



*Rewarding Learning*

**General Certificate of Secondary Education  
2018**

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**GCSE Chemistry**

Unit 2

Foundation Tier

**[GCH21]**

**WEDNESDAY 20 JUNE, MORNING**

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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, the 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) (i)</b> $10^{-9}\text{m}$	[1]
	<b>(ii)</b> idea that all of the effects of nanoparticles are not yet known/ specific risk	[1]
	<b>(b) (i)</b> oxygen/ $\text{O}_2$	[1]
	<b>(ii)</b> $\text{CO}_2 + \text{C} \rightarrow 2\text{CO}$ correct formulae of reactants [1] correct formula of product [1] correct balancing [1]	[3]
	<b>(iii)</b> haematite	[1]
	<b>(iv)</b> $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$ correct formulae of reactants [1] correct formulae of products [1] correct balancing [1]	[3]
	<b>(c) (i)</b> decomposition [1] using electricity [1]	[2]
	<b>(ii)</b> loss of oxygen/gain of hydrogen/gain of electrons	[1]
		13

- 2 (a) (i) petrol [1]  
kerosene [1]  
bitumen [1] [3]
- (ii) fractional distillation [1]
- (iii) cannot be replaced in a human lifetime/will eventually run out [1]
- (iv) contains only carbon and hydrogen (atoms) [1]
- (b) (i) B ethane [1]  
D ethene [1]  
F propene [1] [3]
- (ii)  $C_3H_8$  [1]
- (iii)  $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$   
correct formulae of reactants [1]  
correct formulae of products [1]  
correct balancing [1] [3]
- (iv) alkanes [1]
- (v)  $C_n H_{2n}$  [1]
- (vi) carbon monoxide [1]  
water [1]  
carbon (soot) [1] [3]

AVAILABLE  
MARKS

18

- 3 (a) (i)  $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$   
correct formulae of reactants [1]  
correct formulae of products [1]  
correct balancing [1]
- (ii) white
- (b) (i) 270–275 s
- (ii) 75 s
- (iii) conical flask [1]  
on a top-pan balance [1]  
calcium carbonate and HCl in conical flask [1]  
stopclock [1]
- (c) increases

[3]

[1]

[1]

[1]

[4]

[1]

AVAILABLE  
MARKS

11

- 4 (a) (i) different forms of the same element [1]  
in the same (physical) state [1] [2]
- (ii) monoclinic [1] plastic [1] rhombic [1] [3]
- (b) (i)  $S + O_2 \rightarrow SO_2$   
correct formulae of reactants [1]  
correct formula of product [1] [2]
- (ii)  $SO_3$  [1]
- (iii) car batteries/manufacture of fertilisers [1]

(c) **Indicative content**

**copper(II) oxide reaction**

- copper(II) sulfate [1]
- water **only** [1]

**copper(II) carbonate reaction**

- copper(II) sulfate [1]
- water [1]
- carbon dioxide [1]

**observations for copper(II) carbonate and sulfuric acid**

**Any 2 from:** [2]

- green solid disappears
- blue solution formed
- bubbles/gas produced/fizzing/effervescence

**observations for copper(II) oxide and sulfuric acid**

**Any 1 from:** [1]

- black solid disappears
- blue solution formed

(any incorrect observation, e.g. bubbles, loses this mark)

Response	Mark
Candidates must use appropriate specialist terms to fully compare these two reactions (using 7–8 points of indicative content). They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates must use appropriate specialist terms to compare these two reactions (using 4–6 points of indicative content). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates briefly and partially compare these two reactions (using 2–3 points of indicative content). They use limited spelling, punctuation and grammar and they make little use of specialist terms. The form and style are of a limited standard.	[1]–[2]
Response not worthy of credit	[0]

[6]

AVAILABLE  
MARKS

15

			AVAILABLE MARKS	
<b>5</b>	<b>(a)</b>	<b>(i)</b> boiling removes oxygen/no oxygen in boiled water [1] oil stops oxygen re-entering [1]	[2]	18
		<b>(ii)</b> (anhydrous) calcium chloride removes water [2] (no water/water has been removed from the air [1])	[2]	
		<b>(iii)</b> limited supply of air/oxygen in test tube 2/not limited supply of air/ oxygen in test tube 1	[1]	
	<b>(b)</b>	<b>(i)</b> any <b>two</b> from: painting metal coating (not galvanising or zinc coating)/metal plating plastic coating oil/grease	[2]	
		<b>(ii)</b> zinc	[1]	
	<b>(c)</b>	<b>(i)</b> blue	[1]	
		<b>(ii)</b> colourless/misty [1] gas [1]	[2]	
	<b>(d)</b>	<b>(i)</b> $\text{SO}_2 + 2\text{CO} \rightarrow \text{S} + 2\text{CO}_2$ correct formulae of reactants [1] correct formulae of products [1] correct balancing [1]	[3]	
		<b>(ii)</b> required/taken in [1] carbon monoxide [1] released/given out [1] carbon dioxide [1]	[4]	

- 6 (a) (i)  $\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$   
 correct formulae of reactants [1]  
 correct formulae of products [1]  
 correct balancing [1] [3]
- (ii) any **two** from:  
 calcium metal sinks (and then rises)  
 gas produced/bubbles/fizzing  
 heat released  
 calcium/metal disappears  
 turns cloudy/milky [2]
- (b) (i) magnesium in a boiling tube [1]  
 damp mineral wool in boiling tube [1]  
 heat applied to boiling tube [1]  
 collection over water to include labels for beehive shelf, trough  
 and water [1]  
 gas jar/boiling tube to collect gas [1]  
 delivery tube [1] max [5]
- (c) (i) water that does not readily form a lather with soap [1]

(ii)

Name of compound	Formula	Temporary or Permanent hardness
Calcium sulfate [1]	$\text{CaSO}_4$	Permanent } [1]
Calcium hydrogencarbonate	$\text{Ca}(\text{HCO}_3)_2$ [1]	Temporary

[3]

- (iii) temporary hardness can be removed by boiling but permanent hardness cannot [1]

**Total**AVAILABLE  
MARKS

15

**90**