

New
Specification



**General Certificate of Secondary Education
2017–2018**

**Double Award Science:
Chemistry**

Unit C1

Higher Tier

[GDW22]

THURSDAY 17 MAY 2018, 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.

1 (a) Both of these oxides of iron are coloured solids	[1]	AVAILABLE MARKS
(b) (i) There are four steps – each can gain 1 mark: Steps Dip the wire into (concentrated) hydrochloric acid [1] Adjust the Bunsen to give a blue/non smoky flame [1] Dip the (clean) wire into a sample of the copper chloride [1] Hold the wire in (at the edge of) the (Bunsen) flame [1] The only way to get the full 4 marks is to have all four steps Where a candidate has 1 or 2 marking points then any two of the four ideas below can be used to gain an additional mark: Ideas • Wear goggles • Idea that the HCl step is to clean the wire/solid will stick to wire/ increase volatility • The wire is a nichrome wire • Observe the flame colour So 2 marking points + 2 ideas = [3] 1 marking point + 2 ideas = [2] If crediting 2 ideas just give a small tick with a letter “I” at the top of both the ticks	[4]	
(ii) blue-green or green-blue	[1]	6
2 (a) (i) the paper	[1]	
(ii) idea that each had more than 1 dot/dye in the chromatogram	[1]	
(iii) A [1]		
idea that it does not move as far up the paper [1]	[2]	
second mark dependent on first		
(b) 0.46 [2]		
A method mark can be gained for:		
$R_f = \frac{\text{Distance moved by the spot}}{\text{Distance moved by the solvent}}$	[2]	6

3 (a) a few hundred [1]

(b) Any **three** of:

They absorb **ultraviolet** radiation

They spread more easily/cover the skin better

Less is needed

They are transparent

3 × [1]

[3]

(c) Idea that they pass through the skin/travel around the body (more easily) [1]

Idea that they could be **toxic** (NOT just “harmful”) to some types of cells,

e.g. skin, bone, brain, liver [1]

[2]

not ‘toxic’ on its own

not ‘damages’ cells

4 (a) correct diagram for sodium atom [1] sulfur atom [1]

[2]

(b) **Indicative Content**

1.
 - Correct direction of transfer
 - Sodium loses 1 electron
 - Sulfur gains 2 electrons
 - Two sodium atoms required
 - Correct formula Na₂S
 - Sodium ion Na⁺
 - Sulfide ion S²⁻

2.
 - Soluble in water
 - White solid
 - High **melting** point
 - Conduct electricity when molten/in solution or does not conduct electricity when solid

Or other correct, e.g. brittle

Max. 3 IPs for properties

Response	Mark
Candidates must use appropriate scientific terms throughout to describe the bonding of sodium with sulfur using 8–10 of the points in the indicative content .They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates use 5–7 points from the indicative content to describe the bonding of sodium with sulfur using some scientific terms. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates use 2–4 of the points from the indicative content to describe the bonding of sodium with sulfur. They use limited spelling, punctuation and grammar and make little use of scientific terms. The form and style are of a limited standard.	[1]–[2]
Response not worthy of credit.	[0]

[6]

AVAILABLE
MARKS

6

8

			AVAILABLE MARKS
5	(a) non-metal [1] large (or equivalent) [1] energy [1] weak (or equivalent) [1] van der Waals' Accept: intermolecular [1] [5] (b) correct sharing [1] correct total number of electrons [1] This mark depends on correct sharing dot/cross [1] this mark is independent of the other two as long as the molecule is an attempt at CO₂ [3]		8
6	(a) (Average) mass of an atom [1] compared with (that of the) carbon-12 (isotope) [1], which has a mass of exactly 12 [1] or The (average) mass of an atom (of an element) [1] compared to 1/12 of the mass [1] of (the) carbon-12 (isotope) [1] N.B. if candidate refers to the mass of the nucleus (of an atom) do not penalise. In the 2nd marking point NB explicit idea of comparison with carbon-12 is needed for the carbon-12 mark; In the 3rd marking point allow "which has a mass of 12.000" but do not credit "which has a mass of exactly 12 g"; [3] (b) (i) 100 [1] (ii) 148 [1] (c) (i) 5 allow 150 [1] (ii) 80% If answer wrong up to 2 method marks can be awarded For $\frac{12 \times 100}{30} = 40\%$ award [2] For $\frac{24 \times 100}{30} =$ (wrong answer) [2] For $\frac{n \times 100}{30} = 3.33n\%$ [1] i.e. correct computation where n is not 12 or 24 For $12 \times 2 = 24$ [1] For $\frac{12 \times 100}{30} =$ (wrong answer) [1] [3]		9

7 (a)

Base	Acid	Formula of cation in salt	Formula of anion in salt	Formula of salt produced
calcium hydroxide	hydrochloric acid	Ca^{2+}	Cl^-	CaCl_2
copper oxide/hydroxide	sulfuric acid	Cu^{2+}	SO_4^{2-}	CuSO_4
sodium hydroxide	nitric acid	Na^+	NO_3^-	NaNO_3

4 correct = [2], 2 or 3 correct = [1] [2]

(b) $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl}$
LHS [1] RHS [1] [2]

(c) explicit idea that the pH falls/decreases [1]

(d) explicit idea that **all** the H^+ ions have been released by HNO_3 [2],
e.g. $\text{HNO}_3 \rightarrow \text{H}^+ + \text{NO}_3^-$ but answer can be in words without nitrate ion
idea that high concentration of H^+ ions have been released [1] [2]

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8 (a) Substance D [1]
It has a (very) low melting and/or boiling point **or** does not conduct*
(electricity) (when solid or **molten**) [2]

(b) Substance A [1]
It conducts* (electricity) when molten (but not when solid) [1] [2]

(c) Substance B [1]
It has a high melting point **and** it conducts* (electricity) (both these points
are needed) [1] [2]

(d) Substance C [1]
It conducts* (electricity) **and** idea that its melting point is lower
than B or is 660°C (both these points are needed) [1] [2]
* unless wrongly qualified
NB all explanation marks dependent on correct substance

8

9 (a) 69.8 [2]
One method mark can be awarded for work which shows:
 $60\% \text{ of } 69 + 40\% \text{ of } 71 =$ (but answer is wrong/not computed)
or
 $69 \times 0.6 + 71 \times 0.4 =$ (but answer wrong/not computed)
There are no marks for an answer other than 69.8 which has no correct
computation step shown [2]

(b) Some atoms have 2 [1] extra/more neutrons [1]
The '2' mark is dependent on the 'extra/more neutrons' mark [2]

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AVAILABLE
MARKS

10	(a)	(i)	$2\text{NaI} + \text{Cl}_2 \longrightarrow 2\text{NaCl} + \text{I}_2$			
			LHS [1] RHS [1] balancing [1]	[3]		AVAILABLE MARKS
		(ii)	colourless [1] to brown [1]	[2]		
		(iii)	iodine	[1]		
	(b)	Chlorine and bromine both need to gain one electron/form a –1 ion [1] to have complete outer shells/become stable [1]			[2]	8
				Total		70