Rewarding Learning

General Certificate of Secondary Education
2016–2017

Double Award Science: Chemistry

Unit C1

Higher Tier

[GSD22]

THURSDAY 23 FEBRUARY 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.

				AVAILABLE MARKS
1	**(a)**			

Word	Description letter
hydrated	E
solvent	A
solubility	D
anhydrous	B
solution	C

5 × [1] [5]

(b) **(i)** hydrated [1]

(ii) $CuSO_4$ [1] 7

2 **(a)** aluminium [1]

(b) argon [1]

(c) 2 [1]

(d) six electrons **in outer shell** clearly implied [1]

(e) increases [1]

(f) **(i)** 18 [1]

(ii) 22 [1]

(iii) has a full outer shell/8 electrons in outer shell [1] 8

AVAILABLE MARKS

3 Indicative content

- Calcium 2,8,8,2
- Fluorine 2,7
- Correct idea of electron transfer from calcium to fluorine
- Two electrons lost by calcium
- Fluorine gains one electron
- Two fluorine atoms required
- Calcium ion Ca^{2+}
- Fluoride ion F^-
- Strong/electrostatic forces of attraction
- Correct formula CaF_2

Response	Mark
Candidates must use appropriate scientific terms throughout to describe the formation of calcium fluoride 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 formation of calcium fluoride 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 formation of calcium fluoride. 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] 6

4 (a) (i) 4 [1]

(ii) 2 [1]

(b) covalent **not** simple covalent [1]

(c) idea of two atoms in a molecule [1]

(d) correct sharing [1]
correct outer electrons for both sulfur and hydrogen [1]
dot cross [1] [3] 7

AVAILABLE MARKS

5 **(a)** A and D (both required) [1]

(b) C [1]

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

(ii) layers unless wrongly qualified [1] slide over each other [1] [2]
second mark depends on first

(d) A [1]

6

6 **(a)**

metal oxide	acid used	formula of cation in salt	formula of anion in salt	formula of salt produced
sodium oxide	hydrochloric acid	**Na^+** [1]	Cl^-	**NaCl** [1]
calcium oxide [1]	sulfuric acid	Ca^{2+}	SO_4^{2-}	$CaSO_4$
copper oxide	nitric acid	Cu^{2+}	NO_3^-	**$Cu(NO_3)_2$** [1]
potassium oxide	**sulfuric acid** [1]	K^+	**SO_4^{2-}** [1]	K_2SO_4

[6]

(b) bases (allow insoluble) [1]

(c) $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$
LHS [1] RHS [1] State symbols [1] [3]

(d) **(i)** pH meter/pH probe [1]

(ii) blueberries [1]

(iii) broccoli [1]

13

				AVAILABLE MARKS
7	**(a)**	electrolysis	[1]	
	(b)	anode(s)	[1]	
	(c)	$2O^{2-} - 4e \rightarrow O_2$ LHS [1] RHS [1] Balancing [1] **or** $2O^{2-} \rightarrow O_2 + 4e$ LHS [1] RHS [1] Balancing [1]	[3]	
	(d)	any **two** of: anode is made of carbon/graphite [1] oxygen reacts with anode/carbon/graphite [1] to produce carbon dioxide – unless wrongly qualified [1]	[2]	
	(e)	goods transport links, availability of labour, electricity supply, closeness to a port, good water supply, suitable waste disposal, availability of raw materials	[2]	
	(f)	cryolite [1] reduces operating temperature/melting point (of aluminium oxide) [1] (aluminium oxide) crust [1] reduces heat loss [1] cryolite [1] increases the conductivity [1] (any **two** ways) not answers linked to recycling	[4]	13
8	**(a)**	R, Q, P, S all correct [2] two correct [1]	[2]	
	(b)	chlorine [1] sodium fluoride [1]	[2]	
	(c) **(i)**	$Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$ LHS [1] RHS [1] Balancing [1]	[3]	
	(ii)	colourless [1] to orange/brown [1] accept yellow, orange, brown or combinations accept red-brown **not** red	[2]	
	(iii)	displacement	[1]	10
			Total	**70**