



Rewarding Learning

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

**Double Award Science:
Chemistry**

Unit C1

Higher Tier

[GSD22]

THURSDAY 9 NOVEMBER 2017, 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.

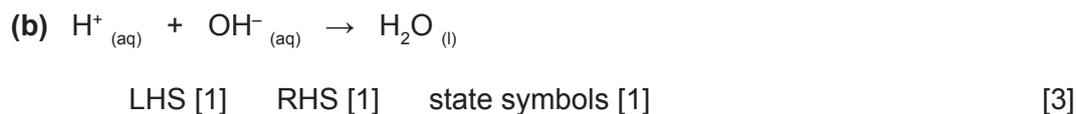
The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends 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) 95 °C [1]
- (b) (i) 55 [1]
- (ii) caesium/Cs [1]
- (c) Group 1/alkali metal [1]
- (d) As the atomic number increases/as the group is descended [1] the melting point decreases [1] [2]
- (e) Reactivity increases as the atomic number increases/as group is descended [1]
Accept idea that reactivity increases as melting point decreases [1]

- 2 (a) (i) Drink X [1]
- (ii) phosphoric acid only [1]
- (iii) pH meter/data logger/pH probe [1]
- (iv) hydrogen/H⁺ if formula given it must be correct [1]



(c)

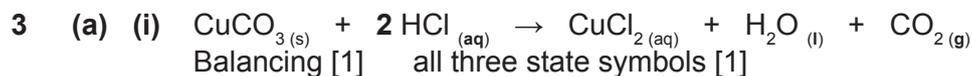
metal oxide	acid used	cation in salt	anion in salt	formula of salt
copper oxide	hydrochloric acid [1]	Cu ²⁺	Cl ⁻	CuCl ₂
sodium oxide	sulfuric acid	Na ⁺	SO₄²⁻ [1]	Na ₂ SO ₄
calcium oxide	nitric acid	Ca ²⁺	NO ₃ ⁻	Ca(NO₃)₂ [1]

[3]

AVAILABLE MARKS

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[2]

AVAILABLE
MARKS

(ii) limewater [1] turns milky white/cloudy [1]

[2]

(b) **Indicative content**

Step or steps and apparatus

- Idea that the acid should be added to the carbonate
- Idea of measured amount/uses a spatula/use a measuring cylinder
- Idea of stirring/agitating the container/using a stirring rod
- One piece of apparatus - flask/conical flask/beaker/boiling tube/test tube - **don't** credit lists which have wrong apparatus, e.g. bunsen, tripod, gauze.

Max 3 IPs

Safety precautions

- Wearing goggles
- Using small amounts
- Taking care not to spill
- Or other correct

Max 2 IPs

Colour changes and other observations

- Green copper carbonate/solid **or** colourless acid/solution*
- (carbonate) dissolves/disappears (**not** reacts)
- Blue copper chloride/solution*
- Bubbles of gas/fizzing/effervescence
- Idea that reaction is (quite) fast (**not** violent)
- Idea that heat is given out

*Allow 'green to blue' or 'colourless to blue' if first and third bullet points both absent.

Max 5 IPs

Band	Response	Mark
A	Candidates must use appropriate scientific terms throughout to describe the method of making the crystals 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]
B	Candidates use 5–7 points from the indicative content to describe the method of making the crystals using some scientific terms. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates use 2–4 of the points from the indicative content to describe the method of making the crystals. 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]
D	Response not worthy of credit.	[0]

[6]

(c) (i) Similar:

Bubbles of gas/fizzing

Carbonate dissolves

Idea that reaction is quite fast (not violent)

Both give out heat

Or other correct [1]

[1]

(ii) Different:

calcium carbonate is white [1]

the solution formed is colourless [1]

[2]

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4 (a) (i) Correct direction of transfer [1]

lithium loses 1 electron [1]

oxygen gains 2 electrons [1]

accept answers with electronic configurations

[3]

(ii) Li_2O

[1]

(b) ionic bonding

[1]

(c) (i) correct sharing [1]

correct total electrons [1]

correct dot cross [1]

[3]

(ii) two atoms in a molecule (of oxygen) (covalently bonded)

or two atoms covalently bonded together

not two elements bonded together, **not** two atoms

[1]

- (d) (i) A [1]
 (ii) C [1]
 (iii) correct diagram of ammonia showing correct sharing [1]
 correct outer electrons [1] (2nd mark depending on 1st) [2]

AVAILABLE
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- 5 (a) C [1]
 Idea of layers of identical atoms/ions closely packed [1] [2]
 (b) A and E either order [1]
 (c) B and C either order [1]
 (d) D [1]
 (e) E [1]
- 6 (a) anode **and** cathode correctly shown [1]
molten lead(II) bromide/or electrolyte [1]
 heat/bunsen burner [1]
 crucible/circuit/tripod [1] [4]

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(b) (i)

halide salt	anode observations	cathode observations	product at anode	product at cathode
lithium iodide	purple gas	silvery beads	Iodine	lithium metal
lead(II) bromide	*brown fumes	silvery beads accept grey beads	bromine	lead metal
potassium bromide	brown fumes	silvery beads	bromine	potassium metal
sodium chloride	(pale) green/ yellow green gas OR pungent smell	silvery beads	chlorine	sodium metal

8 correct = [4]; 6 or 7 correct = [3]; 4 or 5 correct = [2]; 2 or 3 correct = [1] [4]

- (ii) $2\text{Br}^- - 2\text{e}^- \rightarrow \text{Br}_2$ **or** $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$
 LHS [1] RHS [1] balancing if all formulae correct [1]
 Electron can be depicted as e or e⁻
 *Accept brown/orange-brown/red-brown/yellow-brown/orange
not yellow not red [3]

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- 7 (a) (i) correct list:
 Br
 I
 F
 At
 Cl
- bromine, iodine, fluorine and chlorine and astatine all identified/ignore correctness of the symbols/formulae when awarding these marks [2]
 all 5 symbols correct [1]
 if 3 or 4 of the five elements are in the correct order award 1 mark but still allow a second mark for the symbols if all 5 symbols are correct.
 if fewer than 3 elements identified [0] [3]
- (ii) astatine [1]
- (b) (i) from colourless [1] to brown/yellow-brown [1]
 chlorine displaces iodine [1] [3]
- (ii) $2\text{KI} + \text{Cl}_2 \rightarrow 2\text{KCl} + \text{I}_2$
- LHS [1], RHS [1] balancing if all formulae correct [1] [3]

Total**AVAILABLE
MARKS**

10

70