Rewarding Learning

General Certificate of Secondary Education
2014

GCSE Chemistry

Unit 2

Foundation Tier

[GCH21]

THURSDAY 19 JUNE, AFTERNOON

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, the examiners should seek the guidance of the Supervising Examiner.

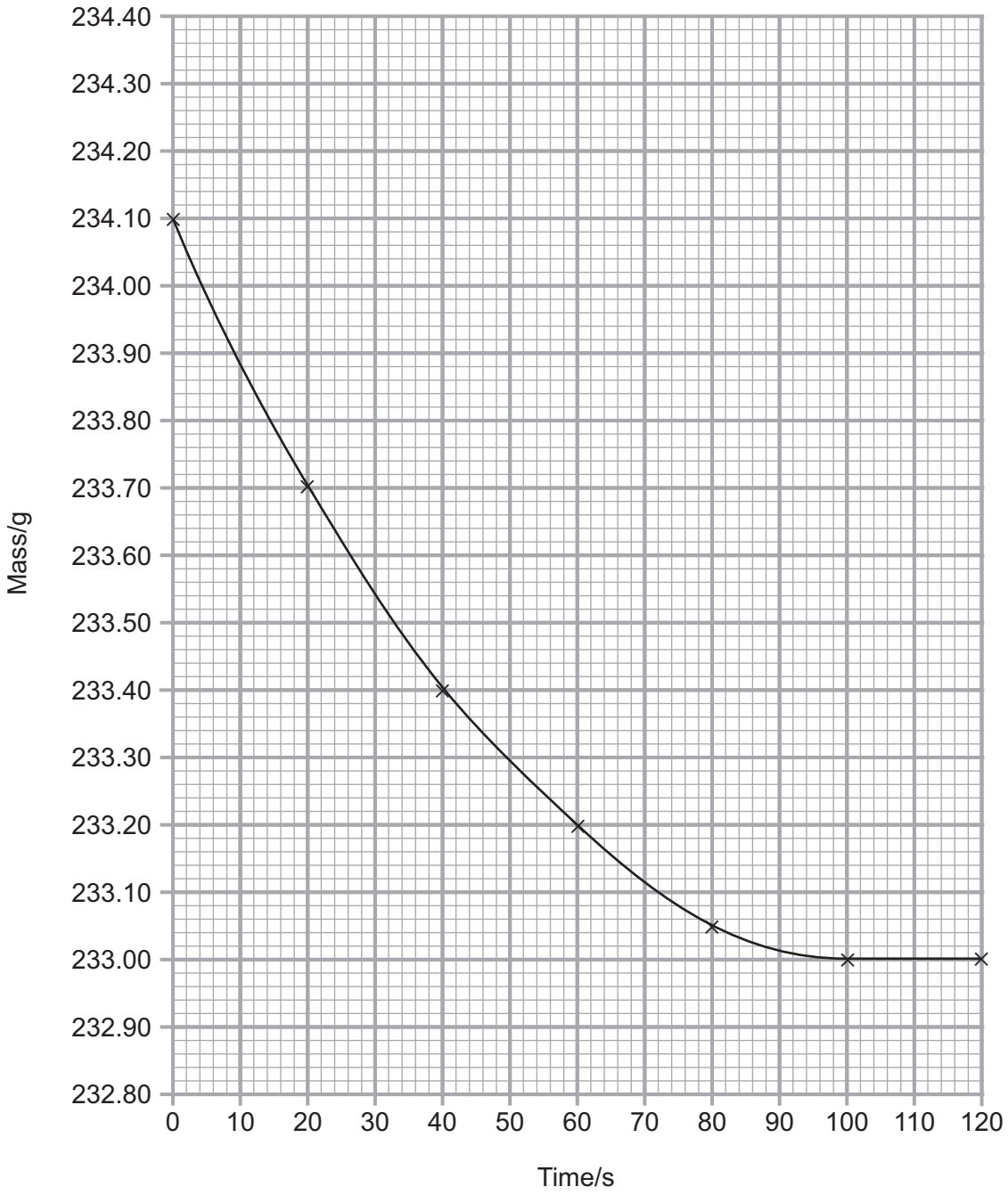
Positive marking
Examiners must be positive in their marking, giving appropriate credit for description, explanation and analysis, using knowledge and understanding and for the appropriate use of evidence and reasoned argument to express and evaluate personal responses, informed insights and differing 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
1	(a)	(i)	conical flask with cotton wool plug	[1]		
			placed on electronic balance	[1]		
			tablet in contact with water	[1]		
			timer/stopclock/stopwatch	[1]	[4]	
			no labels = [0]			
		(ii)	to prevent the loss of any liquid/spray		[1]	
	(b)	(i)	5–7 points plotted correctly	[3]		
			2–4 points plotted correctly	[2]		
			1 point plotted correctly	[1]		
			smooth **curve**	[1]	[4]	
		(ii)	95–100 **seconds** units essential		[1]	
		(iii)	1.10 g units essential allow 1.1 g		[1]	
		(iv)	graph starts at (0, 234.1) **and** remains lower	[1]		
			levels off earlier	[1]		
			levels off at same mass reading as initial graph	[1]	[3]	
		(v)	concentration/surface area/catalyst/pressure/light		[1]	15



AVAILABLE MARKS

AVAILABLE MARKS

2 **(a)** **(i)** ammonia/sulfur dioxide
accept hydrogen sulfide [1]

(ii)

Gas	Formula	Colour
ammonia [1]	NH_3	**colourless** [1]
carbon dioxide	CO_2	**colourless** [1]
hydrogen	**H_2** [1]	colourless
carbon monoxide	CO	colourless

[4]

(iii) $2CO + O_2 \rightarrow 2CO_2$
[1] for correct formulae of reactants
[1] for correct formula of product
[1] for correct balancing [3]

(iv) white [1] smoke/solid [1] allow cloud/fumes [2]

(b) **(i)** $2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$
[1] for correct formulae of reactants
[1] for correct formulae of products
[1] for correct balancing [3]

(ii) hydrogen sulfide/sulfide/allow sulfur [1]

(iii) no naked flames/fume cupboard [1] 15

				AVAILABLE MARKS
3	**(a)**	**(i)**	breaking down (a substance) [1] using heat [1] [2]	
		(ii)	calcium oxide [1] carbon dioxide [1] [2]	
	(b)		Any **two** from: volcanoes/earthquakes/mountain **formation** [2]	
	(c)		comparison of oxygen composition [1] comparison of nitrogen composition [1] one correct % of either oxygen or nitrogen in Earth's atmosphere [1] [3]	
	(d)	**(i)**	a glowing splint [1] relights [1] second mark dependent on first [2]	
		(ii)	Any **two** from: colourless/odourless/neutral pH-7/**low solubility** (in water)/same density as air [2]	
	(e)	**(i)**	**6**CO_2 + **6**$H_2O \rightarrow C_6H_{12}O_6$ + **6**O_2 [1] for correct balancing [1]	
		(ii)	exothermic [1] oxidation [1] [2]	16

AVAILABLE MARKS

4 (a)

State at room temperature	Boiling point °C	Melting point °C	Colour
liquid [1]	100 [1]	0 [1]	colourless [1]

[4]

(b)

Test	Colour before adding water	Colour after adding water
anhydrous copper sulfate [2] copper sulfate [1]	white	blue
cobalt chloride paper	(pale) blue [1]	pink [1]

[4]

(c) (i) does not form a lather **readily** with soap [2]
does not form a lather with soap [1] [2]

(ii) magnesium sulfate [1]

(iii) Indicative content

- Add soap (solution) to sample of water **and shake**
- If scum forms/there is no immediate lather, the water is hard
- Take another sample of the water
- Boil it
- Add soap solution and shake
- If a lather forms – temporary hardness
- If no lather – permanent hardness

Response	Mark
Candidates must use appropriate specialist terms throughout to describe fully how a sample of water is tested for hardness and how to determine if the hardness is temporary or permanent (6–7 points from the indicative content above) in a logical sequence. 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 describe how a sample of water is tested for hardness and/or how to determine if the hardness is temporary or permanent (3–5 points from the indicative content above) in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates describe how to test a sample of water for hardness and/or how to determine if the hardness is temporary or permanent (1–2 points from the indicative content above) which may not be in a logical sequence. 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]

17

AVAILABLE MARKS

5 **(a)** **(i)** crude oil [1]

(ii) fractional distillation [2] distillation [1]
boils [1]
decrease [1] [4]

(iii) carbon [1] hydrogen [1] [2]

(iv) aircraft fuel [1]

(b) **(i)** show **similar** chemical properties/differ by a CH_2 (unit/group) [1]

(ii)

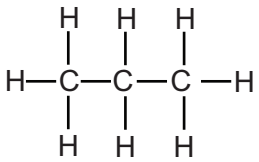
Name of homologous series	General formula	Molecular formula of compound with three carbon atoms
Alkanes	C_nH_{2n+2} [1]	C_3H_8
Alkenes	C_nH_{2n}	C_3H_6 [1]

[2]

(iii) propane [1]

(iv) $\frac{36\ [1]}{44\ [1]} \times 100 = 81.82\ [1]\ \%$ [3]

(v)



[1]

16

					AVAILABLE MARKS
6	(a)	(i)	silver indicated below copper	[1]	
		(ii)	blue	[1]	
		(iii)	copper is more reactive/higher in reactivity series [1] than silver [1] **or** converse second mark dependent on first	[2]	
	(b)	(i)	1×10^{-9} **m or** other suitable idea of length, e.g. 1×10^{-6} **mm**	[1]	
		(ii)	unknown effects/absorbed through skin/discolour skin/allergic reaction/damage organs	[1]	
	(c)	(i)	a layer [1] of (aluminium) oxide [1] forms on surface of aluminium which prevents aluminium reacting [1]	[3]	
		(ii)	aluminium + copper(II) oxide → aluminium oxide + copper [1] for reactants and [1] for products allow copper oxide for copper(II) oxide	[2]	11
				Total	**90**