high and solubility not high* ***C*** *is not correct because solubility not high* ***D*** *is not correct because bot is too high*	**(1)** AO 3 2b

Question Number	Answer	Additional guidance	Mark
2(e)	high melting point / high boiling point / hard / insoluble (in water) / does not conduct (electricity)	ignore strong bonds ignore strong ignore values given ignore any other properties but reject contradictions to allowed answers	**(1)** AO 1 1

(Total for Question 2 = 9 marks)

Question Number	Answer	Additional guidance	Mark
3(a)	flammable	allow inflammable	**(1)** AO 3 2b

Question Number	Answer	Additional guidance	Mark
3(b)	barium and sulfur	both elements must be present for the mark allow Ba and S reject sulfide/sulfate reject if any other elements included	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
3(c)	An explanation linking one of the following pairs of points • wear gloves (1) • {so does not contact/to protect your} skin (1) OR • wear goggles (1) • {so does not contact/to protect} the eyes (1) OR • use in fume cupboard / mask (1) • so you do not inhale it (1)	second mark dependent on first ignore protective/safety clothing	**(2)** AO 3 2a AO 3 2b

Question Number	Answer	Additional guidance	Mark
3(d)(i)	25.7 (g)	do not allow 25 answer may be written on the lower diagram	**(1)** AO 2 2

Question Number	Answer	Additional guidance	Mark
3(d)(ii)	barium sulfate	do not allow barium sulfide	**(1)** AO 1 2

Question Number	Answer	Additional guidance	Mark
3(e)(i)	so that the ions can move	allow the solid does not conduct allow conducts when {in solution/liquid} ignore conducts when molten allow so cations / anions can move ignore so particles can move reject electrons move	**(1)** AO 2 2

Question Number	Answer	Mark
3(e)(ii)	OH^- and Cl^- only circled	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
3(e)(iii)	An explanation linking one of the following pairs of points • use a crucible/metal container (instead of a beaker) (1) • which will not break/melt (when heated strongly) (1) OR • add a Bunsen burner (under the container) (1) • because heat needed to melt the lead bromide / to make the lead bromide a liquid (1)	allow blow torch ignore hot water bath	**(2)** AO 3 3b

(Total for Question 3 = 10 marks)

Question Number	Answer	Mark
4(a)	**A** chromatography **The only correct answer is A** ***B*** *is not correct this would not separate colours* ***C*** *is not correct because this would not separate colours* ***D*** *is not correct because this would not separate colours in best way*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
4(b)(i)	arrows drawn to show water going in the condenser in the bottom and out the condenser at the top	reject arrows drawn coming out of the middle of the condenser	**(1)** AO 1 2

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	An explanation linking • to cool (1) • so (water) {vapour/gas} turns to liquid (1)	 allow water for liquid allow steam for vapour if cooling the ink max 1 for first marking point only	**(2)** AO 1 2

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	electric heater / heating mantle	allow spirit burner allow hot plate/heated plate allow blow torch ignore heater alone ignore Bunsen burner ignore hot water bath	**(1)** AO 2 2

Question Number	Answer	Additional guidance	Mark
4(c)	particles at A: white circles only, none touching (1) particles at B: white circles only, randomly arranged, more circles than in A (1)	 reject 'strings' of particles if black circles are present in both boxes allow 1 mark if arrangement of particles in both boxes is otherwise correct.	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
4(d)	An explanation linking • physical changes do not result in formation of a new substance / chemical change results in formation of a new substance (1) • physical change is easily reversed / chemical change is not easily reversed (1)	 allow no chemical **reaction** has taken place ignore you can see the change	**(2)** AO 1 1

(Total for question 4 = 9 marks)

Question Number	Answer	Additional guidance	Mark
5(a)	any two of the following • high melting points (1) • high boiling points (1) • malleable (1) • conduct electricity (1) • conduct heat (1) • high density (1) • shiny (1) • ductile (1) • strong (1) • sonorous (1)	 allow bendy as alternative to malleable ignore solid ignore hard allow good conductor for 1 mark	**(2)** AO 1 2

Question Number	Answer	Additional guidance	Mark
5(b)	hydrochloric (acid)	allow HCl ignore HCL, hCl, HCL_2 etc	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
5(c)(i)	A description including • apply lighted splint (1) • (squeaky) pop (1)	 allow flame / ignite gas / fire ignore 'squeaky pop test' / glowing splint second mark is dependent on first	**(2)** AO 1 1

Question Number	Answer		Mark
5(c)(ii)	An explanation linking • loss of electron(s) (1) • two electrons (1)	allow gains two electrons for 1 mark zero marks overall if sharing of electrons / gain or loss of protons / positive electrons marks can be awarded for suitably drawn diagram / half equation	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
5(d)	final answer of 94 (g dm^{-3}) with or without working (2) OR $\frac{23.5}{250}$ (1) (= 0.094) 0.094 x 1000 (1) OR $\frac{250}{1000}$ (dm^3) (1) (= 0.25 (dm^3)) $\frac{23.5}{0.25}$ (1) OR $\frac{1000}{250}$ (1) = 4 4 x 23.5 (1)	allow ECF (error carried forward) throughout other final answers: 0.094 / 9.4 (1) 0.000094 or 9.4 x 10^{-5} (1) 0.25 (dm^3) (1) allow $\frac{250}{23.5}$ x 1000 or 10638(.3) (1)	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
5(e)	A description to include • filter (1) and two in a logical order from • **crystallisation** (1) • heat solution (to concentrate) (1) • allow to cool (1) • dry crystals between filter papers (1)	if filtration not first stage, ignore it and give maximum 2 marks allow description of filtration ignore filtration to obtain nickel sulfate (crystals) allow 'leave until water evaporates' / use of water bath / evaporate {water/the solution} allow leave {until crystals form / for a few hours / in a warm place / on a window sill} allow 'dry crystals in (warm) oven' if alternative methods of making nickel sulfate solution described, max 1 mark from last four marking points	**(3)** AO 2 2

(Total for question 5 = 12 marks)

Question Number	Answer	Mark
6(a)(i)	**C** iron oxide is reduced **The only correct answer is C** ***A*** *is not correct because carbon gains oxygen* ***B*** *is not correct because it is not an acid-base reaction* ***D*** *is not correct because iron oxide loses oxygen*	**(1)** AO 1 1

Question Number	Answer		Mark
6(a)(ii)	final answer of 168 (tonnes) with or without working (3) OR relative formula mass Fe_2O_3 = 2x56 + 3x16 (= 160) (1) 160 tonnes Fe_2O_3 produces {2x56 / 112} tonnes Fe (1) 240 tonnes Fe_2O_3 produces $\frac{2x56}{160}$ x 240 (1) = 168 (tonnes) OR relative formula mass Fe_2O_3 = 2x56 + 3x16 (= 160) (1) $\frac{240}{160}$ (1) = 1.5 1.5 x 112 (1) = 168 (tonnes) OR relative formula mass Fe_2O_3 = 2x56 + 3x16 (= 160) (1) $\frac{112}{160}$ (1) = 0.7 0.7 x 240 (1) = 168 (tonnes)	allow ECF throughout M_r $[Fe_2O_3]$= 160 seen without working (1) allow 320 tonnes : 224 tonnes (1) final answer 84 (tonnes) with or without working (2) Note : final answer 1.5 scores 2 overall	**(3)** AO 2 1

Question Number	Answer	Additional guidance	Mark
6(b)	An explanation linking the following points • aluminium is high in reactivity / aluminium oxide is (very) stable (1) • aluminium (oxide) cannot be reduced by carbon (1)	allow carbon is less reactive than aluminium / ORA / aluminium is very reactive ignore 'aluminium is more reactive' (alone) allow carbon cannot displace aluminium / aluminium **oxide** does not react with carbon ignore aluminium extracted by electrolysis	**(2)** AO 1 1

Question Number	Answer	Mark
6(c)	electrolysis	**(1)** AO 3 2a

Question Number	Indicative content	Mark
6(d)	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. 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. • recycling conserves raw materials/natural resources • less power/energy used • therefore conserves fossil fuels • reduces waste in landfill sites • mining for ores avoided • less damage to habitats/landscape • less energy required to melt and reform metals than to extract them • produces less carbon dioxide than extracting/ reduces carbon footprint • carbon dioxide is a greenhouse gas • greenhouse gases cause global warming • avoids use of large amounts of electricity to extract aluminium from its ore • electricity is expensive • avoids release of carbon dioxide when carbon burns • avoids use of large amounts of heat energy needed to extract iron from its ore IGNORE: • environmentally friendly • cheaper • faster • employment	**(6)** AO 1 1 AO 2 1

Level	Mark	Descriptor
	0	• No awardable content
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 6 = 13 marks

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