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# GCSE CHEMISTRY 8462/1F

Paper 1F

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## **Mark scheme**

Specimen (set 2)

Version: 1.0

### **Keep secure**

Please be aware that not all schools and colleges will be using these tests at the same time.

Help us to maintain the security of these papers by ensuring they are not distributed on social media or other platforms.

## Important – please note

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers.

It must be stressed that a mark scheme is a working document. This mark scheme has **not** been through the full standardisation process. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way.

Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

The Information to Examiners is included as a guide to how the mark scheme will function as an operational document.

The layout has been kept consistent so that future operational mark schemes do not appear different from these test materials.

If the printing process in your school alters the scale of a diagram, measure the values on your printed papers and mark the scripts accordingly.

## Information to Examiners

### 1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

### 2. Emboldening and underlining

- 2.1** In a list of acceptable answers where more than one mark is available ‘any **two** from’ is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.
- 2.4** Any wording that is underlined is essential for the marking point to be awarded.

### 3. Marking points

#### 3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as \* in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

#### 3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

#### 3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. Full marks can, however, be given for a correct numerical answer, without any working shown.

#### 3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

### 3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ecf in the marking scheme.

### 3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

### 3.7 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

### 3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

### 3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

### 3.10 Do not accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

## 4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

**Step 1: Determine a level**

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

**Step 2: Determine a mark**

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this.

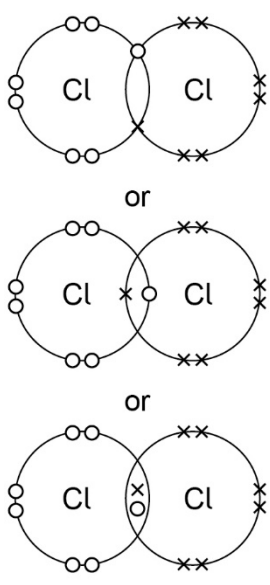
The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
01.1	A		1	AO1 4.2.2.1 Low
01.2	D		1	AO1 4.2.3.1 Low
01.3	C		1	AO1 4.2.1.5 Low
01.4	E		1	AO1 4.2.2.5 Low
01.5	bonding pair of electrons drawn	electrons can be dots, crosses or $e^{-}$ in any combination eg  do <b>not</b> accept if electrons added to outer shells outside overlap	1	AO1 4.2.1.4 Low
01.6	weak forces between molecules		1	AO2 4.2.2.4 Low

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01.7	MnO		1	AO2 4.2.1.3 Low
01.8	ions move around in the liquid		1	AO1 4.2.2.3 Low
<b>Total</b>			<b>8</b>	



## MARK SCHEME – GCSE CHEMISTRY – 8462/1F – SPECIMEN (SET 2)

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
02.1	proton		1	AO1 4.1.1.4 Low
02.2	electron		1	AO1 4.1.1.5 Low
02.3	7 4	in this order only	1 1	AO2 4.1.1.5 Low
02.4	isotopes		1	AO1 4.1.1.5 Low
02.5	neutron		1	AO1 4.1.1.3 Low
02.6	$\frac{(10 \times 20) + (11 \times 80)}{100}$ = 10.8	an answer of 10.8 scores <b>2</b> marks	1 1	AO2 4.1.1.6 Low
02.7	$\frac{0.2}{10\,000}$ = $2 \times 10^{-5}$ (nm)	an answer of $2 \times 10^{-5}$ (nm) scores <b>2</b> marks  allow 0.00002 (nm)	1 1	AO2 4.1.1.5 Low Standard
<b>Total</b>			<b>10</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
03.1	measuring cylinder		1	AO1 4.5.1.1 Low
03.2	use a polystyrene cup  better insulator <b>or</b> reduces energy transfer from the surroundings	allow insulate the beaker and/or use a lid	1  1	AO3 4.5.1.1 Low Standard
03.3	starting temperature of hydrochloric acid  volume of hydrochloric acid		1  1	AO1 4.5.1.1 Low
03.4	21.4 (°C)		1	AO2 4.5.1.1 Low
03.5	15.8 (°C) to 16.1 (°C)	allow 16.1 (°C) to 15.8 (°C)	1	AO2 4.3.1.4 Low
03.6	$\frac{16.1 + 15.8 + 15.9}{3}$ =15.9 (°C)	an answer of 15.9(333..) (°C) scores <b>2</b> marks  allow 15.9(333..) (°C)	1  1	AO2 4.5.1.1 Low
03.7	temperature decreases		1	AO1 4.5.1.1 Low

03.8	straight line from (1.0, 19.8) to (5.0, 14.6)	ignore continuation of line in either direction	1	AO2 4.5.1.1 Low																		
	horizontal straight line from (5.0, 14.6 to 8.0, 14.6)	ignore continuation of line in either direction	1																			
the answer below scores <b>2</b> marks																						
<table border="1"> <caption>Data points from the graph</caption> <thead> <tr> <th>Mass of potassium hydrogencarbonate (g)</th> <th>Mean lowest temperature (°C)</th> </tr> </thead> <tbody> <tr><td>1.0</td><td>19.8</td></tr> <tr><td>2.0</td><td>18.5</td></tr> <tr><td>3.0</td><td>17.2</td></tr> <tr><td>4.0</td><td>16.0</td></tr> <tr><td>5.0</td><td>14.6</td></tr> <tr><td>6.0</td><td>14.6</td></tr> <tr><td>7.0</td><td>14.6</td></tr> <tr><td>8.0</td><td>14.6</td></tr> </tbody> </table>					Mass of potassium hydrogencarbonate (g)	Mean lowest temperature (°C)	1.0	19.8	2.0	18.5	3.0	17.2	4.0	16.0	5.0	14.6	6.0	14.6	7.0	14.6	8.0	14.6
Mass of potassium hydrogencarbonate (g)	Mean lowest temperature (°C)																					
1.0	19.8																					
2.0	18.5																					
3.0	17.2																					
4.0	16.0																					
5.0	14.6																					
6.0	14.6																					
7.0	14.6																					
8.0	14.6																					

03.9	(lowest) temperature decreases to 14.6 °C		1	AO2 4.5.1.1 Low
	<b>or</b> until 5 g added		1	
	then no change to temperature (after 5 g solid added)		1	
	<b>or</b> then temperature remains at 14.6 °C (after 5 g solid added)			

<b>Total</b>			<b>15</b>
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Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
04.1	magnesium zinc iron tin (copper)	all correct scores <b>2</b> marks  three in the correct order scores <b>1</b> mark	2	AO3/ 4.5.2.1 Low
04.2	use 4 cells (each of voltage 1.5 V)  connect in series		1  1	AO2  AO1 4.5.2.1 Low Standard
04.3	reaction stops  (because) one of the reactants is used up		1  1	AO1 4.5.2.1 Low Standard
04.4	(hydrogen +) oxygen (→ water)		1	AO1 4.5.2.2 Low
04.5	any <b>two</b> from: <ul style="list-style-type: none"> <li>• produces water</li> <li>• water is not harmful / polluting</li> <li>• does not produce carbon dioxide</li> <li>• does not produce other named pollutant</li> </ul>	allow an answer of <u>only</u> produces water for <b>2</b> marks	2	AO3 4.5.2.2 Low
<b>Total</b>			<b>9</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
05.1	$4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$	allow multiples	1	AO2 4.1.1.1 Standard
05.2	(sodium) gains oxygen		1	AO1 4.4.1.1 Low
05.3	purple		1	AO1 4.4.2.4 Low
05.4	aluminium chloride		1	AO1 4.4.2.2 Low
05.5	<b>Level 2:</b> Relevant reasons are identified, given in detail and logically linked to form a clear account.		3–4	AO3 AO3 4.1.2.3 4.4.2.4 Low
	<b>Level 1:</b> Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.		1–2	
	No relevant content		0	
	<b>Indicative content</b>  <b>conclusion 1</b> <ul style="list-style-type: none"> <li>pH values above 7 are alkaline</li> <li>sodium oxide, calcium oxide and magnesium oxide do form alkaline solutions (so correct for those)</li> <li>not all metal oxides form solutions (so incorrect for zinc oxide)</li> </ul> <b>conclusion 2</b> <ul style="list-style-type: none"> <li>pH values below 7 are acidic</li> <li>carbon dioxide, sulfur dioxide and phosphorus oxide do form acidic solutions (so correct for those)</li> <li>not all non-metal oxides form solutions (so incorrect for silicon oxide)]</li> </ul>			

05.6	metal oxides produce alkaline solutions if they dissolve in water	allow 1 mark for most metal oxides produce alkaline solutions	2	AO3 4.1.2.3 4.4.2.4 Low Standard
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<b>Total</b>			<b>10</b>	
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	lithium (atom) loses (one) electron(s)  chlorine (atom) gains (one) electron(s)  reference to transfer of one electron  to form positive and negative ions	allow to form noble gas electronic structures <b>or</b> allow to form stable electron arrangements <b>or</b> allow to form full outer shells <b>or</b> allow reference to ionic bonding	1  1  1  1	AO2 4.2.1.2 Low
06.2	$\frac{161}{81 + 98} \times 100$ $= 89.944134$ $= 89.9 (\%)$	an answer of 89.9 (%) scores 3 marks	1  1  1	AO2 4.3.3.2 Low Standard
06.3	more sustainable <b>or</b> less waste	allow any sensible economic or environmental reason but not 'cheaper' without qualification	1	AO1 4.3.3.2 Standard
06.4	50/1000 (dm <sup>3</sup> ) or 0.05 dm <sup>3</sup> <b>or</b> 80/1000 (g/cm <sup>3</sup> ) or 0.08 g/cm <sup>3</sup>  = 4(.00) (g)	an answer of 4(.00) (g) scores 2 marks	1  1	AO2 4.3.2.5 Standard
<b>Total</b>			<b>10</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
07.1	fill burette with sodium hydroxide		1	AO1 4.4.2.5 Low Standard
	add sodium hydroxide from the burette to the hydrochloric acid and indicator		1	
	stop when colour changes		1	
	measure volume used from burette		1	
	plus any <b>two</b> from: <ul style="list-style-type: none"> <li>• stand flask on white tile</li> <li>• swirl</li> <li>• add dropwise near the endpoint</li> <li>• repeat</li> </ul>		2	
07.2	filtration		1	AO3 4.1.1.2 Low
07.3	evaporate some of the solution and leave to cool	allow heat on a water bath <b>or</b> heat with an electric heater	1	AO3 4.1.1.2 4.4.2.3 Standard
<b>Total</b>			<b>8</b>	



Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
08.1	<b>J</b>		1	AO2 4.1.2.1 Standard
08.2	<b>M and Q</b>	either order	1	AO2 4.1.2.1 Standard
08.3	<b>Q</b>		1	AO2 4.1.2.1 4.1.2.3 4.1.2.5 4.2.1.2 Standard
08.4	<b>M</b>		1	AO2 4.1.3.2 Standard
08.5	<b>L</b>		1	AO2 4.1.2.1 4.1.1.7 Standard

08.6	<b>Level 3:</b> A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5–6	AO3 AO1 AO3 4.1.2.2 Standard
	<b>Level 2:</b> Some logically linked reasons are given. There may also be a simple judgement.	3–4	
	<b>Level 1:</b> Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	<b>Indicative content</b>  <b>comparative points</b> <ul style="list-style-type: none"> <li>• both tables have more than one element in a box</li> <li>• both have similar elements in the same column</li> <li>• both are missing the noble gases</li> <li>• both arranged elements in order of atomic weight</li> </ul> <b>advantages of Mendeleev / disadvantages of Newlands</b> <ul style="list-style-type: none"> <li>• Newlands did not leave gaps for undiscovered elements</li> <li>• Newlands had many more dissimilar elements in a column</li> <li>• Mendeleev left gaps for undiscovered elements</li> <li>• Mendeleev changed the order of some elements (eg Te and I)</li> </ul> <b>points which led to the acceptance of Mendeleev’s table</b> <ul style="list-style-type: none"> <li>• Mendeleev predicted properties of missing elements</li> <li>• elements with properties predicted by Mendeleev were discovered</li> <li>• Mendeleev’s predictions turned out to be correct</li> <li>• elements were discovered which fitted the gaps</li> </ul>		
<b>Total</b>		<b>11</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
09.1	precipitate / solid formed	allow colour change	1	AO2 4.1.1.1 4.2.2.2 Standard
09.2	total mass before = 257.68 g total mass after = 257.68 g  <b>so</b> the mass of products equals the mass of the reactants		1  1	AO2 4.3.1.1 Standard
09.3	0.01 g		1	AO2 4.3.1.1 Standard
09.4	$207 + (2 \times 14) + (6 \times 16)$ <b>or</b> $207 + 2 \times [14 + (3 \times 16)]$  = 331	an answer of 331 scores <b>2</b> marks	1  1	AO2 4.3.1.2 Standard
09.5	$\text{CrO}_4^{2-}$		1	AO2 4.2.1.2 Standard
09.6	carbon dioxide is a gas  the gas escapes during the reaction  (so) the mass at the end is less than expected	allow a gas is produced	1  1  1	AO2 4.2.2.2  AO1 4.3.1.3  AO1 4.3.1.3 Standard
<b>Total</b>			<b>10</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
10.1	<b>(diagram)</b> complete circuit with power supply	allow carbon, platinum or inert electrodes	1	AO1 4.4.3.4 Standard
	test solution in beaker or other appropriate apparatus		1	
	electrodes		1	
	<b>(independent variable)</b> salt solutions (with different metal ions)		1	
	<b>(observation)</b> solid / metal deposit on the negative electrode		1	
10.2	(sometimes) hydrogen is produced		1	AO1 4.4.3.4 Standard
	(because) the metal is more reactive than hydrogen		1	
10.3	chlorine		1	AO2 4.4.3.4 Standard
	oxygen		1	
<b>Total</b>			<b>9</b>	