



Rewarding Learning

General Certificate of Secondary Education
2014–2015

Science: Single Award

Unit 2 (Chemistry)

Higher Tier

[GSS22]

ML

THURSDAY 13 NOVEMBER 2014, MORNING

Centre Number

71

Candidate Number

TIME

1 hour 15 minutes, plus your additional time allowance.

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 eleven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.
Quality of written communication will be assessed in Questions **3** and **11**.
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 in this question paper.

For Examiner's use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

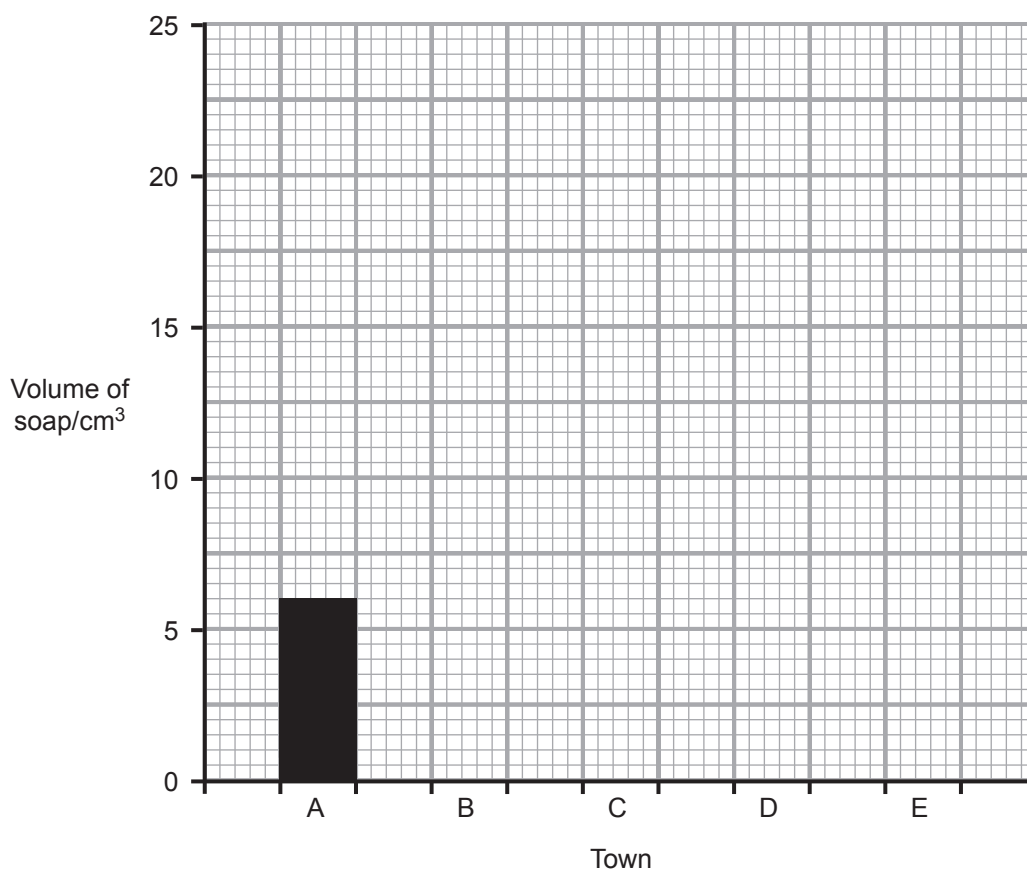
Total Marks

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- 2 (a) A scientist collected water samples from five towns (A, B, C, D and E). The table below gives the volume of soap solution needed to produce a lather with each of the samples.

Town	Volume of water/ cm ³	Volume of soap/ cm ³
A	50	6
B	50	17
C	50	24
D	50	20
E	50	11

- (i) Use the information in the table to complete the bar chart below.



[2]

Examiner Only

Marks Remark

- (ii) Which town (**A**, **B**, **C**, **D** or **E**) has the hardest water?
Explain your answer.

Town _____

Explanation _____

_____ [2]

- (iii) Scientists found that they needed 11 cm³ of soap to produce a lather after shaking the water sample from **town E**. Describe how they could continue their investigation to prove that the water is temporary hard water. Make sure you include how the results should show this.

_____ [3]

- (b) (i) Write down the name of **two** metal ions that cause hard water.

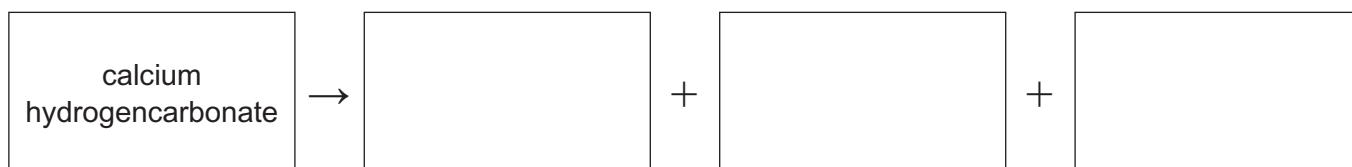
_____ and _____ [2]

- (ii) Hard water has a better taste. Write down **one** other advantage of drinking hard water.

_____ [1]

- (c) Hard water can cause undesirable deposits (fur) in kettles.

- (i) Complete the word equation to show how these undesirable deposits form in kettles.



[3]

- (ii) Write down **one** reason why these deposits cause problems in kettles.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

4 Below there is information about the reactions of some metals.

Metal	Reaction with water	Reaction with hot water or steam	Reaction with air (when heated)
Zinc	No reaction	Reacts slowly giving off a gas	Burns slowly to form a white powder
Magnesium	Very slow reaction	Reacts readily giving off a gas	Burns with a bright white light
Potassium	Violent reaction. It floats on the water surface, burning with a coloured flame	Extremely violent reaction. Burns with a coloured flame	Burns violently with a coloured flame
Copper	No reaction	No reaction	Reacts very slowly
Lead	No reaction	Reacts very slowly	Reacts slowly

(a) Use the information to put the metals in order of decreasing reactivity. The first one has been done for you.

Potassium

[2]

(b) What colour is the flame produced by potassium in water?

_____ [1]

Examiner Only	
Marks	Remark

5 Below there are three statements made by pupils in a class discussion about atoms. However, **one** of these statements is incorrect.



Anne

An atom is always neutral



Jane

Protons, electrons and neutrons do not move in an atom



Mark

Most of the mass of an atom is in the nucleus

Write down the name of the pupil who gave the **incorrect** statement. Explain why this statement is incorrect.

[2]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

6 Below is information about some gases that can pollute the atmosphere.

Gas	Formula	Lifetime in upper atmosphere /years	Contribution to greenhouse effect/%	Source of gas
Carbon dioxide	CO ₂	7	50	Burning fossil fuels
CFC	CF ₂ Cl ₂	100	14	Coolants in fridges
Methane	CH ₄	10	18	Breakdown of organic waste Cows
Nitrous oxide	N ₂ O	170	6	Fertilisers Exhaust fumes Burning fossil fuels

Use the information in the table and your knowledge to answer the questions below.

(a) Write down the name of the gas that is a hydrocarbon.

_____ [1]

(b) Write down the name of the gas that contains three elements.

_____ [1]

(c) Write down the name of the gas(es) with five atoms in their formula.

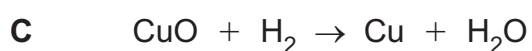
_____ [1]

Examiner Only

Marks

Remark

7 Below are the symbol equations for some chemical reactions.



(a) Which reaction (**A**, **B**, **C** or **D**) represents a displacement reaction?

_____ [1]

(b) Which reaction (**A**, **B**, **C** or **D**) represents a neutralisation reaction?
Explain your answer.

_____ [2]

(c) One of these reactions represents reduction. Explain what is meant by 'reduction'.

_____ [1]

Examiner Only

Marks Remark

8 The compounds below are all hydrocarbons.

butane

ethane

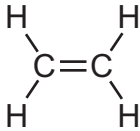
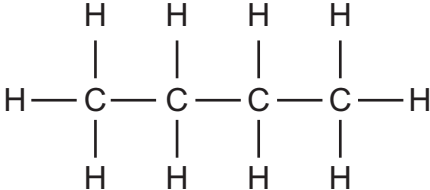
propene

propane

(a) Which of the above compounds is **not** an alkane?

_____ [1]

(b) The table below is about some hydrocarbons.
Fill in the missing answers.

Name of hydrocarbon	Molecular formula	Structural formula
propane	C_3H_8	
ethene		
	C_4H_{10}	

[3]

(c) Propene can undergo polymerisation to form polypropene. Explain what is meant by 'polymerisation'.

_____ [2]

Examiner Only

Marks

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