



Rewarding Learning

**General Certificate of Secondary Education
2013–2014**

Double Award Science: Chemistry

Unit C1

Higher Tier

[GSD22]

THURSDAY 15 MAY 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.

- 1 (a) $2K + Cl_2 \rightarrow 2KCl$
 [1] mark for formula of product
 [1] mark for balancing [2]
- (b) cut surface is shiny or similar Accept silver/silvery [1]
- (c) tarnishes (quickly)/goes dull Accept idea of reacting unless wrongly qualified
Not melting **Not** fizzes [1]
- (d) Idea that it reacts with water vapour and/or oxygen/air
Not just 'it reacts' [1]
- (e) any suitable safety precaution **particular to this reaction** except wearing safety goggles, e.g.
 • use small piece of metal
 • use a safety screen/idea of standing well back from experiment
 • handle with tongs **Not** do not handle with fingers **Not** wear gloves
Not wear lab coat **Not** tie hair back [2]
- (f) (i) (as Group 1 is descended) the reactivity increases [1]
- (ii) idea that at the beginning the universal indicator is green because it is in a neutral liquid [1]
 liquid/water/solution is neutral [1]
 the **reaction** produces alkaline solution [1]
 clear and explicit that indicator is blue in alkaline solution [1] [3]
- (iii) idea that a gas is produced/bubbles/fizzing or other correct [1]
- (iv) sodium + water \rightarrow sodium hydroxide [1] + hydrogen [1]
 Allow [1] if both products given correctly but no reactants given [2]
- 2 (a) an element contains only one type of atom/an element cannot be broken down into anything simpler (by chemical means) [1]
- (b) (relative) atomic mass
Not atomic mass number **Not** mass number **Not** mass [1]
- (c)
- | Name | Symbol | Metal/Non-metal |
|------------|--------|-----------------|
| phosphorus | P | non-metal |
| bismuth | Bi | metal |
- 4 correct = [2] 2–3 correct = [1] [2]
- (d) Period 2 [1]
- (e) clear and explicit idea that group is determined by number of electrons in outer shell [1]
 link between 7 electrons and group 7 **or** 5 electrons and group 5 [1]
 2nd mark dependent on the first [2]

AVAILABLE
MARKS

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			AVAILABLE MARKS	
3	(a)	hydrochloric acid	[1]	9
	(b)	it is not soluble in water (alkalis are soluble in water)	[1]	
	(c)	produces a salt and water (only) Accept H ⁺ ions and OH ⁻ ions produce water Accept ionic equation for neutralisation	[1]	
	(d)	idea that MgO disappears [1] accept dissolves colourless solution remains [1] allow idea of heat given out [1] Max. [2] out of [3] Not idea of bubbles if idea of gas produced is given Max. mark is [1]	[2]	
	(e) (i)	idea of comparison to a colour chart	[1]	
	(ii)	pH of a weak acid is in the range 3–6/orange universal indicator (indicates a weak acid) Allow simple answers such as pH is 3 (3.03)	[1]	
	(iii)	ethanoic acid/vinegar/or other correct named weak acid, e.g. citric acid	[1]	
	(iv)	concentration	[1]	
4	(a) (i)	$12.1 \times 4 = 48.4\text{g}/100\text{g H}_2\text{O}$	[1]	
	(ii)	7–8 tabulated points correctly drawn = [2] 4–6 points correctly drawn = [1] smooth curve/line [1]	[3]	
	(b) (i)	for most solids the solubility increases as the temperature increases both needed	[1]	
	(ii)	the solid becomes more soluble up to 30 °C [1] between 30 °C and 40 °C the solubility is constant [1] idea that above 40 °C the solid becomes less soluble [1] Any two out of three idea of solubility rising then decreasing [1] reference to temperature(s) needed for both marks	[2]	
	(iii)	$40.4 - 16.4 = 24.0\text{g}$ [1] $\frac{24}{2} = 12\text{g}$ [1] Correct answer on its own gets [2]	[2]	9
5	(a)	2 sodium atoms drawn as 2,8,1 and one oxygen atom drawn as 2,6 [1] transfer of e ⁻ from Na to O [1] transfer of 1 electron from both Na atoms to oxygen [1] 2 sodium ions and 1 oxide ion [1] mark can be implied	[4]	6
	(b)	attraction between/electrostatic attraction [1] (between) oppositely charged ions/sodium ions and oxide ions [1] 2nd mark dependent on 1st	[2]	

- 6 (a) allotropes are different forms of the same element [1]
in the same (physical) state [1]
2nd mark dependent on 1st [2]
- (b) sharing (a pair of) electrons [1]
- (c) correct sharing of two pairs of electrons [1] in 2 double bonds
correct number of electrons [1] dependent on 1st mark
dot and cross [1] [3]

(d)

Substance	Type of structure
diamond	giant covalent
graphite	giant covalent/ macromolecular [1]
carbon dioxide	molecular covalent/ simple molecular [1]

[2]

- (e) idea the layers can slide over one another (easily) [1]
and leave a (visible) mark [1] [2]

AVAILABLE
MARKS

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7 Indicative content

structure

- positive ions
- in a regular arrangement **or** lattice – unless wrongly qualified
- **surrounded** by a sea of delocalised electrons

bonding

- attraction between the positive ions or metal ions and the electrons

ductility

- the (positive) ions/atoms can move/slide over each other. Not just layers moving/sliding
- without disrupting the bond

Response	Mark
Candidates make reference to 5–6 of the indicative points above to describe the structure and bonding and ductility of metals. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
Candidates make reference to 3–4 of the indicative points above to describe the structure and/or bonding and ductility of metals. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
Candidates make reference to 1–2 of the indicative points above using limited spelling, punctuation and grammar. The form and style are of limited standard and they have made no use of specialist terms.	[1–2]
Candidates make no reference to the indicative points and offer no other suitable response.	[0]

[6]

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AVAILABLE
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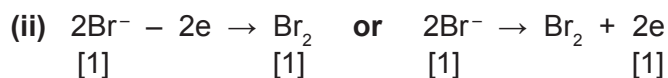
8 (a)

Substance	Name of particle which moves and carries the charge	Effect on the substance due to the passage of electricity
lead	electrons [1]	no effect Allow idea of heating up unless wrongly qualified [1]
lead(II) bromide	ions [1] Not cations Not anions Allow cations and anions	decomposes/ broken down Idea of: • lead formed or • bromine formed or • forms its elements Not splits up Not separates Not breaks up [1]

[4]

(b) (i) a positive electrode

[1]



[2]

Allow $\text{Br}^- \rightarrow \text{Br} + \text{e}^-$ [1]

(iii) bubbles [1]

of brown gas Allow red-brown, orange-brown, yellow-brown, orange [1]

Not red Not yellow

with a characteristic smell [1]

any two × [1]

[2]

e.c.f.: If product shown in (ii) is lead award candidate 1 e.c.f. mark for correct observation related to lead, e.g. silvery metal

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Total

70