



Rewarding Learning

General Certificate of Secondary Education
2017

GCSE Chemistry

Unit 1

Foundation Tier

[GCH11]

WEDNESDAY 14 JUNE, MORNING

**MARK
SCHEME**

General Marking Instructions and Mark Grids

Introduction

Mark schemes are intended to ensure that the GCSE examination is 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 that they should apply in allocating marks to candidates' responses. The mark schemes should be read in conjunction with these marking instructions.

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 must be positive in their marking, giving appropriate credit for description, explanation and analysis, using knowledge and understanding and for the appropriate use of evidence and reasoned argument to express and evaluate personal responses, informed insights and differing viewpoints. Examiners should make use of the whole of the available mark range of 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.

Types of mark scheme

Mark schemes for 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.

1 (a) (i)

Element	Melting point (°C)	Boiling point (°C)	Physical state at room temperature
magnesium	650	1090	solid
mercury	-39	357	liquid [1]
phosphorus	44	277	solid [1]
xenon	-112	-108	gas [1]

[3]

(ii) Br

[1]

(b) (i) sublimation

[1]

(ii) dark grey/grey-black [1] to purple/violet [1]

[2]

(c) (i) alkali metals

[1]

(ii) shiny [1] changes to dull/tarnishes [1]

[2]

(iii) Li

[1]

(d) (i) 5

[1]

(ii) 3

[1]

(e) (i) noble gases

[1]

(ii) full outer shell (of electrons) [1]
idea of stability [1]

[2]

AVAILABLE
MARKS

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- 2 (a) (i) conical flask [1]
- (ii) pH meter/pH probe [1]
- (iii) to ensure mixing (so the solutions react) [1]
- (iv) pH 12 (from graph) [1]
alkaline [1] [2]
- (v) 3.0/3 [1]

(b) (i)

test	Observation	deduction
1. flame test	yellow/orange flame [1]	Sodium ion present
2. (i) add 1 cm ³ of sodium hydroxide solution	White ppt [1]	Zinc ions present
(ii) add excess sodium hydroxide solution	ppt redissolves [1]	
3. add some barium chloride solution	White ppt [1]	Sulfate ion present
4. add some silver nitrate	White ppt [1]	Chloride ion present

[5]

(ii) AgNO₃ [1]

(iii) Any **two**:
zinc chloride/sodium sulfate/zinc sulfate/sodium chloride [2]

AVAILABLE
MARKS

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- 3 (a) (i) B [1]
- (ii) D [1]
- (iii) F [1]
- (iv) NH_3 [1]
- (v) $\text{H} \times \overset{\cdot\cdot}{\underset{\cdot\cdot}{\text{Cl}}} :$ [1]
- (vi) shared pair [1]
of electrons [1] [2]
- (vii) $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
correct formulae of reactants [1]
correct formula of product [1]
correct balancing [1] [3]
- (viii) NH_4Cl [1]

(b)

Ion	Atomic number	Mass number	Number of protons	Number of electrons	Number of neutrons
Mg^{2+}	12	24	12	10	12
O^{2-}	8	16	8	10	8
K^+	19	39	19	18	20
Zn^{2+}	30	65	30	28	35

[1] for each correct column [6]

- (c) (i) magnesium oxide [1]
- (ii) bonding: ionic [1]
structure: (ionic) lattice/giant [1] [2]
- (iii) any **two** from the following marking points:
 - high melting point/high boiling point/solid/powder [1]
 - brittle/crystalline/good cleavage [1]
 - conducts electricity when molten/conducts electricity when aqueous/conducts electricity when liquid [1]
 - soluble (in water) [1]
 - white [1] [2]

AVAILABLE MARKS

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4 (a)

Acid	Base	Name of salt	Formula of salt
		potassium nitrate [1]	KNO ₃ [1]
hydrochloric acid [1]			NaCl [1]
		copper(II) sulfate [1]	CuSO ₄ [1]

[6]

(b) $\text{KOH} + \text{HCl} \rightarrow \text{KCl} + \text{H}_2\text{O}$
 correct formulae of reactants [1]
 correct formulae of products [1] [2]

(c) *evaporate to half volume/reduced volume [1]
 cool and crystallise [1]
 filter off the crystals [1]
 *dry between filter paper/in a low temperature oven/in a desiccator [1] max [3]
 *essential mark

(d) (i) 6.4 [1]

(ii) 20 [1]

(iii) 32 [1]

(iv) increases [1]

AVAILABLE MARKS

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5 (a)

Substance	Mass	RFM	Moles
	20 [1] g	100 [1]	
		74 [1]	0.0025 [1]

[4]

(b) Indicative content:

- 1 Weigh container with hydrated solid
- 2 Heat and weigh
- 3 Repeat until mass no longer changes/consecutive mass the same
- 4 Subtract final mass from initial mass to find mass of water
- 5 Evaporating basin/crucible not crucible with lid
- 6 Bunsen burner with tripod, gauze. If crucible use pipe-clay triangle

Response	Mark
Candidates must use appropriate specialist terms to explain fully the process (using 5–6 points of indicative content). They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates use some appropriate specialist terms to explain the process (using 3–4 points of indicative content). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates briefly and partially explain the process (using at least 2 points of indicative content). They use limited spelling, punctuation and grammar and they have made little use of specialist terms. The form and style are of a limited standard.	[1]–[2]
Response not worthy of credit	[0]

[6]

(c) $219 [1] \times \frac{108}{219} [1] \times 100 = 49.3 [1]$

or

$$\frac{(6 \times 18)}{219}$$

[3]

Total**AVAILABLE
MARKS**

13

80