



*Rewarding Learning*

**General Certificate of Secondary Education  
2014–2015**

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**Double Award Science: Chemistry**

Unit C1

Higher Tier

**[GSD22]**

**THURSDAY 13 NOVEMBER 2014, MORNING**

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**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)	6 electrons drawn as 2,4 in shells around the nucleus [1] 6 protons [1] 7 neutrons [1] both neutrons and protons in the nucleus[1] the mark for electrons can be awarded without a label but labels or a key are necessary to distinguish between the protons and neutrons [4]		
	(b)	idea of equal number of protons and electrons [2] for idea that the charges cancel each other out allow [1] <b>or</b> that there are equal numbers of positive and negative charges [1] [2]		
	(c)	(i) A [1]  (ii) B and D both needed [1]  (iii) C [1]		9
2	(a)	$\text{H}_2\text{SO}_4 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$ LHS [1], RHS [1], balancing [1] [3]		
	(b)	neutralisation reaction involves an acid and a base/alkali [1] reacting to form a salt and water (only) [1] <b>or</b> hydrogen ions plus hydroxide ions [1] provide water [1] for this answer second mark depends on first [2]		
	(c)	sulfuric acid has a pH in the range 0–2 (which is the pH of a strong acid) accept fully dissociates into ions <b>not just</b> low/very low pH [1]		
	(d)	(i) green [1]  (ii) idea solid disappears/dissolves [1] fizzing/bubbles/gas given off [1] colourless liquid [1] becomes blue/blue solution formed [1] gas is colourless [1] idea of exothermic reaction [1] Any 4 × [1] [4]		
	(e)	apply a lighted splint [1] burns with a (squeaky) pop [1] [2]		13

			AVAILABLE MARKS				
3	(a)	structure: regular arrangement [1] <b>not just</b> rows or layers of positive ions [1] in a sea of delocalised electrons [1] bonding: the attraction between the electrons and the positive ions [1]	[4]	14			
		(b) (i)	a positive ion		[1]		
		(ii)	calcium ion 2,8,8 [1] fluoride ion 2,8 [1]		[2]		
		(iii)	CaF <sub>2</sub>		[1]		
	(c)	(i)	correct sharing showing two bonded pairs [1] correct number of electrons (dependent on 1st mark) [1] dot and cross notation [1]		[3]		
		(ii)	there are <b>weak</b> forces of attraction [1] between the molecules (of oxygen) [1] which require little energy to break [1] second mark depends on first		[3]		
	4	(a)	solubility changes with temperature		[1]	10	
		(b)	step 2 (add) a known volume [1] of water [1] Max 20 cm <sup>3</sup> step 4 (wait until) crystals form [1] step 6 (add) another known volume [1] of water [1] accept or another known mass [1] of solid [1] no credit if both water and solid added		[5]		
			(c) (i)		40		[1]
			(ii)		Saturated [1] 100 g of water is saturated when 27 g of solid is added [1]; idea that 50 g is saturated when 13.5 g of solid is added <b>or</b> idea that there would be 36 g of CuSO <sub>4</sub> added to 100 g of water [1]		[3]
5			(a) (i)	A	[1]		
		(ii)	C	[1]			
(b)	(iii)	A	[1]				
	(iv)	B	[1]				
	(b) <b>strong</b> (covalent) bonds [1] between atoms/in a giant structure [1] bonds require a lot of energy to break [1]	[3]					
	(c)	delocalised electrons <b>can move</b> [1] and carry the charge [1] – must refer to electrons	[2]				
	(d)	different forms of the same element [1] in the same physical state [1] second mark dependent on first	[2]				
			11				

## 6 Indicative content

### DESCRIPTION

- when  $\text{PbBr}_2$  is solid the bulb does not light
- $\text{PbBr}_2$  melts
- when the  $\text{PbBr}_2$  is liquid the bulb lights
- bubbles/gas evolved/effervescence
- brown (gas)
- pungent smell

### EXPLANATION

- the bulb lights because the circuit is complete/the liquid conducts but the solid does not
- when molten the ions are free to move
- and carry the charge
- bromide ions move to the anode
- they are discharged/lose electrons at anode
- bromine gas formed

Band	Response	Mark
A	Candidates make reference to 9–12 of the main points above to describe <b>and</b> explain the observations made during the experiment. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates make reference to 5–8 of the main points above to describe <b>and/or</b> explain the observations made during the experiment. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates make reference to 1–4 of the main 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]
D	Candidates make no reference to the main points and offer no other suitable response.	[0]

- 7 (a) displacement – accept redox [1]
- (b) chlorine is more reactive than iodine [1]  
 iodine is displaced/formed [1]  
 iodine is brown [1] – accept – yellow-orange-brown or combinations. Not red  
 iodine dissolves (in water) [1]  
 Any 3 × [1] [3]
- (c)  $\text{Cl}_2 + 2\text{I}^- \rightarrow \text{I}_2 + 2\text{Cl}^-$   
 LHS [1] RHS [1] balancing [1] [3]

**Total**

6

7

**70**