Rewarding Learning

General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 2 (Chemistry)

Higher Tier

[GSS22]

TUESDAY 25 FEBRUARY 2014, 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)** **(i)** 1 [1]

(ii) 25 cm^3 [1]

(b) **(i)** Green [1]

(ii) More accurate/gives numbers [1]

4

2 **(a)** 0.6 [1]

(b) Aluminium [1]
3 [1] [2]

(c) 1.0–1.7 g/cm^3 [1]

(d) They are all gases [1]

5

3 **(a)** Hard water is water that is difficult to lather/forms a scum [1]
with soap [1] [2]

(b) Indicative Content:

- Advantages: better taste, helps form stronger bones/teeth
- Advantage: tourism, better for making beer
- Disadvantages: causes stains on washing, clogging water pipes, and fur in kettles
- caused by calcium/magnesium ions/compounds
- softened by, **one** from: thermal decomposition/distillation/ion exchange/ adding washing soda (if temporary, softened by boiling)

Band	Response	Marks
A	Candidates must use appropriate specialist terms throughout to describe hard water using **all** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe hard water using **three to four** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe hard water using **one or two** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

8

		AVAILABLE MARKS
4	**(a)** All points plotted correctly [2] [7 points plotted correctly gains 1 mark] smooth curve drawn [1] [3]	
	(b) No more loss in mass/no more bubbles/last values the same [1]	
	(c) sodium chloride [1] water [1] (Any order) [2]	
	(d) Use limewater [1] it turns milky/cloudy [1] [2]	
	(e) **(i)** 22 g [1]	
	(ii) The gas/carbon dioxide escaped from the beaker/given off [1]	
	(f) Bubbles observed/loss in mass [1] slower/less vigorous reaction than with HCl [1] [2]	12
5	**(a)** They are running out/getting harder to find/non-renewable [1]	
	(b) Contamination of ground water/risks to air quality/mishandling of waste [1] chosen concern explained, e.g. ground water can be used as a source of drinking water [1] [2]	
	(c) (20 000 000/100) $\times$ 2 [1] 400 000 [1] [2]	
	(d) Tectonic plates [1] suddenly move past each other [1] [2]	7
6	**(a)** **(i)** Electron [1]	
	(ii) Neutron [1]	
	(b) The number of **protons** in an atom [1]	
	(c) Same/equal number of protons and electrons [1]	
	(d)	

	Na	O	Na_2O
Number of protons	11	8	30
Number of electrons	11	8	30
Number of neutrons	12	8	32

[1] for each correct column [3] 7

				AVAILABLE MARKS
7	**(a)**	Displacement	[1]	
	(b)	silver [1] copper nitrate [1] either order	[2]	
	(c)	Copper nitrate is blue	[1]	
	(d)	Correct order: iron, copper, silver	[1]	
	(e)	$Zn + \mathbf{2}HCl \rightarrow ZnCl_2 + H_2$	[1]	6
8	**(a)**	**(i)** Used Book of Genesis/Bible [1] counted the number of generations [1]	[2]	
		(ii) 6000 years	[1]	
	(b)	**(i)** Use radioactivity/radioisotopes/half-life [1] find the ratio of undecayed : daughter nuclei in rocks [1]	[2]	
		(ii) 4 500 million years	[1]	6
9	**(a)**	Positive electrode	[1]	
	(b)	Positively charged aluminium ions [1] gain electrons [1] idea of **3** electrons [1]	[3]	4
10	**(a)**	13%	[1]	
	(b)	16.1 % (15 + 1 gains [1])	[2]	
	(c)	CO_2 / CO / NO / SO_2 / H_2O	[1]	
	(d)	$C_3H_8 + 5\ O_2 \rightarrow 3\ CO_2 + 4\ H_2O$ LHS formula [1] RHS formula [1] balancing correct [1]	[3]	
	(e)	Correct structural formula of propane drawn	[1]	8

AVAILABLE MARKS

11 **(a)** Mg: 2.8.2 [1]
O: 2.6 [1] [2]

(b) Indicative content

- Electrons are transferred/gained and lost
- There are **two** electrons involved in transfer
- Magnesium atom loses two electrons to become a **positive** ion/cation
- Magnesium's electron arrangement changes from 2.8.2 to 2.8
- Oxygen atom gains two electrons to become a **negative** ion/anion
- Oxygen's electron arrangement changes from 2.6 to 2.8
- Ionic bonding is involved/electrostatic forces of attraction

Band	Response	Marks
A	Candidates must use appropriate specialist terms throughout to describe the bonding involved using **6 or 7** of the above points. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates must use some appropriate specialist terms throughout to describe the bonding involved, using **3–5** of the above points. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe the bonding involved using only **1 or 2** of the above points. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 8

Total **75**