



*Rewarding Learning*

**General Certificate of Secondary Education  
January 2019**

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**GCSE Chemistry**

Unit 2

Foundation Tier

**[GCH21]**

**FRIDAY 25 JANUARY, AFTERNOON**

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**MARK  
SCHEME**

## **General Marking Instructions and Mark Grids**

### ***Introduction***

Mark schemes are intended to ensure that the GCSE examination is marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria that they should apply in allocating marks to candidates' responses. The mark schemes should be read in conjunction with these marking instructions.

### ***Quality of candidates' responses***

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

### ***Flexibility in Marking***

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

### ***Positive Marking***

Examiners must be positive in their marking, giving appropriate credit for description, explanation and analysis, using knowledge and understanding and for the appropriate use of evidence and reasoned argument to express and evaluate personal responses, informed insights and differing viewpoints. Examiners should make use of the whole of the available mark range of any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

### ***Awarding zero marks***

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

### ***Types of mark scheme***

Mark schemes for questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

			AVAILABLE MARKS	
<b>1</b>	<b>(a)</b>	<b>(i)</b> anhydrous copper(II) sulfate [1] white [1] to blue [1]	[3]	13
		<b>(ii)</b> barium sulfate	[1]	
		<b>(iii)</b> anhydrous calcium chloride	[1]	
		<b>(iv)</b> water vapour [1] water [1]	[2]	
		<b>(v)</b> sodium fluoride	[1]	
	<b>(b)</b>	<b>(i)</b> X	[1]	
		<b>(ii)</b> Y	[1]	
		<b>(iii)</b> Z	[1]	
		<b>(iv)</b> Ca <sup>2+</sup> /Mg <sup>2+</sup>	[1]	
		<b>(v)</b> scum	[1]	

- 2 (a) (i) 
$$\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{C} = \text{C} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$$
 [1]
- (ii)  $\text{C}_2\text{H}_4$  [1]
- (iii)  $\text{C}_n\text{H}_{2n}$  [1]
- (iv)  $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$   
 correct formulae of reactants [1]  
 correct formulae of products [1]  
 correct balancing [1] [3]
- (b) (i) any **two** from:  
 bubbles/effervescence/gas produced  
 heat released  
 solid or sodium carbonate disappears  
 colourless solution formed [2]
- (ii)  $\text{Na}_2\text{CO}_3$  [1]
- (iii) does not contain carbon and hydrogen only [1]
- (iv) a long chain molecule [1]
- (c) sugar solution and yeast [1]  
 warm [1]  
 absence of air/anaerobic [1]  
 produces ethanol and carbon dioxide [1] [4]
- (d) (i) can be replaced in a human lifetime/does not run out [1]
- (ii) coal/oil/natural gas/peat/turf/lignite [1]

AVAILABLE  
MARKS

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			AVAILABLE MARKS
<b>3 (a) (i)</b>	circle round hydrogen; oxygen; carbon dioxide	[1]	
<b>(ii)</b>	$2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ correct formula of reactant [1] correct formulae of products [1] correct balancing [1]	[3]	
<b>(iii)</b>	manganese(IV) oxide	[1]	
<b>(iv)</b>	conical flask with magnesium and hydrochloric acid in contact [1] sealed system with delivery tube/side arm connection [1] gas syringe [1] timer/stopclock [1]	[4]	
<b>(b) (i)</b>	$99\text{s} \pm 2$	[1]	
<b>(ii)</b>	$0.0101 \text{ (s}^{-1}\text{)}$	[1]	
<b>(iii)</b>	starts at 0,0 [1] stays above line [1] levels off at same gas volume but earlier [1]	[3]	14

- 4 (a) (i) two atoms [1] covalently bonded [1] [2]
- (ii) colourless [1]  
odourless [1] [2]
- (b) (i) hydrogen [1]
- (ii) 450°C [1]  
200 atm [1] [2]
- (iii) iron [1]
- (c) (i)  $2\text{NH}_3 + \text{H}_2\text{SO}_4 \rightarrow (\text{NH}_4)_2\text{SO}_4$   
correct formulae of reactants [1]  
correct formula of product [1]  
correct balancing [1] [3]
- (ii) nitric acid [1]
- (d) **Indicative content:**  
glass rod [1]  
dipped in concentrated hydrochloric acid [1]  
apply to the gas [1]  
white smoke/white fumes/white cloud [1]  
 $\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl}$  [2]

Response	Mark
Candidates must use appropriate specialist terms to describe the test for ammonia gas (5–6 points). They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates use some appropriate specialist terms to discuss the test for ammonia gas (3–4 points). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates describe the test for ammonia gas (using a minimum of 2 points). They use limited spelling, punctuation and grammar and form and style are of a limited standard.	[1]–[2]
Response not worthy of credit	[0]

[6]

AVAILABLE  
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- 5 (a) (i)  $\text{NaHCO}_3 + \text{HCl} \rightarrow \text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$   
 correct formulae of reactants [1]  
 correct formula of products [1] [2]
- (ii) endothermic [1]  
 temperature decreases/falls [1] [2]

(b)

Reaction	Exothermic	Endothermic
Rusting	✓	
Combustion of methane	✓ [1]	
Thermal decomposition of calcium carbonate		✓ [1]

[2]

- (c) (i) reaction of a fuel [1]  
 reaction with oxygen [1]  
 forming oxides [1] and releasing heat [1] max [3]
- (ii) gain of oxygen/loss of hydrogen/loss of electrons [1]
- (iii) redox [1]

- (d) (i) oxygen [1]  
 water [1] [2]
- (ii) brown/orange [1] flaky [1] solid [1] max [2]

(iii)

Object	Oiling	Painting	Galvanising
Bridge		✓ or	✓ [1]
Bicycle chain	✓	or	✓ [1]

[2]

- (iv) zinc [1]

AVAILABLE  
MARKS

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			AVAILABLE MARKS	
<b>6</b>	<b>(a)</b>	<b>(i)</b> A = delivery tube [1] B = gas jar [1]	[2]	
		<b>(ii)</b> to generate steam	[1]	
		<b>(iii)</b> hydrogen	[1]	
		<b>(iv)</b> copper/silver/gold	[1]	
	<b>(b)</b>	<b>(i)</b> haematite	[1]	
		<b>(ii)</b> hot air	[1]	
		<b>(iii)</b> B = molten slag [1] C = molten iron [1]	[2]	
		<b>(iv)</b> carbon dioxide/carbon monoxide/nitrogen	[1]	10
	<b>Total</b>			<b>90</b>