Rewarding Learning

General Certificate of Secondary Education
2013

Science: Chemistry

Unit C2

Foundation Tier

[GCH21]

THURSDAY 20 JUNE, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

AVAILABLE MARKS

1 **(a)** **(i)** white [1]

(ii) $2Mg + O_2 \rightarrow 2MgO$
[1] for correct formulae of reactants
[1] for correct formula of product
[1] for correct balancing [3]

(iii) one fifth/20% (allow 19–21%) [1]

(b) **(i)** black solid [1] burns with an orange/yellow [1] flame [1]
sooty/smoky [1]
white/grey ash [1] formed
heat released [1] **max** [2]

(ii) carbon monoxide [1]

(c) KNO_3 [1]

(d) **(i)** water/moisture [1]
air/oxygen [1] [2]

(ii) iron gains oxygen [1]
gain of oxygen is oxidation [1] [2]

(iii) red-brown/colour change [1]

(e)

Reaction in the Blast Furnace	Type of Reaction
$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$	redox [1]
$CaCO_3 \rightarrow CaO + CO_2$	thermal decomposition [1]

[2]

16

					AVAILABLE MARKS
2	**(a)**	**(i)**	A = conical flask [1] B = gas syringe [1]	[2]	
		(ii)	manganese(IV) oxide/manganese dioxide	[1]	
		(iii)	substance which increases [1] the **rate of a (chemical) reaction** [1] without being used up/without being chemically changed at the end [1]	[3]	
		(iv)	$2H_2O_2 \rightarrow 2H_2O + O_2$ [1] for correct formula of reactant [1] for correct formulae of products [1] for correct balancing	[3]	
	(b)	**(i)**	any second accurate timing device, e.g. stopclock/stopwatch	[1]	
		(ii)	40 (cm^3)	[1]	
		(iii)	48 (cm^3)	[1]	
		(iv)	38–40 (s)	[1]	13

AVAILABLE MARKS

3 (a) (i) **only** contains carbon and hydrogen [1]

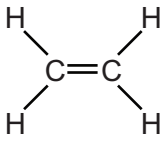
(ii) C═C [1]

(iii) $C_{10}H_{16} + 14\ O_2 \rightarrow 10\ CO_2 + 8\ H_2O$
[1] for correct formulae of products
[1] for balancing [2]

(iv) 136 [1]

(v) $\frac{120}{136} \times 100$ [1] = 88.2 [1] [2]

(b)

Name	Molecular formula	Structural formula	State at room temperature
Ethene	C_2H_4 [1]	 [1]	gas [1]

[3]

(c) Indicative content
- polymer is a long chain molecule
- chain made up of repeating units or monomers bonded together

Advantages and disadvantages in context of disposal of **polymers**

Advantages of landfill:
- using local land/small transport costs
- cheapest option available

Disadvantages of landfill:
- (addition) polymers are nonbiodegradable
- wastes land
- eyesore
- creates litter

Advantages of incineration:
- prevents landfill
- idea that heat produced may be usefully employed, e.g. in production of electricity

Disadvantages of incineration:
- releases greenhouse gases
- releases toxic gases
- causes air pollution
- ash residue is toxic

Response	Mark
Candidates must use appropriate specialist terms to describe fully what is meant by a polymer and to discuss an advantage and disadvantage of landfill and an advantage and disadvantage of incineration (**using 5–6 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 what is meant by a polymer and to discuss an advantage and disadvantage of landfill and/or an advantage and disadvantage of incineration (**using 3–4 points** of indicative content). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates explain briefly what is meant by a polymer or discuss some of the advantages and disadvantages of landfill or incineration (**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]

AVAILABLE MARKS

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4 **(a)** **(i)** decomposition [1]
using a current of electricity [1] [2]

(ii) Al_2O_3 [1]

(iii)

Name of ion	Formula of ion (including charge)	Name of electrode to which ion is attracted
aluminium	Al^{3+} [1]	cathode [1]
oxide [1]	O^{2-}	anode [1]

[4]

(iv) anode/carbon reacts with oxygen [1]
forming carbon dioxide [1] [2]

(b) any **two** from:
- there is less mining (of aluminium ore)/saves resources
- there is less use of electricity/less energy used
- there is less noise/dust pollution
- there is less destruction of natural habitat/eyesore
- it provides more employment [2]

AVAILABLE MARKS

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				AVAILABLE MARKS
5	**(a)**	grey/white metal [1] red flame [1] small explosion [1] white solid formed [1] Any **two**	[2]	
	(b)	**(i)** A delivery tube [1] B gas jar [1]	[2]	
		(ii) to generate steam	[1]	
		(iii) hydrogen	[1]	
		(iv) copper/silver/gold/platinum	[1]	
	(c)	**(i)** copper	[1]	
		(ii) any **three** from: floats/on surface moves about melts to form a silvery ball fizzing/gas produced colourless solution formed metal disappears heat released	[3]	
		(iii) $2Na + 2H_2O \rightarrow 2NaOH + H_2$ [1] for correct formulae of reactants [1] for correct formulae of products [1] for correct balancing	[3]	14
6	**(a)**	100 [1] (pale) blue [1] pink [1]	[3]	
	(b)	**(i)** measuring cylinder/burette/pipette	[1]	
		(ii) C	[1]	
		(iii) B	[1]	
		(iv) C	[1]	
	(c)	disadvantages associated with: • wastes soap • produces limescale in kettles/hot water pipes/iron etc. • qualified cost (more electricity used, purchase of ion exchange, dishwasher salt) • forms scum with soap	**max** [2]	9

7 **(a)** **(i)**

	Nitrogen
State at room temperature and pressure	gas [1]
Colour	colourless [1]
Odour	odourless [1]

[3]

(ii) coolant/food packaging [1]

(b) dip glass rod [1]
into concentrated hydrochloric acid [1] apply to gas
white [1] smoke/solid [1] [4]

(c) **(i)** $NH_3 + HNO_3 \rightarrow NH_4NO_3$ [2]

(ii) blue baby syndrome/stomach cancer/eutrophication [1]

Total

AVAILABLE MARKS

11

90