Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE
Chemistry (1CH0_1H) Paper 1H

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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	Mark
1(a)	**C** yes high coloured **The only correct answer is C** ***A*** *is not correct because transition metal chlorides are coloured* ***B*** *is not correct because all properties are incorrect* ***D*** *is not correct because transition metals are used as catalysts and have a high density*	**(1)** AO 1 1

Question Number	Answer	Mark
1(b)	An explanation linking • {air/oxygen} excluded / {water/moisture} excluded / oil acts as a barrier (1) • {air/oxygen} **and** {water/moisture/damp conditions} both needed (for iron to rust / corrosion) (1)	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
1(c)	An explanation linking • zinc corrodes {easier than / in preference to / OWTTE} iron / zinc reacts with air and water instead (1) • zinc is more reactive than iron / zinc is sacrificial / zinc has a higher tendency to form ions (1)	 reject zinc rusts	**(2)** AO 1 1 AO 2 1

Question Number	Answer	Additional guidance	Mark
1(d)	An explanation linking two of the following points • {metal ions / cations} surrounded by (delocalised) electrons (1) • strong {forces of attraction / bonding} (between (delocalised) electrons and {metal ions / cations}) (1) • needs lots of energy to {separate the particles / break bonds / break forces of attraction} (1)	ignore metal nuclei allow electrostatic bonds / metallic bonds ignore separating electrons any mention of intermolecular forces / covalent bonding / molecules / ionic bonding / atoms – max 1 mark marking points independent	**(2)** AO 1 1

Total for question 1 = 7 marks

Question Number	Answer	Additional guidance	Mark
2(a)(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 2 2

Question Number	Answer		Mark
2(a)(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
2(b)	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
2(c)	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 2 = 9 marks

Question Number	Answer	Mark
3(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	Additional guidance	Mark
3(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 $\frac{2 \times 56}{160}$ 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
3(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
3(c)	electrolysis	**(1)** AO 3 2a

Question Number	Answer	Additional guidance	Mark
3(d)	A description to include • plants absorb {copper/metal} (ions) from the {soil/ores} / plants concentrate copper ions (1) • plants (harvested and) burned (to leave copper/metal compound) (1)	ignore plants absorb copper from solid metal ignore copper {atoms/metal/compounds} ignore plants heated mark independently	**(2)** AO 1 1

Total for question 3 = 9 marks

Question Number	Answer	Mark
4(a)(i)	$2H_2$ (g) + O_2 (g) → $2H_2O$ (g)	**(2)** AO 3 1a AO 3 1b

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	all atoms in the reactants are present in the product / only one product is formed	allow no atoms are wasted (in the reaction) / no waste products / nothing is wasted allow total mass of reactants = mass of useful products allow complete calculation to show that atom economy is 100% ignore equation is balanced / same number of atoms on both sides	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
4(b)	final answer of 90 with or without working (4) OR total mass : 2x223 + 12 / (2 x 207) + 44 (= 458) (1) mass of useful products : 2 x 207 = 414 $\frac{414}{458}$ (1) x 100 (1) (= 90.39) = 90 (1)	allow ECF throughout 458 seen (1) 90.39 / 90.4 for 3 marks 110.628… / 111 (2) 110 (3) correct rounding of an answer with working to 2 sig fig (1)	**(4)** AO 2 1

Question Number	Answer	Additional guidance	Mark
4(c)(i)	final answer of 65(%) with or without working (2) OR $\frac{7.67}{11.80}$ (= 0.65) (1) $\frac{7.67}{11.80}$ x 100 (=65(%)) (1)	allow any fraction x 100 (1) 153.84…. scores 1	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
4(c)(ii)	any two from • incomplete / reversible reactions • competing/unwanted/side reactions • practical losses during the experiment / loss on transfer from one piece of equipment to another	ignore gases formed / impure substances / losses through incompetence / products not used up	**(2)** AO 1 1

Total for question 4 = 11 marks

Question Number	Answer	Mark
5(a)	**C** 30 2403 **The only correct answer is C** ***A*** *is not correct because it will be a solid above 80 °C* ***B*** *is not correct because it will be a liquid at 20 °C and gas at 80 °C* ***D*** *is not correct because it will be a liquid at 20 °C and gas at 80 °C*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
5(b)(i)	An explanation linking • water {boils / evaporates} (to form steam / water vapour / leaving salt behind) (1) • (steam / water vapour) condenses (to form pure water) (1) allow alternative wording for evaporate and condense	ignore sea water evaporates sea water evaporates and condenses scores 1 overall mark independently	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An explanation linking • use a (Liebig) condenser / surround test tube with (beaker of) {iced/cold} water / wrap delivery tube with cold cloth (1) • to increase effectiveness of cooling / amount of condensation / remove the heat energy more effectively / ensure all the water vapour condenses (1)	ignore anti bumping granules / fractionating column allow alternative suitably described methods / prevent water vapour escaping / cools water vapour faster ignore sea water vapours a closed system scores 0 overall mark independently	**(2)** AO 3 3b

Question Number	Answer	Additional guidance	Mark
5(c)	An explanation linking from B to C: graph flat because • particles in solid use energy to {break out of lattice / break (intermolecular) bonds (between particles) / particles becoming randomly arranged / turn solid to liquid} (1) and any three from from A to B: graph rises because • particles in solid in a lattice / fixed (mean) positions (1) • vibrate more (rapidly) (as temperature increases) (1) from C to D: graph rises because • particles in liquid move past one another / randomly (1) • particles move more (rapidly) (as temperature increases) (1)	may be shown as a diagram / on graph may be shown as a diagram / on graph ignore references to gas / evaporation / boil	**(4)** AO 3 2a AO 3 2b

Total for question 5 = 9 marks

Question Number	Answer	Mark
6(a)(i)	**C** chlorine zinc **The only correct answer is C** ***A*** *is not correct because oxygen cannot be produced by the electrolysis of this molten salt* ***B*** *is not correct because hydrogen cannot be produced by the electrolysis of this molten salt* ***D*** *is not correct because hydrogen and oxygen cannot be produced by the electrolysis of this molten salt*	**(1)** AO 2 1

Question Number	Answer	Mark
6(a)(ii)	**D** it contains ions that can move **The only correct answer is D** ***A*** *is not correct because molten zinc chloride does not contain molecules* ***B*** *is not correct because molten zinc chloride does not have a giant structure* ***C*** *is not correct because delocalised electrons are not present*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
6(b)(i)	A diagram of a workable apparatus showing a complete circuit including • electrodes labelled in (copper sulfate) solution (1) • {power supply / power pack / battery} connected (1)	max 1 if circuit not complete allow labelling as 'electrodes' or 'anode' and 'cathode' or 'copper' ignore 'connected to mains' allow symbol for cell/battery even if wrong way round	**(2)** AO 1 2

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	An explanation linking the following point to a maximum of four • anode lost copper **and** cathode gained copper / reaction at cathode is reverse of reaction at anode / copper ions move into solution at anode AND copper ions move out of solution at cathode (1) and any three from • at anode copper atoms become copper ions (1) and lose **two** electrons (1) OR (at anode) $Cu \rightarrow Cu^{2+} + 2e$ (2) • at cathode copper ions become copper atoms (1) and gain **two** electrons (1) OR (at cathode) $Cu^{2+} + 2e \rightarrow Cu$ (2)	ignore references to zinc, chlorine and zinc chloride allow copper atoms are oxidised (1) marking points independently allow copper ions are reduced (1) marking points independently penalise wrong use of atom / ion once only penalise wrong use of reduced / oxidised once only	**(4)** AO 2 1

Question Number	Answer	Additional guidance	Mark
6(c)	$2H^{+} + 2e^{(-)} \rightarrow H_2$ / $2H^{+} \rightarrow H_2 - 2e^{(-)}$ (2) species in correct place as shown above (1) balancing of correct species in correct place (1)	allow use of = or ⇌ in place of → allow multiples reject h2 / h_2 / H2 / H^2	**(2)** AO 1 1

Total for question 6 = 10 marks

Question Number	Answer	Mark
7(a)	**B** 750 **The only correct answer is B** ***A*** *is not correct because 375.5 dm^3 is half the actual volume formed* ***C*** *is not correct because 1125.5 dm^{3}is one and a half times the actual volume formed* ***D*** *is not correct because 1500 dm^3 is double the actual volume formed*	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
7(b)	½ x 750 (1) = 375 (dm^3)	375 alone (1)	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
7(c)	final answer of 2 (kg) with or without working (3) OR moles of SO_2 = $\frac{750}{24}$ (1) (= 31.25) mass of SO_2 = $\frac{750}{24}$ x 64 (1) (= 2000) mass of SO_2 = $\frac{2000}{1000}$ (1) (= 2 (kg))	allow ECF throughout 31.25 x 64 (2) allow ECF allow any calculated mass / 1000 (1) final answer 2000 (kg) (2)	**(3)** AO 2 1

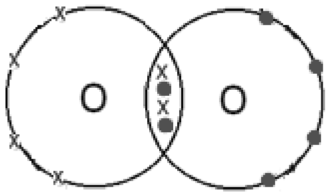
Question Number	Indicative content	Mark
7(d)	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlines in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. • equilibrium reached faster because of higher temperature in set A / equilibrium reached slower because of lower temperature in set B • higher temperature means more frequent collisions because molecules have more energy / ORA for lower temperature in set B • decrease in temperature increases equilibrium yield but system takes longer to reach equilibrium • temperature chosen for optimum conditions • yield lower as forward reaction is exothermic • high temperature favours back reaction which is endothermic • equilibrium reached faster because of higher pressure in set B / equilibrium reached slower because of lower pressure in set A • higher pressure causes molecules to be closer together so more frequent collisions / ORA for lower pressure in set A • yield higher because products occupy smaller volume than reactants for set B • catalyst in set B causes equilibrium to be reached faster • catalyst increases rate of both forward and back reactions • equilibrium position not affected so catalyst does not affect yield • catalyst reduces the need for the higher temperature	**(6)** AO 2 1 AO 3 1a AO 3 1b

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Interpretation and evaluation of the information attempted but will be limited with a focus on mainly just one variable. Demonstrates limited synthesis of understanding. (AO3) • 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	• Interpretation and evaluation of the information on both variables, synthesising mostly relevant understanding. (AO3) • 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	• Interpretation and evaluation of the information, demonstrating throughout the skills of synthesising relevant understanding. (AO3) • 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 7 = 11 marks

Question Number	Answer	Mark
8(a)(i)	**B** -78 -33 does not conduct **The only correct answer is B** ***A*** *is not correct because simple molecular, covalent substances do not have high mpt and bpt* ***C*** *is not correct because ammonia is a gas at room temperature and does not conduct* ***D*** *is not correct because simple molecular, covalent substances do not have these properties*	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
8(a)(ii)	$N_2 + 3H_2 \rightarrow 2NH_3$ (2) left hand side formulae (1) balancing of correct formulae (1)	accept multiples allow = or ⇌ in place of → ignore state symbols even if incorrect do not allow N2, n2, etc	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
8(b)	 (2)	double bond (1) rest of molecule (1) (dependent on correct double bond) ignore atomic symbol allow all x or ● ignore inner shells of electrons even if incorrect	**(2)** AO 1 1

Question Number	Indicative content	Mark
8(c)*	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. • in all structures the carbon atoms bonded by single covalent bonds • shared pair of electrons • strong bonds • in diamond each carbon atom joined to four others • diamond has a giant covalent {structure/lattice} • graphene has a giant covalent {structure/lattice} • fullerene has a molecular structure • in graphene and fullerene each carbon atom joined to three others • in diamond and graphene many bonds need to be broken to melt • need lots of energy • therefore very high melting / sublimation points • in fullerene weak forces between molecules • less energy needed to separate molecules • fullerene has the lowest melting / sublimation point • because diamond and graphene have lots of strong covalent bonds so both are very strong materials • because weak forces between fullerene molecules so its strength is very low • in diamond there are no free electrons • so diamond does not conduct • in graphene and fullerene each carbon atom has one free electron • hence delocalised electrons • graphene conducts electricity • fullerene only conducts electricity across the surface of the molecule • no/little movement of electrons between molecules • so fullerene is poor conductor of electricity (/ semi conductor)	**(6)** AO 1 1

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, enquiry, techniques and procedures 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, enquiry, techniques and procedures is not fully detailed and

		fully devolved. (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, enquiry, techniques and procedures is detailed and fully devolved. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Total for question 8 = 11 marks

Question Number	Answer	Additional guidance	Mark
9(a)(i)	P R Q S (2)	two in correct order (1)	**(2)** AO 3 2a AO 3 2b

Question Number	Answer		Mark
9(a)(ii)	A workable diagram showing a method to measure the volume of the gas • delivery tube between test-tube and (1) • gas syringe / (graduated tube / inverted burette / measuring cylinder) over water bath (1)	if diagram is not workable (eg no bung at top of test tube), max 1 mark allow connection shown as  if collection vessel not labelled, graduations must be shown for the second mark	**(2)** AO 3 3a AO 3 3b

Question Number	Answer	Additional guidance	Mark
9(b)	iron $\frac{10.00}{56}$ = 0.179 / 0.18 / 0.2 and copper $\frac{11.34}{63.5}$ = 0.179 / 0.18 / 0.2 (1) (ratio 1:1) so reaction A (1)	allow max 1 mark for Fe : $\frac{56}{10.00}$ = 5.6 Cu : $\frac{63.5}{11.34}$ = 5.6 so reaction A other methods of calculation include 10.00 g Fe forms $\frac{10.00}{56}$ x 63.5 (1) g copper = 11.34 g copper so reaction A (1) second mark dependent on first	**(2)** AO 3 2a AO 3 2b

Question Number	Answer	Additional guidance	Mark
9(c)	$2Al + 6H^+ \rightarrow 2Al^{3+} + 3H_2$ (2)	Al and H_2 (1) balancing of correct species (1) allow multiples	**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
9(d)	pH {increases / goes up} by <u>one</u> / moves <u>1</u> closer to neutral	ignore {increases / goes up} alone	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
9(e)	1 mol of hydrogen atoms = a mass of 1.00 g = 6.02×10^{23} atoms 6.02×10^{23} H atoms has mass = 1.00 g (1) mass of 1 H atom = $\frac{1.00}{6.02 \times 10^{23}}$ (1) = 1.66×10^{-24} (g) (1)	correct answer alone (3) if $1 \times 6.02 \times 10^{23}$ is followed by atoms or particles, then award 1st marking point on answer line 3.32×10^{-24} (g) (2) ignore sig figs except for one	**(3)** AO 2 1

Total for question 9 = 12 marks

Question Number	Answer	Mark
10(a)	from pink / red to orange / yellow	**(1)** AO 1 2

Question Number	Answer	Mark
10(b)	Any two linked explanations Any two suitable precautions to make use of pipette or burette as accurate as possible or to carry out the titration as accurate as possible (1) linked explanation (1) e.g. read bottom of the meniscus on the burette/pipette scale / read burette/pipette at eye-level (1) to obtain accurate volume of sodium hydroxide solution / sulfuric acid added (1) add {solution from burette / alkali} one drop at a time near end point (1) to identify exactly when colour change of indicator takes place (1) use a white tile (1) to make it easier to see exactly when colour change of indicator takes place (1) make sure no air bubbles in burette or pipette when measuring volumes (1) so exact volumes are recorded (1) continually swirl flask (1) to ensure complete mixing of acid with alkali (1) wash inside of conical flask with a little deionised/distilled water (1) to wash reactants into reaction mixture (1) wash burette / pipette with appropriate solution before titration (1) to ensure burette / pipette is not contaminated (1) do not award marks for concordancy / reliability / changes of indicator	**(4)** AO 1 2

Question Number	Answer	Mark
10(c)	0.097 (mol dm^{-3}) with or without working (4) OR moles of NaOH = $\frac{\underline{24.25 \times 0.200}}{1000}$ (1) (= 4.85×10^{-3}) from reaction equation moles acid = ½ x moles alkali = ½ x 4.85×10^{-3} (1) (= 2.425×10^{-3}) concentration of H_2SO_4 = $\frac{\underline{2.425 \times 10^{-3} \times 1000}}{25.00}$ (1) = 0.097 (1) (mol dm^{-3}) OR ½ (1) x 24.25 x 0.200 = 25.00 x conc H_2SO_4 (1) conc H_2SO_4 = ½ x $\frac{\underline{24.25 \times 0.200}}{25.00}$ (1) = 0.097(1) (mol dm^{-3}) on answer line 0.388 / 0.39 (3) [x2 instead of x½] 0.194 / 0.19 (3) [not x½] Ignore sig figs except for 1	**(4)** AO 3 2a AO 3 2b

Question Number	Answer	Additional guidance	Mark
10(d)	24.5 (g dm^{-3}) with or without working (2) OR concentration = 98 x 0.25 (1) = 24.5 (1) (g dm^{-3})	allow 2.45 / 24500 (1)	**(2)** AO 2 1

Total for question 10 = 11 marks

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