OCR
Oxford Cambridge and RSA

Accredited

GCSE (9–1) Combined Science (Chemistry) A (Gateway Science)

F

J250/04 Paper 4 (Foundation Tier)

Sample Question Paper

Date – Morning/Afternoon

Version 2

Time allowed: 1 hour 10 minutes

You must have:
- the Data Sheet

You may use:
- a scientific or graphical calculator
- a ruler

First name	
Last name	
Centre number	Candidate number

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **60**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- This document consists of **24** pages. Any blank pages are indicated.

SECTION A

Answer **all** the questions.

You should spend a maximum of 20 minutes on this section.

1 Some students want to clean a sample of muddy water.

What is the first technique they would use?

A Crystallisation

B Evaporation

C Filtration

D Sedimentation

Your answer ☐ **[1]**

2 The following statements are about pollutants in the air.

Which statement is **incorrect**?

A Carbon monoxide is a toxic gas made by the incomplete combustion of fuel in a car engine.

B Oxides of nitrogen are made when nitrogen combines with hydrogen in a car engine.

C Particulates are tiny pieces of carbon made when petrol or diesel burns in a car engine.

D Sulfur dioxide is made when sulfur impurities in fossil fuels burn.

Your answer ☐ **[1]**

3 A student adds small pieces of metal to some samples of acid.

- She uses the same volume and concentration of acid every time.
- She measures the time taken for the reaction to finish.

Look at her results.

Metal	Time taken for reaction to finish (in seconds)
Calcium	26
Iron	62
Lithium	15
Zinc	35

The student does another experiment. This time she adds a small piece of sodium to the acid.

What is the best prediction for the time taken for this reaction to finish?

A 8 s

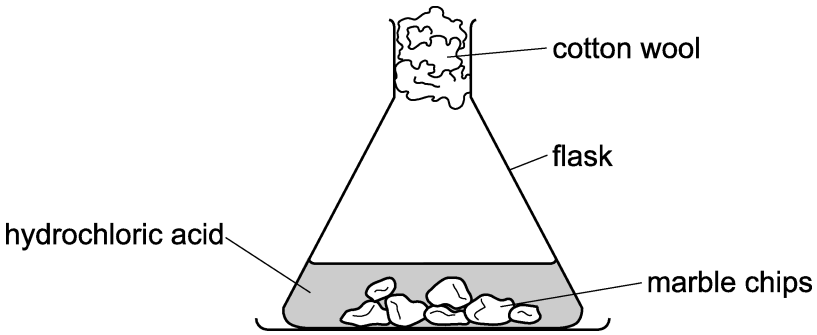
B 15 s

C 20 s

D 40 s

Your answer ☐ **[1]**

4 A student investigates the reaction between marble chips and dilute hydrochloric acid.



Which change would increase the rate of this reaction?

A Add water to the reaction mixture.

B Increase the size of the marble chips.

C Use a more concentrated solution of hydrochloric acid.

D Use hydrochloric acid at a lower temperature.

Your answer ☐ **[1]**

5 Crude oil is a mixture of straight chain alkanes. What is the molecular formula of hexane that has a chain length of six carbon atoms?

A C_6H_6

B C_6H_{12}

C C_6H_{14}

D C_6H_{24}

Your answer ☐ **[1]**

6 Aluminium is extracted from its ore by electrolysis.

Which statement explains why aluminium can only be extracted by electrolysis?

A Aluminium is higher than carbon in the reactivity series.

B Aluminium is higher than iron in the reactivity series.

C Aluminium is lower than carbon in the reactivity series.

D Aluminium is lower than sodium in the reactivity series.

Your answer ☐ **[1]**

7 Which relative molecular mass, M_r, is **not** correct for the molecule given?

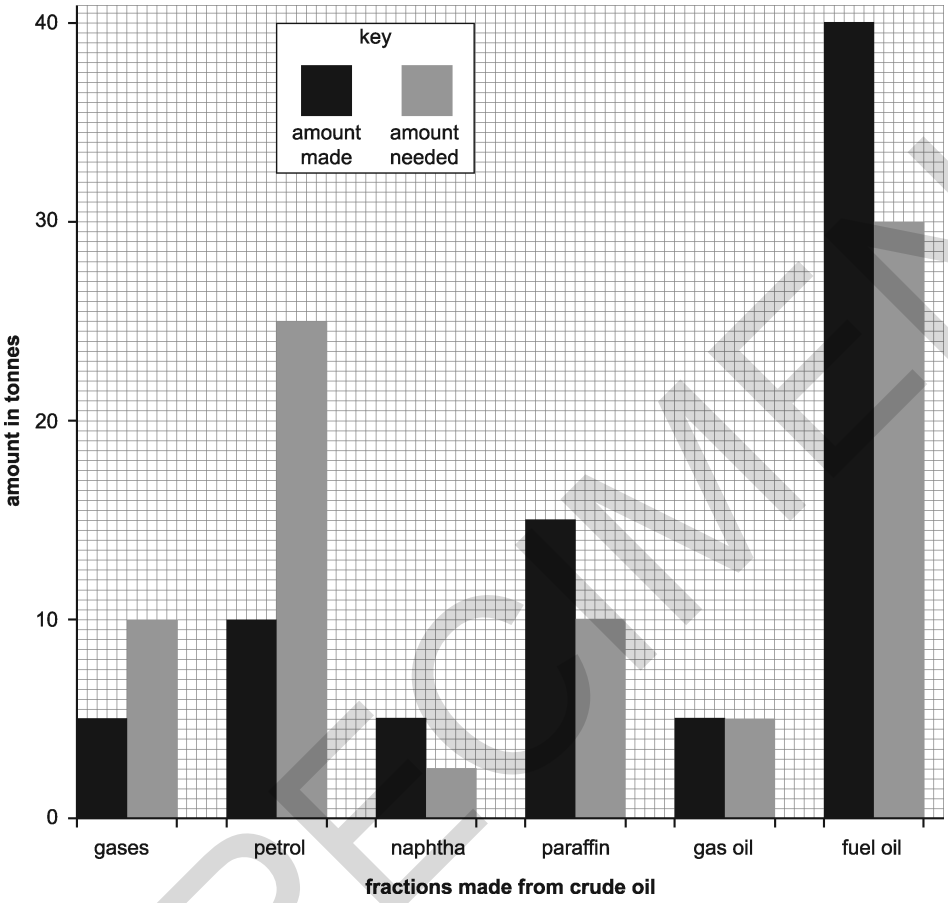
	Molecule	M_r
A	Ammonia, NH_3	17.0
B	Carbon dioxide, CO_2	44.0
C	Methane, CH_4	16.0
D	Oxygen, O_2	16.0

Your answer ☐ **[1]**

8 Fractional distillation separates the substances in crude oil into useful fractions in a refinery.

Look at the bar chart.

- It shows the amount of some of the fractions made from 100 tonnes of crude oil.
- It also shows the amount of each fraction needed for everyday uses.



Cracking converts large molecules into smaller more useful molecules to make supply meet demand.

What is the percentage of petrol produced by cracking?

A 25%

B 40%

C 50%

D 60%

Your answer ☐ **[1]**

9 Which row in the table gives correct information about sulfur dioxide?

	Source	Problem caused
A	combustion of impurities in fuel	acid rain
B	incomplete combustion of fuel	acid rain
C	incomplete combustion of fuel	leaves solid deposits on buildings
D	reaction between gases in the air at high temperature	leaves solid deposits on buildings

Your answer ☐ **[1]**

10 Look at the table.

It shows some fractions made from the fractional distillation of crude oil and their boiling ranges.

Fraction	Boiling range (ºC)
LPG	less than 25
petrol	85 – 110
diesel	150 – 290
fuel oil	290 – 390
bitumen	greater than 400

A hydrocarbon called eicosane has a boiling point which is 3.5 times the boiling point of petrol.

To which fraction does eicosane belong?

A Bitumen

B Diesel

C Fuel oil

D LPG

Your answer ☐ **[1]**

SECTION B

Answer **all** the questions.

11 **(a)** Describe what is meant by the greenhouse effect.

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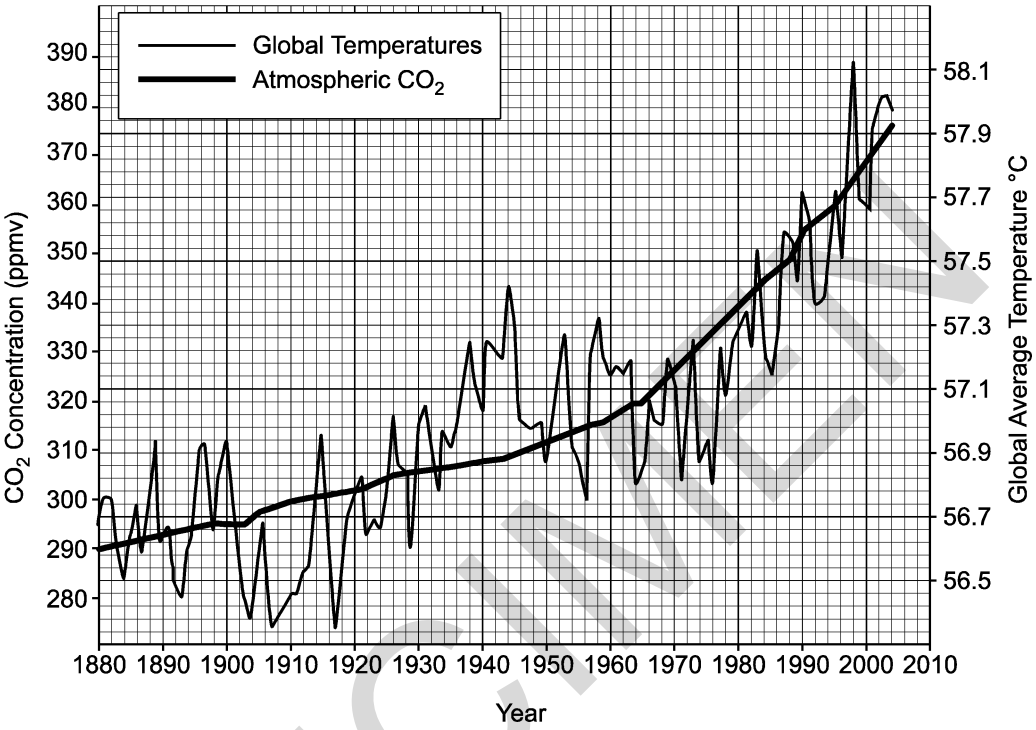
..... **[2]**

(b) Look at the graph.

It shows changes between 1880 and 2005 in

- global temperatures
- atmospheric carbon dioxide, CO_2, concentrations



Calculate the increase in CO_2 concentration in the atmosphere from 1900 to 1960.

Increase in CO_2 concentration = ...ppmv **[2]**

12 A student investigates the reaction between zinc and sulfuric acid, H_2SO_4.

Zinc sulfate, $ZnSO_4$ is made.

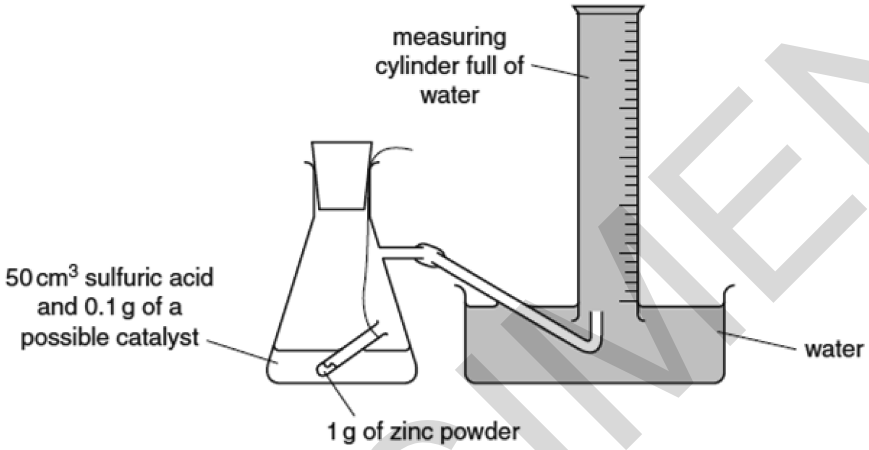
(a) Write a balanced symbol equation for this reaction.

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

(b) The student does several experiments.

He wants to find a substance that is a catalyst for the reaction.

The diagram shows the apparatus he uses.



The flask is shaken to start the reaction.

He records the time taken to collect 50 cm^3 of gas.

Look at Table 12.1. It shows his results.

Possible catalyst used	Appearance of catalyst	Time to collect 50 cm^3 of gas (in seconds)	Other observations
no catalyst added		65	colourless solution made
copper lumps	red-brown lumps	56	red-brown lumps left behind
copper powder	red-brown powder	19	red-brown powder remains
copper sulfate	blue solid	10	colourless solution made and the zinc powder was coated with a pink solid
sodium chloride	white solid	65	colourless solution made

Table 12.1

Which **two** substances in Table 12.1 could the student use as a catalyst for the reaction?

Explain your answer.

Use information from the table to help you.

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

(c) Explain how a catalyst works. Use ideas about activation energy.

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

(d) Look at Table 12.1.

Calculate the rate of reaction when copper lumps and copper powder are used.

Give your answers to **three** significant figures.

Give an explanation for the difference in the rates.

Rate for copper lumps = …….

Rate for copper powder = …….

Explanation: .....

.....

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

13 Two students investigate methods for extracting metals from their ores.

Look at the reactivity series of some metals.

The element carbon is also included in the reactivity series.

sodium **MOST REACTIVE**

calcium

aluminium

carbon

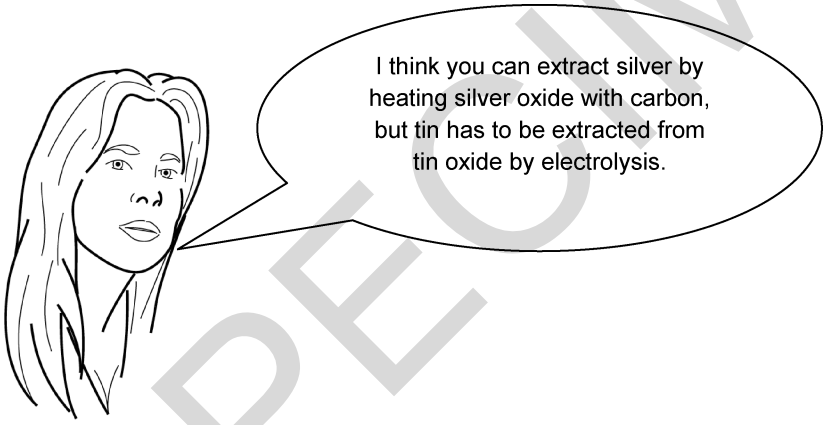
tin

copper

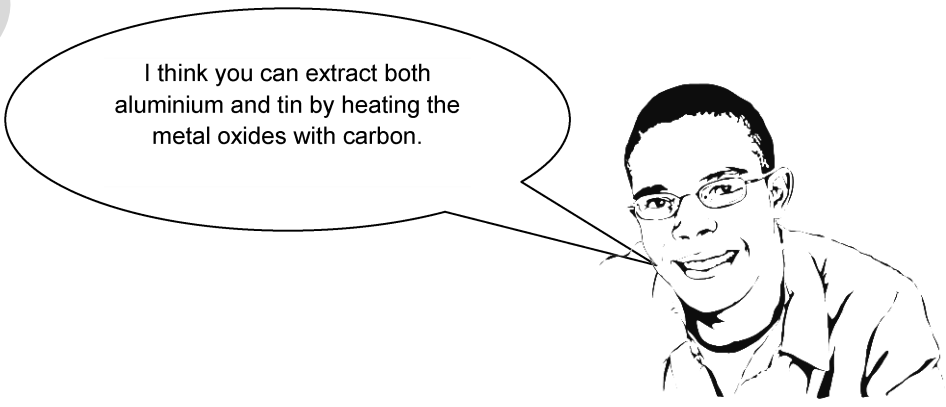
silver

gold **LEAST REACTIVE**

The two students make some predictions.



Student **A**



Student **B**

(a) Comment on which part of each prediction is correct.

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

(b) Copper is extracted by heating copper oxide, CuO, with carbon.

Look at the equation for the reaction.

$$2CuO + C \rightarrow 2Cu + CO_2$$

Copper oxide is **reduced** in this reaction.

How can you tell?

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

14 This question is about life-cycle assessment.

(a) Describe the stages in a life-cycle assessment.

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..... **[4]**

(b) A supermarket is considering whether to sell plastic or paper carrier bags to customers for their shopping.

They do a life-cycle assessment of both plastic and paper carrier bags.

Look at the table. It gives information from life-cycle assessments.

	Plastic bag	**Paper bag**
Total energy use (in MJ)	2622	763
Fossil fuel use (in kg)	23.2	14.9
Solid waste produced (in kg)	7.0	33.9
Greenhouse gas emissions (in tonnes)	0.08	0.04
Fresh water use (in litres)	264	4564

(i) How many more times is fresh water used to make paper bags than to make plastic bags?

Give your answer to the nearest whole number.

Answer = ……. more times **[1]**

(ii) Even though more fresh water is used, the supermarket decides to sell paper bags to its customers.

Explain why this is the best decision.

Use information from the table to help you.

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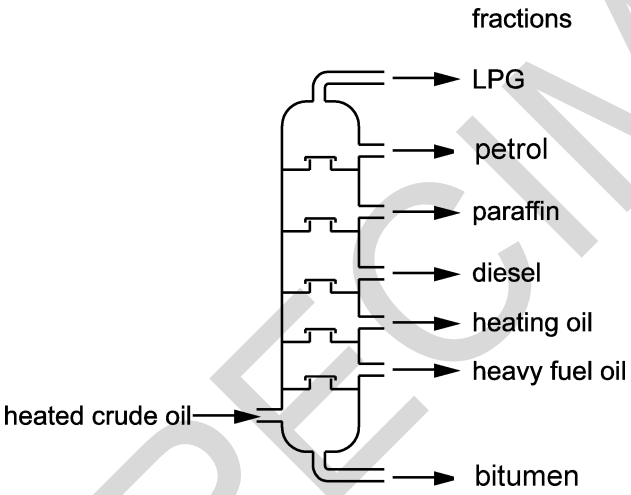
..... **[2]**

(c) The plastic for the carrier bags is made from crude oil.

Crude oil is separated into different parts by **fractional distillation**.

Look at the diagram.

It shows a fractionating column.



Crude oil contains a mixture of hydrocarbons that boil at different temperatures.

Describe **how** crude oil can be separated using a fractionating column.

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..... **[4]**

(d) Fractional distillation separates fractions because they have different boiling temperatures.

Explain why the fractions have different boiling temperatures.

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

15 The Group 7 elements are called the halogens.

Look at the table.

It shows some information about the halogens.

Element	Colour	State at room temperature	Melting point (in ºC)	Boiling point (in ºC)
fluorine	pale yellow	gas	.....	–188
chlorine	pale green	gas	–101	–35
bromine	orange	liquid	–7	59
iodine	dark grey	solid	114	184
astatine	black	solid	302	.....

(a) Use ideas about trends down a group to predict the following.

- The **melting point** of fluorine
- The **boiling point** of astatine.

Add your predicted values to the table. **[2]**

(b) Why do Group 7 elements all react in a similar way?

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

(c)* Another group of elements in the Periodic Table are the Group 1 elements.

Lithium is a Group 1 element.

- A teacher adds a small piece of lithium to a bowl of water and it reacts with the water.
- The lithium moves about on the surface of the water.
  Bubbles of hydrogen gas are made.
- The piece of lithium gets smaller and smaller until it has completely reacted.
  A solution of lithium hydroxide, LiOH, is made.

Caesium is another element in Group 1.

Predict, including a balanced symbol equation, how the reaction of **caesium** with water compares with the reaction of **lithium** with water.

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

(d) Sodium chloride is made by reacting sodium with chlorine.

A student wants to obtain solid sodium chloride from a solution of sodium chloride.

- She suggests filtering the solution.
- She will **not** obtain solid sodium chloride by this method.

Suggest what method she should use.

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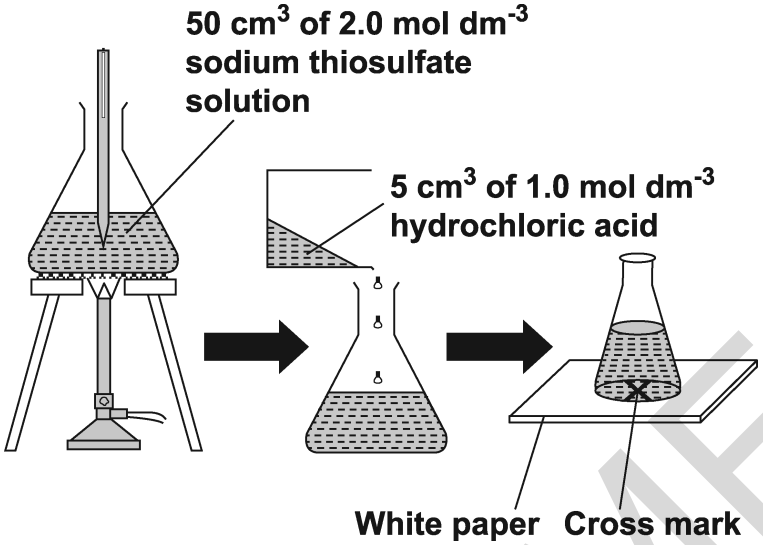
..... **[1]**

16 This question is about rates of reaction.

A student investigates the reaction between sodium thiosulfate solution and hydrochloric acid at different temperatures.

(a) Look at how the student does the experiment.



1. He measures 50 cm^3 of sodium thiosulfate solution into the conical flask.
He heats the solution to the required temperature.
He records the temperature.

2. He takes the flask off the tripod and gauze and places it on the bench.

3. He adds 5 cm^3 of hydrochloric acid and then places the flask on the cross.

4. He measures the time for the cross to disappear.

How should the student improve his method?

Explain your answer.

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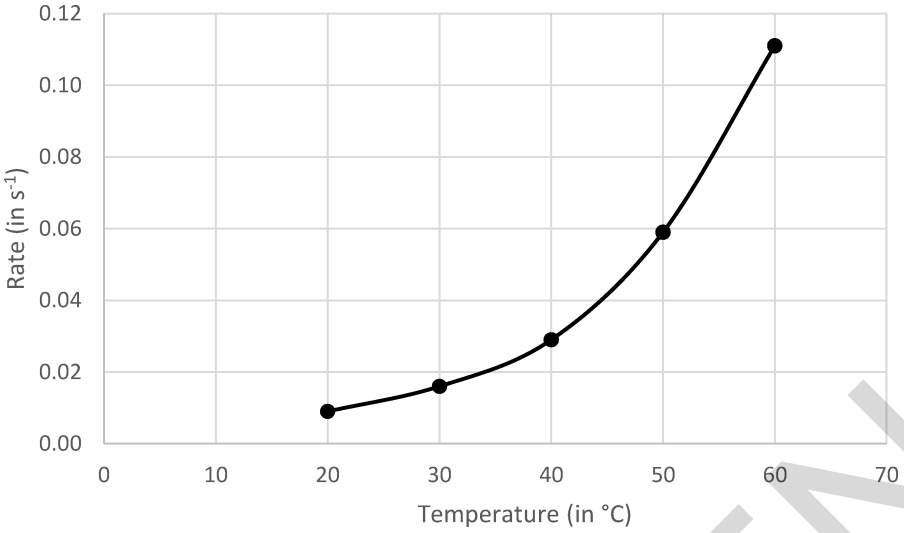
..... **[2]**

(b) Look at the graph. It shows the student's results at different temperatures.



When is the reaction fastest?

Use the graph to explain your answer.

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

(c) Explain why the rate of reaction of sodium thiosulfate solution and hydrochloric acid is different at different temperatures.

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

17 This question is about the reactivity series of metals.

A student heats mixtures of metals and metal oxides.

Look at the table. It shows his results.

	Magnesium, Mg	**Lead, Pb**	**Iron, Fe**	**Copper, Cu**
Magnesium oxide, MgO	no reaction	no reaction	no reaction	no reaction
Copper oxide, CuO	magnesium oxide and copper formed	lead oxide and copper formed	iron oxide and copper form	no reaction
Lead oxide, PbO	magnesium oxide and lead formed	no reaction	iron oxide and lead formed	no reaction
Iron oxide, Fe_2O_3	magnesium oxide and iron formed	no reaction	no reaction	no reaction

(a) Using the results, work out an order of reactivity for the metals.

Explain how you used the results to put the metals in order of reactivity.

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..... **[4]**

(b) In another experiment, the student reacts copper with silver nitrate, $AgNO_3$.

Silver and copper nitrate, $Cu(NO_3)_2$, are formed.

Write a **balanced symbol** equation for the reaction.

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

END OF QUESTION PAPER

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OCR
Oxford Cambridge and RSA

…day June 20XX – Morning/Afternoon

GCSE (9– 1) Combined Science (Chemistry) A (Gateway Science)
J250/04 Paper 4 (Foundation Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 10 minutes

MAXIMUM MARK 60

This document consists of 20 pages

MARKING INSTRUCTIONS

PREPARATION FOR MARKING

SCORIS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris 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 posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to scoris and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

   YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

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 scoris 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 scoris messaging system.

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 a tick to confirm that the work has been seen.

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 scoris **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 scoris 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.

11. **Annotations**

Annotation	Meaning
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

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 Combined Science A (Gateway Science):

	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.

SECTION A

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

SECTION B

Question			Answer	Marks	AO element	Guidance
11	(a)		**Any two from** electromagnetic radiation (at most wavelengths) from the Sun passes through the Earth's atmosphere (1) the Earth absorbs electromagnetic radiation with short wavelengths (and so warms up) (1) heat is radiated from the Earth as longer wavelength infrared radiation (1) some of this infrared radiation is absorbed by greenhouse gases in the atmosphere instead of escaping into space (and so the atmosphere warms up more than without greenhouse gases) (1)	**2**	**1.1**	
	(b)	**(i)**	correct reading for 1900 is 295 **AND** for 1960 is 315 (1) correct subtraction 315 – 295 = 20 (ppmv) (1)	**2**	**2.1**	**ALLOW** ecf for second mark from incorrect readings

Question			Answer	Marks	AO element	Guidance
12	(a)		$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ (1)	1	1.1	
	(b)		copper powder **and** copper lumps (1) time taken to collect 50 cm^3 of gas is less / reaction is faster (1) (copper powder and copper lumps) are unchanged at the end of the reaction (1)	3	3.2b 3.1b x 2	
	(c)		provides an alternative reaction pathway / AW (1) with a lower activation energy (1)	2	1.2	
	(d)		rate with copper powder = 1/19 = 0.053 s^{-1} rate with copper lumps = 1/56 = 0.018 s^{-1} **Any one from** (powder has) a larger surface area (1) there are more collisions per second / more frequent collisions (1)	2	1.2	**One mark for both rates** **ALLOW** collisions are more likely / more chance of collisions **IGNORE** just more collisions **IGNORE** faster collisions / quicker collisions

Question			Answer	Marks	AO element	Guidance
13	(a)		(Student A is correct because) silver can be extracted by heating copper oxide with carbon (1) (Student B is correct because) tin can be extracted by heating with carbon (1)	2	3.2a 3.2a	**ALLOW** ora (Student A is wrong because) tin can be extracted by heating tin oxide with carbon (1) (Student B is wrong because) aluminium cannot be extracted by heating with carbon / aluminium has to be extracted by electrolysis (1)
	(b)		(because) oxygen is lost / oxygen is removed (1)	1	2.1	

Question			Answer	Marks	AO element	Guidance
14	(a)		**Any four from** • the main requirements for energy input / amount of energy required for making each material (1) • the environmental impact and sustainability of making the materials from natural resources (1) • the environmental impact of making the product from the material (1) • the environmental impact of using the product (1) • the environmental impact of disposing of the product by incineration, landfill or recycling (1) • comparison of the use of different materials for the same job (1)	**4**	**1.1**	
	(b)	**(i)**	4564 ÷ 264 = 17 (1)	**1**	**2.2**	
		(ii)	**Any two from** total energy use is less (than plastic bags) (1) fossil fuel use is less (than plastic bags) (1) greenhouse gas emissions are less (than plastic bags) (1)	**2**	**3.1b**	

Question			Answer	Marks	AO element	Guidance
	(c)		Tall column with condensers coming off at different heights (1) Column heated at the bottom so hot at the bottom and cool at the top (1) Substances with high boiling points condense at the bottom (1) Substances with low boiling points condense at the top (1)	4	1.2	
	(d)		**Any two from** idea that larger molecules have stronger intermolecular forces / ora (1) idea that larger molecules have higher boiling points / ora (1) idea that the stronger the intermolecular forces the higher the boiling point / ora (1)	2	1.1	

Question			Answer	Marks	AO element	Guidance
15	(a)		melting point of fluorine -190 to -250 (1) boiling point of astatine 310 to 400 (1)	2	2.1	**ALLOW** answers given as a range if it falls within the stated values
	(b)		(all have) 7 electrons in their outer shell (1)	1	1.2	
	(c)*		*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)** **Applies knowledge of the reaction of alkali metals to predict some observations of the reaction of caesium with water including a comparison of the rate of reaction with lithium AND** **constructs a balanced symbol equation for the reaction between caesium or lithium with water.** *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)** **Applies knowledge of the reaction of alkali metals to predict some observations of the reaction of caesium with water** **AND** **gives the names or formulae of products formed in the reaction between caesium and water.**	6	2.1 x 2 2.2 x 4	**AO2.1: Apply knowledge of ideas related to Group 1 metals** • $2Cs + 2H_2O \rightarrow 2CsOH + H_2$ • $2Li + 2H_2O \rightarrow 2LiOH + H_2$ • caesium + water → caesium hydroxide + hydrogen • hydrogen made • caesium hydroxide made **AO2.2: Apply knowledge of a given context to a novel situation to predict observations** • Faster reaction than with lithium / more reactive / more violent • fizzes • gives a flame • forms a colourless solution • alkaline solution formed • explodes • caesium loses electrons more easily

Question			Answer	Marks	AO element	Guidance
			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)** **Applies knowledge of the reaction of alkali metals to predict some observations of the reaction of caesium with water** **OR** **gives the names or formulae of products formed in the reaction between caesium and water.** *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.*			
	(d)		(The student should use) evaporation (to obtain solid sodium chloride) (1)	**1**	**3.3a**	

Question			Answer	Marks	AO element	Guidance
16	(a)		measure temperature of sodium thiosulfate and acid mixture (1) (because) temperature will be different from sodium thiosulfate solution alone (1) **OR** place flask on cross before adding acid (1) idea that reaction has started before timing begins / idea that moving flask will increase mixing (1)	**2**	**3.3b**	**ALLOW** measure temperature of sodium thiosulfate solution when it has been removed from tripod (1) (because) temperature will continue to rise after flask is removed from tripod (1)
	(b)		(reaction is fastest) at 60°C (1) (because) gradient of graph is steepest (1)	**2**	**2.2**	**ALLOW** (reaction is fastest) between 50 – 60 °C (1) **ALLOW** rate of reaction has highest value (1)
	(c)		At higher temperatures ion/molecules of sodium thiosulfate and hydrochloric acid have more energy (1) So more frequent and more successful collisions (1)	**2**	**2.2**	

Question			Answer	Marks	AO element	Guidance
17	(a)		**Order of reactivity (most to least)** magnesium iron lead copper magnesium as most reactive and copper as least (1) iron and lead in correct order (1) **Explanation** **Any two from** idea that none of the metals displace magnesium (from magnesium oxide) / magnesium displaces all the other metals from their metal oxides so magnesium is most reactive (1) idea that copper is displaced from copper oxide by all three other metals / copper cannot displace any of the other metals so copper is least reactive (1) idea that lead will displace iron or copper so is more reactive than these metals / lead cannot displace magnesium so is less reactive (1)	**4**	**3.1a** **3.1a** **2.2 x 2**	**ALLOW** correct explanation for iron (1)
	(b)		$Cu + 2AgNO_3 \rightarrow 2Ag + Cu(NO_3)_2$ formulae (1) balancing (1)	**2**	**2.1** **2.2**	balancing mark is conditional on correct formulae **ALLOW** any correct multiple e.g. $2Cu + 4AgNO_3 \rightarrow 4Ag + 2Cu(NO_3)_2$ **ALLOW** = or ⇌ for arrow **DO NOT ALLOW** 'and' or & for + **ALLOW** one mark for correct balanced equation with incorrect use of upper and lower case formulae e.g. CU + 2AgNO3 → 2Ag + Cu(NO3)2

Summary of updates

Date	Version	Change
May 2018	2	We've reviewed the look and feel of our papers through text, tone, language, images and formatting. For more information please see our assessment principles in our "Exploring our question papers" brochures on our website

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