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Rewarding Learning

General Certificate of Secondary Education
2017

GCSE Chemistry

Unit 2

Foundation Tier

[GCH21]

WEDNESDAY 21 JUNE, MORNING

MARK SCHEME

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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, 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.

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AVAILABLE MARKS

1 **(a)**

Material	Natural	Synthetic
Wool	✓ [1]	
Glass		✓ [1]
PVC		✓ [1]

[3]

(b) air [1]
sea/earth [1]
crude oil [1] [3]

(c) **(i)** haematite [1]

(ii) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
correct formulae of reactants [1]
correct formulae of products [1]
correct balancing [1] [3]

(iii) redox/reduction [1]

(d) bauxite [1]
conductivity [1]
carbon/graphite [1]
cathode [1]
electrons [1] [5]

16

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AVAILABLE MARKS

2 **(a)** **(i)** crude oil is heated [1]
evaporates and condenses [1]
separated due to different boiling points [1] max [3]

(ii) compound containing **only** carbon and hydrogen (atoms) [1]

(b) **(i)** $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
correct formulae of reactants [1]
correct formulae of products [1]
correct balancing [1] [3]

(ii) methane/ethane/butane or other correctly named alkane [1]

(c) **(i)** same general formula [1]
differ by a CH_2 unit [1]
similar chemical properties [1]
gradation in physical properties [1] max [3]

(ii)

Name	Molecular formula	Physical state at room temperature
ethene	C_2H_4 [1]	gas
propene [1]	C_3H_6	gas [1]

[3] 14

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			AVAILABLE MARKS
3	**(a)**	temperature [1] surface area (of solid)/size of (solid) particles [1] use of a catalyst [1] [3]	
	(b) **(i)**	$Mg + 2HCl \rightarrow MgCl_2 + H_2$ correct formulae of reactants [1] correct formulae of products [1] correct balancing [1] [3]	
	(ii)	A [1] highest concentration of acid [1] fastest reaction/steepest slope/finishes first [1] [3]	
	(iii)	starts at origin [1] steeper line [1] levels off at 55 cm^3 [1] [3]	
	(iv)	59 ± 1 s units essential [1]	13

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			AVAILABLE MARKS
4	(a)	any **two** from: colourless pungent less dense **than air** soluble **in water** [2]	
	(b) (i)	nitrogen gains hydrogen [1] gain of hydrogen is reduction [1] [2]	
	(ii)	lit splint [1] pops [1] [2]	
	(iii)	glass rod/stopper from bottle [1] **concentrated** hydrochloric acid [1] white smoke/fumes/clouds/solid [1] [3]	
	(c) (i)	$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$ [1]	
	(ii)	unreactive [1]	
	(iii)	coolant or other correct use [1]	12

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AVAILABLE MARKS

5 **(a)** **(i)** $2Cu + O_2 \rightarrow 2CuO$
correct formulae of reactants [1]
correct formula of product [1]
correct balancing [1] [3]

(ii) tongs [1]
Bunsen burner [1] [2]

(iii) 21% (accept 20–22) [1]

(b) **(i)** green [1] to black [1] [2]

(ii) $CuCO_3 \rightarrow CuO + CO_2$
correct formula of reactant [1]
correct formulae of products [1] [2]

(c) **(i)** reduced [1]
copper [1] water [1] [3]

(ii) hydrogen + oxygen → water [1]

(d) **indicative content**

- copper/copper(II) oxide loses oxygen
- loss of oxygen is reduction
- carbon gains oxygen
- gain of oxygen is oxidation
- redox is oxidation and reduction occurring simultaneously in the same reaction
- CuO is black
- Cu is brown/red-brown

Response	Mark
Candidates must use appropriate specialist terms to explain fully the process (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 the process (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 briefly and partially explain the process (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] 20

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					AVAILABLE MARKS
6	(a)	(i)	$Sr + 2H_2O \rightarrow Sr(OH)_2 + H_2$ correct formulae of reactants [1] correct formulae of products [1] correct balancing [1]	[3]	
		(ii)	Any **three** from: K floats and Sr sinks [1] (lilac) flame and no flame [1] both produce a gas/fizz [1] both disappear [1]	[3]	
	(b)	(i)	$Sr + 2AgNO_3 \rightarrow Sr(NO_3)_2 + 2Ag$ correct formulae of reactants [1] correct formulae of products [1] correct balancing [1]	[3]	
		(ii)	calcium nitrate [1] cadmium [1]	[2]	
		(iii)	strontium above calcium [1] cadmium between iron and copper [1]	[2]	
	(c)	(i)	barium sulfate	[1]	
		(ii)	low solubility/insoluble (in water)	[1]	15
				Total	**90**