CAMBRIDGE
International Education

Cambridge IGCSE™

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **February/March 2024**

MARK SCHEME

Maximum Mark: 40

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the February/March 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	<u>'List rule' guidance</u> For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

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6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

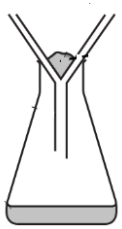
Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

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Question	Answer	Marks
There are six pages above **Q1(a)** that all require 'seen' on them. These should be checked before you start marking a script and any answers linked to the appropriate question part.		
1(a)	glass rod / stirring rod	**1**
1(b)	to mix (the substances together)	**1**
1(c)		
	M1 funnel over a suitable container to collect the filtrate	**1**
	M2 filter paper shown inside the funnel	**1**
1(d)(i)	calcium chloride / $CaCl_2$ **OR** sodium chloride / $NaCl$	**1**
1(d)(ii)	pour water over the residue in the funnel	**1**
1(e)	**Test for carbonate ions** **M1** add dilute hydrochloric acid / nitric acid / sulfuric acid (1) **M2** does **not** effervesce / fizz / bubble (1) **OR** **Test for calcium ions** **M1** add aqueous sodium hydroxide / aqueous sodium carbonate (1) **M2** (white) precipitate / filter and there is a solid residue (1)	**2**

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Question	Answer	Marks
2(a)	**M1** All three final readings recorded correctly (26.2, 12.9, 39.1)	**1**
	M2 All three initial readings recorded correctly (0.8, 0.2, 1.0)	**1**
	M3 all three titres correct (25.4, 12.7, 38.1)	**1**
	M4 all **nine** volumes recorded to 1 dp or better	**1**
2(b)(i)	A **AND** as volume (of A in Experiment 1 needed was) lower (than volume of B in Experiment 3)	**1**
2(b)(ii)	1.5	**1**
2(c)(i)	**M1** a greater volume is used in Experiment 1	**1**
	M2 by a factor of two / twice as much	**1**
2(c)(ii)	**M1** 19.05 / 19.1	**1**
	M2 cm^3	**1**
2(d)(i)	(dilute) hydrochloric acid / **A**	**1**
2(d)(ii)	larger volume (of acid) / more acid needed / larger titre	**1**
2(d)(iii)	increases volume of aqueous sodium carbonate	**1**
2(e)	so colour (change) is easy to see / colour (change) clear(er) / colour (change) more obvious	**1**
2(f)	**M1** none	**1**
	M2 amount / moles (of sodium carbonate) does not change / volume of sodium carbonate does not change / concentration (of sodium carbonate) does not change	**1**

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Question	Answer	Marks
3(a)	no change	**1**
3(b)	yellow precipitate	**1**
3(c)(i)	no change	**1**
3(c)(ii)	(red) litmus (paper) turns blue	**1**
3(d)	pink	**1**
3(e)	nitrate / NO_3^-	**1**
3(f)	carbon dioxide / CO_2	**1**
3(g)	**M1** Na^+ / sodium (ion)	**1**
	M2 Fe^{2+}/ iron(II) (ion)	**1**
	M3 CO_3^{2-} / carbonate (ion)	**1**

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Question	Answer	Marks
4	Any 6 from: **MP1** use a known / measured / stated / fixed volume of dilute sulfuric acid. **MP2** add a known / measured / stated / fixed mass of zinc **MP3** measure time to collect a set volume of gas / measure the volume of gas collected in a set time **OR** time until no more fizzing **OR** no more gas made **OR** time until no more solid **OR** time until no more mass loss **OR** time until no more gas collected **OR** measure mass loss / gas volume in set time **MP4** use of suitable reaction vessel – (conical) flask, test-tube, boiling tube **OR** gas syringe / inverted measuring cylinder to collect gas **MP5** repeat but add (a known mass / measure) of copper as well as zinc **MP6** filter out the copper from the solution, (wash and) dry the copper and weigh the copper **MP7** copper is a catalyst if mass does not change **AND** more gas collected in set time / time to collect set volume of gas is less / time to end is less **max 6**	**6**

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	time to			**how much gas made reaction for fixed time**		**mass**
	make a known volume of gas	**make a known number of bubbles gas**	**end of reaction**	**vol of gas**	**bubbles of gas**	**mass loss**
MP1	know / specified / stated / measured VOLUME of sulfuric acid **Ignore** amount / mass / moles / excess					
MP2	known / specified / stated / measured MASS / WEIGHT of zinc **Ignore** amount / volume / moles / excess					
MP3	measure time to collect a set volume / amount of gas	measure time for a set number of bubbles	measure time until fizzing stops / no more gas made / time until all zinc dissolved / time until bubbles stop	measure the volume / amount of gas collected in a set time	count the number of bubbles in a set time	measure mass loss in a set time or time for set mass loss or time to mass stops changing
MP4	use of suitable reaction vessel – (conical) flask, test-tube, boiling tube **Allow** gas syringe / inverted measuring cylinder over water	use of suitable reaction vessel – (conical) flask, test-tube, boiling tube **Allow** delivery tube dipping into beaker of water if no suitable reaction vessel	use of suitable reaction vessel – (conical) flask, test-tube, boiling tube or beaker if collecting gas then allow gas syringe / inverted measuring cylinder	use of suitable reaction vessel – (conical) flask, test-tube, boiling tube **Allow** gas syringe / inverted measuring cylinder over water	use of suitable reaction vessel – (conical) flask, test-tube, boiling tube **Allow** delivery tube dipping into beaker of water if no suitable reaction vessel	use of suitable reaction vessel – (conical) flask, test-tube, boiling tube or beaker
MP5	**repeat** with copper added					
MP6	weigh the copper or even just a visual inspection ‘look at copper to see if changed’					

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	time to			**how much gas made reaction for fixed time**		**mass**
	make a known volume of gas	**make a known number of bubbles gas**	**end of reaction**	**vol of gas**	**bubbles of gas**	**mass loss**
MP7	copper is a catalyst if unchanged **and** time is less			copper is a catalyst if unchanged **and** more gas collected in set time	copper is a catalyst if unchanged **and** more bubbles in set time	copper is a catalyst if unchanged **and** bigger mass loss in set time / shorter time for set mass loss / shorter time to end
	visual inspection in MP6 could be awarded for statement in MP7					

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