Oxford Cambridge and RSA

Foundation

GCSE

Chemistry A Gateway Science

J248/04: Paper 4 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2023

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

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.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 2023

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

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.

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

5. Work crossed out:

   a. where a candidate crosses out an answer and provides an alternative response, the crossed-out response is not marked and gains no marks

   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed-out answer and award marks appropriately.

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 read.

7. There is a NR (No Response) option. Award NR (No Response)

   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in any way relate to the question (e.g., 'can't do', 'don't know')
   - OR if there is a mark (e.g., a dash, a question mark) which isn't an attempt at the question.

   Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

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.

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

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 **19**.

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

11. Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
	Benefit of doubt given
	Contradiction
	Rounding error
	Error in number of significant figures
	Error carried forward
	Level 1
	Level 2
	Level 3
	Benefit of doubt not given
	Noted but no credit given
	Ignore

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

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

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

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.

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

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

	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.

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

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

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

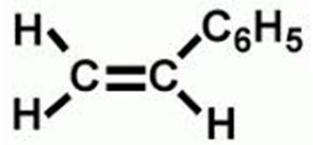
Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
16	(a)	(i)	Nitric acid ✓	1	3.3b	**ALLOW** HNO_3 **IGNORE** dilute / concentrated Name takes precedence over formula
		(ii)	Hydrochloric acid contains chloride ions / Cl^- ✓ Idea that these ions would give a precipitate (which would interfere with the test) ✓	2	2 x 3.3b	**IGNORE** chlorine ions **ALLOW** (hydrochloric acid) contains chlorine Mark independently
	(b)		Solution **A** = Bromide ✓ Solution **B** = Sulfate ✓	2	2 x 3.2b	**ALLOW** Br^- **DO NOT ALLOW** bromine **DO NOT ALLOW** silver bromide **ALLOW** SO_4^{2-} **DO NOT ALLOW** sulfur **DO NOT ALLOW** barium sulfate Name takes precedence over formula
	(c)		Cu^{2+} (aq) + $2OH^-$ (aq) $\rightarrow$ $Cu(OH)_2$ (s) Formulae ✓ Balancing ✓ State symbols ✓	3	3 x 2.2	**ALLOW** any correct multiple, including fractions **DO NOT ALLOW** and / & instead of '+' **DO NOT ALLOW** $Cu^{2+}(OH^-)_2$ Balancing mark is dependent on the correct formulae but **ALLOW** 1 mark for a balanced equation with a minor error in subscripts / formulae e.g., Cu^{2+} (aq) + $2Oh^-$ (aq) $\rightarrow$ $CU(OH)_2$ (s) Mark for state symbols dependent on correct species

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
	(d)		**First check the answer on answer line** **If answer = 0.53 (g) award 3 marks**	**3**		
			Conversion of cm^3 to dm^3: 25 ÷ 1000 = 0.025 dm^3 ✓			
			mass = concentration x volume = 21 x 0.025 = 0.525 (g) ✓		**2 x 2.2**	**ALLOW ECF** from incorrect volume
			OR			
			Conversion of g/dm^3 to g/cm^3: 21 g/dm^3 = 0.021 g/cm^3 ✓			
			mass = concentration x volume = 0.021 x 25 = 0.525 (g) ✓			0.525 without working scores 2 marks
			2 significant figures = 0.53 (g) ✓		**1.2**	**ALLOW ECF** if significant figures are correct from incorrect calculation of mass

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
17	(a)		B ✓ **Any two from:** Idea that (B) will not soften (when filled with a hot drink) ✓ Idea that (B) will hold its shape ✓ Idea that (B) will not melt (when filled with a hot drink) ✓ Idea that (B) is the strongest / stronger (than others) ✓	3	3 x 3.2a	**Mark is for a valid reason and not just for picking a property from the table** **IGNORE** (B) has a high softening temperature unless qualified **IGNORE** (B) has a high melting point unless qualified **ALLOW** (B) has a high tensile strength / is strong, if qualified **ALLOW** C with idea that (C) will not melt (when filled with a hot drink) for 1 mark only
	(b)		 Double bond between C atoms✓ Rest of structure correct ✓	2	2 x 2.1	**DO NOT ALLOW** multiple double bonds **ALLOW** C_6H_5 group in any position **ALLOW** bond from C to H of C_6H_5 group **IGNORE** any square brackets / n MP2 is dependent on MP1

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
	(c)		**Monomer** **Polymer** amino acids — DNA nucleotides — proteins sugars — starch ✓✓	**2**	**2 x 1.1**	All 3 correct = 2 marks 1 correct = 1 mark

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
18	(a)		$2HCl + Mg \rightarrow MgCl_2 + H_2$ Formulae ✓ Balancing ✓	2	2 x 2.2	**ALLOW** any correct multiple, including fractions **DO NOT ALLOW** and / & instead of '+' Balancing mark is dependent on the correct formulae but **ALLOW** 1 mark for a balanced equation with a minor error in subscripts / formulae e.g., 2HCL + Mg $\rightarrow$ MgCl2 + h_2
	(b)		Idea that the reaction (with magnesium powder) takes less time the more concentrated the (hydrochloric) acid / **AW** ✓	1	3.1b	**IGNORE** just quoting data from the table
	(c)	(i)	60 (s) ✓	1	2.2	
		(ii)	Line drawn above line for magnesium powder ✓ Line follows same general shape as line for magnesium powder ✓	2	2 x 2.2	 **ALLOW** line starting at (0.5,117) MP2 is dependent on MP1
	(d)		**First check the answer on answer line** **If answer = 96 (cm^3) award 4 marks** M_r of H_2 = 2.0 ✓ Moles of H_2 = $\frac{0.008}{2}$ / 0.004 ✓ Volume of H_2 = 0.004 x 24 / 0.096 dm^3 ✓ Volume of H_2 in cm^3 = 96 (cm^3) ✓	4	3 x 2.2 1.2	 **ALLOW ECF** from incorrect M_r **ALLOW ECF** from incorrect moles calculation **ALLOW ECF** from volume in dm^3

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
19*			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)** Analyses the information to give a clear and detailed comparison of the environmental impacts of each car over its lifetime. **AND** Applies knowledge and understanding of scientific ideas to give a detailed evaluation of the difference in emissions with an explanation of why a steel car has the smallest environmental impact. *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)** Analyses the information to give a clear comparison of some of the environmental impacts of each car over its lifetime and suggests which car has the smallest environmental impact with some reasoning. **OR** Applies knowledge and understanding of scientific ideas to give a clear evaluation of the difference in emissions with an explanation of which car has the smallest environmental impact. *There is a line of reasoning presented with some structure.* *The information presented is relevant and supported by some evidence.*	**6**	**2 x 2.1** **4 x 3.2a**	**AO3.2a Analyse ideas and information to make judgements** **and** **AO2.1 Apply knowledge and understanding of scientific ideas** **Production** • extraction of aluminium from aluminium ore uses electrolysis which uses lots of energy • due to energy required for electrolysis production of aluminium, it produces the most CO_2 emissions • iron (for steel) is extracted by heating iron ore with carbon • this requires less energy (than electrolysis) so produces less CO_2 emissions **Driving** • aluminium has a lower density (than iron) so has better fuel economy and reduces CO_2 emissions **End of life** • aluminium's higher CO_2 emissions when producing the metal mean that there is a greater saving (than with iron) on CO_2 emissions by recycling the metal **Overall** • lifetime CO_2 emission for aluminium is 42 408kg, compared to 41 952kg for steel/iron • steel/iron therefore has the least environmental impact

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
			Level 1 (1–2 marks) Analyses the information to compare an environmental impact of each car. **OR** Applies some knowledge and understanding of scientific ideas to attempt an explanation of the difference in emissions in one of the three life-cycle stages. *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.*			

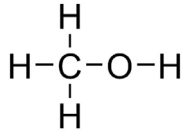
Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
20	(a)		$2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ **OR** $C_4H_{10} + 6½O_2 \rightarrow 4CO_2 + 5H_2O$ Formulae ✓ Balancing ✓	2	2 x 2.2	**ALLOW** any correct multiple, including fractions **DO NOT ALLOW** and / & instead of '+' Balancing mark is dependent on the correct formulae but **ALLOW** 1 mark for a balanced equation with a minor error in subscripts / formulae e.g., $C_4h_{10} + 6½O_2 \rightarrow 4Co_2 + 5H2O$
	(b)		Idea that the higher the number of carbon atoms the less the energy given out / **ORA** ✓	1	3.1a	
	(c)	(i)	Any value in range 375 – 400 (°C) ✓	1	3.2a	Note – Boiling point of tetracosane is 391°C
		(ii)	**Any three from:** Octacosane has a higher boiling point ✓ Octacosane contains large(r) molecules ✓ Idea that the (fractionating) column is hotter at the bottom / cooler at the top ✓ The larger the molecule the greater or stronger the intermolecular forces ✓ The greater or stronger the intermolecular forces the more energy needed to break them ✓ The greater or stronger the intermolecular forces the higher the boiling point ✓ The more energy needed to break the intermolecular forces the higher the boiling point ✓	3	3 x 1.1	**ALLOW** fractions lower down the fractionating column for octacosane **IGNORE** melting point **ALLOW** octacosane is a long hydrocarbon chain / idea that octacosane contains more carbon atoms **ALLOW** the larger the molecule the more intermolecular forces **ALLOW** intermolecular bonds for intermolecular forces

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
	(d)		($C_{28}H_{58}$ → $C_{12}H_{26}$ +) **$8C_2H_4$** Formula of ethene ✓ Balancing ✓	**2**	**2 x 2.2**	**ALLOW** any correct multiple, including fractions **ALLOW** $C_{16}H_{32}$ or $4C_4H_8$ for 2 marks
	(e)		Kerosene / fuel oil ✓ Idea that the supply is greater than the demand ✓	**2**	**2 x 3.2b**	**ALLOW** naphtha

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
21	(a)	(i)	Yield decreases ✓ (Lower pressure) moves position of equilibrium to the left / favours the backward reaction / **ORA** ✓ As there are more moles or molecules on the LHS / **ORA** ✓	3	2.1 2 x 1.1	**ALLOW** yield of CO and H_2 increases **ALLOW** (equilibrium moves) to favour the reactants / to favour CO and H_2 **ALLOW** equilibrium moves to increase the pressure
		(ii)	Idea that the rate of reaction is slow(er) when a lower temperature is used / **ORA** ✓	1	1.1	
	(b)		No effect / **AW** ✓	1	1.1	**ALLOW** a catalyst just increases the rate of reaction
	(c)		**First check the answer on answer line** **If answer = 46.8 (tonnes) award 3 marks** % yield = (actual yield ÷ predicted yield) x 100 **OR** 78 = (actual yield ÷ 60) x 100 ✓ actual yield = $\frac{78 \times 60}{100}$ ✓ = 46.8 (tonnes) ✓	3	1.1 2 x 2.2	**ALLOW** 47
	(d)	(i)	 -O-H group correctly bonded to C ✓ Rest of structure correct ✓	2	2 x 1.1	Bond between O and H **must** be shown for MP1, but MP2 can still be awarded if shown as -OH

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
21	(d)	(ii)	-OH / OH ✓	1	1.1	**ALLOW** hydroxy / hydroxyl ✓ **IGNORE** alcohol **DO NOT ALLOW** hydroxide
	(e)		Potassium manganate(VII) / $KMnO_4$ ✓	1	1.2	**ALLOW** potassium permanganate / just potassium manganate **ALLOW** potassium dichromate(VI)
	(f)	(i)	Addition ☐ Condensation ☑ ✓ Decomposition ☐ Neutralisation ☐	1	1.1	
		(ii)	Water ✓	1	1.1	**ALLOW** H_2O

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
22	(a)		(Solution would) turn yellow / brown / orange / red ✓	1	2.2	**ALLOW** correct colour combinations e.g., orange-red **IGNORE** initial colour of solution **DO NOT ALLOW** a precipitate / solid / vapour **DO NOT ALLOW** fizzing / bubbles / effervescence
	(b)	(i)	Electrons are gained ✓	1	1.1	
		(ii)	$2Br^- - 2e^- \rightarrow Br_2$ **OR** $2Br^- \rightarrow Br_2 + 2e^-$ Formulae ✓ Balancing ✓	2	2 x 2.2	**ALLOW** any correct multiple, including fractions **DO NOT ALLOW** and / & instead of '+' Balancing mark is dependent on the correct formulae but **ALLOW** 1 mark for a balanced equation with a minor error in subscripts / formulae e.g., $2br^- - 2e^- \rightarrow Br2$
	(c)		Idea that chlorine gains electrons more easily (than bromine) / **ORA** ✓ (Because) incoming electron is closer to nucleus / greater attraction between nucleus and incoming electron / less shielding / **ORA** ✓	2	2 x 1.1	**Assume unqualified answer refers to chlorine, unless clearly describing the trend in reactivity up or down Group 7** **IGNORE** idea that chlorine gains electrons faster or more quickly (than bromine) / **ORA** **ALLOW** chlorine has fewer (electron) shells
	(d)		52 ✓	1	2.1	

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
	(e)		**Any two from:** (Instrumental methods are) (More) sensitive ✓ (More) accurate ✓ Fast(er) / can run all the time ✓	**2**	**2 x 1.1**	 **ALLOW** can use smaller amounts **IGNORE** more precise **ALLOW** idea that more samples can be processed in the same time or a shorter time

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
23	(a)		The measured volume will be greater than the actual volume. ☐ The measured volume will be smaller than the actual volume. ☑ ✓ The measured volume will be the same as the actual volume. ☐	1	3.2b	
	(b)	(i)	**First check the answer on answer line** **If answer = 24.0 (cm^3) award 1 mark** Average titre = $\frac{24.1 + 23.9 + 24.0}{3}$ = 24.0 (cm^3) ✓	1	2.2	**ALLOW** 24 (cm^3) **ALLOW** Average titre = $\frac{24.1 + 24.0}{2}$ = 24.05(cm^3) **ALLOW** Average titre = $\frac{23.9 + 24.0}{2}$ = 23.95(cm^3)

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Question			Answer	Marks	AO element	Guidance
		(ii)	**First check the answer on answer line** **If answer = 4.7 / 4.70 / 4.704 / 4.71 / 4.7088 (g/dm^3)** **award 5 marks** Moles of KOH = $\frac{0.100 \times 24.0}{1000}$ / 0.100 x 0.024 / 0.0024 ✓ Moles of H_2SO_4 = $\frac{0.0024}{2}$ / 0.0012 ✓ Concentration of H_2SO_4 = $\frac{0.0012}{0.025}$ = 0.048 (mol/dm^3) ✓ M_r of H_2SO_4 = 98.0 / 98.1 ✓ Concentration of H_2SO_4 in g/dm^3 = 98 x 0.048 = 4.70 (g/dm^3) **or** Concentration of H_2SO_4 in g/dm^3 = 98.1 x 0.048 = 4.71 (g/dm^3) ✓ **OR for MP3, 4 & 5:** Mr of H_2SO_4 = 98.0 / 98.1 ✓ Mass of H_2SO_4 = 98.0 x 0.0012 = 0.1176 g **or** Mass of H_2SO_4 = 98.1 x 0.0012 = 0.1177 g ✓ Concentration of H_2SO_4 in g/dm^3 = 0.1176 ÷ 0.025 = 4.70 (g/dm^3) **or** Concentration of H_2SO_4 in g/dm^3 = 0.1177 ÷ 0.025 = 4.71 (g/dm^3) ✓	**5**	**5 x 2.2**	**ALLOW ECF** from average titre in part **(i)** **ALLOW ECF** from moles of KOH unit not needed **ALLOW ECF** from moles of alkali i.e., concentration = $\frac{\text{moles}}{0.025}$ / $\frac{\text{moles x 1000}}{25}$ **ALLOW ECF** from concentration of H_2SO_4 **ALLOW ECF** from moles of H_2SO_4 **ALLOW ECF** from mass of H_2SO_4 Answer is 4.7138 (g/dm^3) if answer for **(b)(i)** is 24.05 cm^3 or 4.6942 (g/dm^3) if answer for **(b)(i)** is 23.95 cm^3

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on

01223 553998

Alternatively, you can email us on

support@ocr.org.uk

For more information visit

ocr.org.uk/qualifications/resource-finder

ocr.org.uk

Twitter/ocrexams

/ocrexams

/company/ocr

/ocrexams

CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT

OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. © OCR 2023 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA.

Registered company number 3484466. OCR is an exempt charity.

OCR operates academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers including A Levels, GCSEs, Cambridge Technicals and Cambridge Nationals.

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up-to-date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please contact us.

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our Expression of Interest form.

Please get in touch if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.

Find Personal Tutor from www.wisesprout.co.uk 找名校导师，用小草线上辅导（微信小程序同名）