



*Rewarding Learning*

**General Certificate of Secondary Education  
2013–2014**

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**Science: Single Award**

Unit 2 (Chemistry)

Higher Tier

**[GSS22]**

**THURSDAY 15 MAY 2014, MORNING**

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**MARK  
SCHEME**

## **General Marking Instructions**

### **Introduction**

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

### **The Purpose of Mark Schemes**

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

			AVAILABLE MARKS
<b>1</b>	<b>(a)</b> Nucleus [1] (electron) shell [1]	[2]	9
	<b>(b)</b> 4	[1]	
	<b>(c)</b> The number of protons <b>and</b> neutrons	[1]	
	<b>(d)</b> Group 2 [1] the atom has two electrons in its outside shell [1]	[2]	
	<b>(e)</b> 2.6	[1]	
	<b>(f)</b> <b>(i)</b> Magnesium oxide	[1]	
	<b>(ii)</b> Oxidation (accept combustion)	[1]	
<b>2</b>	<b>(a)</b> Sedimentary [1] metamorphic [1] (Any order)	[2]	4
	<b>(b)</b> Aluminium	[1]	
	<b>(c)</b> 5.7	[1]	

3 (a) Indicative Content:

- Similarities: **two** from: metal floats on water, bubbles/fizzing/gas given off, moves on water, metal dissolves/disappears, exothermic
- Differences: **two** from: potassium more vigorous, faster, lilac flame
- Products: metal hydroxide and hydrogen [6]

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to compare the reactivity of potassium and sodium with water using <b>five or six</b> of the points above, in a logical sequence which includes a named product. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
B	Candidates use some appropriate specialist terms to compare the reactivity of potassium and sodium with water using <b>three to four</b> of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates compare the reactivity of potassium and sodium with water using <b>one or two</b> of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1–2]
D	Not worthy of credit.	[0]

- (b) Francium is very/too reactive [1]  
it would be dangerous [1] [2]

- 4 (a) Sodium chloride [1]  
water [1]  
carbon dioxide [1] (Any order) [3]

- (b) Sodium hydroxide is a strong alkali/too corrosive [1]

- (c)  $2\text{NaHCO}_3$  [1]

- 5 (a) (i) Three [1]

- (ii) Magnesium and aluminium [1]

- (iii) Seven [1]

- (b)  $\text{Al}_2\text{O}_3$  [1]

- (c) Aluminium is more reactive than iron [1]  
and replaces a less reactive metal from its salt [1] [2]

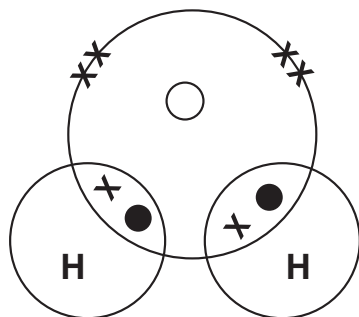
AVAILABLE  
MARKS

8

5

6

- 6 (a) (i)  $1.6 \times 4$  [1]  
6.4 [1] [2]
- (ii) Calcium **and** magnesium [1]
- (b) (i) Difficult to lather with soap/forms scum with soap [1]
- (ii) Any two from:  
adding washing soda/ion exchange/distillation [2]
- (c) HCl [1]  
CaCl<sub>2</sub> [1]  
correct balancing [1] (2HCl) [3]
- (d) (i) B is temporary hard water [1]  
there was more lather after boiling than before/boiling softened the water [1] [2]
- (ii) Add soap and shake [1]  
until a permanent lather forms/measure the height of the lather [1]  
repeat with boiled water samples [1] [3]
- (iii) Any two from:  
same amount of soap [1]  
same amount of water [1]  
same amount of shaking [1]  
or other suitable [1] [2]
- 7 (a) (i) Sodium loses one electron [1]  
chlorine gains one electron [1]  
to form full outer shells/idea of electrostatic attraction/idea of forming ions [1] [3]
- (ii) Any named ionic compound, e.g. magnesium oxide [1]
- (b) (i) Correct diagram including:



1 oxygen and 2 hydrogens [1]  
Correct sharing [1]  
Correct total number of electrons [1] [3]

- (ii) The two atoms are the same/only one element [1]

AVAILABLE  
MARKS

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8

- 8 (a) (i) High density polyethene's maximum usable temperature is above 100 °C  
(penalise other responses) [1]
- (ii) High density polyethene [1]  
insoluble in oil below 110 °C [1]  
maximum usable temperature above 90 °C [1]  
(penalise reference to density) [3]
- (b) Biodegradable plastics will decompose [1]  
reduce landfill sites or other suitable [1] [2]
- (c) (i) Polymerisation [1]  
**Many** small molecules/ethene molecules [1]  
Join together/make a long chain polymer [1] [3]
- (ii)
- $$\left[ \begin{array}{cc} \text{H} & \text{H} \\ | & | \\ -\text{C} & -\text{C}- \\ | & | \\ \text{H} & \text{H} \end{array} \right]_n$$
- Double bond removed [1]  
(Square) brackets [1]  
n in correct position [1] [3]
- (d) Fractional distillation [1]

AVAILABLE  
MARKS

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**9 Indicative Content:**

- Electrolysis is the breaking down of a substance/bauxite
- Using electricity
- Anode is the positive electrode and cathode is the negative electrode
- Anode/cathode are made from carbon/graphite
- Aluminium ions move [1]
- to the negative electrode/cathode [1]
- where they gain three [1]
- electrons [1]

(Ionic equation acceptable  $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$  [2])

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the process of electrolysis and its role in the extraction of aluminium using <b>five or more</b> of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
B	Candidates use some appropriate specialist terms to describe the process of electrolysis and its role in the extraction of aluminium using <b>three to four</b> of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates describe the process of electrolysis and its role in the extraction of aluminium using <b>one or two</b> of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1–2]
D	Not worthy of credit.	[0]

[6]

**Total**

**AVAILABLE MARKS**

6

**75**