



*Rewarding Learning*

**General Certificate of Secondary Education  
2014–2015**

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**Science: Single Award**

Unit 2 (Chemistry)

Higher Tier

**[GSS22]**

**THURSDAY 14 MAY 2015, 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								
1	(a)	Strong [1] cheap [1] penalise: m.p./density	[2]	6							
	(b)	Gold is very dense/heavy[1] wires may break/too heavy for pylons [1] independent marks	[2]								
	(c)	Aluminium [1] low density [1] penalise reference to other reasons (ignore cost)	[2]								
2	(a)	X placed in correct position (Group 7)	[1]	6							
	(b)	(i) D/argon	[1]								
		(ii) A	[1]								
	(c)	18	[1]								
(d)	Octaves [1] Mendeleev [1]	[2]									
3	(a)	(i) Copper [1] water [1] (either order)	[2]	6							
		(ii) Reduction (accept REDOX)	[1]								
	(b)	Y [1] the diagram shows two of the <b>same</b> type of atom joined together [1]	[2]								
(c)	6	[1]									
4	(a)	Bone <b>combines</b> two or more materials [1] reference to properties/reference to hard & flexible [1] more useful/better material/for a particular property/purpose [1]	[3]	7							
	(b)	(i) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th style="padding: 5px;">Element</th> <th style="padding: 5px;">Number of protons</th> <th style="padding: 5px;">Number of neutrons</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Phosphorus</td> <td style="padding: 5px; text-align: center;">15 [1]</td> <td style="padding: 5px; text-align: center;">16</td> </tr> <tr> <td style="padding: 5px;">Oxygen</td> <td style="padding: 5px; text-align: center;">8</td> <td style="padding: 5px; text-align: center;">8 [1]</td> </tr> </tbody> </table>	Element		Number of protons	Number of neutrons	Phosphorus	15 [1]	16	Oxygen	8
Element	Number of protons	Number of neutrons									
Phosphorus	15 [1]	16									
Oxygen	8	8 [1]									
	(ii)	zero/ $\frac{1}{1840}$ [1] or range $\frac{1}{1800} \rightarrow \frac{1}{2000}$ -1 [1]	[2]								

## 5 Indicative Content:

### Method

- use a **flame test** rod/nichrome wire
- dip into (concentrated) acid
- dip into the metal salt
- place into **blue** Bunsen flame
- clean the rod/use new rod

or

- use a spray bottle
- make a solution of the salt/add water
- spray into flame
- use blue Bunsen flame
- clean bottle/use a new bottle

### Results

- copper – blue-green
- lithium – red

[6]

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe carrying out a flame test using <b>five to seven</b> of the points above, in a logical sequence including at least one result. 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 carrying out a flame test using <b>three or 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 carrying out a flame test 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]

AVAILABLE  
MARKS

6

			AVAILABLE MARKS		
<b>6</b>	<b>(a)</b>	Thermal decomposition	[1]	10	
	<b>(b) (i)</b>	The gas/CO <sub>2</sub> can escape [1] There should be a bung/cork in the clamped test tube [1] the glass tube must extend into the limewater [1]	[2]		
	<b>(ii)</b>	Turns milky/cloudy	[1]		
	<b>(iii)</b>	Mass will decrease [1] CO <sub>2</sub> /gas is escaping/releasing/producing/losing [1]	[2]		
	<b>(iv)</b>	No more bubbles/no further change in mass/no more CO <sub>2</sub> released	[1]		
	<b>(v)</b>	Sodium carbonate[1] + Water [1] symbols OK	[2]		
	<b>(c)</b>	Tartaric acid	[1]		
<b>7</b>	<b>(a)</b>	Hard water does not lather easily with soap/more soap is required to form a lather with hard water/forms a scum with soap	[1]		6
	<b>(b) (i)</b>	The water is temporary hard water	[1]		
	<b>(ii)</b>	Calcium carbonate	[1]		
	<b>(c)</b>	Calcium <b>ions</b> /Ca <sup>2+</sup> from hard water [1] are replaced by sodium ions [1] sodium ions do not cause hardness/removing calcium ions means the water is no longer hard/contains no calcium ions/contains only sodium ions [1]	[3]		
<b>8</b>	<b>(a)</b>	All plotted correctly [2] 4 plotted correctly [1] correct curve [1]	[3]	6	
	<b>(b) (i)</b>	0.43–0.44 (correct value from graph)	[1]		
	<b>(ii)</b>	6 (correct value from graph)	[1]		
	<b>(c)</b>	magnesium (accept calcium or aluminium)	[1]		

			AVAILABLE MARKS
<b>9</b>	(a) Continental drift	[1]	7
	(b) Earthquakes/(fold) mountains	[1]	
	(c) Igneous	[1]	
	(d) 98.75%	[1]	
	(e) <ul style="list-style-type: none"> <li>• radioactive isotopes/radio isotopes/elements [1]</li> <li>• found in uranium/potassium [1]</li> <li>• used the half life/ratio/proportions of decayed/undecayed or parent/daughter [1]</li> </ul>	[3]	
<b>10</b>	(a) More vigorous reaction/explode <b>instantly</b> [1] further down group 1 [1]	[2]	9
	(b) (i) Sodium has one electron in its outer shell/same number of electrons as potassium and rubidium	[1]	
	(ii) $2\text{Na} + 2\text{H}_2\text{O} [1] \rightarrow 2\text{NaOH} + \text{H}_2 [1]$ correctly balanced [1]	[3]	
	(c) One electron [1] transferred [1] from sodium to chlorine [1] gives [1]	[3]	

## 11 Indicative Content:

- small molecules are called monomers
- the name of the process is polymerisation
- double bond breaks
- breaks/forms single bonds
- monomers join together/combined/connect
- named examples of polymers: polythene/polypropene/poly vinyl chloride/nylon (PVC) [max 2]

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the process using <b>five to seven</b> of the points above, in a logical sequence including at least one named example of a polymer. 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 using <b>three or 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 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]

**Total**

**AVAILABLE  
MARKS**

6

**75**