Rewarding Learning

General Certificate of Secondary Education
2016–2017

Double Award Science: Chemistry

Unit C1

Higher Tier

[GSD22]

THURSDAY 10 NOVEMBER 2016, 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)**		He	[1]	
	(b)		SO_2	[1]	
	(c)		NH_4^+	[1]	
	(d)		Br_2	[1]	4
2	**(a)**	**(i)**	(As the temperature rises) the solubility falls	[1]	
		(ii)	chlorine	[1]	
		(iii)	carbon dioxide	[1]	
		(iv)	carbon dioxide	[1]	
		(v)	nitrogen, oxygen and chlorine [2] any two correct **only** [1] two correct and one incorrect [0] if 4 gases given and 3 are correct [1]	[2]	
		(vi)	chlorine	[1]	
	(b)	**(i)**	thermal	[1]	
		(ii)	oxygen	[1]	
	(c)	**(i)**	As the temperature increases solubility also increases	[1]	
		(ii)	72 g	[1]	
		(iii)	72 – 60 = 12 g 12 ÷ 2 = 6 g **Method**: dividing by 2 [1] Taking the solubility at 14 °C away from the **(c)(ii)** answer [1] correct answer 6 g [3] answer of 12 g (no working) [1] answer of 12 g with working out [2]	[3]	14

AVAILABLE MARKS

3 **(a)** C A B in correct order [1]

(b) $CuSO_4$ [1] + H_2O [1] [2]

(c) **(i)** green [1]

(ii) carbon dioxide [1]

(d) **Indicative content**

Apparatus used
- beaker
- spatula
- filter funnel
- filter paper
- evaporating basin/dish
- tripod
- Bunsen
- (retort) stand
- clamp
- (wire) gauze

Maximum [4] IPs for apparatus

Steps
- D idea of **adding until** no more solid dissolves
- C idea of **filtering** to remove excess solid/copper oxide/residue
- A **heating** to remove water/to evaporate
- B (idea of) cooling to produce crystals

Colours
- copper oxide – black
- copper sulfate – blue
- dilute sulfuric acid – colourless

Safety
- goggles/care in use of Bunsen burner or other

There is a maximum of [12] IPs – apparatus [4], steps [4], colours [3], safety [1]

Response	**Mark**
Candidates must use appropriate scientific terms throughout to describe the method of making the crystals using **9–12** 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 **6–8** 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]
Candidates use **2–5** 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]
One **1 or 0** indicative points correct. Response not worthy of credit	[0]

[6]

11

				AVAILABLE MARKS
4	**(a)**	Q	[1]	
	(b)	S	[1]	
	(c)	P and R both required	[1]	
	(d)	17	[1]	
	(e)	23	[1]	
	(f)	correct 2,8,7 drawing	[1]	6
5	**(a)**	**(i)** 4	[1]	
		(ii) 4	[1]	
		(iii) covalent or double covalent	[1]	
	(b)	correct diagram of nitrogen molecule showing 3 pairs of shared electrons in centre. Correct sharing [1], correct total electrons (if sharing correct) [1] Dot cross diagram [1]	[3]	6
6	**(a)**	ionic bonding [1] made up of positive and negative ions/oppositely charged ions [1] electrostatic/strong attraction between oppositely charged ions/positive ions and negative ions [1] 3rd marking must not be wrong	[3]	
	(b)	Property: high melting point [1] Explanation: large amount of energy needed to break bonds [1] Property: does not conduct electricity [1] Explanation: ions are not free to move [1] accept converse for molten or dissolved Property: brittle [1] Explanation: idea ions of same charge repel when aligned [1] Property: hard [1] Explanation: idea of strong bonds (unless wrongly qualified) [1] or other correct	[4]	
	(c)	electron transfer from magnesium → sulfur [1] magnesium loses 2 electrons **or** sulfur gains 2 electrons [1] formation of oppositely charged ions **or** formation of Mg^{2+} and S^{2-} [1] idea of attraction between oppositely charged ions [1]	[4]	
	(d)	correct diagram showing delocalised electrons [1] positive ions only [1] regular arrangement of positive ions only [1] for ionic structure – no marks if no labels max [2]	[3]	14

			AVAILABLE MARKS
7	**(a)**	$2Li + F_2 \longrightarrow 2LiF$ correct LHS [1], correct RHS [1] correct balancing if all formulae correct [1] [3]	
	(b)	Sodium and lithium both have one electron/same number of electrons in their outer shells [1] they both lose this electron [1] to become stable/to have a complete outer shell [1] [3]	
	(c) **(i)**	The decomposition/breaking down of a substance [1] **NOT** separating by the passage of an electric current/using electricity [1] [2]	
	(ii)	(good) conductor of electricity [1] high melting point/or inert [1] [2]	
	(d) **(i)**	$2F^- \rightarrow F_2 + 2e^-$ or $2F^- - 2e \rightarrow F_2$ correct LHS [1] correct RHS [1] correct balancing [1] [3]	
	(ii)	$Li^+ + e^- \rightarrow Li$ LHS [1] RHS [1] If anode and cathode reactions are both given **but** the wrong way round penalise each answer by [1] [2]	15
		Total	**70**