Foundation

GCSE

Chemisty B Twenty First Century Science

J258/01: Breadth in Chemistry (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2025

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.

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 40% 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 and mark any responses using the annotations in section 11.

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 is not 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.**

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 questions on this paper are **X** and **X**

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**.

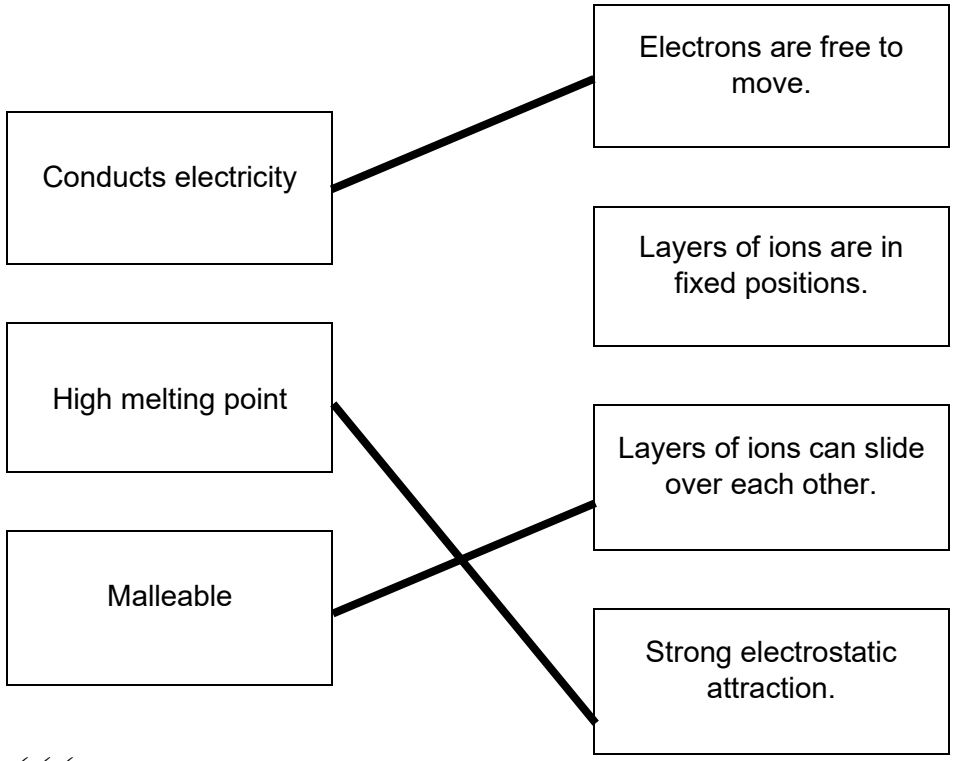
Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

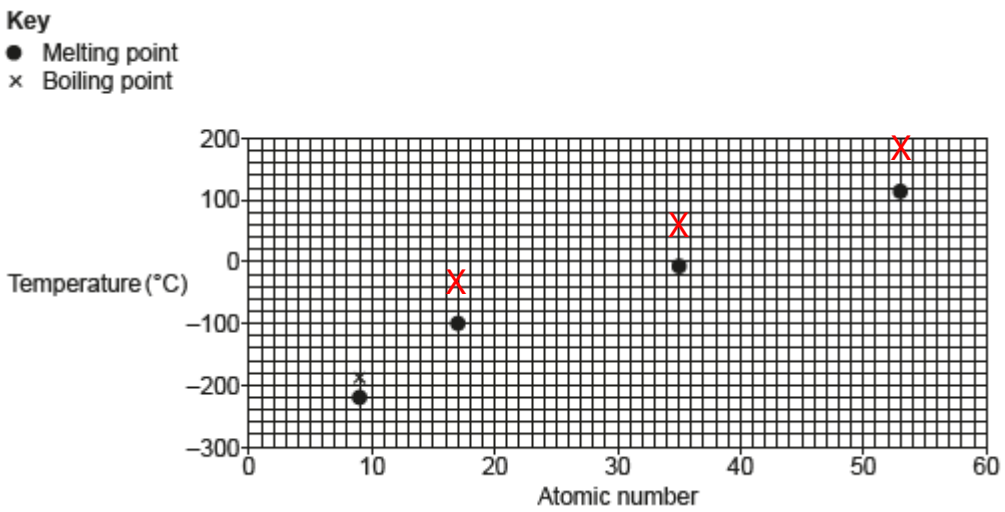
The breakdown of Assessment Objectives for GCSE (9-1) in Chemistry B:

	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.

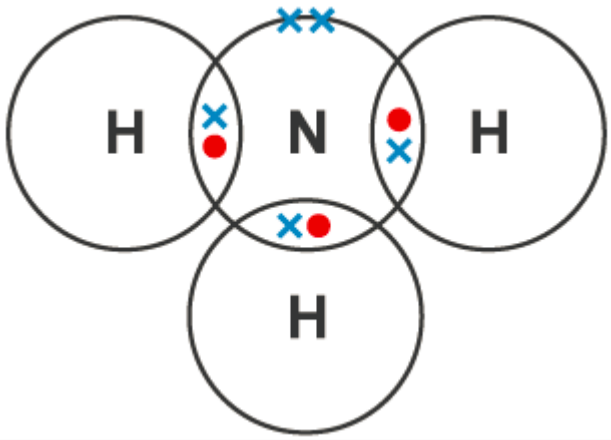
Question			Answer	Marks	AO element	Guidance
1	(a)	(i)	Methane ✓	1	1.1	
		(ii)	Flooding of low land ✓ Melting of polar ice caps ✓	2	1.1	
		(iii)	Any **two** from: Burn less fossil fuels/ drive less / fly less/ more public transport/ fewer factories/ not use as much energy ✓ Plant more tress/ reduce deforestation ✓ Use renewable fuels/solar/wind/tidal/hydroelectric ✓ Increase energy efficiency✓ Electric cars ✓ Carbon capture/ filter factory gases ✓	2	2.1	**ALLOW** Other reasonable answers E.g. Nuclear power Less plastic/ more recycling **IGNORE** if lacks detail 'use electricity' Less food wastage Less cows/ farming
	(b)	(i)	Both graphs show an upward trend / as the number of cars increases the CO2 concentration increases ✓	1	3.1a	The existence of BOTH graphs must be inferred **ALLOW** as BOD graphs are similar / both have a positive correlation **DO NOT ALLOW** 'the years match' or 'keeps increasing'

		(ii)	**First check the answer on the answer line.** **If answer = 65 to 80 (ppm) award 2 marks.** Identifies both numbers within range✓ **OR** One number out of range but calculation correct for those numbers ✓ Answer = 65 to 80 ppm ✓	**2**	**2.2**	Range 385 to 395 And 315 to 320

Question			Answer	Marks	AO element	Guidance
2	(a)	(i)	Giant ✓	1	1.1	
		(ii)	 ✓✓✓	3	1.1	
	(b)	(i)	Silver ✓ No reaction with acid (and water) ✓	2	1 x 3.2a 1 x 2.1	**ALLOW** 'no reaction' unspecified
		(ii)	They form positive ions. ✓	1	1.1	
		(iii)	Potassium chloride ✓	1	2.1	**IGNORE** 'potassium chlorine'

Question			Answer	Marks	AO element	Guidance
3	(a)	(i)	I_2 ✓ Liquid ✓ Yellow-green or green ✓	3	1.1	**DO NOT ALLOW** 'I' or I^2 **DO NOT ALLOW** 'yellow'
	(b)	(i)	 ✓✓	2	2.2	**ALLOW** 1 mark for correctly plotting chlorine **OR** bromine and iodine
		(ii)	Solid ✓	1	3.2b	
	(c)	(i)	Bromine ✓	1	2.1	
		(ii)	Displacement ✓	1	1.2	

Question			Answer	Marks	AO element	Guidance
4	(a)	(i)	Formulation ✓	1	1.1	
		(ii)	5% ✓	1	2.2	
		(iii)	Any **one** from: Wear gloves ✓ Wear goggles ✓	1	1.2	**IGNORE** 'PPE' 'wash hands'
	(b)	(i)	More than one spot/colour on the chromatogram ✓	1	1.1	
		(ii)	**First check the answer on the answer line.** **If answer = 0.75 award 2 marks** (Distance moved by solvent) = 8 **AND** (distance moved by chemical) = 6 ✓ Rf = $\frac{6}{8}$ = 0.75 ✓	2	2.2	 Identifies 6 & 8 ✓ No **ECF**
		(iii)	Stationary ✓	1	1.2	

Question			Answer	Marks	AO element	Guidance
5	(a)		A covalent bond forms between two non-metal atoms. ✓ A covalent bond forms from a shared pair of electrons. ✓	2	1.1	
	(b)	(i)	atoms ✓ molecules ✓	2	1.1	
		(ii)	 One dot in each overlap ✓ Question attempted and no other dots outside overlaps ✓	2	2.2	**ALLOW** crosses
	(c)	(i)	4 ✓	1	1.1	
		(ii)	It is made up of one type of substance ✓	1	1.1	
		(iii)	Any **one** from: Hard ✓ Does not conduct electricity ✓ High melting point ✓ Shiny ✓	1	1.1	**ALLOW** reasonable conjectures e.g. high density **IGNORE** references to bonds **IGNORE** 'solid' **ALLOW** durable/ difficult to

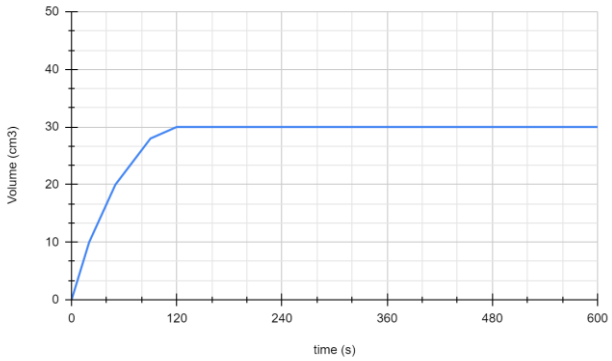
<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>break</td></tr>
<tr><td></td><td></td><td>(iv)</td><td>
<table>
<tr><th></th><th>True</th><th>False</th></tr>
<tr><td>Diamond contains delocalised electrons.</td><td></td><td>✓</td></tr>
<tr><td>Diamond has a 2D arrangement of atoms.</td><td></td><td>✓</td></tr>
<tr><td>Diamond has a giant structure.</td><td>✓</td><td></td></tr>
<tr><td>Diamond is an allotrope of carbon.</td><td>✓</td><td></td></tr>
</table>
✓✓✓
</td><td>3</td><td>2.1</td><td>3 rows correct = 2 marks
2 rows correct = 1 mark</td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
6	(a)	(i)	$CuCl_2$ (aq) + **2** NaOH ✓ (aq) → $Cu(OH)_2$ (s) + 2 **NaCl** ✓ (aq)	**2**	**1 x 2.2** **1 x 1.1**	Upper & lower case must be correct
		(ii)	Filtration ✓	**1**	**2.2**	More than one response – use list principle
		(iii)	Quantitative ✓	**1**	**1.2**	
	(b)	(i)	Put samples in (tubes) / label the tubes✓ Add dilute sodium hydroxide ✓	**2**	**3.3a**	**MAX 1** if order wrong
		(ii)	A ✓	**1**	**2.1**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td>
<table>
<tr><th></th><th>True</th><th>False</th></tr>
<tr><td>Crude oil contains substances that combust.</td><td>✓</td><td></td></tr>
<tr><td>Crude oil is a feedstock for the petrochemical industry.</td><td>✓</td><td></td></tr>
<tr><td>Crude oil is a renewable resource.</td><td></td><td>✓</td></tr>
<tr><td>Crude oil is a source of natural gas.</td><td></td><td>✓</td></tr>
</table>
✓✓✓</td><td>3</td><td>1.1</td><td>3 rows correct = 2 marks
2 rows correct = 1 mark</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>different ✓
weakest ✓
gases ✓</td><td>3</td><td>1.1</td><td>No ECF for last two</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Cracking ✓</td><td>1</td><td>1.1</td><td>IGNORE fracking</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>C_2H_5</td><td>1</td><td>2.1</td><td>ALLOW $2C_2H_5$ as BOD</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>36˚C/any number between -1˚C and 50˚C ✓

Boiling point increases down the series/ with carbon chain length✓</td><td>2</td><td>3.2b</td><td></td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
8	(a)		water ✓ disposal ✓ environment ✓	3	1.1	
	(b)		Recycling is the process of taking a waste product and reprocessing it to create a different material ✓ Reusing is when you keep that item intact ✓	2	1.1	**ALLOW** use it more than once
	(c)	(i)	Electricity is generated/ Price is not the most expensive ✓ No raw material is recovered/ Greenhouse gas/ Carbon dioxide is released ✓	2	3.1b	**ALLOW** cheap, but not cheapest **DO NOT ALLOW** Correct + incorrect statement for either answer (treat as contradiction) If answered in terms of landfill / recycling, there must be a clear comparison reference
		(ii)	No greenhouse gases generated from recycling process/ No emissions/ Both the others produce CO_2 ✓ Raw material recovered/ 80% raw material recovered ✓	2	3.2a	If only incineration or landfill discussed, a comparison must be implied so **DO NOT ALLOW** 'landfill and incineration produce CO_2' **MAX 1** If a statement shows misunderstanding of the table, eg 'needs electricity'
	(d)		**First check the answer on the answer line.** **If answer = 383 (years) award three marks.** (600 + 450 + 100)/3 ✓ Mean = 383.33333…. ✓ Answer = 383 ✓	3	**2 x 2.2** **1 x 1.2**	**ALLOW ECF** if three incorrect numbers correctly calculated ✓ **ALLOW** 1 mark for clear evidence of incorrect answer correctly rounded to 3 significant figures

Question			Answer	Marks	AO element	Guidance
9	(a)		**First check the answer on the answer line.** **If answer = 0.17 (cm^3/s), award three marks.** Volume after 120 s = 20 (cm^3) ✓ Rate of reaction = vol/time, 20/120 (= 0.16666667) (cm^3/s) ✓ Rate of reaction= 0.17 (cm^3/s) ✓	3	**2 x 2.2** **1.2**	**IGNORE** markings on the graph **ALLOW** 0.16 etc for **MP2** **ALLOW ECF for MP2:** rate = change in volume / 120 **DO NOT ALLOW** final mark if not given to 2 d.p. **ALLOW MP3** for clear evidence of **incorrect answer** correctly **rounded to 2 decimal places.**
	(b)	(i)	 Initial gradient steeper ✓ Curve goes flat before 300s at 30cm^3 ✓	2	**3.2a**	**MP1 ALLOW** straight line **MP2** Must be a curve **MP2** allow flat line +/- 0.5 of a square

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td></td><td></td><td>(ii)</td><td>Higher/more surface area (to volume ratio) ✓

More frequent collisions / more collisions per unit time/ more collisions per second / higher rate of collisions / more particles or collisions have minimum activation energy ✓</td><td>2</td><td>2.1</td><td>ALLOW large surface area

MP2 Must be comparative
IGNORE atoms/molecules/ions
IGNORE more chance of collisions / more successful/effective collisions / more collisions / faster collisions</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Metal D✓

(because) fast(er) rate of reaction / less time
AND
can be recovered unchanged/ mass remains the same / has not been used up ✓</td><td>2</td><td>3.1b</td><td>Mark independently

ALLOW faster reaction / speeds up the reaction / it is faster / faster time
IGNORE comment A has same reaction time
DO NOT ALLOW catalyst does not take part in the reaction/does not react/ ‘is not used’ alone</td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table><tr><th></th><th>True</th><th>False</th></tr><tr><td>A catalyst changes the overall energy change for a reaction.</td><td></td><td>✓</td></tr><tr><td>A catalyst lowers the activation energy of a reaction.</td><td>✓</td><td></td></tr><tr><td>A catalyst provides an alternative route for a reaction.</td><td>✓</td><td></td></tr></table>✓✓</td><td>2</td><td>1.1</td><td>ALLOW 1 mark for 2 correct</td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>10</td><td>(a)</td><td></td><td>
<table>
<tr><th>Particle</th><th>Relative Mass</th><th>Relative Charge</th></tr>
<tr><td>Proton</td><td>1</td><td>+1</td></tr>
<tr><td>Neutron</td><td>1</td><td>0</td></tr>
<tr><td>Electron</td><td>0.0005</td><td>- 1</td></tr>
</table>
✓✓
</td><td>2</td><td>1.1</td><td>ALLOW charge ‘positive’ / + / 1+
IGNORE ’+’ for mass of neutron

All four correct = 2 marks
Any 2 correct = 1 mark</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Number of protons = 9 ✓

Number of neutrons = 10 ✓

Number of electrons = 9 ✓</td><td>3</td><td>2.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>First check the answer on the answer line.
If answer = 1 x 10^4 (m), award two marks.

2 x 10^{-1} x 5 x 10^4 / 10 x 10^3 ✓

= 1 x 10^4 ✓</td><td>2</td><td>2.1</td><td>ALLOW 10^4 / 10 000 for MP1

ALLOW 1.0 x 10^4 = 2 marks</td></tr>
</table>

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