



Rewarding Learning

**General Certificate of Secondary Education
2014**

Double Award Science: Chemistry

Unit C2

Foundation Tier

[GSD51]

TUESDAY 10 JUNE 2014, AFTERNOON

**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) oxygen [1]
hydrogen [1] [2]
- (ii) reduction [1]
- (b) $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$ [1]
 $2\text{HI} \rightarrow \text{H}_2 + \text{I}_2$ [1]
 $\text{CuS} + \text{O}_2 \rightarrow \text{Cu} + \text{SO}_2$ [1] [3]

- 2 (a) Colourless/odourless/tasteless/
or other correct physical property
Accept (slightly) soluble in water
Not gas, **not** low boiling point, **not** low density
[1] for each correct answer
max (2 × [1]) [2]
- (b) Breathing (apparatus)/steel making/welding/rocket engines or other correct
Not combustion, **not** hospitals (not medical use unless qualified)
[1] for each correct answer **max** (2 × [1]) [2]

(c)

Element	Colour of element	Colour of flame during heating with oxygen	Description of product
sulfur	yellow [1]	blue [1]	choking/colourless/pungent/acidic [1] gas [1]
magnesium	grey/silver-grey [1] Accept silver Not shiny	bright/white [1]	white or white/grey [1] Not grey solid/ash/powder [1]

[8]

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- 3 (a) (i) Poisonous or toxic **or** explanation linked to haemoglobin/red blood cells [1]
Colourless or odourless [1]
second mark dependent on first [2]
- (ii) Idea of lack of oxygen gas/incomplete combustion [1]
- (b) (i) colourless [1]
denser than air [1] [2]
- (ii) Soluble/odourless/colourless/tasteless
Not cheap, **not** idea of keeping drinks fizzy/**not** toxic/**not** harmful [1]
- (iii) Fire extinguishers/dry ice
or other correct
[1] for each correct answer
max (2 × [1]) [2]
- (c) (i) Greenhouse effect [1]
- (ii) Any **two** of the following:
 - Increase in the Earth's temperature/global warming
 - Decrease in rainfall
 - Melting of polar ice caps
 - Sea levels rising
 - Flooding in low lying areas
or other correct
Not climate/not weather change – unless qualified
Not ozone layer ideas
[1] for each correct answer
max (2 × [1]) [2]

AVAILABLE
MARKS

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4 (a) Any **three** of the following:

- Heat
- Use zinc powder or smaller granules or increase surface area
- Use **more concentrated** acid **not** more acid **not** stronger
- Add a catalyst
- Shake/stir/mix

or other correct

[1] for each correct answer

max (3 × [1])

[3]

(b) *Feasible methods enable either the (loss in) mass to be measured/recorded or the volume of gas produced to be measured/recorded.*

Indicative content

- Placing the dilute acid and the marble chips in a suitable reaction container
- Using a (top pan) balance **or** using a gas syringe – in a correct context
- Idea of start the clock/time
- At the start weigh the contents of the beaker/flask **or** at the start take an initial syringe reading/zero the syringe
- Measure/record loss in mass **or** gain in (gas) volume **or** time needed for marble chip(s) to disappear/reaction to stop
- Idea of measuring/recording the change at different times **or** if time was measured for marble chip(s) to disappear then loss in mass is also measured/recorded
- Idea of plotting a graph (using the results) **or** idea of calculating the rate
- Idea that the graph should be mass **or** volume against time **or** that the rate calculation is mass or volume/time

Response	Mark
Candidates must use specialist terms throughout to plan the experiment in a logical sequence (6 or more indicative points required). They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates use some specialist terms to plan the experiment in a logical sequence (4 to 5 indicative points required). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates give 1 to 3 of the indicative points tested but not necessarily in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1]–[2]
Response not worthy of credit.	[0]

[6]

AVAILABLE
MARKS

			AVAILABLE MARKS	
(c)	(i)	Volume of H ₂ gas (cm ³) unit needed	[1]	15
	(ii)	8–9 correct points – within $\frac{1}{2}$ square 7 correct points [1] Smooth curve starting at zero	[2] [1] [3]	
	(iii)	90(s) or 90 seconds units needed	[1]	
	(iv)	30 ±1(s) or seconds If units absent in (iii) and (iv) apply CM If answer outside 29–31 seconds range check graph again – if answer/error due to poor curve penalise curve in 4(c)(ii) but allow answer in 4(c)(iv)	[1]	
5	(a)	(i) Most reactive zinc nickel Least reactive copper all three correct [2] all correct but reversed [1] No credit for listing compounds	[2]	9
	(ii)	Idea of being too reactive or of reacting with the water	[1]	
	(iii)	(Light) blue [1] → colourless or idea that a blue solution fades [1] Not clear	[2]	
	(iv)	Magnesium/aluminium	[1]	
	(b)	(i) Gold	[1]	8
	(ii)	Aluminium or calcium	[1]	
	(iii)	Iron or lead – allow silver or gold	[1]	
6	(a)	(i) 85	[1]	8
	(ii)	98	[1]	
	(iii)	74	[1]	
	(b)	The relative formula mass [1] in grams [1] of a substance Second mark depends on first	[2]	8
	(c)	(i) 0.5 mole	[1]	
	(ii)	8 tonne = 8000 kg or 8 000 000 g 8 tonne = 50 000 moles [2] (1 method mark for correct step but incorrect answer) e.g. $\frac{8000}{160} = 50$ or $0.5 \times 100 = 50$	[2]	

				AVAILABLE MARKS						
7	(a) (i)	calcium oxide [1] carbon dioxide [1] either order	[2]							
	(ii)	Takes in heat energy from the surroundings	[1]							
	(iii)	thermal decomposition	[1]							
	(b)	Carbon dioxide dissolves in rain water [1] to form (carbonic) acid/an acidic solution [1] This reacts with (insoluble) calcium carbonate/limestone [1] to form a soluble calcium compound/calcium hydrogencarbonate/calcium ions in solution [1]	[4]							
	(c) (i)	73–75%	[1]							
	(ii)	Idea of being 'locked'/trapped in fossil fuels Idea of being 'locked'/trapped in carbonates/limestone Idea of being absorbed/used by plants/trees in photosynthesis Idea of being dissolved in oceans Any 2 × [1]	[2]		11					
8	(a) (i)	colourless odourless if 3 ticks – 2 correct award [1]	[1] [1] [2]							
	(ii)	Food packaging/coolant or other correct	[1]							
	(b) (i)	<table border="1"> <tbody> <tr> <td>temperature</td> <td>250–450 °C [1]</td> </tr> <tr> <td>catalyst</td> <td>Iron [1]</td> </tr> <tr> <td>pressure</td> <td>200–500 atm [1]</td> </tr> </tbody> </table>	temperature		250–450 °C [1]	catalyst	Iron [1]	pressure	200–500 atm [1]	[3]
temperature	250–450 °C [1]									
catalyst	Iron [1]									
pressure	200–500 atm [1]									
	(ii)	Manufacture of fertilisers Production of nitric acid Manufacture of nylon Or other correct max (2 × [1])	[2]	8						

9	(a)	(i)	Name: Propene or other correct	[1]	AVAILABLE MARKS	
			Molecular formula C ₃ H ₆ or other correct	[1]		[2]
		(ii)	Carbon dioxide [1] water [1] either order			[2]
		(iii)	Polyethene or Polythene			[1]
		(iv)	Disadvantage: Can be unsightly/Idea that they are not broken down/remain for many years/lack of recycling or other correct idea, e.g. idea of harming animals Not loss of habitat, not pollution, not non-biodegradable			[2]
(b)	(i)	(i)	Solvent/fuel or other correct		[1]	
		(ii)	Idea of effect or effects resulting from incapacitation, e.g. dangerous to drive, can leave people vulnerable to be taken advantage of Idea of effect(s) linked to health, e.g. liver damage/brain damage/ heart attack/kidney damage Idea of addiction and financial/social effects Allow any two reasonable answers max (2 × [1])		[2]	10
				Total	90	