Rewarding Learning

General Certificate of Secondary Education
2023

Double Award Science: Chemistry

Unit C2

Foundation Tier

[GDW51]

TUESDAY 13 JUNE, MORNING

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.

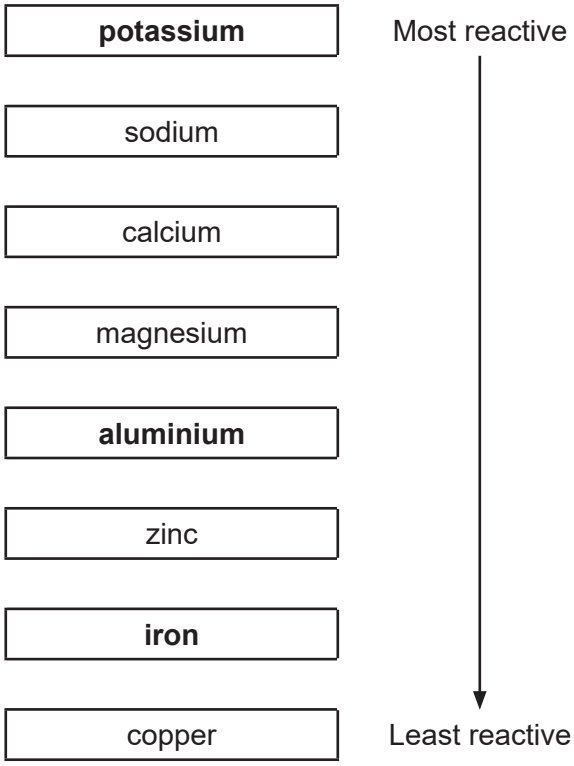
The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends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



[1]

(b) (i) calcium hydroxide [1]

(ii)

Prediction for reaction of calcium with water	Correct	Incorrect
The metal will burn with a lilac flame		✓ [1]
The metal will sink to the bottom of water then rise	✓ [1]	
The solution formed will be blue		✓ [1]
Bubbles of gas will be given off	✓ [1]	

[4]

(c) (i) displacement [1]

(ii) tin sulfate + copper (any order and ignore any oxidation state of tin) [1]

(iii) red-brown [1]

(iv) tin is more reactive than copper [1] 10

AVAILABLE MARKS

2 Indicative content

Write the chemical formulae of aluminium oxide

- Al_2O_3

State what is meant by an exothermic reaction

- heat energy given out

Explain, in terms of oxygen content, why this reaction is described as a redox reaction

- iron(III) oxide loses oxygen
- loss of oxygen is reduction
- aluminium gains oxygen
- gain of oxygen is oxidation
- redox is oxidation and reduction occurring in the same reaction

Band	Response	Mark
A	Candidates must use appropriate specialist terms including a minimum of 6 points of indicative content. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates must use appropriate specialist terms including a minimum of 4 points of indicative content. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates' brief and partial response includes a minimum of 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]
D	Response not worthy of credit	[0]

[6] 6

AVAILABLE MARKS

3 **(a)** **(i)**

Substance	Particle which can move and carry the charge		
	Proton	Electron	Ion
solid aluminium		✓	
molten lead(II) bromide			✓ [1]

[1]

(ii) decompose [1]

(b) **(i)** positive electrode [1]

(ii) any **two** from:
good conductor of electricity
inert/unreactive
high melting point [2]

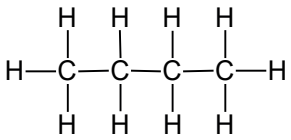
(iii)

Anode		Cathode	
Observations	**Name of product formed**	**Observations**	**Name of product formed**
red-brown [1] gas [1]	bromine [1]	Grey liquid formed	lead [1]

[4]

(iv) (bromine is) toxic [1]

10

					AVAILABLE MARKS
4	**(a)**	**(i)**	carbon and hydrogen (atoms)	[1]	
		(ii)	**A**	[1]	
		(iii)	C_2H_4	[1]	
		(iv)	four	[1]	
		(v)	alkane	[1]	
		(vi)	but-1-ene	[1]	
	(b)	**(i)**	C_nH_{2n}	[1]	
		(ii)	bromine water	[1]	
		(iii)	orange to colourless	[1]	
	(c)	**(i)**		[1]	
		(ii)	butane + oxygen → carbon dioxide + water	[2]	
		(iii)	carbon monoxide	[1]	13
5	**(a)**		water chemically bonded into the crystal structure	[1]	
	(b)	**(i)**	106	[1]	
		(ii)	286	[1]	
	(c)		$CaSO_4$ = 136 [1] xH_2O = 172 – 136 = 36 [1] x = 2 [1]	[3]	
	(d)	**(i)**	61.5 (g)	[1]	
		(ii)	30 (g)	[1]	
		(iii)	31.5 (g)	[1]	
		(iv)	heat to constant mass/remove all the water of crystallisation	[1]	10

					AVAILABLE MARKS
6	**(a)**	**(i)**	**K =** delivery tube [1] **L =** gas jar [1]	[2]	
		(ii)	$2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$ [1] for state symbols	[1]	
		(iii)	manganese(IV) oxide/manganese dioxide	[1]	
		(iv)	welding	[1]	
		(v)	glowing splint relights	[1]	
	(b)				

Metal	Observations during heating	Appearance of product
Magnesium	white flame [1]	white solid [1]
Copper	glows red/orange/ blue-green flame [1]	black solid [1]

[4] 10

7	**(a)**		stopclock/timer/measuring cylinder	[1]	
	(b)	**(i)**	any **one** from: mass of magnesium carbonate temperature same division of magnesium carbonate, i.e. lump/powder	[1]	
		(ii)	experiment **5**	[1]	
		(iii)	rate = $\frac{1}{\text{time}}$	[1]	
	(c)	**(i)**	limewater	[1]	
		(ii)	colourless [1] to milky [1]	[2]	
		(iii)	acidic [1] colourless [1]	[2]	
	(d)	**(i)**	$\rightleftharpoons$	[1]	
		(ii)	any **one** from: temperature pressure concentration of a reactant or product	[1]	11
				Total	**70**