



*Rewarding Learning*

**General Certificate of Secondary Education  
2015–2016**

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**Science: Single Award**

Unit 2 (Chemistry)

Higher Tier

**[GSS22]**

**THURSDAY 25 FEBRUARY 2016, 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.

- 1 (a) (i) All points plotted correctly [1]  
correct line of best fit [1] (not back to point 0,0)  
(mark line of best fit independently) [2]
- (ii) As the percentage of gold increases the number of carats increases  
**or**  
opposite, not **they** both increase. [1]
- (iii) 58–59%  
or correct from graph [1]
- (b) 2.8.3 [1]
- 2 (a) (i) Carbon dioxide/CO<sub>2</sub> [1]
- (ii) Thermal decomposition [1]
- (b) Reaction had not started/temperature was not high enough/  
not enough carbon dioxide produced [1]
- (c) Any **two** from:  
The reaction was finished [1]  
all the sodium hydrogencarbonate had reacted/only a small amount  
of sodium hydrogencarbonate was used [1]  
no more carbon dioxide/gas produced [1] [2]
- 3 **Indicative Content:**
- add aluminium powder/talc
  - sprinkle powder over print/dust/brush
  - brush off any **excess** powder
  - lift print with (clear) tape/cellotape
  - place onto card/glass/any colour of card
  - whorl print shown above/labelled on diagram
  - fingerprints are unique/everyone has their own
  - place criminal at crime scene/use a database

AVAILABLE  
MARKS

5

5

6

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout using <b>7 or 8</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 using <b>4, 5 or 6</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 lifting of a fingerprint method using <b>1, 2 or 3</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]

4 (a)

Solution Metal	Copper sulfate	Zinc sulfate	Magnesium sulfate
Copper		X	X
Zinc	✓		X
Magnesium	✓	✓	

half mark for each correct answer, rounded down [2]

(b) Magnesium sulfate [1]  
zinc [1] (either order) [2]

(c) Displacement [1]

5 (a) **Fractional** distillation [1]

(b) Refinery gas/naphtha/lubricating oil/tar (bitumen) [1]

(c) 4800/4.8 [1] 1000 [1] [2]

(d) Demand for jet fuel is increasing [1]  
production of jet fuel is decreasing [1] [2]

(e) Any **two** from:  

- the current values are estimates/guesses
- difficult to predict what will happen in the future/may be fewer planes
- more oil discovered
- other alternative answer, e.g. alternative fuels used/new fuel

[2] 8

6 (a) Chain of small molecules/monomers [1]  
joined/bonded together [1] [2]

(b) Ultraviolet light/watermark/metal strip/hologram [1]

(c) Can be broken down [1]  
by microbes [1] [2] 5

AVAILABLE MARKS

5

8

5

			AVAILABLE MARKS			
7	(a)	(i) Steel has a <b>high</b> density/is heavy [1]	[1]	10		
		(ii) Kevlar [1] kevlar is very strong <b>and</b> light [1]	[2]			
	(b)	(i) Carbon (fibre) and plastic [1] combined to make a more useful material [1]	[2]			
		(ii) Glass fibre/reinforced glass/(reinforced) concrete/bone/steel or other suitable [1]	[1]			
	(c)	(i) Aluminium/Magnesium [1]	[1]			
		(ii) Carbon/graphite [1] conducts electricity/inert [1]	[2]			
(iii) Negatively/negative [1]		[1]				
8	(a)	(i) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$ [1]	[1]	11		
		(ii) Magnesium loses electrons [1] two electrons [1] oxygen gains electrons [1]	[3]			
		(iii) NaCl [1]	[1]			
	(b)	(i) 4 (Magnesium, hydrogen, carbon, oxygen) [1]	[1]			
		(ii) 2 [1]	[1]			
		(iii) 11 [1]	[1]			
	(c) Any <b>three</b> from: Molecule B is an element/not a compound [1] as it contains <b>one type of atom</b> [1] molecule A has <b>two different types</b> of atom [1] molecule A is a compound [1]	[3]				
	9	(a)	(i) Burette/pipette/ <b>25 cm<sup>3</sup></b> measuring cylinder [1]		[1]	7
			(ii) No spillage/easier to shake [1]		[1]	
(iii) Water that is hard to lather with soap [1]			[1]			
(b)		Town Y [1] after boiling the volume did decrease removing the temporary hardness [1] did not go down enough representing also permanent hardness [1]	[3]			
		(c) Calcium chloride/magnesium chloride/calcium sulfate/magnesium sulfate [1]	[1]			

## 10 Indicative Content

## Theory

- originally one continent/'Pangaea'
- it broke up and formed other continents/continental drift
- over millions of years

## Evidence

- continents fitted together (like a jigsaw)
- rock (features) in one continent extended into another continent
- fossils found in different continents match up across the joint

## Rejection

- geologists believed that continents could not drift/no evidence at that time/couldn't see this happen

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout using <b>six or seven</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 using <b>four to five</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 use <b>one to three</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]

- 11 (a) (i) Ethene [1]
- (ii) Correct structure for methane [1]  
 $C_4H_{10}$  [1] [2]
- (b) Polymerisation [1]
- (c)  $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$   
 LHS [1] RHS [1] Correct balancing if both sides are correct [1] [3]

Total

6

7

75