



*Rewarding Learning*

**General Certificate of Secondary Education  
2016**

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## **GCSE Chemistry**

Unit 1

Foundation Tier

**[GCH11]**

**WEDNESDAY 15 JUNE, 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 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) (i)</b>	any <b>four</b> from:	
		floats [1]	
		moves about [1]	
		releases heat [1]	
		fizzes or hisses or gas produced [1]	
		crackle/small explosion/disappears [1]	
		colourless solution remains [1]	
	melts to form a silvery ball [1]	max [4]	
	<b>(ii)</b>	potassium	[1]
	<b>(iii)</b>	potassium hydroxide [1]	
hydrogen [1]		[2]	
<b>(b)</b>	<b>(i)</b>	(isotopes are atoms which have)	
		same atomic number/same number of protons [1]	
	different mass number/different number of neutrons [1]	[2]	
	<b>(ii)</b>	3	[1]
	<b>(iii)</b>	88	[1]
<b>(iv)</b>	strontium	[1]	
<b>(v)</b>	small sample/identification of elements/fast	[1]	13

2 (a) (i) Universal Indicator [1]

(ii)

Solution	Formula	pH value
sulfuric acid [1]	H <sub>2</sub> SO <sub>4</sub>	0–2 [1]
water	H <sub>2</sub> O	7 [1]
ethanoic acid [1]	CH <sub>3</sub> COOH	3

[4]

(b) (i) zinc chloride [1]

(ii) apply a lighted splint [1] pop [1] [2]

(c) (i) bubbles/fizzing/gas produced [1]  
tablet disappears [1]  
heat released [1]  
colourless solution forms [1] max [3]

(ii)  $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$   
[1] for correct formulae of reactants  
[1] for correct formulae of products  
[1] for correct balancing [3]

(d) (i) Al(OH)<sub>3</sub> [1]

(ii) white [1]

(iii) white [1] precipitate [1]  
redissolves in excess [1] [3]

AVAILABLE  
MARKS

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- 3 (a) (i) **mixture** [1]  
of two or more elements  
at least one of which is a metal [1] [2]

(ii) **Indicative content**

- covalent bonding [1]
- macromolecular/giant [1] covalent
- layers (of carbon atoms) [1]
- carbon atoms bonded to three others [1]
- hexagonal (arrangement of carbon atoms) [1]
- weak forces (of attraction) between the layers [1]
- one electron unbonded per carbon atom/delocalised electrons (between layers) [1]

Response	Mark
Candidates must use appropriate specialist terms to explain fully the structures of graphite (using 6–7 points of indicative content). 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 explain structure of graphite (using 3–5 points of indicative content). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates partially explain the structures of graphite (using at least 2 points of indicative content). They use limited spelling, punctuation and grammar and they have made little use of specialist terms. The form and style are of a limited standard.	[1]–[2]
Response not worthy of credit	[0]

[6]

- (b) (i) covalent [1]

- (ii) ionic [1]

- (iii) (calcium atom) 2,8,8,2 [1] (oxygen atom) 2,6 [1]  
(calcium ion) 2,8,8 [1] (oxide ion) 2,8 [1]  
 $\text{Ca}^{2+}$  [1]  $\text{O}^{2-}$  [1] [6]  
Electronic configurations must be **drawn**

- (c) (i) FeO [1]

(ii)

Atom or ion	Atomic number	Mass number	Number of protons	Number of electrons	Number of neutrons
			26	26	30
			26	24	30

[1] per column [3]

- (d) (i)  $\text{CO}_2$  [1]

- (ii) covalent [1]

- (iii) any lone pair of electrons labelled [1]

- 4 (a) solubility is the mass [1] of solute required to saturate [1] 100 g of water [1] at a particular temperature [1]  
allow maximum for saturate [4]

(b) (i)

Soluble	Insoluble
KOH	Cu(OH) <sub>2</sub>
(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	CaCO <sub>3</sub>

Each error or missing [-1] until zero [2]

(ii) ammonium sulfate [1]

(c) (i) D [1]

(ii) D [1]

(iii) 56 (±1) (°C) [1]

(iv) 70 (±1) (°C) [1]

AVAILABLE  
MARKS

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5 (a) (i)

Name of Salt	Formula	Relative Formula Mass
magnesium chloride [1]	MgCl <sub>2</sub>	95 [1]
sodium sulfate	Na <sub>2</sub> SO <sub>4</sub>	142 [1]

[3]

(ii) 29250 g [1]

$$\frac{29250}{58.5 [1]} = 500 [1] \text{ mol}$$

[3]

(iii) NaOH + HCl → NaCl + H<sub>2</sub>O

[2]

(b) (i) water which is chemically bonded in the crystal structure

[1]

(ii) 203

[1]

(iii) 108 [1] / 203 × 100 = 53.2 [1]

[2]

(iv) heat [1] to constant mass [1]

[2]

**Total**

AVAILABLE  
MARKS

14

**80**