Rewarding Learning

General Certificate of Secondary Education
2015–2016

Double Award Science: Chemistry

Unit C1

Higher Tier

[GSD22]

THURSDAY 12 NOVEMBER 2015, 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)** soluble (in water)/idea that they dissolve [1] idea of being formed from a metal and a non-metal [1] [2]	
	(b) candidates draw the electronic configuration of a calcium ion 2,8,8 [1] charge +2 (This should be placed in the box provided but mark it correct wherever it is placed.) [1] [2]	
	(c) 6 [1]	
	(d) $MgSO_4$ [1] K_2CO_3 [1] [2]	
	(e) white [1]	8
2	**(a)** The Law of Octaves [1]	
	(b) **Indicative content** • Modern Periodic Table arranged in order of atomic number • Mendeleev's Periodic Table arranged in order of atomic mass • Mendeleev's Periodic Table placed more than one element in a space/ Modern Periodic Table places only one element in a space • Modern Periodic Table has no gaps/Mendeleev's Periodic Table had gaps • Idea that modern Periodic Table places transition elements in a separate block • Mendeleev's Periodic Table had no Noble gases/modern Periodic Table has Noble gases • Modern Periodic Table has more elements/has actinides/has lanthanides • Correct idea of elements moved e.g. H or e.g. I_2/Te exchanged	

Response	**Mark**
Candidates make reference to **6–8** of the main points above to describe the main differences between Mendeleev's Periodic Table and the modern Periodic Table. They use good spelling, punctuation and grammar and the form and style are of a high standard. It must be clear which table the candidate is referring to.	[5]–[6]
Candidates make reference to **4–5** of the main points above to describe the main differences between Mendeleev's Periodic Table and the modern Periodic Table. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard. It must be clear which table the candidate is referring to.	[3]–[4]
Candidates make reference to **2–3** of the main points above using limited spelling, punctuation and grammar. The form and style are of a limited standard and they have made no use of specialist terms. It must be clear which table the candidate is referring to.	[1]–[2]
Candidates make no reference to the main points and offer no other suitable response.	[0]

[6] 7

AVAILABLE MARKS

3 **(a)** 0–2 (NOT 1–2) [1]

(b) **(i)** copper sulfate [1] water [1] any order [2]

(ii) it (is a reaction between an acid and a base which) forms a salt and water [1] only (clearly implied) [1]
idea of hydrogen ions forming water gets [1] [2]

(iii) colourless [1] to blue [1] [2]

(c) **(i)** $Na_2O + 2HCl \rightarrow 2NaCl + H_2O$
correct formula of NaCl [1]
correct formula of H_2O [1]
if a third product is given maximum mark is [1]
balancing [1] [3]

(ii) it is a base [1] it is soluble [1] [2]

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4 **(a)**

Name of conductor	Name of the **type** of particle which moves and carries the charge	Effect of the passage of electricity on the conductor (A) No effect (B) Conductor breaks down (C) The conductor melts
copper	electron [1]	(A)/no effect [1]
sodium chloride solution	ion [1]	(B)/conductor breaks down [1]

[4]

(b) **(i)** graphite is a (good) conductor of electricity
or idea that graphite is inert
or high melting point [1]

(ii) $Li^+ + e^- \rightarrow Li$
L.H.S. [1] R.H.S. [1] [2]

(c) **(i)** bauxite [1] is purified [1] (2nd mark dependent on first)
for aluminium ore purified allow [1] [2]

(ii) lowers the melting point (of the aluminium oxide)/lowers the operating temperature [1]
NOT lowers melting point of aluminium
increases the (electrical) conductivity (of the aluminium oxide) [1] [2]

(d) it prevents heat loss/conserves energy [1]

(e) idea of saving waste
idea of requiring less energy to recycle than to extract/recycling is cheaper
idea of conserving resources [2]
Any 2 × [1] out of 3

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				AVAILABLE MARKS
5	**(a)**	sharing (a pair of) electrons unless wrongly qualified e.g. not elements sharing electrons	[1]	
	(b)	correct sharing between one hydrogen atom and one chlorine atom [1] correct number of outer electrons for each atom [1] this mark is awarded only when 1st mark is given correct dot and cross representation [1]	[3]	
	(c)	atoms [1] break* molecules [1] break* * [1] if break given twice	[3]	
	(d)	candidates tick insoluble in water [1] non-conductors of electricity [1]	[2]	9
6	**(a)**	bromine is less reactive than chlorine [1] or vice versa and idea that it cannot displace chlorine [1]	[2]	
	(b)	displacement	[1]	
	(c)	$Cl_2 + 2KI \rightarrow I_2 + 2KCl$ L.H.S. [1] R.H.S. [1] balancing [1]	[3]	
	(d)	they have 7 electrons in their outer shell [1] they need to gain one electron [1] to form a full outer shell/to become stable [1] max 2 × [1] 'to become stable' is dependent on gaining one electron	[2]	8
7	**(a)**	anhydrous copper(II) sulfate [2] If only copper(II) sulfate [1] ((II) not required in the name) turns (from white to) blue [1]	[3]	
	(b)	idea that there is a 2:1 ratio of hydrogen to oxygen <u>in water</u>/there are two hydrogen atoms for every 1 oxygen atom <u>in water</u>	[1]	
	(c)	(apply a) lighted splint [1] (hydrogen burns with a squeaky) pop [1]	[2]	6

			AVAILABLE MARKS
8	**(a)**	the solid becomes less soluble in water [1] idea that some of the solid in the solution can no longer dissolve and comes out of solution [1] [2]	
	(b)	solubility at 82 °C = 58 [1] g/100 g water solubility at 30 °C = 24 [1] g/100 g water difference in solubility = 58 – 24 = 34 [1] g $\frac{34}{5}$ = 6.8 [1] g [4]	6
		Total	**70**