Higher

GCSE

Chemistry A Gateway Science

J248/03: Paper 3 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2024

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

MARKING INSTRUCTIONS

PREPARATION FOR MARKING

RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.
3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 50% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the RM Assessor messaging system.

5. **Crossed Out Responses**

Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple Choice Question Responses

When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).
When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only one mark per response)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth two or more marks)
If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)
Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add the annotation 'SEEN' to confirm that the work has been seen.

7. Award No Response (NR) if:

- there is nothing written in the answer space

Award Zero '0' if:

- anything is written in the answer space and is not worthy of credit (this includes text and symbols).

Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

8. The RM Assessor **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

If you have any questions or comments for your Team Leader, use the phone, the RM Assessor messaging system, or email.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:

Read through the whole answer from start to finish, using the Level descriptors to help you decide whether it is a strong or weak answer. The indicative scientific content in the Guidance column indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance. Using a 'best-fit' approach based on the skills and science content evidenced within the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer.

Once the level is located, award the higher or lower mark:

The higher mark should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in italics) have been met.

The lower mark should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in italics) are missing.

In summary:

The skills and science content determines the level.

The communication statement determines the mark within a level.

Level of response question on this paper is **21(a)**

11. Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
BOD	Benefit of doubt given
CON	Contradiction
RE	Rounding error
SF	Error in number of significant figures
ECF	Error carried forward
L1	Level 1
L2	Level 2
L3	Level 3
NBOD	Benefit of doubt not given
SEEN	Noted but no credit given
I	Ignore

12. Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
✓	Separates marking points
DO NOT ALLOW	Answers which are not worthy of credit
IGNORE	Statements which are irrelevant
ALLOW	Answers that can be accepted
( )	Words which are not essential to gain credit
__	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

13. **Subject-specific Marking Instructions**

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

The breakdown of Assessment Objectives for GCSE (9-1) in Chemistry A:

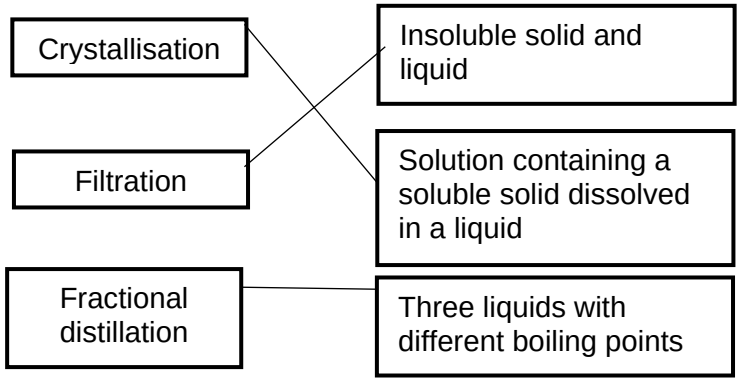
	Assessment Objective
AO1	**Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.**
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
AO2	**Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.**
AO2.1	Apply knowledge and understanding of scientific ideas.
AO2.2	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
AO3	**Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.**
AO3.1	Analyse information and ideas to interpret and evaluate.
AO3.1a	Analyse information and ideas to interpret.
AO3.1b	Analyse information and ideas to evaluate.
AO3.2	Analyse information and ideas to make judgements and draw conclusions.
AO3.2a	Analyse information and ideas to make judgements.
AO3.2b	Analyse information and ideas to draw conclusions.
AO3.3	Analyse information and ideas to develop and improve experimental procedures.
AO3.3a	Analyse information and ideas to develop experimental procedures.
AO3.3b	Analyse information and ideas to improve experimental procedures.

For answers to Section A if an answer box is blank ALLOW correct indication of answer e.g. circled or underlined.

Question	Answer	Marks	AO element	Guidance
1	C	1	1.1	
2	D	1	1.1	
3	D	1	2.1	
4	C	1	1.1	
5	B	1	1.1	
6	B	1	1.2	
7	A	1	1.2	
8	A	1	1.1	
9	B	1	2.1	
10	B	1	2.2	
11	C	1	2.2	
12	D	1	1.2	
13	B	1	2.1	
14	C	1	2.2	
15	D	1	2.1	

Question			Answer	Marks	AO element	Guidance
16	(a)	(i)	**First check the answer on the answer line** **If answer = 7.5 : 1 award 2 marks** 1.5 ÷ 0.2 = 7.5 ✓ 0.2 ÷ 0.2 = 1 ✓	**2**	**2 x 2.1**	If no answer given on answer line, check table. **ALLOW** 15:2 for 1 mark
	(a)	**(ii)**	As the surface area to volume ratio <u>increases/gets larger</u>, the tablet will take <u>less</u> time to dissolve ✓ **OR** As the surface area to volume ratio <u>decreases/gets smaller</u>, the tablet will take <u>more</u> time to dissolve ✓	**1**	**3.1a**	**ALLOW** shorter for less time **IGNORE** faster for less time **ALLOW** longer for more time **IGNORE** slower for more time
	(a)	**(iii)**	(Tablet D) has the highest / higher surface area <u>to volume ratio</u> ✓ So it will take less / least time to dissolve / dissolves faster / fastest ✓	**2**	**2 x 3.1b**	**No mark for no; marks are for explanation** **Answer must be comparative** **ALLOW** (Tablet D) has the highest / higher <u>ratio</u> **ALLOW** Tablet D does not have smallest surface area <u>to volume ratio</u> so will not dissolve slowest ✓ Tablet C will dissolve slowest as has smallest surface area to volume ratio ✓

Question			Answer	Marks	AO element	Guidance
	(b)	**(i)**	(Use a) locating agent / stain / UV light ✓	**1**	**1.2**	**ALLOW** specific locating agents / stains e.g., iodine, ninhydrin, methylene blue, dye **IGNORE** ink / (universal) indicator / food colouring / food dye **IGNORE** Use blue light
	(b)	**(ii)**	**First check the answer on the answer line** **If answer = 0.73 / 0.733 award 3 marks** R_f value = distance moved by spot ✓ distance moved by solvent = 4.4 ÷ 6.0 ✓ = 0.73 ✓ **OR** distances moved = 4.4 and 6.0 ✓ R_f value = distance moved by spot / 4.4 ✓ distance moved by solvent 6.0 = 0.73 ✓	**3** **1.2** **2 x 2.2**		**ALLOW ECF** from incorrect distances **ALLOW** 0.7 for 0.73 **ALLOW ECF** from incorrect distances **ALLOW** 0.7 for 0.73

Question			Answer	Marks	AO element	Guidance
17	(a)			2	2 x 1.2	Any one correct = one mark All three correct = two marks
	(b)	(i)	Use a water bath (instead of the Bunsen burner) / Use a heating mantle (instead of the Bunsen burner) ✓	1	3.3b	**ALLOW** use an (electric) heater / heating plate **ALLOW** idea of clamping the (round bottom) flask (to prevent it falling over)
	(b)	(ii)	Add a thermometer (to the top of the flask containing the mixture) ✓	1	3.3b	**ALLOW** use a temperature probe **DO NOT ALLOW** thermometer added to collection flask / receiving flask

Question			Answer	Marks	AO element	Guidance
	(c)		The empirical formula is CH_2. ☐ The melting point is lower than 35 °C. ✓ ✓ The pure liquid contains two compounds. ☐ The pure liquid is an element. ☐ The pure liquid will be a gas at above 35 °C. ✓ ✓	2	2 x 2.1	
	(d)		**First check the answer on the answer line** **If answer = 74.0 / 74 award 3 marks** 4 x 12.0 = 48.0 **OR** 2 x 12.0 = 24.0 ✓ 10 x 1.0 = 10.0 **OR** 5 x 1.0 = 5.0 ✓ (48.0 + 10.0 + 16.0) = 74.0 ✓	3	3 x 2.2	**IGNORE** any units given **ALLOW ECF** for addition of incorrect numbers of C, H and O if no other mark awarded

Question			Answer	Marks	AO element	Guidance
18	(a)	(i)	Products are lower (in energy) than reactants / **ORA** ✓	1	2.1	**ALLOW** the energy/enthalpy change is negative **ALLOW** the energy (level) decreases (as the reaction progresses) **IGNORE** idea that energy is lost in the reaction **IGNORE** ideas linked to bond breaking / making
	(a)	(ii)	**Difference** Idea of (energy of) reactants will be lower than (energy of) products / **ORA** ✓ **Similarity** There will still be an activation energy / idea that energy will increase then decrease between reactants and products ✓	2	2 x 1.1	**ALLOW** idea that the energy/enthalpy change will be positive **ALLOW** the energy (level) increases (as the reaction progresses) **IGNORE** idea that energy is gained in the reaction **IGNORE** references to temperature changes **ALLOW** idea that both will show an upwards curve **ALLOW** idea of same/similar shape or curve
	(b)	(i)	**First check the answer on the answer line** **If answer = 8514 (kJ/mol) award 3 marks** 6 x 799 = 4794 ✓ 8 x 465 = 3720 ✓ 4794 + 3720 = 8514 ✓	3	3 x 2.2	**ALLOW ECF** from bonds formed **IGNORE** + or - sign
	(b)	(ii)	**First check the answer on the answer line** **If answer = -2034 (kJ/mol) award 2 marks** Energy change = Bonds broken – Bonds made / = 6480 – 8514 ✓ = -2034 ✓	2	2 x 2.2	**ALLOW ECF** from **(b)(i)** **ALLOW** 8514 – 6480 = (+)2034 (kJ/mol) for 1 mark **AND ALLOW ECF** from **(b)(i)**

Question			Answer	Marks	AO element	Guidance
	(c)	(i)	 D is step 1 ✓ F, A and B are chosen in the correct order ✓ G is step 5 ✓	3	3 x 3.3a	**ALLOW** C in place of B
	(c)	(ii)	The temperature (of the reaction / surroundings) increases ✓ Exothermic reactions give out or release heat / energy ✓	2	2 x 3.1b	**ALLOW** a correct quoted temperature increase **IGNORE** idea that energy was lost from the reactants / energy is lost to the surroundings **IGNORE** idea that the solution has taken in energy **IGNORE** ideas linked to bond breaking / making

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>19</td><td>(a)</td><td></td><td>Any two from:

(Rutherford's model):

Shows that an atom has a <u>positively</u> charged nucleus ✓

Shows that the nucleus contains most of the mass (of the atom) ✓

Shows most of the atom is empty space ✓

Shows (negative) electrons orbit around (the nucleus) ✓</td><td>2</td><td>2 x 1.1</td><td>

IGNORE reference to neutrons

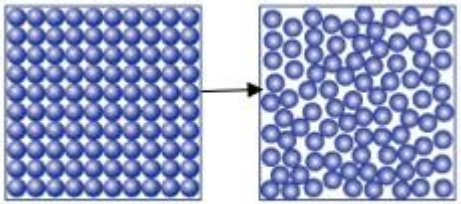
ALLOW idea of electron shells
IGNORE sea of electrons</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Atoms are oxidised to form positive ions. Atoms lose electrons to form positive ions.
Atoms are reduced to form negative ions. Atoms gain electrons to form negative ions.
✓✓</td><td>2</td><td>2 x 2.1</td><td>Oxidised AND reduced for 1 mark
Lose AND gain for 1 mark

Mark independently</td></tr>
<tr><td></td><td>(b)</td><td>(ii)</td><td>
<table>
<tr><th>Ion</th><th>Number of protons</th><th>Number of neutrons</th><th>Number of electrons</th><th>Mass number</th></tr>
<tr><td>Mg^{2+}</td><td>12</td><td>12</td><td>10</td><td>24</td></tr>
<tr><td>F^{-}</td><td>9</td><td>10</td><td>10</td><td>19</td></tr>
<tr><td>Li^{+}</td><td>3</td><td>4</td><td>2</td><td>7</td></tr>
</table>
✓✓</td><td>2</td><td>2 x 2.1</td><td>All three correct = 2 marks

One or two correct = 1 mark</td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
	(b)	(iii)	**Difference** Different number of neutrons / different mass number / idea that number of neutrons in "new" Li^+ will not be 3 ✓ **Similarity** Same number of protons / all have 3 protons / same number of electrons / same atomic number / same charge / all have 1+ charge ✓	**2**	**2 x 2.1**	**IGNORE** different (relative) atomic masses **IGNORE** idea that they have all lost 1 electron
	(b)	(iv)	**First check the answer on the answer line** **If answer = 2.6 x 10^8 award 3 marks** Atomic radius is in the order of 1 x 10^{-10} m / 0.1 nm ✓ **Unit conversion mark:** 5.2 cm = 0.052 m / 5.2 x 10^{-2} m / 5.2 x 10^7 nm ✓ 0.052 or 5.2 x 10^{-2} ÷ (2 x (1 x 10^{-10})) = 2.6 x 10^8 ✓	**3**	**1.1** **1.1** **2.2**	**ALLOW** conversion of atomic radius to same units as Mg metal for this MP, e.g., 1 x 10^{-8} cm **ALLOW ECF** for 5.2 (cm) ÷ (2 x (1 x 10^{-10})) = 2.6 x 10^{10}

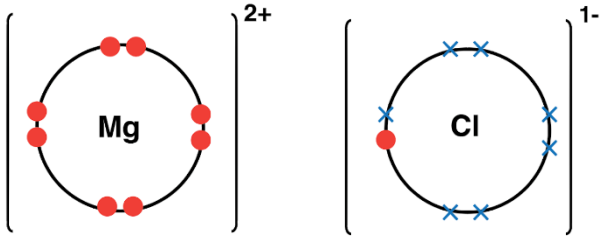
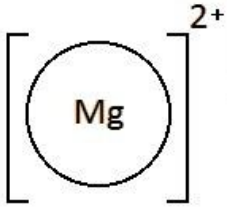
Question			Answer	Marks	AO element	Guidance
	(c)	(i)	A dilute solution has a low ratio of acid to volume of solution. ✓ ✓ A dilute solution of acid contains more acid than a concentrated solution A strong acid can be made into a concentrated solution or a dilute solution ✓ ✓ A strong acid partially ionises in solution. A weak acid can only be made into a dilute solution.	2	2 x 1.1	
	(c)	(ii)	**Any two from:** Add more acid to the (current) solution ✓ (Prepare a new solution) using a higher ratio of acid to water / using less water ✓ Idea of using a stronger acid / acid that ionises fully ✓	2	2 x 3.3b	**ALLOW** increase the concentration (of H^+ ions) **ALLOW** idea of using a (new) less dilute solution **IGNORE** idea of evaporating water (from the current solution) **IGNORE** add acid with a lower pH (stem of question) **IGNORE** reference to OH^- ions

Question			Answer	Marks	AO element	Guidance
20	(a)	(i)	Solid particles in an ordered, close-packed manner ✓ Liquid particles in a more random order, with majority of particles touching each other ✓ e.g.,  	2	2 x 1.1	**Note: the particles do not need to fill the boxes**
	(a)	(ii)	Boiling describes a gas turning into a liquid. ☐ Freezing is a chemical change. ☐ Melting is a physical change. ✓ ✓ The amount of energy needed to melt a substance depends on the strength of the forces between particles. ✓ ✓ The arrangement of particles becomes more random when condensing. ☐	2	2 x 1.1	

Question			Answer	Marks	AO element	Guidance
	(a)	(iii)	**Any two from:** It does not take into account forces (of attraction) between particles ✓ It shows all particles as spheres ✓ It shows all particles as inelastic ✓ It doesn't take into account the size of particles (relative to the space between particles) ✓	**2**	**2 x 1.1**	**ALLOW** atoms / molecules / ions for particles throughout **ALLOW** idea that the forces are not shown **IGNORE** references to bonds between particles **ALLOW** idea that particles are not always spheres **ALLOW** idea that particles aren't all the same size
	(b)		(Formulation) B ✓ B has highest melting point / **ORA** / B is solid at the highest temperature ✓	**2**	**2 x 3.2a**	**MP2 is dependent on MP1** **ALLOW** idea that B has the highest temperature before it changes state

Question			Answer	Marks	AO element	Guidance
21	(a)		Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. **Level 3 (5–6 marks)** Demonstrates detailed knowledge and understanding of the structure and bonding in all 3 structures **AND** Accurately applies knowledge and a detailed understanding to explain why diamond has the highest melting point. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Demonstrates clear knowledge and understanding of the structure and bonding in some of the structures **AND** Applies clear knowledge and understanding to explain why diamond has the highest melting point. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Demonstrates limited knowledge and understanding of the structure and bonding in some of the structures **OR** Attempts to apply knowledge and understanding to explain why diamond has the highest melting point.	**6**	**3 x 1.1** **3 x 2.1**	**AO1.1 – Demonstrates knowledge and understanding of structures and bonding.** • covalent bonds are very strong • a lot of energy is required to break covalent bonds • intermolecular forces are weaker than covalent bonds • more energy is needed to break covalent bonds than overcome intermolecular forces • more atoms in a molecule mean more intermolecular forces • more intermolecular forces require more energy to overcome **AO2.1 – Applies knowledge and understanding of structures and bonding to diamond, Cl_2 and polyethene** • diamond only contains covalent bonds • diamond requires high energy to break covalent bonds between atoms • chlorine has intermolecular forces between the molecules • chlorine requires low energy to break intermolecular forces between molecules • polyethene has intermolecular forces between the polymer chains • covalent bonds in chlorine and polyethene are not broken on melting • polyethene has more / stronger intermolecular forces between chains than chlorine does between molecules

Question			Answer	Marks	AO element	Guidance
			There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant. **0 marks** *No response or no response worthy of credit.*			

Question			Answer	Marks	AO element	Guidance
	(b)	(i)	Idea that ionic compounds contain ions ✓ Idea that the ions cannot move in a solid/ions are held in fixed positions ✓ Idea that when ionic compounds are dissolved, the ions are free to move ✓	3	3 x 1.1	**DO NOT ALLOW** reference to (delocalised) electrons in the incorrect context – scores 0 for the question **ALLOW** ions are free
	(b)	(ii)	 Correct magnesium ion / 2.8 **OR** one shell showing 8 electrons **OR** empty outer shell ✓  Correct chloride ion / 2.8.8 **OR** correct chloride ion showing full outer shell only ✓	2	2 x 1.2	**DO NOT ALLOW** structures with shared electrons Two correct electronic structures but no charges award one mark Two correct charges with incorrect electronic structure award one mark The ionic charges must **not** be shown in the nucleus One electronic structure must be labelled in some way to indicate which ion is which in order to score two marks. **ALLOW** answers showing the transfer of electrons providing the same electrons are not shown twice All electrons can be dots or crosses If dots and crosses are used the number of each must be correct Inner shell electrons do not need to be shown but must be correct if they are shown.

Question			Answer	Marks	AO element	Guidance
22	(a)		(Method) 3 ✓ **And any two from:** Idea that $MgCO_3$ produced is pure ✓ (Method 3) produces more $MgCO_3$ <u>than method 1</u> ✓ The cost per gram is less <u>than method 1</u> (which also produces pure $MgCO_3$) ✓	3	3 x 3.2b	**ALLOW** idea of producing the highest mass of $MgCO_3$ whilst still being pure for 2 marks **ALLOW** 1 mark only if Method 1 is selected with reason given that it is pure
	(b)		**Any one from:** Yes (they should use the same method) because purification takes time / resources ✓ No (they should use a different method) because another method would be cheaper / another method would produce more product ✓	1	3.1b	**ALLOW ECF** from **(a)(i)** with reasonable justification **ALLOW** named resources, e.g. energy, solvents
	(c)	(i)	**$MgCl_2$ (aq)** + H_2O (l) + **CO_2 (g)** Both species ✓ Both state symbols ✓	2	2 x 1.2	**ALLOW** $MgCl_2$ (aq) / CO_2 (g) for 1 mark if no other mark awarded

Question			Answer	Marks	AO element	Guidance
	(c)	(ii)	**First check the answer on the answer line** **If answer = 9.25 (g) award 4 marks** 0.1 mol of $MgCO_3$ reacts with 0.2 mol of HCl / Idea of 1:2 mole ratio $MgCO_3$: HCl ✓ M_r of $MgCO_3$ = 84.3 ✓ Mass of $MgCO_3$ that reacted = 0.1 x 84.3 = 8.43 g ✓ Mass of $MgCO_3$ used in the reaction = 8.43 + 0.82 = 9.25 g ✓	**4**	**4 x 2.2**	**ALLOW ECF** from incorrect M_r and/or moles of $MgCO_3$ **ALLOW ECF** from incorrect mass of $MgCO_3$

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