



*Rewarding Learning*

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

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**Science: Single Award**

Unit 2 (Chemistry)

Higher Tier

**[GSS22]**

**WEDNESDAY 25 FEBRUARY 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) (i) Calcium chloride (CaCl <sub>2</sub> ) [1]<br>water (H <sub>2</sub> O) [1]<br>(any order)  |                          |                           |                            | [2] | 7  |
|   | (ii) Neutralisation   |                          |                           |                            | [1] |    |
|   | (b) The volume of CO <sub>2</sub> increases with time [1]<br>after 3 mins no more CO <sub>2</sub> produced/stops increasing after 25 cm <sup>3</sup> [1]                    |                          |                           |                            | [2] |    |
| (c) Limewater [1]<br>turns cloudy/milky [1] |   |                          |                           | [2]                        |     |    |
| 2   | (a) Mendeleev   |                          |                           |                            | [1] |    |
|   | (b) Noble gases   |                          |                           |                            | [1] |    |
|   | (c) (i)   |                          |                           |                            |     |    |
|   |   | <b>Number of protons</b> | <b>Number of neutrons</b> | <b>Number of electrons</b> |     |    |
|   | Sodium (Na)   | 11 [1]                   | 12 [1]                    | 11 [1]                     | [3] |    |
|   | (ii) Correct electronic structure drawn; 2.8.1<br>Consequential (c)(i) (12 or 23 only)  |                          |                           |                            | [1] |    |
|   | (d) (i) Any <b>two</b> from:<br>• yellow or orange flame/sparks<br>• bubbles/fizzing/hissing/gas given off<br>• exothermic/(melts) to form a ball<br>• dissolves/disappears |                          |                           |                            | [2] |    |
|   | (ii) Sodium hydroxide   |                          |                           |                            | [1] |    |
|   | (e) Any <b>two</b> from:<br>• both alkali metals<br>• both have one electron in outside shells<br>• both have similar (chemical) reactions/properties                       |                          |                           |                            | [2] | 11 |
| 3   | (a) (i) Burette/measuring cylinder/syringe/pipette  |                          |                           |                            | [1] |    |
|   | (ii) Repeat the experiment  |                          |                           |                            | [1] |    |
|   | (b) Y is a mixture of permanent and temporary hard water [1]<br>It needed a lot of soap solution both before and after boiling [1]  |                          |                           |                            | [2] |    |
|   | (c) Causes 'fur' on kettles/limescale in pipes/leaves stains on clothing/<br>block in pipes/cost qualified (e.g. replace kettles/more energy)<br><b>Not</b> soap related    |                          |                           |                            | [1] | 5  |

#### 4 Indicative Content:

- A displacement reaction has occurred
- Displacement is when a more reactive metal takes the place of a less reactive metal in a compound/full equation
- Magnesium is more reactive than copper/magnesium is higher in the reactivity series
- Copper sulfate is blue
- Solution fades/goes colourless
- Pink/red/brown solid is produced
- Silver/grey solid disappears
- Exothermic

| Band | Response   | Mark    |
|------|--|---------|
| A    | Candidates must use appropriate specialist terms throughout to describe the displacement reaction 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 displacement reaction 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 displacement reaction 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]

6

- 5 (a) Stainless steel [1]
- (b) It can withstand high temperatures (only) [1]
- (c) Low carbon steel [1]  
(strong) and easily shaped [1]  
(penalise reference to hard and ignore cost) [2]
- (d) Stainless steel [1]  
resistant to rusting [1] [2]
- (e) Low carbon steel **combines** two different materials/elements/  
carbon + iron [1]  
harder/stronger than iron/has different properties to iron [1] [2]

8

AVAILABLE  
MARKS

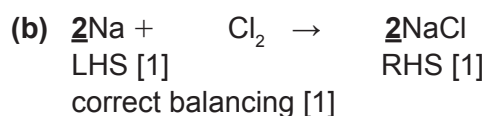
|     |  |  | AVAILABLE MARKS |    |
|-----|--|--|-----------------|----|
| 6   | (a)  | Continents were once one land mass/Pangaea and have drifted/moved apart [1]<br>over millions of years [1]  | [2]             | 9  |
|     | (b)  | The continents move because the mantle moves   | [1]             |    |
|     | (c)  | Tectonic plates move past each other [1]<br>pressure/tension builds up [1]<br>sudden movement/release of this pressure causes an earthquake [1]  | [3]             |    |
|     | (d)  | The Richter scale  | [1]             |    |
|     | (e)  | Volcanoes [1]<br>mountain building/ranges [1]  | [2]             |    |
| 7   | (a)  | H <sub>2</sub> O [1]<br>CO <sub>2</sub> [1] either order<br>correct balancing [1]  | [3]             | 5  |
|     | (b)  | It produces carbon dioxide/gas [1]<br>which allows the cakes to rise/gives them a lighter texture [1]  | [2]             |    |
| 8   | (a) (i)  | Red  | [1]             | 10 |
|     | (ii)   | Red cabbage  | [1]             |    |
|     | (b)  | Litmus solution [1]<br>it has a unique colour at pH7/neutral [1]   | [2]             |    |
|     | (c) (i)  | pH sensor, universal indicator, litmus indicator   | [1]             |    |
|     | (ii)   | pH sensor gives a digital reading/pH to decimal places/exact number [1]<br>universal indicator gives a range of (14) colours/shows strength [1]<br>litmus only has two/three colours [1] | [3]             |    |
| (d) | Graph drops at 20 cm <sup>3</sup> [1]<br>levels/finishes at pH 1/2 [1] | [2]  |                 |    |
| 9   | (a)  | Methane [1]<br>correct structural formula for C <sub>3</sub> H <sub>8</sub> [1]<br>C <sub>4</sub> H <sub>10</sub> [1]  | [3]             | 5  |
|     | (b)  | Oxygen   | [1]             |    |
|     | (c)  | Polymerisation   | [1]             |    |

10 (a) Indicative content

- Sodium loses one electron
- Chlorine gains one electron
- Idea of **transfer** from sodium to chlorine
- Sodium chloride
  
- There are two hydrogen atoms for every oxygen atom
- Idea of **sharing** electrons
- **Each** hydrogen atom shares **one** electron
- Water

| Band | Response  | Mark    |
|------|---|---------|
| A    | Candidates must use appropriate specialist terms throughout to describe the bonding using <b>five or more</b> of the points above, in a logical sequence making reference to both compounds. 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 using <b>three to four</b> of the points above, in a logical sequence making reference to both compounds. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard. | [3]–[4] |
| C    | Candidates describe the bonding 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]



[3]

**Total**

AVAILABLE  
MARKS

9

**75**