



Rewarding Learning

**General Certificate of Secondary Education
2016–2017**

Science: Single Award

Unit 2 (Chemistry)

Higher Tier

[GSS22]

THURSDAY 23 FEBRUARY 2017, MORNING

**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)	(i) Sodium carbonate [1] water [1]	[2]	8
		(ii) Thermal decomposition	[1]	
	(b)	(i) Limewater	[1]	
		(ii) Test tube A: There should be a bung in the test tube/ test tube needs to be heated [1] Test tube B: The delivery tube should be in the limewater [1]	[2]	
	(c)	(i) Tartaric acid	[1]	
		(ii) It allows the cake to rise/gives it a lighter texture	[1]	
2	(a)	Lighter [1] too expensive [1]	[2]	4
	(b)	Any two from: Graphene is lighter Graphene is stronger Graphene is less stiff (penalise cost)	[2]	

3 (a) (i) Water that forms a scum/is hard to form a lather [1] with soap [1] [2]

(ii) Calcium/magnesium [1]

(b) **Indicative content**

- temporary hard water
- permanent hard water
- take/measure a sample of each water
- record the amount of soap needed to form a permanent lather/add soap and record the height of the lather
- repeat with boiled samples
- fair test: same amount of water/same amount of shaking
- expected results: temporary needs less soap/produces more lather after boiling
- expected results: permanent needs same soap/produces same lather after boiling

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe hard water using six to eight 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 hard water using four or five 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 hard water using one, two or three 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]

9

4 (a) Similarity: As you move down Group 1 they both decrease [1]
Difference: The boiling points decrease more rapidly/by more [1]

[2]

(b) Alkali metals [1]

(c) The boiling points increase from magnesium to calcium [1]
and then decrease [1] [2]

(d) range 600 °C–700 °C [1]

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			AVAILABLE MARKS	
5	(a) (i)	Major peak labelled	[1]	6
	(ii)	One of the smaller peaks labelled (first 4)	[1]	
	(b)	Richter	[1]	
	(c) (i)	The continents were once one large land mass/Pangaea [1] Over millions of years they have gradually moved apart [1]	[2]	
	(ii)	The continents fit together like a jigsaw/same fossils or types of rocks found on edges of once joined continents	[1]	
6	(a)	D	[1]	3
	(b)	C	[1]	
	(c)	Reduction is when a (substance) loses oxygen/gains hydrogen	[1]	
7	(a) (i)	7	[1]	6
	(ii)	Magnesium	[1]	
	(iii)	W	[1]	
	(iv)	X	[1]	
	(b) (i)	4	[1]	
	(ii)	18	[1]	

- 8 (a) Correct electronic arrangements drawn: hydrogen: 1 [1]
and oxygen: 2.6 [1] [2]

(b) **Indicative content**

- Electrons are **shared**
- Hydrogen atom shares **one** electron
- Oxygen atom shares **two** electrons/Oxygen shares one electron with **each** hydrogen atom
- There are **two** hydrogen atoms required for **each** oxygen atom
- Bonding occurs to give each atom a full outer shell/make each atom stable
- Chemical formula for water is **H₂O**

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the bonding in water using five to six 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 bonding in water using three to four 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 bonding in water using one or two 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]

8

- 9 (a) Cathode, anode [1]

- (b) Carbon is a good conductor [1] Carbon is inert [1] (accept high melting point) [2]

- (c) Aluminium ions (Al³⁺)[1] gain 3 electrons [1] to become aluminium atoms [1] [3]

6

			AVAILABLE MARKS	
10 (a)	A more reactive metal takes the place of [1] a less reactive metal in its compound/solution [1]	[2]	7	
(b)	Copper nitrate [1] silver [1] (either order)	[2]		
(c)	Copper	[1]		
(d)	Iron, copper, silver	[1]		
(e)	Potassium is too reactive/it would be too dangerous	[1]		
11 (a)	A compound/substance that contains carbon and hydrogen [1] only [1]	[2]	12	
(b)	C ₂ H ₆ [1] propane [1]			
	$ \begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & & & \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{H} & & \\ & & & & & & \\ & \text{H} & \text{H} & \text{H} & & & \end{array} $	[1]		[3]
(c)	Alkanes	[1]		
(d)	Fractional distillation [1] crude oil is heated [1] each fraction/hydrocarbon separates at a different boiling point [1]	[3]		
(e)	Correct balancing			
	$\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$	[1]		
(f) (i)	10%	[1]		
(ii)	Oxygen	[1]		
Total				75