Rewarding Learning

General Certificate of Secondary Education
2023–2024

Double Award Science
Chemistry

Unit C1

Foundation Tier

[GDW21]

THURSDAY 22 FEBRUARY 2024, MORNING

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCSE Double Award Science.

Candidates must:

AO1 Demonstrate knowledge and understanding of:
- scientific ideas; and
- scientific techniques and procedures;

AO2 Apply knowledge and understanding of and develop skills in:
- scientific ideas; and
- scientific enquiry, techniques and procedures; and

AO3 Analyse scientific information and ideas to:
- interpret and evaluate;
- make judgements and draw conclusions; and
- develop and improve experimental procedures.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. The exception to this for GCSE Double Award Science is when examiners are marking complex calculations when the Examiners are briefed to mark by error or omission. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Marking Calculations

In marking answers involving calculations, examiners should apply the 'carry error through' rule so that candidates are not penalised more than once for a computational error. To avoid a candidate being penalised, marks can be awarded where correct conclusions or inferences are made from their incorrect calculations.

Types of mark schemes
Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response
In deciding which level of response to award, examiners should look for the number of indicative content points in candidate responses to ensure that the answer has been written to coincide with the question. In deciding which mark within a particular level to award to any response, quality of communication will be assessed and examiners are expected to use their professional judgement.

The following guidance is provided to assist examiners.

- ***Threshold performance:*** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.

- ***High performance:*** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication
Quality of written communication is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of bands of response. The description for each band of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within bands of response as follows:

Band A: Quality of written communication is excellent.
Band B: Quality of written communication is good.
Band C: Quality of written communication is basic.
Band D: Response not worthy of credit.

In interpreting these band descriptions, examiners should refer to the more detailed guidance provided below:

Band A (Excellent): Excellent reference to scientific terminology. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

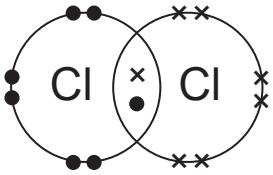
Band B (Good): Good reference to scientific terminology. The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Band C (Basic): Basic reference to scientific terminology. The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

				AVAILABLE MARKS
1	**(a)**	corrosive	[1]	
	(b)	3	[1]	
	(c)	universal (indicator)	[1]	
	(d)	3–6	[1]	
	(e)	(an alkali is) a soluble base	[1]	
	(f)		[3]	8

	Name	**Formula**
Ion present in acidic solutions	**hydrogen** [1]	**H^+** [1]
Ion present in alkaline solutions	hydroxide	**OH^-** [1]

2	**(a)**	melting	[1]	
	(b)	3/4 points correct [1] line of best fit [1]	[2]	
	(c)	**(i)** solvent	[1]	
		(ii) colourless	[1]	
		(iii) NaCl	[1]	6

			AVAILABLE MARKS
3	**(a)**  correct sharing [1] all electrons correct [1] dot and cross [1] (each mark dependent on previous)	[3]	
	(b) two/2 [1] atoms [1]	[2]	
	(c)		

hydrogen (H_2)	✓ [1]
carbon dioxide (CO_2)	
iron (Fe)	
helium (He)	
hydrogen chloride (HCl)	✓ [1]

[2]

(d) van der Waals' forces [1]

(e) 8 [1] 9

AVAILABLE MARKS

4 (a) Indicative content

Three features of Mendeleev's Periodic Table

- Mendeleev's periodic table arranged in order of **atomic mass**
- Mendeleev's periodic table had gaps
- Mendeleev's periodic table included groups/periods
- Transition metal elements were not in a block
- no noble gases
- no lanthanides/actinides

(**max** three of the above)

State how the modern periodic table is different from Mendeleev's Periodic Table.

- Modern periodic table arranged in order of **atomic number**
- Modern periodic table places transition elements in a separate block/ area
- Modern periodic table has noble gases
- Modern periodic table has actinides/lanthanides **or** correct idea that modern periodic table changed position of some elements, e.g. hydrogen **or** Mendeleev's periodic table has more than one element in a space/modern periodic table only one element in a space
- No gaps

(**max** three of the above)

Band	Response	Mark
A	Candidates must use appropriate scientific terms throughout using **at least 5** 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 **at least 3** points from the indicative content, 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** of the points from the indicative content. 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]

(b) potassium + water → potassium hydroxide [1] + hydrogen [1] [2]

(c) in oil [1]

(d) shiny [1]
dull/tarnished [1] [2]

11

					AVAILABLE MARKS
5	**(a)**	**(i)**	15 protons [1] 15 electrons [1] 16 neutrons [1]	[3]	
		(ii)	B	[1]	
	(b)		idea of unequal protons and electrons/more electrons than protons	[1]	
	(c)	**(i)**	high [1] bond/attraction [1] oppositely [1]	[3]	
		(ii)	ions	[1]	9
6	**(a)**		X = covalent bond [1] Y = carbon **atom** [1]	[2]	
	(b)		soft/weak van der Waals' forces between layers/layers can slip over each other/layers leave a mark on the page	[1]	
	(c)		diamond/graphene	[1]	4
7	**(a)**		2	[1]	
	(b)		CO_2/carbon dioxide	[1]	
	(c)		copper(II) sulfate/copper sulfate	[1]	
	(d)				

Formula	Total number of atoms in the formula	Number of different elements in the formula
I_2	2 [1]	1 [1]
$(NH_4)_2SO_4$	15 [1]	4 [1]

[4] 7

8 **(a)** $ZnSO_4$ = 161 [1]
$Fe_2(CO_3)_3$ = 292 [1] [2]

(b) (24/240) × 100 [1]
10 (%) [1] [2]

(c)

Chemical	Relative formula mass (M_r)	Mass/g	Moles
$BaSO_4$	233	69.9	**0.3** [1]
Na_2S	78	**11.7** [1]	0.15

[2]

Total

AVAILABLE MARKS

6

60