Rewarding Learning

General Certificate of Secondary Education
2016–2017

Science: Single Award

Unit 2 (Chemistry)

Higher Tier

[GSS22]

THURSDAY 10 NOVEMBER 2016, 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)** Glass [1]	
	(ii) 66 – 22 [1] 44% [1] [2]	
	(iii) Reprocessing of cullet/broken into pieces/crushed [1] use furnace/melt [1] remould/reshape/reformed [1] [3]	
	(b) **(i)** Newspaper [1]	
	(ii) Any **two** from: • (waste) giving off polluting gases • foul smelling liquid • liquid can leak into water supplies • eyesore [2]	
	(c) Cannot be broken down [1] by microbes [1] [2]	
	(d) Provide **special** bins/advertising in newspapers, magazines and on television/education in schools/fines or rewards or other suitable [1]	12

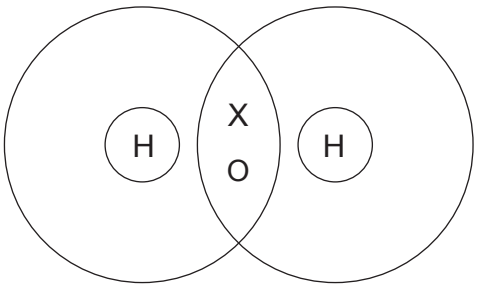
2 **Indicative Content:**

- Newlands developed the law of octaves
- Each eighth element was similar
- Newlands put two elements in one box
- Newlands/Mendeleev ordered the elements according to mass number/ atomic mass
- Mendeleev ordered the elements into groups and periods
- Mendeleev separated metals and non metals
- Mendeleev left gaps for undiscovered elements
- Mendeleev predicted properties of elements yet to be discovered/ Mendeleev more elements
- Noble gases not discovered in 1869

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the work of Newlands and Mendeleev using **5–8** 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 **3 or 4** 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 the work of Newlands and Mendeleev using **1 or 2** 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	Not worthy of credit.	[0]

[6] 6

				AVAILABLE MARKS
3	**(a)**	**(i)**	Calcium/magnesium [1]	
		(ii)	Advantages: better taste/stronger teeth or bones/reduces risk of heart disease [1] Disadvantages: causes 'fur' on kettles/limescale in pipes/stains clothing/ block pipes/cost qualified (e.g. replace kettles/more energy) [1] [2]	
	(b)	**(i)**	Water Y is permanent hard water [1] there was still **a lot** of soap solution needed to form a lather after boiling [1] [2]	
		(ii)	Water Z is temporary hard water [1] the **volume of soap** required to form a lather decreased after boiling [1] [2]	7
4	**(a)**	**(i)**	Remains of plants/animals [1] **preserved** in rock [1] [2]	
		(ii)	Any **two** from: • shape of continents fit together • similar species of animals still living in continents • similar rock types in continents once joined [2]	
	(b)		Scientists believed that continents could not drift/no evidence at that time/fixed position [1]	5
5	**(a)**	**(i)**	Hydrochloric acid [1]	
		(ii)	Universal indicator [1] provides a full range of colours/5 different individual colours [1] [2]	
		(iii)	(Red) litmus paper [1] it is the same colour in acid and water [1] [2]	
	(b)		HCl [1] $NaHCO_3$ [1] [2]	7

					AVAILABLE MARKS
6	**(a)**	**(i)**	 [1]		
		(ii)	Water/H_2O or other correct	[1]	
	(b)	**(i)**	2:8:5	[1]	
		(ii)	Metallic character decreases (from left to right)	[1]	
		(iii)	Melting point increases from sodium to aluminium/as atomic number increases/as you move from left to right	[1]	
	(c)		Two (or more) elements [1] (**chemically** combined/joined) [1]/bonded [1]	[2]	
	(d)		Displacement [1] magnesium is more reactive than copper/magnesium is higher in the reactivity series [1]	[2]	9
7	**(a)**	**(i)**	Two (or more) materials combined/joined [1] to make a new material for a particular purpose/with specific properties [1]	[2]	
		(ii)	Aircraft B contains **more** composite material/comparison	[1]	
	(b)	**(i)**	Bone/teeth or other suitable	[1]	
		(ii)	Glass fibre/reinforced glass/reinforced concrete/ glass reinforced plastic or other suitable	[1]	5
8	**(a)**	**(i)**	Seven points plotted correctly award [2] six points plotted correctly award [1] smooth curve through the points [1]	[3]	
		(ii)	As the **time** increases, total **mass** decreases	[1]	
		(iii)	Carbon dioxide/gas is escaping	[1]	
	(b)		10	[1]	
	(c)		Magnesium chloride [1] carbon dioxide and water [1] (any order)	[2]	
	(d)		Bubbles observed/loss in mass/magnesium carbonate disappears [1] slower/less vigorous reaction than with hydrochloric acid [1]	[2]	10

9 Indicative Content:

Archbishop Ussher
- Book of Genesis
- involved counting generations of ancestors
- put the age of the Earth at 6000 years old

Scientific theory
- uses radiometric dating
- radioactive isotopes/uranium or potassium (found in rocks)
- have a half-life
- proportion of daughter nuclei/isotopes left allow age to be worked out
- Earth 4500 million/4.5 billion years old

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout using **six to eight** 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 using **three to five** 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 use **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	Not worthy of credit.	[0]

[6] 6

10 (a) (i) Ethene [1]

(ii) Correct structure for butane [1]

(iii) CH_4 [1]

(iv) $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
LHS [1] RHS [1] Correct balancing if both sides are correct [1] [3]

(b) Correct ethene monomer on LHS [1] correct single bond structure on RHS [1] [2] 8

Total **75**

AVAILABLE MARKS