



Rewarding Learning

General Certificate of Secondary Education
2015–2016

Centre Number

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Candidate Number

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Science: Single Award

Unit 2 (Chemistry)
Higher Tier



[GSS22]

THURSDAY 12 NOVEMBER 2015, MORNING

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

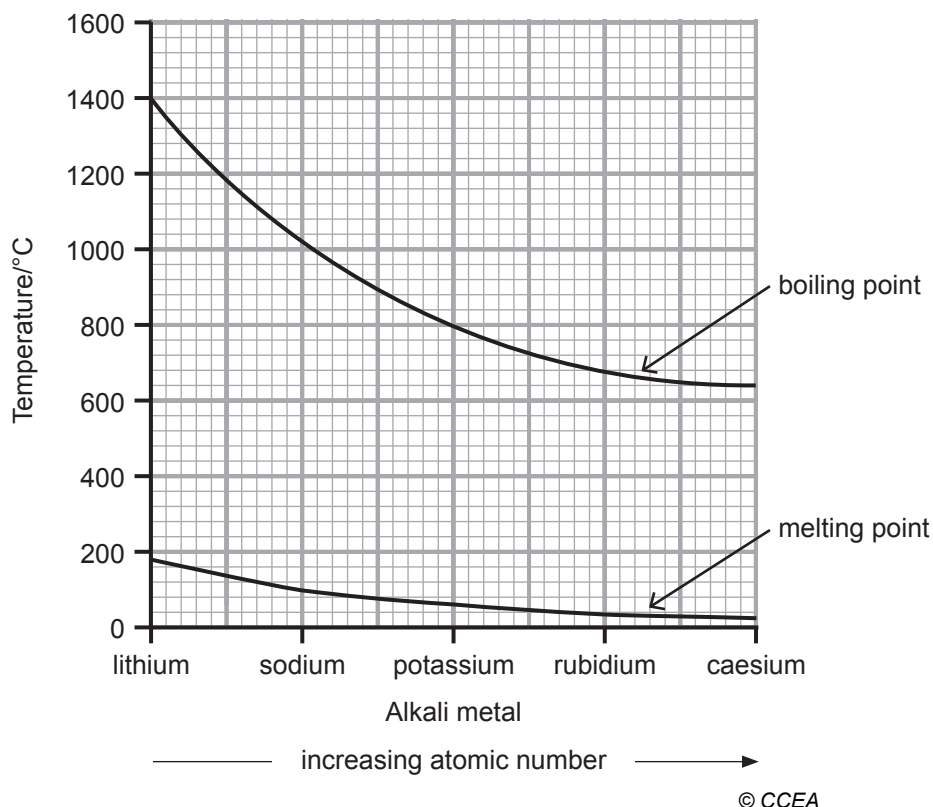
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.
Quality of written communication will be assessed in Questions **2** and **9(a)**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet, which includes a Periodic Table of the Elements, is included for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

- 1 Information about the melting and boiling points of some Group 1 (alkali) metals is shown below.



Use this information and your knowledge to answer the following questions.

- (a) Complete the following sentence to describe the trend in boiling points of the alkali metals.

As the atomic number of the alkali metals _____
 _____ [1]

- (b) Francium is below caesium in Group 1 of the Periodic Table. Predict the boiling point of francium.

_____ °C [1]

- (c) Choose the metal with the biggest difference between its melting point and its boiling point. Calculate the temperature difference between its melting point and its boiling point.

(Show your working out.)

_____ °C [2]

Examiner Only

Marks Remark

3 The table below gives information about some plastics.

Plastic	Properties	Colours available	Cost
PVC	hard, keeps its shape, weather resistant	wide range of colours	medium
nylon	hard, long lasting	white or cream	high
polythene	soft, flexible, good electrical insulator	wide range of colours but they fade easily	medium
plasticised PVC	soft, flexible, good electrical insulator	wide range of colours	medium
polystyrene	does not keep its shape, good heat insulator	white	low
acrylic	stiff, weather resistant, good electrical insulator	wide range of colours	high

Use the information in the table to answer the questions below.

(a) Which **two** plastics could be best used for covering electrical cables?

_____ and _____ [1]

(b) A manufacturer is going to produce cheap, green buckets to sell at large DIY stores.



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Which plastic should the manufacturer choose? Give **two** reasons for your choice.

 _____ [3]

(c) Give **one** reason why polystyrene is **not** used to make garden chairs. Explain your answer.

 _____ [2]

Examiner Only	
Marks	Remark

- 4 Given below is information about the reactions of some metals with their metal salt solutions.

Examiner Only	
Marks	Remark

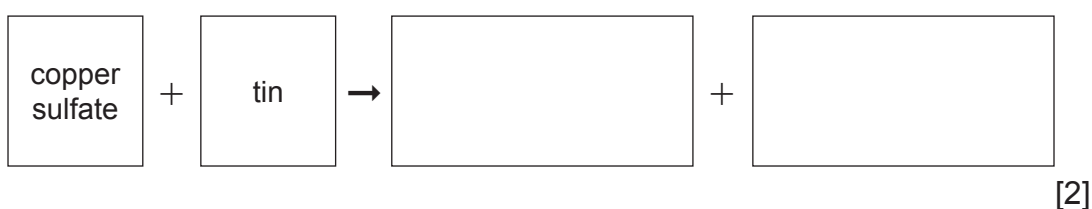
	Tin sulfate	Zinc sulfate	Copper sulfate	Magnesium sulfate
Tin		no reaction	reaction	no reaction
Zinc	reaction		reaction	no reaction
Copper	no reaction	no reaction		no reaction
Magnesium	reaction	reaction	reaction	

- (a) Use the information to put the metals in order of decreasing reactivity.

_____ most reactive

 _____ least reactive [2]

- (b) (i) Complete the word equation for the reaction between tin and copper sulfate.



- (ii) What name is given to this type of reaction?

_____ [1]

(c) Using lines, match each metal reaction with **one** expected observation.

Metal reaction

Expected observation

zinc + copper sulfate

bubbles of gas

blue solution fades

magnesium + acid

silver coloured solid forms

solution turns milky

[2]

Examiner Only

Marks

Remark

- 5 (a) The table below gives information about the structure of four elements **A**, **B**, **C** and **D**.

Element	Number of protons	Number of electrons	Number of neutrons
A	4	4	5
B	9	9	10
C	15	15	16
D	12	12	12

You may find your Data Leaflet helpful.

- (i) Name the element labelled **C** above.

_____ [1]

- (ii) Which element (**A**, **B**, **C** or **D**) has 7 electrons in its outer shell?

_____ [1]

- (iii) Which **two** elements (**A**, **B**, **C** or **D**) are in the same Group of the Periodic Table?

_____ and _____ [1]

- (iv) Calculate the mass number of element **A**.

_____ [1]

- (v) Which element (**A**, **B**, **C** or **D**) is a halogen?

_____ [1]

- (b) The Greeks were the first to recognise the idea of elements. Name **two** elements the Greeks used.

_____ and _____ [2]

Examiner Only

Marks

Remark

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(Questions continue overleaf)

6 Shown below are parts of labels from two mineral water bottles, **A** and **B**.

Ions present	Composition/ mg/dm ³
calcium	78.0
magnesium	24.0
potassium	1.0
sodium	5.0
chloride	4.5
hydrogencarbonate	329.0
nitrate	2.8
sulfate	8.0
pH = 7.2	

Water A

Ions present	Composition/ mg/dm ³
calcium	24.5
magnesium	8.5
potassium	0.4
sodium	5.7
chloride	9.0
hydrogencarbonate	260.0
nitrate	3.5
sulfate	9.0
pH = 7.8	

Water B

(a) How many different metal ions are present in mineral water **A**?

_____ [1]

(b) A student carried out an investigation using soap solution to see if the mineral waters were hard water.

(i) How would the student know from this investigation if the water was hard?

_____ [1]

(ii) His teacher suggested that he also tested pure distilled water for hardness. Suggest why the student's teacher thought this was important.

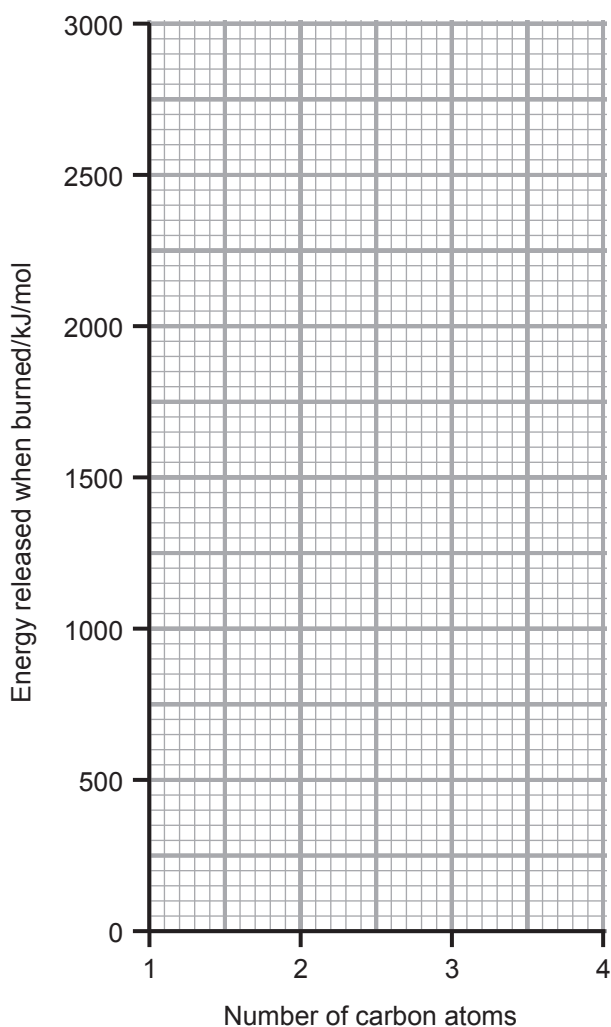
_____ [1]

Examiner Only	
Marks	Remark

- 7 (a) The table below shows information about the energy released when some alkanes burn.

Alkane	Number of carbon atoms	Energy released when burned/kJ/mol
methane	1	900
ethane	2	1550
propane	3	2200
butane	4	2850

- (i) On the grid below draw a line graph to show this information.



[3]

- (ii) Pentane is an alkane with five carbon atoms. Predict the energy released when pentane is burned.

_____ kJ/mol [1]

Examiner Only

Marks Remark

(b) In the space below draw the structural formula for ethane (C₂H₆).

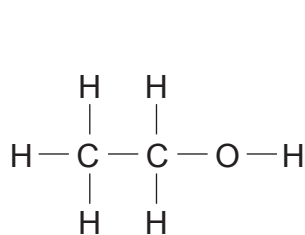
[1]

(c) Complete the balanced symbol equation for the burning of methane.

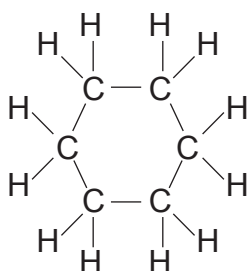


[3]

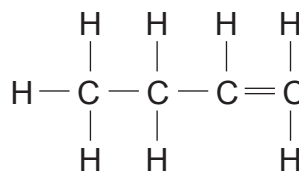
(d) Below are the structures of some organic compounds.



A



B



C

(i) Which compound (**A**, **B** or **C**) has the formula C₄H₈?

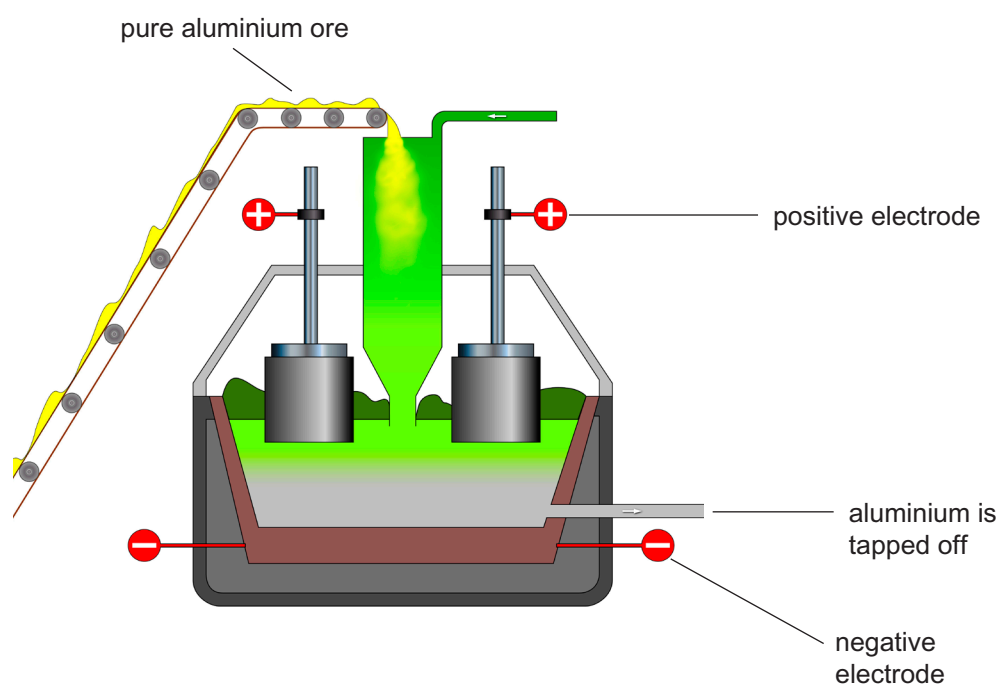
_____ [1]

(ii) Which compound (**A**, **B** or **C**) is **not** a hydrocarbon? Explain your answer fully.

_____ [2]

Examiner Only	
Marks	Remark

- 8 Electrolysis can be used to extract aluminium from its ore on a large scale using the process shown below.



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- (a) What is meant by the term 'electrolysis'?

_____ [2]

- (b) What is the chemical name for pure aluminium ore?

_____ [1]

- (c) (i) What name is given to the negative electrode?

_____ [1]

- (ii) Explain in terms of ions and electrons how aluminium is formed at the negative electrode.

_____ [3]

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