Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/53**

Paper 5 Practical Test **May/June 2021**

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 May/June 2021 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 descriptors 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.

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	'List rule' guidance 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.

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.

Examples of how to apply the list rule
State **three** reasons…. [3]

A

1. Correct	✓	**2**
2. Correct	✓	
3. Wrong	×	

B **(4 responses)**

1. Correct, Correct	✓, ✓	**3**
2. Correct	✓	
3. Wrong	ignore	

C **(4 responses)**

1. Correct	✓	**2**
2. Correct, Wrong	✓, ×	
3. Correct	ignore	

D **(4 responses)**

1. Correct	✓	**2**
2. Correct, CON (of 2.)	×, (discount 2)	
3. Correct	✓	

E **(4 responses)**

1. Correct	✓	**3**
2. Correct	✓	
3. Correct, Wrong	✓	

F **(4 responses)**

1. Correct	✓	**2**
2. Correct	✓	
3. Correct CON (of 3.)	× (discount 3)	

G **(5 responses)**

1. Correct	✓	**3**
2. Correct	✓	
3. Correct Correct CON (of 4.)	✓ ignore ignore	

H **(4 responses)**

1. Correct	✓	**2**
2. Correct	×	
3. CON (of 2.) Correct	(discount 2) ✓	

I **(4 responses)**

1. Correct	✓	**2**
2. Correct	×	
3. Correct CON (of 2.)	✓ (discount 2)	

Question	Answer	Marks
1(a)	all experiments have volume of sulfuric acid of 25 cm^3	**1**
	all volumes of water correct (30, 20, 10, 5, 0) and all volumes in table given to the same precision	**1**
	volumes of gas increase as table descended.	**1**
	volume of gas for experiment 5 comparable to supervisors	**1**
1(b)	suitable scale for *y*-axis	**1**
	plotting – all 5 correct scores 2, 4 corrects scores 1	**2**
	suitable best fit line	**1**
1(c)	appropriate extrapolation of line to 35	**1**
	correct reading from extrapolation	**1**
1(d)(i)	correct calculation of volume for experiment 3 ÷ 30	**1**
	cm^3 / s	**1**
1(d)(ii)	5	**1**
1(e)(i)	more accurate	**1**
1(e)(ii)	slower / takes more time	**1**
1(f)	(gas) syringe	**1**
1(g)	any 2 from: • the reaction can be started by tipping the flask • do not have to replace/remove the bung • so no gas escapes (while the bung is being removed / replaced)	**2**

Question	Answer	Marks
	Tests on solid I	
2(a)	green precipitate	**1**
	dissolves in excess	**1**
2(b)	grey-green precipitate	**1**
	remains / does not dissolve	**1**
2(c)	white ppt	**1**
2(d)	grey-green precipitate / fizzing	**1**
2(e)	chromium(III) / Cr^{3+}	**1**
	chloride / Cl^-	**1**
	Tests on solid J	
2(f)	lilac	**1**
2(g)(i)	fizzing / effervescence / bubbling	**1**
	limewater turns milky	**1**
2(g)(ii)	carbon dioxide / CO_2	**1**
2(h)(i)	no change / no reaction / remains colourless	**1**
2(h)(ii)	green / blue ppt	**1**
2(i)	potassium / K^+	**1**
	carbonate / CO_3^{2-}	**1**

Question	Answer	Marks
3	any 6 from: • specified / set volume / mass of water • measure start temperature of water • heat water using spirit burner <u>for all three fuels</u> **and** • start timing when heating started • heat to set temperature / set temperature rise • record time • shortest time gives out most energy **OR** • measure mass of fuel (plus spirit burner) at start • heat to set temperature / set temperature rise • measure mass of fuel (plus sprit burner) at end (and subtract from first mass to fine mass of fuel used) • smallest mass used gives out most energy **OR** • put specified mass / volume of fuel in spirit burner • burn until burner goes out • measure final temperature of water and calculate temperature rise • highest temperature (rise) gives out most energy **OR** • heat water for a specified time • measure final temp of water • calculate temperature rise • highest temperature (rise) is fuel that gives out most energy	**6**

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SUMMARY TABLE

	time to heat to a set temp	**mass of fuel to heat to a set temp**	**temp change when fuel runs out**	**temp change in specified time**	**time to boil**
MP1	specified / set / measured volume / mass of water				
MP2	measured start temperature of water				
MP3	heat water using spirit burner <u>for all three fuels</u>				
MP4	start timing when heating started	measure mass of fuel (plus spirit burner) at start	put specified mass / volume of fuel in spirit burner stops	start timing when heating started	start timing when heating started
MP5	heat to set temperature / set temperature rise	heat to set temperature / set temperature rise	burn until it goes out	heat for specified time	heat until boiling
MP6	record time	measure mass of fuel (plus spirit burner) at end (and subtract from first mass to find mass of fuel used)	measure final temperature of water and calculate temperature rise	measure final temperature of water and calculate temperature rise	record time
MP7	shortest time gives out most energy	smallest mass used gives out most energy	highest temperature (rise) gives out most energy	highest temperature (rise) gives out most energy	shortest time gives out most energy