Qualification Accredited

OCR
Oxford Cambridge and RSA

GCSE (9-1)

Examiners' report

GATEWAY SCIENCE COMBINED SCIENCE A

J250

For first teaching in 2016

J250/10 Summer 2023 series

Version 1

ocr.org.uk/science

Contents

© OCR 2023

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate answers is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

Would you prefer a Word version?

Did you know that you can save this PDF as a Word file using Acrobat Professional?

Simply click on **File > Export to** and select **Microsoft Word**

(If you have opened this PDF in your browser you will need to save it first. Simply right click anywhere on the page and select **Save as . . .** to save the PDF. Then open the PDF in Acrobat Professional.)

If you do not have access to Acrobat Professional there are a number of **free** applications available that will also convert PDF to Word (search for PDF to Word converter).

© OCR 2023

Paper 10 series overview

J250/10 is the second of two higher tier papers assessing chemistry in the Combined Science A suite. The other four papers in the suite assess biology and physics. This paper assesses content from topics C4–C6 and CS7, with assumed knowledge of C1–C3. To do well on this paper, candidates need to be comfortable applying their knowledge and understanding to unfamiliar contexts and be familiar with a range of practical techniques. There is also an emphasis on knowledge and understanding of the assessment objectives from the specification.

It is important that candidates understand the command words and what is expected when a particular command word is used. In some cases, descriptions were given when explanations were needed and so not all marks were accessed. In other cases answers were given that, although they included some good science, did not answer the question in terms of the context the question was set.

Exam practice is essential so that candidates understand the requirements of a paper. In some cases, it was clear candidates were not reading the question carefully which sometimes caused them to lose marks as they did not use information given to them.

It is good to see that candidates are reading the maths style questions correctly and recognising where specific number of decimal places or significant figures are needed. It is also good to see workings shown.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• read the question carefully and used all information given • knew basic scientific principles and terminology and used them correctly • were able to interpret data from tables and graphs • were familiar with relevant practicals • understood the effect of controlling or changing variables in a practical • understood the difference between today's atmosphere and Earth's early atmosphere • understood different methods for metal extraction • could explain the factors that affect reactivity • were able to write half equations correctly • were able to use data correctly to perform calculations and show working, including giving answers to correct decimal places or significant figures • could interpret information related to dynamic equilibrium reactions.	• did not read the questions carefully and did not use all the information provided • did not use correct terminology • struggled to interpret data from tables and graphs • were not familiar with practical techniques • did not understand the effect of controlling or changing variables in a practical • did not understand the difference between today's atmosphere and Earth's early atmosphere • did not understand different methods for metal extraction • could not explain the factors that affect reactivity • could not write correct half equations • did not show working for calculation questions • did not use a calculator for calculation questions • could not interpret information related to dynamic equilibrium reactions.

© OCR 2023

Section A overview

It was good to see few candidates leaving any of the multiple-choice questions blank, although some guesswork was evident.

The majority of candidates answered Question 2, Question 4, Question 8 and Question 9 correctly. Slightly fewer answered Question 1, Question 5, Question 6, Question 7 and Question 10 correctly. For Question 1, D was a common incorrect answer. For Question 7, A was a common incorrect answer.

Very few candidates answered Question 3 correctly. B was a common wrong answer.

It is important that the question and all possible answers are read carefully. It is also important that their answer is clear to the examiner. If the candidate decides to change their mind they should clearly cross out the first answer and put the replacement answer next to the box.

OCR support

Our Multiple Choice Quiz for topic C4 can be printed and used to check knowledge but also support examination technique. Quizzes for the other topics are also available from Teach Cambridge, but as more schools move to the use of digital homework and revision platforms, it is important to provide plenty of opportunity for students to respond to multiple choice assessments by hand.

Question 3

3 A small piece of a Group 1 metal is added to a trough of water.

The metal floats, fizzes vigorously and melts to form a silvery ball.

Which Group 1 metal was added to the water?

A Lithium

B Potassium

C Rubidium

D Sodium

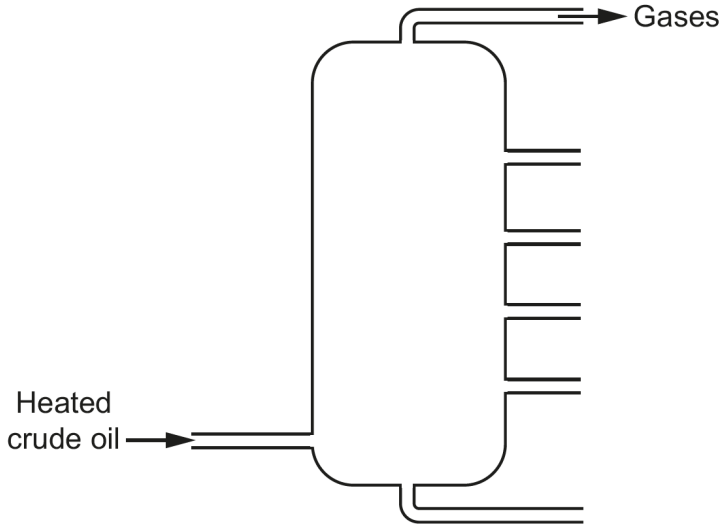
Your answer ☐ **[1]**

Question 3 proved challenging with many candidates not gaining the mark. Many of these metals actually fizz vigorously and the candidates found it difficult to differentiate between B (Potassium) and D (Sodium). Candidates did not recognise that forming a silver ball is indicative of sodium.

© OCR 2023

Question 5

5 The diagram shows the fractional distillation of crude oil.



Which row in the table describes the Gases fraction?

	Size of molecules	Strength of intermolecular forces
A	large	strong
B	large	weak
C	small	strong
D	small	weak

Your answer ☐ **[1]**

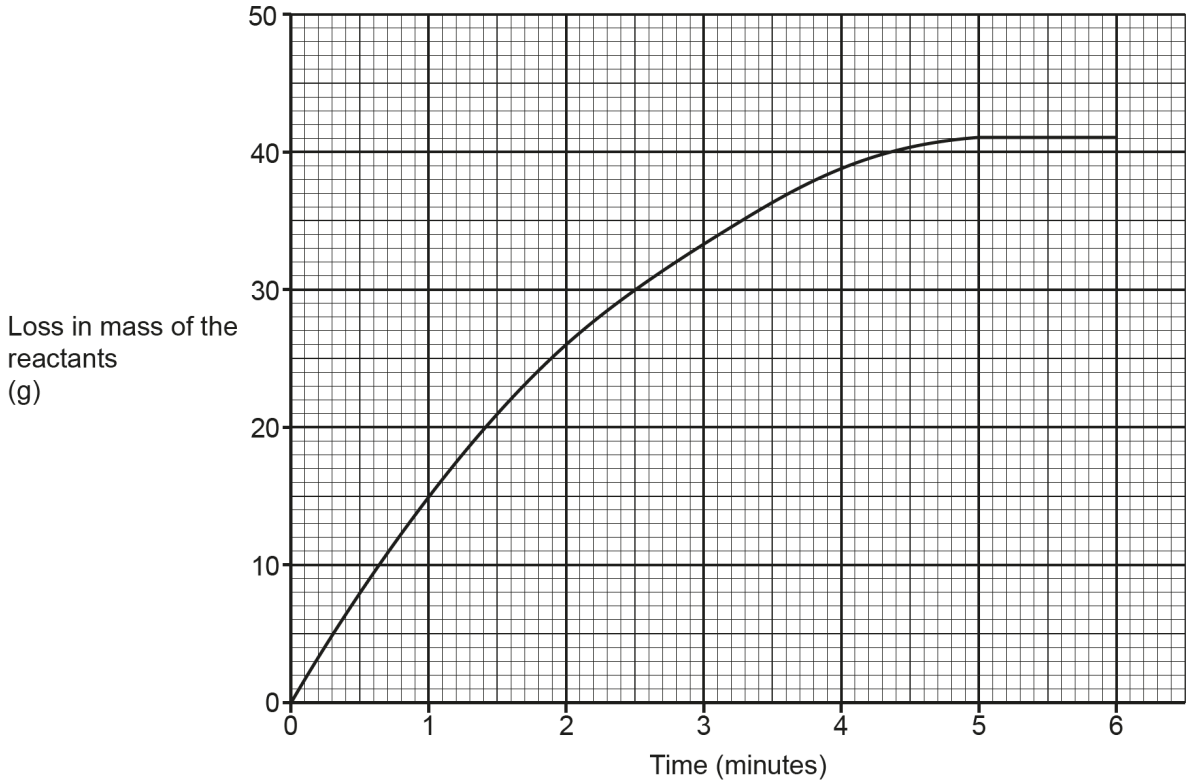
Candidates would have scored the mark here if they had focused on the word 'gas' and linked that to properties.

© OCR 2023

Question 10

10 When marble chips react with dilute hydrochloric acid, the mass of the reactants decreases.

The graph shows the loss in mass of the reactants with time.



What is the **correct formula** used to calculate the mean rate of reaction between 2 and 4 minutes?

A $\frac{2-4}{26-39}$

B $\frac{4-2}{39-26}$

C $\frac{26-39}{2-4}$

D $\frac{39-26}{4-2}$

Your answer ☐ **[1]**

A common wrong answer was C because candidates recognised that the rate came from the gradient, i.e., change (y-axis)/change (x-axis). They just substituted the numbers incorrectly.

© OCR 2023

Section B overview

It was good to see many candidates attempt most questions. This is excellent exam technique. In some cases, marks were lost because of incorrect or imprecise use of scientific terms which meant candidates did not fully answer the questions. In other cases, marks were not gained because the candidates did not answer in terms of the context of the question. Instead, they repeated knowledge without applying it.

More practice of drawing graphs would help throughout the papers. As would using a sharp pencil for plots and lines. Most showed good exam technique in showing their working for calculation questions.

Most candidates found Question 11(a) challenging. Many did not draw a diagram. Many understood how rate of reaction increases and were able to gain some marks for Question 11(e). Most candidates gained some marks for Question 12 and showed understanding of why different percentages of gases are present in the air, although most did not know the percentages of oxygen and nitrogen in today's atmosphere. Candidates had good knowledge of metal extraction techniques for Question 13.

Many candidates had good knowledge of reactivity and the reason for trends in a group and so gained at least a couple of marks for Question 14. Again, most candidates attempted this question, which is good technique as they are likely to gain marks as long as they write some relevant science that answers the question. Many knew to use the data given and so accessed at least the Level 1 marks.

Question 15 was challenging for most candidates, with few gaining any marks. However, most were able to calculate percentage mass.

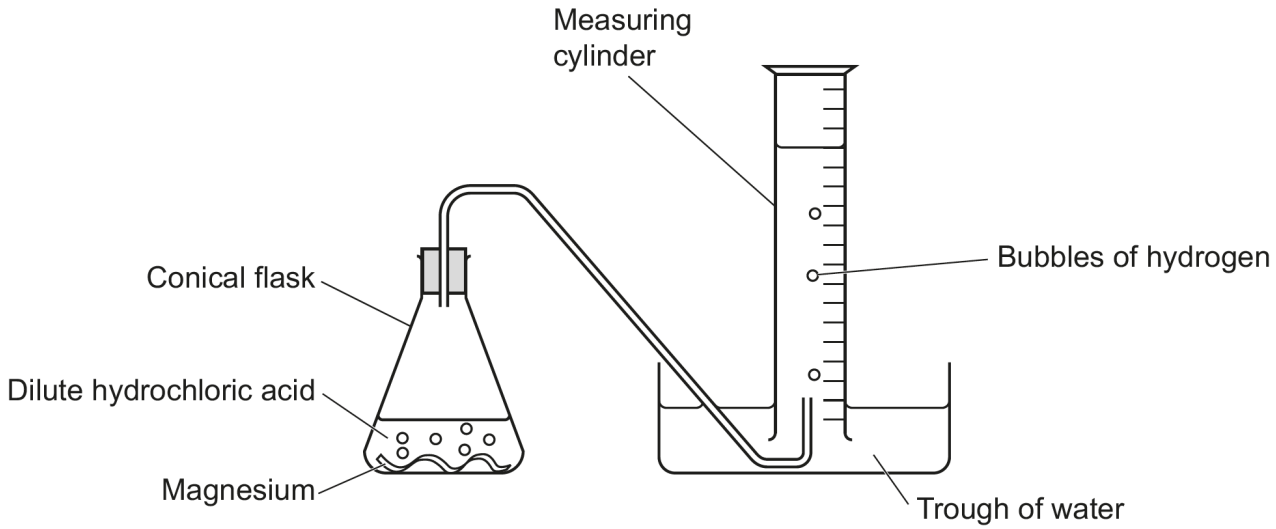
Question 16 was also difficult for most candidates. Candidates need more practice interpreting and using reversible equations and Le Chatelier's principle. They need to answer in terms of the context by applying their knowledge.

© OCR 2023

Question 11 (a)

11 A student investigates the rate of reaction between magnesium and an **excess** of dilute hydrochloric acid.

The diagram shows the apparatus they use.

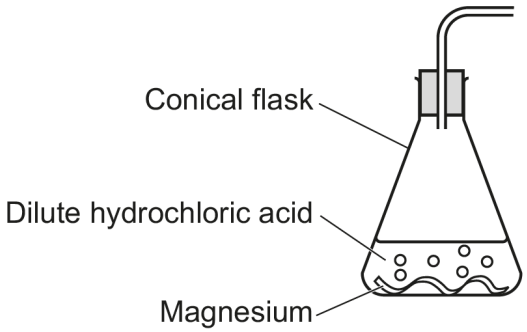


(a) The student has difficulty filling the measuring cylinder with water.

They change the measuring cylinder for a different piece of apparatus which allows them to measure the volume of hydrogen more accurately.

Name the piece of apparatus they use and complete the diagram below to show this apparatus.

Name of piece of apparatus .....



[3]

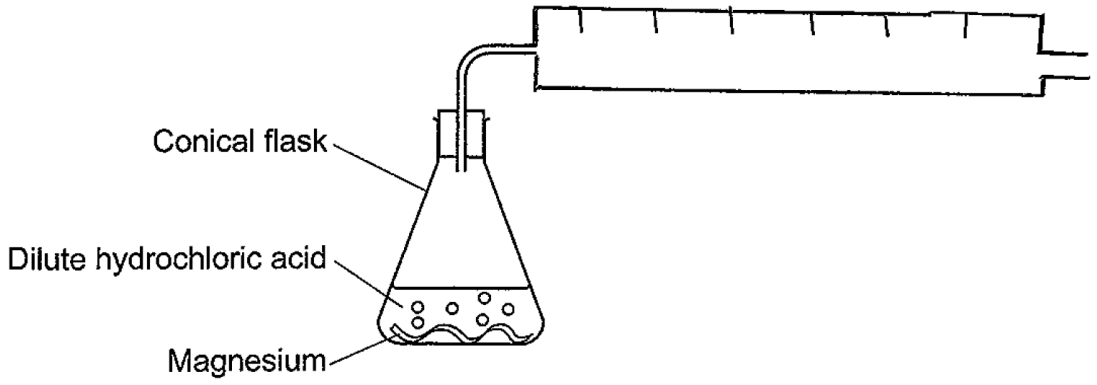
© OCR 2023

Practical Work

Although some candidates were able to name this apparatus, many could not. Of those that correctly named it, a large proportion did not attempt to draw the diagram or drew incorrect diagrams. Some candidates redrew the trough and measuring cylinder.

Practical work is an important part of the course as it engages candidates and supports their understanding. Practical skills and knowledge will always be assessed and so the more practical experience candidates have, the better prepared they will be for this type of question.

Exemplar 1



The candidate has attempted to draw a gas syringe. However, it is not clear if it is a syringe as there is no plunger. A barrel and a plunger would be the minimum expected. The response was given 1 mark out of the 3 available.

OCR support

The Practical support guide has suggestions for alternative practicals to support the delivery of each practical activity group. In addition, there are links for videos to demonstrate equipment that may be less available in centres, like the gas syringe.

Question 11 (b)

(b) Complete the **balanced symbol** equation for the reaction.

$$Mg(s) + 2HCl(.....) \rightarrow ..... (aq) + H_2(g)$$

[2]

Common errors here were to give (*l*) as the state symbol for the acid and to give 2MgC*l* for the product. Other candidates put numbers on the answer lines in an attempt to balance the equation. Candidates that have practised writing and balancing equations were able to correctly answer this question.

© OCR 2023

Question 11 (c)

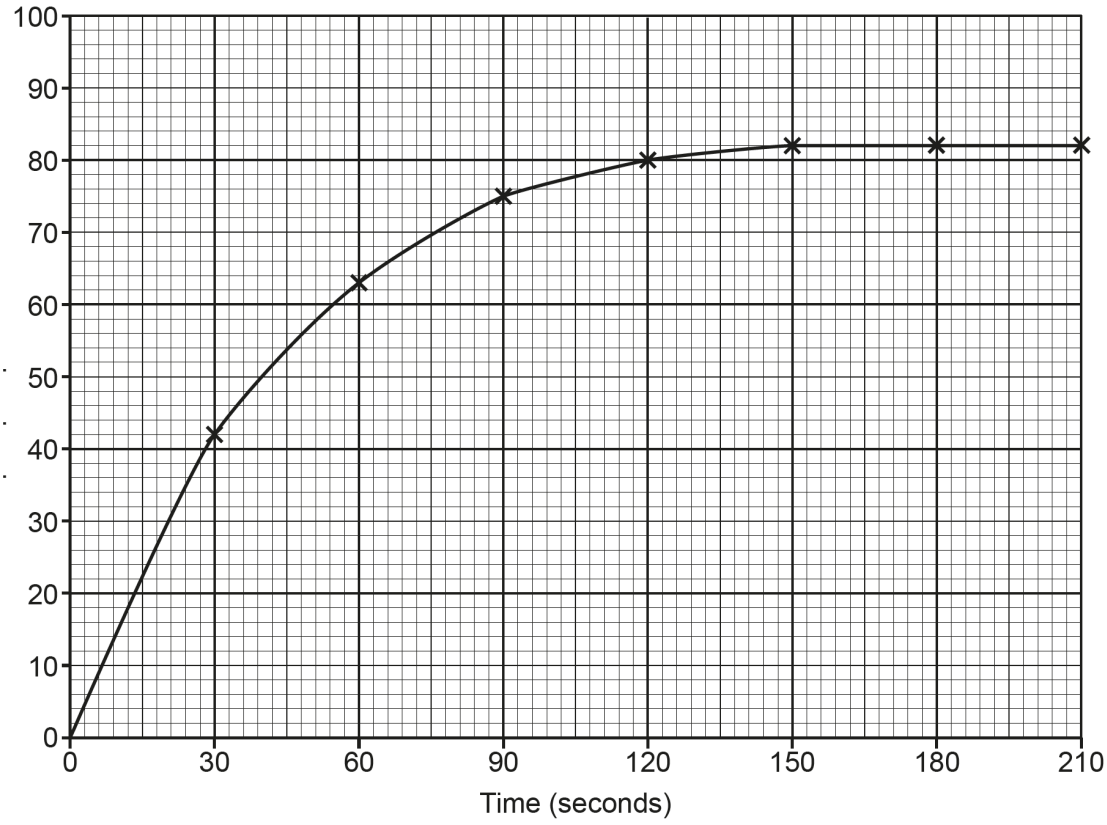
(c) The student records the results of the experiment every 30 seconds. The graph shows the student's results.

Write the correct label, including the units, for the y-axis on the graph. **[2]**

.....

.....

.....



Importance of reading the question

Throughout this paper it was clear that some candidates did not read the question carefully. They were told within the question that the volume of hydrogen is being measured. Many gave incorrect answers such as 'rate' or 'concentration'. They then struggled to give the correct units. Others gave 'number of bubbles'. Although this was not creditworthy, in some cases they gave correct units and so gained a mark. Some candidates that gave the correct label struggled to give correct units. Candidates need to think carefully about the measuring equipment they have used to help them decide on appropriate units.

© OCR 2023

Question 11 (d)

(d) The student repeats the experiment. The only difference is they use a **higher** concentration of acid.

Draw a line on the graph to show the results of this experiment. **[2]**

Candidates generally knew that a higher concentration would lead to a steeper curve. However, most thought it levelled off at a higher point. It was good to see that almost all candidates knew the line should start at the origin.

In general candidates did not recognise that the magnesium would be a limiting factor and so the curve should level off at the same point as the less concentrated acid.

Question 11 (e)

(e) If the experiment is repeated at a **higher** temperature, the rate of reaction increases.

Explain why. Use ideas about particles and collisions.

.....

.....

.....

.....

.....

..... **[3]**

This question was generally well answered, with many candidates gaining at least 1 or 2 marks. Some candidates missed out on marks because they did not explain clearly enough, or showed some misunderstanding or their use of language was imprecise.

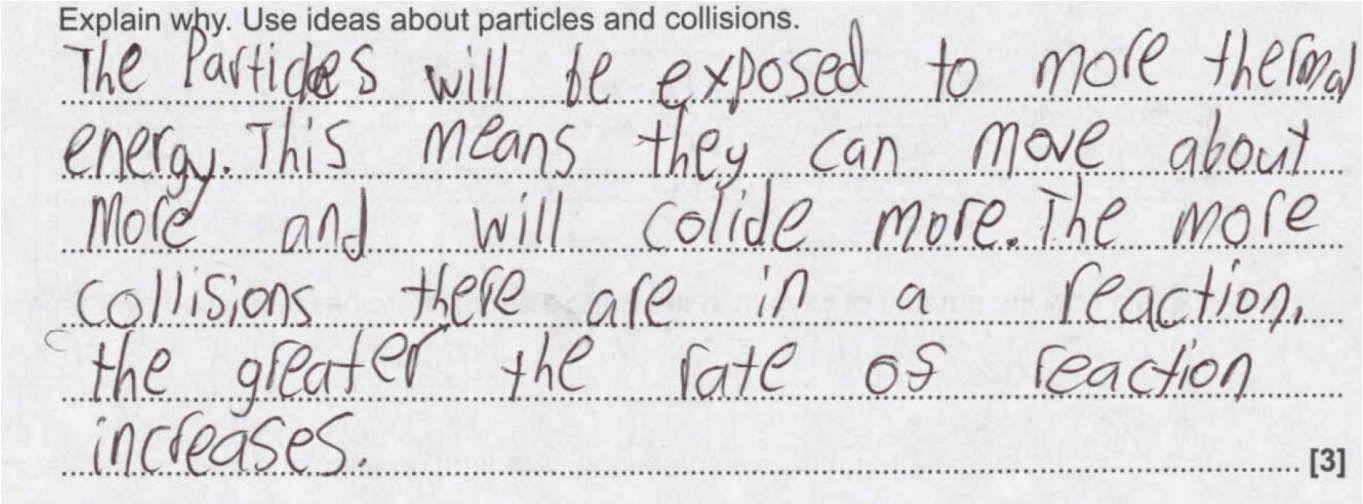
The phrase 'more frequent successful collisions' was very commonly seen and gained 2 marks.

Common errors seen were particles move more, more collisions or particles collide more, more chance of (successful) collisions.

Activation energy was rarely seen.

© OCR 2023

Exemplar 2


Explain why. Use ideas about particles and collisions.

The Particles will be exposed to more thermal energy. This means they can move about more and will colide more. The more collisions there are in a reaction, the greater the rate of reaction increases. [3]

The response in Exemplar 2 was given 1 mark. It mentions more thermal energy but does not recognise this increases the kinetic energy of the particle. They state the particles move more rather than faster and so do not gain this mark point here either.

They state the particles collide more. They need to make it clear that particles collide more frequently for the mark. There is no mention of more successful collisions and they do not discuss activation energy. They then repeat the stem of the question re reaction increasing.

Clearer language and better use of terminology could have helped this candidate gain more marks.

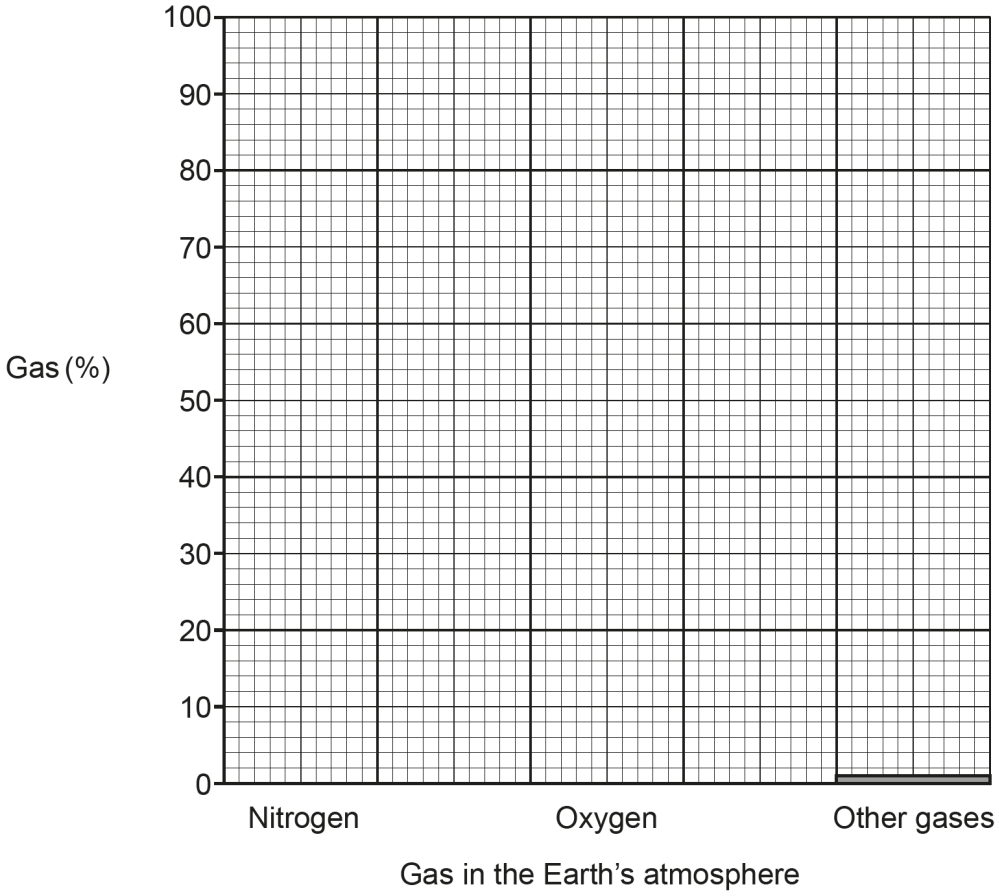
© OCR 2023

Question 12 (a)

12 The Earth's early atmosphere was mainly water vapour and carbon dioxide.

The Earth's atmosphere today is mainly nitrogen and oxygen with small amounts of other gases including carbon dioxide.

(a) Complete the bar chart to show the percentage of nitrogen and oxygen found in the Earth's atmosphere today. **[2]**



Misconception

There is a common misconception that the percentage of gases was 80% nitrogen and 19% oxygen. It was also clear in many cases that candidates were guessing with a range of percentages given.

© OCR 2023

Question 12 (b)

(b) Explain how the amounts of water vapour and carbon dioxide in the Earth's early atmosphere decreased over time.

Water vapour .....

.....

Carbon dioxide .....

.....

[2]

Many candidates were able to explain how carbon dioxide in the Earth's early atmosphere decreased. Photosynthesis was the most common correct response seen.

However, many missed the mark for how water in the Earth's early atmosphere decreased. Many discussed condensation but then did not go on to state oceans had formed.

Common errors seen for first marking point were water precipitating or falling as rain (no oceans), water condensing or condensing into clouds (no oceans), water absorbed by plants, less water evaporating due to cold and less water given off by volcanoes.

Question 12 (c)

(c) Explain how the amount of oxygen in the Earth's atmosphere has increased over time.

.....

..... **[1]**

Many candidates correctly gave photosynthesis as a response. There were a few that still confused respiration and photosynthesis and so lost the mark. Some candidates put the exact same response here as they used in part 12(b). Many simply said 'plants release oxygen', usually mirroring an answer of 'plants take in carbon dioxide' in the previous part.

© OCR 2023

Question 12 (d)

(d) The Earth's early atmosphere may have trapped more of the sun's heat than Earth's atmosphere traps today.

Give a reason why.

.....

..... **[1]**

Misconception

A common misconception here was that the thickness of the ozone layer influenced how much heat is trapped. Some candidates thought it was because the ozone layer was thicker, others that it did not exist. Many had the impression that human activity was involved and/or that the problems of the modern atmosphere were required in their response.

Some candidates knew that greenhouse gases caused more heat to be trapped but did not name a greenhouse gas and so did not gain the mark.

© OCR 2023

Question 12 (e)

(e) The amount of carbon dioxide in the Earth's atmosphere is 409.8 parts per million.

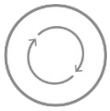
1 part per million is equal to 0.0001%

Calculate the percentage of carbon dioxide in the Earth's atmosphere today.

Give your answer to **3** decimal places.

Percentage of carbon dioxide = ... % **[3]**

Assessment for learning



Candidates should practice carrying out calculations using numbers in a written question. They should also practice correct rounding to a given number of significant figures or decimal places.

Some candidates carried out the calculation correctly but then lost the final mark because they could not give the answer correctly rounded to 3 decimal places.

Common errors included 0.0410, 0.41 and 0.040 as well as further processing of 0.04098 by multiplying or dividing by 100, rounding errors of 0.04098 to 0.04 (truncating) or 409.8 x 0.0001% = 0.0004098.

© OCR 2023

Question 13 (a) (i)

13 Copper can be extracted from its compounds by different processes.

(a)

Process 1

- Copper is extracted from copper oxide, CuO.
- The copper is extracted by heating copper oxide with carbon.

This is the equation for the reaction in **Process 1**.

$2CuO(s) + C(s) \rightarrow 2Cu(s) + CO_2(g)$

(i) Explain why carbon can be used to extract copper from copper oxide.

.....

..... **[1]**

In general candidates did well on this question. It is important they are clearer about which substance they are talking about. For example, a response such as 'high reactivity' would not gain the mark as the examiner would not know whether the candidate meant copper or carbon had high reactivity. Common errors seen were carbon is less reactive than copper, comparing reactivity to copper oxide and carbon reacts with oxygen (no reactivity comparison).

© OCR 2023

Question 13 (a) (ii)

(ii) One of the products of this reaction causes an environmental problem.

Identify the product and describe its impact on the environment.

.....

..... **[1]**

The most common correct response here was carbon dioxide causing global warming or climate change. However, some candidates stated 'carbon dioxide is a greenhouse gas'. This alone did not gain the mark as the greenhouse effect is needed and so not an environmental problem. Candidates that understood it enhanced the greenhouse effect did gain the mark. This shows the importance of fully answering the question within the context it is set.

Other common errors seen were omitting the product or just naming carbon, description of the greenhouse effect but not of global warming, e.g. 'traps heat in the atmosphere', acid rain, damage to the ozone layer or carbon causes global warming.

Question 13 (b) (i)

(b)

Process 2

- Copper is extracted from copper sulfide, CuS.
- Solid copper sulfide is broken down by bacteria to form a solution of copper sulfate, $CuSO_4$.
- The copper is extracted from the solution of copper sulfate by either reacting it with iron or by electrolysis.

(i) Why is process 2 described as a **biological** method of metal extraction?

..... **[1]**

This question was generally well answered. Those that did not gain the mark did not use the information in the question or did not understand the term 'biological'. Some answered in terms of why it was a metal extraction and had not noticed that 'biological' was in bold.

© OCR 2023

Question 13 (b) (ii)

(ii) Describe **two** advantages of extracting copper from the solution of copper sulfate by reacting it with iron rather than using electrolysis.

1 .....

.....

2 .....

.....

[2]

A good response stated less energy was used and less harmful gases were produced. Many candidates answered in terms of cost without relating that to use of energy or electricity and so did not gain a mark. Many gave vague responses related to less pollution or increased safety, which were also not creditworthy.

Question 13 (c)

(c) Ores are rocks that contain metals or their compounds.

The table shows some information about high-grade and low-grade ores.

Grade of ore	Mass of ore (kg)	Mass of metal in the ore (kg)
high	50	1.5
low	500	8.0

Explain the difference in the mass of metal contained in a high-grade and low-grade ore.

Use information from the table.

.....

.....

.....

..... **[2]**

Less successful candidates did not attempt to manipulate the data given and so assumed that the low grade ore had more metal because the number in the table was bigger.

High achieving candidates manipulated the data to show the percentage of metal in each ore and therefore could explain that high grade ore contained a higher percentage of ore.

Correct responses were mostly for 3% and 1.6% or working out mass of metal per kg of ore.

© OCR 2023

Question 14*

14* Magnesium, calcium and strontium are metals in Group 2 of the Periodic Table.

Tables 14.1 and **14.2** show some information about these metals.

Table 14.1

Reactions of the metals with cold water

Metal	Observations
Magnesium	• metal disappears very slowly • fizzes very slowly • forms a white solid
Calcium	• metal disappears slowly • fizzes slowly • forms a cloudy solution
Strontium	• metal disappears quickly • fizzes quickly • forms a colourless solution

Table 14.2

Energy required to form a 2+ ion

Metal	Energy required (kJ / mol)
Magnesium	2189
Calcium	1735
Strontium	1614

Barium is below strontium in Group 2.

Describe and explain the reactivity of barium.

Include observations of the reaction of barium with water.

Use information from **Tables 14.1** and **14.2**.

.....

.....

.....

..... **[6]**

© OCR 2023

Nearly all candidates attempted this question and of those that did nearly all gained at least 1 mark. The less successful gained marks from interpreting the data given. The more successful used their own knowledge and understanding to explain reactivity in terms of the ease of loss of electrons, atomic radius and attraction between nucleus and outer electrons. Their response would include as a minimum a trend and some appropriate observations, a good explanation of the increase in reactivity, an interpretation of the data given as well as using their own knowledge.

Less successful candidates were not always given marks because their use of science language was weak and so did not fully explain concepts. For example, they discussed losing electrons but not losing outer electrons, or they stated forces were weak but did not state what these forces were. They also struggled to give appropriate observations and just repeated the observations for strontium without showing an understanding of the reactions being faster or more vigorous.

Common errors were observations either omitted or being the same as strontium's, reactions being described only as quicker rather than an increase in reactivity or more vigorous, barium needing to break bonds when it reacts, often energy needed to break intermolecular forces, energy required as activation energy, less energy needed to react but no mention of ion formation, barium gaining electrons rather than losing and losing one electron rather than two.

Exemplar 3

↳ Since Group 2 metals become more reactive as you go down the group, Barium would be significantly more reactive than Mg^{2+} & Sr^{2+}.

↳ Barium would fizz vigorously and be quickly forming into a gas. It would also dissapear very ~~quickly~~ quickly when reacting with water

↳ Barium would also require less energy (1281kJ) form its Ba^{2+} ions as it's 2 outershell electrons are easily lost due to electrons being further away from the nucleus than the previous elements. Since it's an incomplete outershell he 2 electrons would be lost to the O^{2-} in H_2O. **[6]**

Exemplar 3 is a typical 5-mark, Level 3 response to Question 14. The candidate has given a trend and some appropriate observations. They have given a good explanation of the increase in reactivity. They have done this by interpreting the data given as well as using their own knowledge. The observations, trend and good explanation allows them to gain Level 3.

© OCR 2023

Question 15 (a)

15 Iodine is an element in Group 7 of the Periodic Table.

Seaweed has small amounts of compounds containing iodine. It is possible to extract iodine from seaweed.

The diagram shows the stages in the extraction of iodine.

Stage 1	The seaweed is heated until an ash containing iodide ions is formed.
↓	
Stage 2	The ash is dissolved to form a solution, and the iodide ions are converted to iodine.
↓	
Stage 3	A purified solution of iodine is heated to leave solid iodine.

(a) In **Stage 1** iodide ions are produced by reduction.

Explain reduction in terms of electrons.

..... **[1]**

This was well answered. Common errors included 'compounds gain electrons' and 'loss of electrons'.

Question 15 (b)

(b) In **Stage 2** iodide ions are oxidised to iodine.

Complete the **half-equation** for the oxidation of iodide ions into iodine.

$2I^- \rightarrow$ ..... **[2]**

Only the most successful responses were given marks here, for example, for the two electrons. Common errors included '2I' and using a minus sign rather than a plus.

© OCR 2023

Question 15 (c)

(c) In **Stage 3** if the solution is heated for too long, iodine vapour is formed.

What colour is iodine vapour?

..... **[1]**

Many candidates gave black as a response, possibly confusing this with the test for starch. Others gave brown/yellow/orange, possibly remembering the colour of iodine solution.

Question 15 (d)

(d) 0.13 g of iodine is produced from 5.0 g of seaweed.

Calculate the percentage mass of iodine in the seaweed.

Percentage mass of iodine = ... % **[2]**

Less successful candidates found this question challenging. Many put extra steps in and so were not given marks. It was clear that some candidates did not have a calculator and so tried to work out the answer on paper, often struggling to do so. Other responses knew to do a division but did not know they had to then multiply by 100 to gain a percentage.

Assessment for learning

Candidates should practice percentage calculations as well as use of calculators.

OCR support

The Mathematical Skills Handbook provides both teachers and students support on the use of mathematical skills in GCSE Combined Science. It can also be used in conjunction with the Mathematical skills check in to assess student skills.

© OCR 2023

Question 16 (a)

16 When a solution of yellow $Fe^{3+}(aq)$ ions is mixed with a solution of colourless $SCN^{-}(aq)$ ions they react to form a solution of red $FeSCN^{2+}(aq)$ ions.

This is an example of a **dynamic equilibrium**.

(a) Complete the equation for this reaction.

$$\underset{\text{yellow}}{Fe^{3+}(aq)} + \underset{\text{colourless}}{SCN^{-}(aq)} \quad \cdots\cdots\cdots \quad \underset{\text{red}}{FeSCN^{2+}(aq)}$$

[1]

All but the least successful candidates gained a mark here. Some candidates inserted an = sign. This is not creditworthy in an equation for a reaction at dynamic equilibrium.

Question 16 (b) (i)

(b) The table shows how the concentration of $Fe^{3+}(aq)$ ions change when solutions of $Fe^{3+}(aq)$ ions and $SCN^{-}(aq)$ ions are mixed together.

Time (seconds)	0	30	60	90	120	150	180
Concentration of $Fe^{3+}(aq)$ ions (mol/dm^3)	0.100	0.093	0.087	0.083	0.081	0.081	0.081

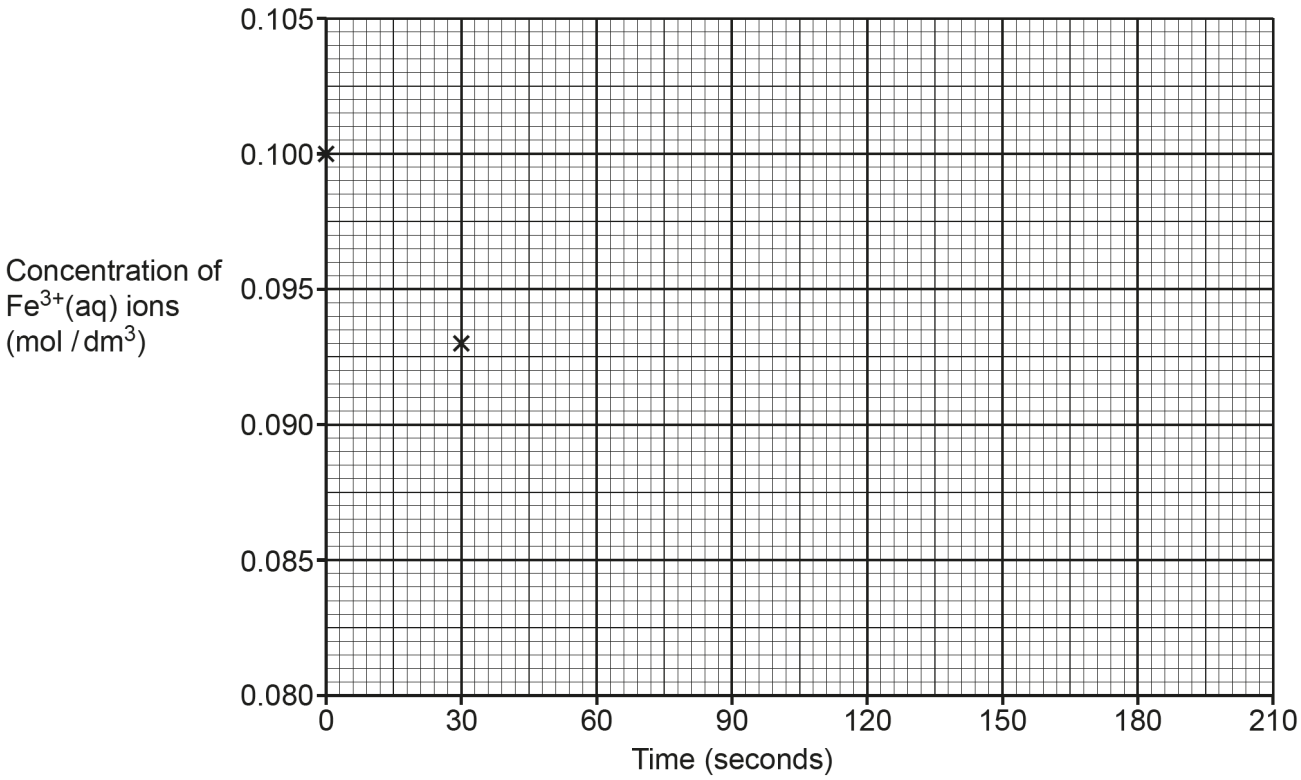
(i) Plot the results from the table on the graph. Two points have already been plotted for you. **[2]**

Most candidates were able to successfully plot these points. The most common error was for the final three plots at 0.081. Candidates mistakenly plotted these at 0.805. It is important that candidates check the axis carefully and recheck their plotting to make sure it is correct. It is also important to use a sharp pencil as thick plots could look out of tolerance and not gain marks.

© OCR 2023

Question 16 (b) (ii)

(ii) Draw a line of best fit. **[1]**



Many candidates incorrectly drew a straight line rather than a curve. In science a 'line of best fit' can be a straight line or a curve and candidates need to decide which is most appropriate for the plots drawn.

OCR support

Our Candidate Exemplars are useful resources for teacher development but also for supporting students. For example, this one from the Maths series (June 2022) indicates how different responses for a graph question gained their marks.

© OCR 2023

Question 16 (b) (iii)

(iii) What is the time it takes for the reaction to reach equilibrium?

Give a reason for your answer.

Time to reach equilibrium = ... seconds

Reason .....

..... **[2]**

Most responses were able to gain a mark for 120 seconds. The more successful candidates were also able to give the reason for their choice. Some stated that the reason was because the line had stopped decreasing; they did not understand that this was not enough to gain the mark. It needed to be clear that the concentration was no longer changing or was remaining constant. Some incorrectly assumed the reaction had stopped so showed they did not understand the reaction.

Question 16 (c)

(c) A student increases the concentration of SCN^-(aq) ions in the mixture.

The mixture turns **darker red**.

Use Le Chatelier's principle to explain the change in colour.

.....

.....

.....

..... **[2]**

Candidates struggled with this question. Some were able to state that the forward reaction would be favoured. Only the very best responses explained that this happened in order to reduce the reactants. Many responses repeated the question or just stated the colour change again. This would not be creditworthy. Other candidates quoted Le Chatelier's principle and said the reaction opposed the change. However, this did not answer the question as set and so did not gain a mark. Answers need to be related to the context of the question.

© OCR 2023

Question 16 (d)

(d) The student thinks that the forward reaction shown in **(a)** for the equilibrium is **exothermic**.

Describe what the student should do to the equilibrium mixture to show that the forward reaction is exothermic.

Predict the student's observations.

.....

.....

.....

..... **[2]**

Only the most successful candidates gained marks here. Most answered in terms of measuring the temperature as they understood reactions are endothermic or exothermic and so affect the temperature of the surroundings. However, very few suggested increasing or decreasing the temperature. Even fewer went on to suggest the colour change you would see.

© OCR 2023

Supporting you

Teach Cambridge

Make sure you visit our secure website **Teach Cambridge** to find the full range of resources and support for the subjects you teach. This includes secure materials such as set assignments and exemplars, online and on-demand training.

Don't have access? If your school or college teaches any OCR qualifications, please contact your exams officer. You can forward them this link to help get you started.

Reviews of marking

If any of your students' results are not as expected, you may wish to consider one of our post-results services. For full information about the options available visit the OCR website.

Access to Scripts

For the June 2023 series, Exams Officers will be able to download copies of your candidates' completed papers or 'scripts' for all of our General Qualifications including Entry Level, GCSE and AS/A Level. Your centre can use these scripts to decide whether to request a review of marking and to support teaching and learning.

Our free, on-demand service, Access to Scripts is available via our single sign-on service, My Cambridge. Step-by-step instructions are on our website.

Keep up-to-date

We send a monthly bulletin to tell you about important updates. You can also sign up for your subject specific updates. If you haven't already, sign up here.

OCR Professional Development

Attend one of our popular CPD courses to hear directly from a senior assessor or drop in to a Q&A session. Most of our courses are delivered live via an online platform, so you can attend from any location.

Please find details for all our courses for your subject on **Teach Cambridge**. You'll also find links to our online courses on NEA marking and support.

Signed up for ExamBuilder?

ExamBuilder is the question builder platform for a range of our GCSE, A Level, Cambridge Nationals and Cambridge Technicals qualifications. Find out more.

ExamBuilder is **free for all OCR centres** with an Interchange account and gives you unlimited users per centre. We need an Interchange username to validate the identity of your centre's first user account for ExamBuilder.

If you do not have an Interchange account please contact your centre administrator (usually the Exams Officer) to request a username, or nominate an existing Interchange user in your department.

Active Results

Review students' exam performance with our free online results analysis tool. It is available for all GCSEs, AS and A Levels and Cambridge Nationals.

Find out more.

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
facebook.com/ocrexams
twitter.com/ocrexams
instagram.com/ocrexaminations
linkedin.com/company/ocr
youtube.com/ocrexams

We really value your feedback

Click to send us an autogenerated email about this resource. Add comments if you want to. Let us know how we can improve this resource or what else you need. Your email address will not be used or shared for any marketing purposes.

I like this **I dislike this**

Please note – web links are correct at date of publication but other websites may change over time. If you have any problems with a link you may want to navigate to that organisation's website for a direct search.

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.

You can copy and distribute this resource freely if you keep the OCR logo and this small print intact and you acknowledge OCR as the originator of the resource.

OCR acknowledges the use of the following content: N/A

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.