

GCSE

CHEMISTRY

Paper 1 Higher Tier

Mark scheme Practice Paper Series – Set 1 SGC/S1/SC/1H

Version 1.1

This mark scheme is an original resource written for sciencegcse.co.uk to accompany the Set 1 practice paper SGC/S1/SC/1H. It is not an AQA mark scheme and has not been produced or endorsed by AQA. It follows the structure and conventions of AQA GCSE science mark schemes so that students and teachers can mark the practice paper in the same way that a real paper is marked.

Marking should be carried out using the Information to Examiners on the following pages. The paper has not been standardised, so raw marks should not be converted into grades using any published grade boundaries.

Specification references are to the AQA GCSE Chemistry (8462) specification, sections 4.1–4.5. AO = assessment objective; WS = working scientifically; MS = mathematical skills; RP = required practical.

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the answer(s) expected, including alternative acceptable wording, in the **Answers** column
- guidance on which answers are and are not creditworthy in the **Extra information** column
- the assessment objective (AO) and specification reference for each marking point.

Award marks positively. Do not deduct marks for incorrect additional material unless it contradicts a correct answer (see 3.1). Marks are awarded for what the student has written, not for what they might have meant.

2. Emboldening and underlining

- 2.1 Where a list of acceptable answers is given and more than one mark is available, **any two from** (or similar) is used, followed by the acceptable answers.
- 2.2 A bold **and** indicates that both parts of the answer are needed to gain the mark.
- 2.3 Alternative answers acceptable for the same mark are separated by **or**. Different words that are acceptable within a marking point are separated by a forward slash (/).
- 2.4 Words in bold in the Answers column are the essential words that must be present, or their equivalent, for the mark to be awarded.

3. Marking points

3.1 Marking of lists

For a question asking for a fixed number of responses, consider the whole answer, including extra responses. Each incorrect or contradictory response cancels one correct response; ignore neutral additions. Numbered answer lines do not limit marking to the first responses. This rule does not apply to extended answers.

3.2 Marking procedure for calculations

Full marks can be awarded for a correct numerical answer without working, unless the question asks for working to be shown. If the answer is incorrect, marks may be awarded for the correct stages of working shown in the mark scheme. Anything shown in brackets in the Answers column (for example the unit) is not required for the mark.

3.3 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.4 Errors carried forward

Any error in the answer to a structured question causes the loss of the mark(s) for that part only. Later parts should be marked on the assumption that the incorrect answer was correct, where the mark scheme indicates that error carried forward (ECF) applies.

3.5 Phonetic spelling

Accept misspelled or phonetic scientific terms when the intended answer is clear, unless the spelling could be confused with a different technical term. This also applies when the question asks for the name of a process or structure.

3.6 Brackets

Words shown in brackets in the Answers column are not required to gain the mark but help to set the context.

3.7 Allow

Answers that are acceptable but which would not normally be expected are shown as **allow**.

3.8 Ignore

Statements shown as **ignore** are neither creditworthy nor penalised. Mark the rest of the answer normally.

3.9 Do not accept

Statements shown as **do not accept** are incorrect and, where they contradict or replace the expected answer, mean the mark is not awarded.

4. Level of response marking instructions

Extended-response questions (questions 06.1 and 07.5 in this paper) are marked using a level of response mark scheme. The scheme has three levels, each covering two marks, plus a level descriptor and indicative content.

Step 1 – Determine a level. Read the whole answer and decide which level descriptor best fits it. Use a 'best-fit' approach: an answer does not need to meet every part of a descriptor to be placed in that level, and a weak part of the answer need not prevent it from reaching the higher level if the overall quality matches the descriptor.

Step 2 – Determine a mark within the level. Award the higher mark in the level if the answer meets the descriptor fully and the points made are well linked; award the lower mark if the answer only just meets the descriptor or contains minor errors or omissions.

The indicative content is not a checklist: students need not include every point to reach the top level, and other relevant, correct points should be credited. An answer that lists points without linking them into a coherent answer should be placed in a lower level than one that develops and connects them.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	2,8,1	allow 2.8.1 or a correct diagram showing 2, 8 and 1 electrons in three shells	1	AO1 4.1.1.7
01.2	(a sodium atom has) one electron in its outer shell	allow the outer electron is far from the nucleus / weakly attracted	1	AO1 4.1.2.5
	(which is) easily lost (to form a positive ion / Na^+)	allow little energy is needed to remove the outer electron	1	AO1 4.1.2.5
01.3	any two from: (transition metals have) higher melting points - higher densities - are harder / stronger - are less reactive (with water)	answers must be comparative ignore properties not shown in Table 1 unless a correct comparison is made	2	AO2 4.1.3.1
01.4	(FeCl_2) +2 / 2+	allow Fe^{2+}	1	AO2 4.1.3.2 4.2.1.2
	(FeCl_3) +3 / 3+	allow Fe^{3+}	1	AO2 4.1.3.2 4.2.1.2
01.5	any one from: (they are) useful as catalysts - they form ions with different charges	allow a named example, e.g. iron is the catalyst in the Haber process ignore good conductors / malleable (typical of all metals)	1	AO1 4.1.3.2
Total			8	
02.1	$5 \times 10^{-8} \text{ m}$	if more than one box is ticked, no mark	1	AO2 4.2.4.1 MS 1b
02.2	(surface area =) $6 \times 10 \times 10 = 600 \text{ (nm}^2\text{)}$ and (volume =) $10 \times 10 \times 10 = 1000 \text{ (nm}^3\text{)}$	an answer of 0.6 scores 2 marks allow $600 : 1000$ or $6 : 10$ for 1 mark	1	AO2 4.2.4.1 MS 5c
	(ratio =) $600 \div 1000 = \mathbf{0.6} \text{ (nm}^{-1}\text{)}$	allow $0.6 : 1$ or $3 : 5$	1	AO2 4.2.4.1 MS 5c
02.3	the surface area to volume ratio increases by a factor of 10	allow it becomes 10 times bigger allow an answer using the values 0.06 and 0.6	1	AO1 4.2.4.1 MS 1c
02.4	nanoparticles have a (much) larger surface area to volume ratio (than larger particles)	allow a larger surface area for the same mass / volume	1	AO2 4.2.4.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	(so) smaller quantities are needed to be effective or more of the titanium dioxide is at the surface (where it blocks / absorbs the UV light)	allow the nanoparticles are more effective (at blocking UV light) for the same mass	1	AO2 4.2.4.1
02.5	any one from: - the nanoparticles may be absorbed through the skin / into cells (and cause harm) - the effects on the body / health are not fully known - they may harm the environment when the sunscreen is washed off	allow the long-term effects are not known ignore they are dangerous without a reason	1	AO1 4.2.4.2
Total			7	
03.1	$(2 \times 56) + (3 \times 16) = \mathbf{160}$	an answer of 72 (one iron atom counted) or 128 scores 0 marks	1	AO2 4.3.1.2 MS 1a
03.2	(moles of Fe_2O_3 =) $800 \div 160 = 5$ (mol)	an answer of 560 scores 3 marks alternative approach: 160 g of Fe_2O_3 gives $2 \times 56 = 112$ g of iron (1); $800 \div 160 = 5$ (1); $5 \times 112 = 560$ (1)	1	AO2 4.3.2.2 MS 1a
	(moles of Fe =) $2 \times 5 = 10$ (mol)	allow ECF from an incorrect M_r in 03.1 or an incorrect number of moles	1	AO2 4.3.2.2 MS 1a
	(mass of iron =) $10 \times 56 = \mathbf{560}$ (g)	an answer of 280 (1 : 1 ratio used) scores 2 marks	1	AO2 4.3.2.2 MS 1a
03.3	$(476 \div 560) \times 100$	an answer of 85 scores 2 marks allow ECF from an incorrect answer to 03.2 if 550 g is used: $476 \div 550 \times 100 = 86.5 / 87$ (%) scores 2 marks	1	AO2 4.3.3.1 MS 1c
	(percentage yield =) 85 (%)		1	AO2 4.3.3.1 MS 1c
03.4	any two from: - the reaction may not go to completion or the reaction is reversible - some of the product may be lost when it is separated from the reaction mixture - some of the reactants may react in different ways from the expected reaction or side reactions occur	allow some iron(III) oxide is left unreacted ignore human error	2	AO1 4.3.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	$(2 \times 56) \div (160 + (3 \times 28)) \times 100$ or $112 \div 244 \times 100$	an answer of 45.9 or 46 scores 2 marks allow ECF from an incorrect M_r in 03.1 an answer of 23 (one iron atom counted) scores 1 mark	1	AO2 4.3.3.2 MS 1a
	(atom economy =) 45.9 (%)	allow 46 (%) allow 45.90 (%)	1	AO2 4.3.3.2 MS 1a
03.6	any one from: - less waste (product) is made (so) it is more sustainable / uses fewer raw materials / is better for the environment - it is more economic or more of the reactants end up in the useful product	ignore cheaper without a reason	1	AO1 4.3.3.2
Total			11	
04.1	(a giant structure / regular arrangement of) positive ions	allow copper ions arranged in layers do not accept atoms / molecules	1	AO1 4.2.1.5
	(surrounded by a 'sea' of) delocalised electrons	allow free electrons allow strong (electrostatic) attraction between the positive ions and the delocalised electrons	1	AO1 4.2.1.5
04.2	the delocalised electrons are free to move (through the metal) and carry the charge / current	do not accept ions move	1	AO1 4.2.2.8
04.3	the layers (of atoms / ions) can slide over each other	allow the atoms are arranged in layers which can slide	1	AO1 4.2.2.7
04.4	(zinc) atoms are a different size (from copper atoms)	allow the atoms are different sizes	1	AO1 4.2.2.7
	(so) the layers are distorted / the regular arrangement is disrupted, so the layers cannot slide over each other (as easily)	allow the layers are harder to move	1	AO1 4.2.2.7
04.5	Brass B because it is the hardest / has the highest hardness (110) so it is scratched least easily	both the choice and a reason linked to hardness are needed for the mark ignore it contains the most zinc unless linked to hardness	1	AO3 4.2.2.7
Total			7	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	$24 + (2 \times 35.5) = 95$	an answer of 59.5 (only one chlorine counted) scores 0 marks	1	AO2 4.3.1.2 MS 1a
05.2	$2.4 \div 24 = 0.1$ (mol)	allow 0.10	1	AO2 4.3.2.1 MS 1a
05.3	(moles of MgCl_2 = moles of Mg =) 0.1 (mol) or 0.1×95	an answer of 9.5 scores 2 marks allow ECF from incorrect answers to 05.1 and 05.2	1	AO2 4.3.2.2 MS 1a
	(mass =) 9.5 (g)		1	AO2 4.3.2.2 MS 1a
05.4	0.1 mol of magnesium needs (0.1×2 =) 0.2 mol of hydrochloric acid or the ratio of Mg : HCl is 1 : 2	alternative approach: 0.15 mol of hydrochloric acid reacts with ($0.15 \div 2$ =) 0.075 mol of magnesium (1)	1	AO2 4.3.2.4 MS 1c
	0.15 (mol) is less than 0.2 (mol) so (all) the hydrochloric acid is used up (before the magnesium) / the magnesium is in excess	0.075 mol is less than 0.1 mol so the magnesium is in excess / not all the magnesium reacts (1)	1	AO2 4.3.2.4 MS 1c
05.5	(moles of MgCl_2 =) $0.15 \div 2 = 0.075$ (mol) or 0.075×95	an answer of 7.1 scores 2 marks an answer of 7.125 or 7.13 (not to 2 significant figures) scores 1 mark allow ECF from an incorrect M_r in 05.1	1	AO2 4.3.2.4 MS 1c MS 2a
	(mass =) $7.125 = 7.1$ (g)		1	AO2 4.3.2.4 MS 1c MS 2a
05.6	any one from: - some of the solution / product was lost when it was transferred or filtered - some solution was lost by spitting when it was heated (to evaporate the water) - some crystals were left in the (evaporating) basin / on the filter paper - the reaction had not finished / not all the acid had reacted	ignore human error / incorrect measurements	1	AO3 4.3.1.4 4.4.2.3
05.7	(moles of hydrogen =) $0.15 \div 2 = 0.075$ (mol)	an answer of 1.8 scores 2 marks an answer of 3.6 (1 : 1 ratio used) scores 1 mark	1	AO2 4.3.5 MS 1c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	(volume =) $0.075 \times 24 = 1.8 \text{ (dm}^3\text{)}$	allow 1800 cm^3	1	AO2 4.3.5 MS 1c
Total			11	
06.1	Level 3 (5–6 marks)	A clear, detailed and logically ordered method that would give an accurate titre: the alkali measured with a pipette, an indicator used, the acid added from the burette with swirling and drop by drop near the end point, burette readings taken, and the titration repeated to obtain concordant results.	6	AO1 4.4.2.5 RP 2
	Level 2 (3–4 marks)	A method with most of the main steps in a sensible order, but with some detail needed for accuracy missing or incomplete (for example no repeat titrations, or no mention of adding the acid slowly near the end point).		
	Level 1 (1–2 marks)	Simple statements of some relevant steps, for example using an indicator and adding acid until the colour changes, with little detail or organisation.		
	0 marks	No relevant content.		
	Indicative content • use a (volumetric) pipette and pipette filler to measure 25.0 cm^3 of the sodium hydroxide solution into a conical flask • add a few drops of a suitable indicator (e.g. phenolphthalein or methyl orange) to the flask • fill the burette with hydrochloric acid (using a funnel, then remove the funnel) and record the initial burette reading • place the flask on a white tile under the burette so that the colour change is easier to see • add the acid to the flask while swirling the flask • add the acid slowly / drop by drop near the end point • stop adding acid when the indicator just changes colour (e.g. phenolphthalein turns from pink to colourless) • record the final burette reading (to the nearest 0.05 cm^3) and calculate the volume of acid added (the titre) • do a rough titration first, then repeat the titration until concordant results (within 0.10 cm^3) are obtained • calculate the mean of the concordant titres Credit other correct, relevant points. Do not credit heating the mixture or measuring the alkali with a beaker.			
06.2	(concordant results are) 21.90 and 21.80 or $(21.90 + 21.80) \div 2$	an answer of 21.85 scores 2 marks an answer of 21.97 or 22.0 (all three titrations used) or 22.1 (all four results used) scores 0 marks	1	AO2 4.4.2.5 MS 2b RP 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	(mean volume =) 21.85 (cm ³)	allow 21.9 (cm ³)	1	AO2 4.4.2.5 MS 2b RP 2
06.3	(moles of HCl =) $0.100 \times 21.85 \div 1000 = 0.002185$ (mol)	an answer of 0.0874 scores 3 marks allow ECF from an incorrect mean volume in 06.2	1	AO2 4.3.4 MS 1a MS 1c
	(moles of NaOH =) 0.002185 (mol) or the ratio of NaOH : HCl is 1 : 1	allow 2.185×10^{-3}	1	AO2 4.3.4 MS 1a MS 1c
	(concentration =) $0.002185 \div 0.0250 = \mathbf{0.0874}$ (mol/dm ³)	an answer of 0.087 or 0.08740 (not 3 significant figures) scores 2 marks allow 8.74×10^{-2}	1	AO2 4.3.4 MS 1a MS 2a
06.4	0.0874×40	an answer of 3.50 or 3.496 scores 2 marks allow ECF from an incorrect answer to 06.3	1	AO2 4.3.4 MS 1c
	(concentration =) 3.50 (g/dm ³)	allow 3.5 (g/dm ³)	1	AO2 4.3.4 MS 1c
Total			13	
07.1	the bigger the difference in reactivity between the two metals, the bigger the voltage	allow the more reactive the metal (used with copper), the higher the voltage	1	AO3 4.5.2.1
	magnesium is the most reactive (of the metals) so gives the largest voltage or two copper electrodes give 0 V because there is no difference in reactivity	allow the metals must be different to produce a voltage	1	AO3 4.5.2.1
07.2	any value greater than 0 and less than 0.8 (V)	allow 0.1 to 0.7 (V)	1	AO2 4.5.2.1 MS 2b
07.3	(one of) the reactants / chemicals is used up	allow the reaction stops when one of the chemicals runs out	1	AO1 4.5.2.1
	the reaction is not reversible / cannot be reversed (by an external electric current)	allow the battery cannot be recharged because the reaction is irreversible	1	AO1 4.5.2.1
07.4	$\text{H}_2 \rightarrow 2\text{H}^+ + 2\text{e}^-$ correct species	allow $2\text{H}_2 + 4\text{OH}^- \rightarrow 4\text{H}_2\text{O} + 4\text{e}^-$ (alkaline fuel cell) for 2 marks allow multiples	1	AO1 4.5.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.								
	correctly balanced, with the electrons on the right-hand side	allow $\text{H}_2 - 2\text{e}^- \rightarrow 2\text{H}^+$ do not accept electrons on the left-hand side	1	AO1 4.5.2.2								
07.5	<table><tr><td>Level 3 (5–6 marks)</td><td>A clear evaluation that gives advantages and disadvantages of both hydrogen fuel cells and rechargeable batteries, relates them to powering a car, and reaches a justified conclusion. The points made are well organised and linked.</td></tr><tr><td>Level 2 (3–4 marks)</td><td>Some relevant advantages and/or disadvantages of one or both types of cell, with a limited comparison. A conclusion may be missing or not justified.</td></tr><tr><td>Level 1 (1–2 marks)</td><td>Simple statements about fuel cells or rechargeable batteries with little or no comparison.</td></tr><tr><td>0 marks</td><td>No relevant content.</td></tr></table> Indicative content Hydrogen fuel cells – advantages - the only product is water, so no pollutants / carbon dioxide are produced by the car - the cell does not need recharging – refuelling with hydrogen takes a few minutes, whereas recharging a battery takes hours - the cell keeps producing electricity as long as hydrogen and oxygen (air) are supplied / it does not run down Hydrogen fuel cells – disadvantages - hydrogen is a flammable / explosive gas which must be stored at high pressure – safety and storage problems - most hydrogen is currently made from fossil fuels (or by electrolysis using electricity) so producing it may release carbon dioxide / uses a lot of energy - there are few hydrogen filling stations - fuel cells are expensive (e.g. they use a platinum catalyst) Rechargeable batteries - can be recharged at home / charging points are widely available - the electricity used to charge them may come from renewable sources (or from fossil fuels) - heavy, with a limited range and a long charging time - the battery stores less charge over time / has a limited number of charge cycles and must eventually be replaced - production and disposal of the metals in the batteries can harm the environment A justified conclusion, e.g. fuel cells are better for quick refuelling and produce only water in use, but batteries are more practical at present because of the lack of hydrogen infrastructure. Credit other correct, relevant points. Do not credit statements that fuel cells produce no pollution at all without reference to how the hydrogen is made, or that hydrogen is a renewable fuel without qualification.		Level 3 (5–6 marks)	A clear evaluation that gives advantages and disadvantages of both hydrogen fuel cells and rechargeable batteries, relates them to powering a car, and reaches a justified conclusion. The points made are well organised and linked.	Level 2 (3–4 marks)	Some relevant advantages and/or disadvantages of one or both types of cell, with a limited comparison. A conclusion may be missing or not justified.	Level 1 (1–2 marks)	Simple statements about fuel cells or rechargeable batteries with little or no comparison.	0 marks	No relevant content.	6	AO3 4.5.2.1 4.5.2.2
Level 3 (5–6 marks)	A clear evaluation that gives advantages and disadvantages of both hydrogen fuel cells and rechargeable batteries, relates them to powering a car, and reaches a justified conclusion. The points made are well organised and linked.											
Level 2 (3–4 marks)	Some relevant advantages and/or disadvantages of one or both types of cell, with a limited comparison. A conclusion may be missing or not justified.											
Level 1 (1–2 marks)	Simple statements about fuel cells or rechargeable batteries with little or no comparison.											
0 marks	No relevant content.											
Total			13									

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	(energy needed to break bonds $\Rightarrow$) $(2 \times 436) + 498 = \mathbf{1370}$ (kJ/mol)	an answer of -486 scores 3 marks an answer of 486 or $+486$ (sign missing or incorrect) scores 2 marks	1	AO2 4.5.1.3 MS 1a
	(energy released when bonds form $\Rightarrow$) $4 \times 464 = \mathbf{1856}$ (kJ/mol)	allow $2 \times (2 \times 464)$	1	AO2 4.5.1.3 MS 1a
	(overall energy change $\Rightarrow$) $1370 - 1856 = \mathbf{-486}$ (kJ/mol)	allow ECF for a correct subtraction using their two values	1	AO2 4.5.1.3 MS 1a
08.2	the energy change is negative or more energy is released when the new bonds form than is taken in to break the bonds	allow the energy released forming bonds (1856) is greater than the energy needed to break bonds (1370) do not accept it gives out heat without reference to the answer to 08.1	1	AO2 4.5.1.3
08.3	(the reaction needs) activation energy or the (minimum) energy needed for the particles to react / to break the bonds (in the reactants)	allow the hydrogen and oxygen molecules do not have enough energy (to react)	1	AO1 4.5.1.2
	the spark supplies the activation energy / enough energy (to start the reaction)	allow the spark supplies enough energy to break the bonds	1	AO1 4.5.1.2
Total			6	
09.1	(potassium bromide solution) hydrogen and bromine	both needed for the mark do not accept potassium	1	AO2 4.4.3.4 RP 3
	(copper sulfate solution) copper and oxygen	both needed for the mark do not accept sulfur / sulfate / sulfur dioxide	1	AO2 4.4.3.4 RP 3
09.2	copper is less reactive than hydrogen (so copper ions are discharged in preference to hydrogen ions)	allow copper is below hydrogen in the reactivity series	1	AO1 4.4.3.4
09.3	$\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$	allow multiples $\text{Cu}^{2+} + \text{e}^- \rightarrow \text{Cu}$ (unbalanced) scores 0 marks for the equation	1	AO1 4.4.3.5
	reduction	the reason mark can only be awarded if reduction is chosen	1	AO1 4.4.1.4
	because the copper ions gain electrons	allow reduction is the gain of electrons do not accept loss of oxygen	1	AO1 4.4.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	$4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^-$ correct species: OH^- , O_2 , H_2O and electrons	allow $4\text{OH}^- - 4\text{e}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O}$	1	AO1 4.4.3.5
	correctly balanced, with the electrons on the right-hand side	allow multiples do not accept electrons on the left-hand side	1	AO1 4.4.3.5
09.5	copper ions (Cu^{2+}), which are blue, are removed from the solution / discharged as copper (at the negative electrode), so the concentration of copper ions decreases	allow the blue colour is due to the copper ions and there are fewer copper ions in the solution	1	AO2 4.4.3.4 RP 3
Total			9	
10.1	any two from: - the blue colour (of the solution) fades / the solution becomes colourless - a brown / pink / red-brown solid forms (on the zinc) - the zinc (powder) disappears / gets smaller - the temperature rises / the beaker gets warm	allow the solution goes paler ignore bubbles / fizzing	2	AO2 4.4.1.2
10.2	$\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$ correct species, with the sulfate ions omitted	ignore state symbols do not accept an equation that includes SO_4^{2-}	1	AO2 4.4.1.2 4.4.1.4
	correct charges on both ions (Cu^{2+} and Zn^{2+}) and balanced		1	AO2 4.4.1.2 4.4.1.4
10.3	zinc (atoms) lose electrons (to form zinc ions), which is oxidation	allow oxidation is loss of electrons and zinc loses two electrons	1	AO1 4.4.1.4
	copper ions gain electrons (to form copper atoms), which is reduction	allow reduction is gain of electrons and Cu^{2+} gains two electrons	1	AO1 4.4.1.4
10.4	silver is less reactive than copper so it cannot displace copper (from the solution) or silver cannot lose electrons to copper ions	allow only a more reactive metal can displace a less reactive metal from its compound	1	AO1 4.4.1.2
10.5	zinc sulfate	allow ZnSO_4 do not accept zinc sulfide / zinc sulfite	1	AO1 4.4.2.1
Total			8	
11.1	D	the reason mark can only be awarded if D is chosen	1	AO2 4.2.2.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	(because it) conducts electricity when solid (and when molten)	allow it is the only substance that conducts when solid ignore high melting point on its own	1	AO2 4.2.2.8
11.2	B	the reason mark can only be awarded if B is chosen	1	AO2 4.2.2.4
	(because it has a) low melting point (so only weak forces between the molecules need to be overcome)	allow it is a gas / liquid at room temperature allow it does not conduct electricity and has a low melting point	1	AO2 4.2.2.4
11.3	(substance A is ionic and) in the solid the ions are in fixed positions / cannot move	allow the ions are held in a lattice	1	AO1 4.2.2.3
	(when molten) the ions are free to move (and carry the charge)	do not accept electrons are free to move	1	AO1 4.2.2.3
11.4	giant covalent (structure)	allow (giant) lattice of atoms joined by covalent bonds allow macromolecular	1	AO1 4.2.2.6
Total			7	
TOTAL FOR PAPER			100	