



Rewarding Learning

**General Certificate of Secondary Education
2018**

Double Award Science: Chemistry

Unit C2

Foundation Tier

[GSD51]

WEDNESDAY 13 JUNE 2018, 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)	Nail – Galvanising [1]	[3]	14
		Car bonnet – painting [1]		
		Bicycle chain – oiling [1]		
	(b)	Rusting is the reaction of the metal iron [1] with water [1] and air [1] (water and air interchangeable)	[3]	
		(c) (i)	Burning a fuel [1]	
	Turning carbon monoxide (CO) into carbon dioxide (CO ₂) [1] If 3 boxes ticked award [1]			
		(ii) hydrogen	[1]	
	(d)	Test – glowing splint/taper[1]	[2]	
		Result – relights [1]		
	(e) (i)	Hydrogen [1]	[1]	
(ii) Black [1]		[1]		
(iii) (H ₂ O) water		[1]		
2	(a)	Calcium	[2]	11
		Aluminium		
		Iron		
		All three in correct order [2] One or two correct [1]		
	(b)	The reaction is very fast [1]	[3]	
		A silver ball is formed [1]		
		Sodium moves about the surface [1]		
		If four boxes ticked – 3 correct and 1 wrong award [2]		
		If four boxes ticked – 2 correct and 2 wrong award [1] If five boxes ticked award [0]		
	(c)	Burns with bright/white light (not catches fire) allow flame	[3]	
White powder formed accept ‘ash’ allow grey-white not ‘grey’				
Heat given out				
White smoke Magnesium disappears Idea of vigorous reaction Any 3 × [1] Maximum [3]				
(d) (i)	From blue [1] to colourless [1]	[3]		
	(ii) Idea that copper is displaced (not general idea of a reaction) [1] Accept idea that zinc sulfate solution is colourless			

- 3 (a) Idea of adding soap to the water [1]
A lather is formed [1] [2]

(b)

Statement	Temporary hardness True or False?	Permanent hardness True or False?
forms a scale in kettles		False
can be removed on boiling	True	False
Is good for teeth and bones	True	

4 correct = [2]; 2 or 3 correct = 1 [2]

- (c) (i) Calcium (ion) **or** magnesium (ion) [1]
Allow Ca^{2+} or Mg^{2+} [1]

- (ii) Any **two** from:
Idea of wasting soap/costs money to replace soap
Idea of costing money to soften
Idea of (cost of) repairs to boilers etc.
Or other correct
(2 × [1]) [2]

- 4 (a) Burning natural gas – no [1]
Neutralising acid with alkali – no [1]
Water turning into steam – yes [1] [3]

- (b) (i) Calcium oxide [1] carbon dioxide [1] [2]
(ii) Thermal decomposition [1] [1]

- (c) Neutralising acidity in soil [1]
Making building materials [1] [2]

AVAILABLE
MARKS

7

8

		AVAILABLE MARKS
5 (a)	Any three from: (pale) yellow brittle solid (at RTP) poor conductor of electricity insoluble (in water) low melting point (3 × [1])	[3]
(b) (i)	it (continues to) glow(s)/gives out heat [1] idea that a grey or black solid (not powder) is formed [1] i.e. idea of turning grey or black unless wrongly qualified; not 'soot'; not 'powder'; not 'ash' ignore reference to smell	[2]
(ii)	Fe + S → FeS LHS [1] RHS [1] If balancing wrong but formulae all correct award [1]	[2]
(c) (i)	blue [1]	[1]
(ii)	pungent [1]	[1]
(d) (i)	idea that the spray reacts with/neutralises/removes the acidic substance [1] sulfur dioxide unless wrong qualified [1]	[2]
(ii)	Any two from: idea of burning less fossil fuels idea of using renewable named energy sources idea of removing sulfur from fuels (before combustion) or other correct, e.g. legislation, electrostatic precipitation Any 2 × [1]	[2]
		13

6 Indicative content:

Physical properties

- Colourless
 - Odourless
 - Tasteless
 - More dense than air
 - (Slightly) soluble in water
- (Any three physical properties)

Reaction

- Reacts with water forming carbonic acid
- Turns limewater milky
- Idea that if excess carbon dioxide added the precipitate dissolves

Global warming

- Idea of CO₂ insulating heat on the earth's surface/CO₂ absorbs infrared radiation
- An effect of global warming,
- A second effect of global warming, e.g. melting polar icecaps, sea levels rise, loss of habitat, climate change, weather change or other correct

Response	Marks
Candidates must use specialist terms throughout (7–9 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 throughout (4–6 indicative points required) They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates give 2–3 of the indicative points. They use limited spelling, punctuation and grammar and have little use of specialist terms.	[1]–[2]
Response not worthy of credit. Candidates make reference to less than 2 of the points above and offer no other suitable response.	[0]

[6]

6

AVAILABLE
MARKS

			AVAILABLE MARKS	
7	(a) (i)	46	[1]	7
	(ii)	126	[1]	
	(iii)	96	[1]	
	(b)	... in grams [1] is (known as) a/one mole (of the substance) [1] (second mark depends on the first)	[2]	
	(c) (i)	4	[1]	
	(ii)	160	[1]	
8	(a)	$\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ RHS [1] Balancing – if RHS formulae correct [1]	[2]	11
	(b)	x-axis labelled as Time/s [1] 6 or 7 points correct [2] 4 or 5 points correct [1] Correct curve not ruler drawn [1]	[4]	
	(c) (i)	Idea that the reaction has finished	[1]	
	(ii)	9 cm ³ (+/-1) units needed	[1]	
	(d) (i)	Increase	[1]	
	(ii)	Decrease	[1]	
	(iii)	Decrease	[1]	

- 9 (a) A compound/substance/molecule made up of carbon and hydrogen (atoms) only (clearly implied) [2]
If "made up of/consisting of ..." is stated then "only" is clearly implied
If "only" is not clearly implied, e.g. "a substance containing carbon and hydrogen atoms" award [1] [2]

- (b) Clear idea that fractions have different boiling points [1]
Idea that fractions condense at different temperatures/collect at different levels (in the column)/correct idea of a temperature gradient [1] [2]

(c)

Name	Molecular formula	Structural Formula	Physical state at room temperature
ethene	C_2H_4	$\begin{array}{c} H & H \\ & \\ C & = & C \\ & \\ H & H \end{array}$	Gas [1]
propane [1]	C_3H_8 [1]	$\begin{array}{c} H & H & H \\ & & \\ H - C & - & C & - & C - H \\ & & \\ H & H & H \end{array}$	Gas [1]

[4]

- (d) (i) ethene [1]
(ii) addition [1] polymerisation [1] [2]

- (e) Any **two** from:
Bubbles (of gas)/fizzing/effervescence/gas given off (not just "gas", not gas produced)
Idea that the gas is colourless
Magnesium/solid dissolves/disappears
Colourless solution remains
Idea that the reaction produces heat (not just "exothermic")
Idea that reaction is slow(ish)
(2 × [1]) [2]

Total

AVAILABLE
MARKS

13

90