GCSE

COMBINED SCIENCE: TRILOGY 8464/C/1H

Chemistry Paper 1H

Mark scheme

Specimen (set 2)

Version: 1.1

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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.

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 <u>not</u> 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.

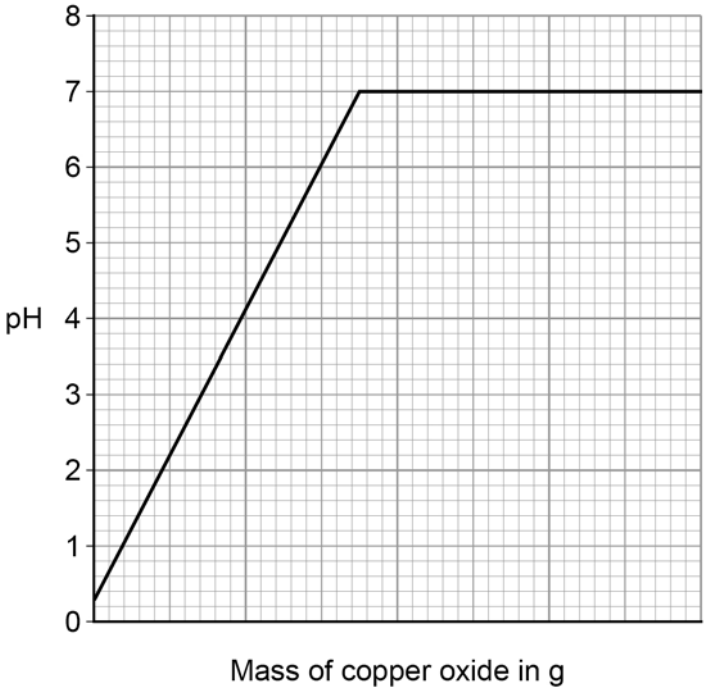
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

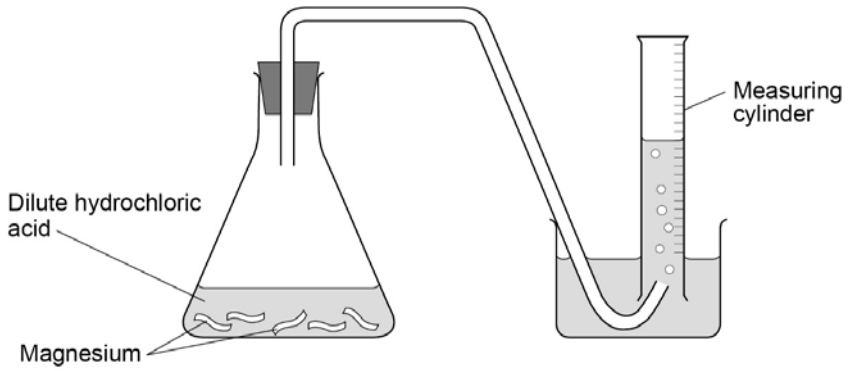
Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

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	continuous independent		1 1	AO2 5.4.2.2 5.5.1.1 Standard
01.2	 31.5 – 24.0 7.5 (°C)	an answer of 7.5 (°C) scores **2** marks	 1 1	AO2 5.4.2.2 5.1.1.1 Standard
01.3	25.5 – 26(.0) cm^3		1	AO2 5.4.2.2 5.1.1.1 Standard
01.4	did not stir **or** did not wait long enough for the highest temperature to be reached		1	AO3 5.4.2.2 5.1.1.1 Standard
01.5	 $\frac{40}{1000}$ (or $\frac{1}{20}$) × 80 3.2 (g)	an answer of 3.2 (g) scores **3** marks	 1 1 1	AO2 5.3.2.5 Standard
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
02.1	 initial pH of hydrochloric acid is 0–3 pH increases as CuO is added horizontal from pH=7		1 1 1	AO1 AO3 5.4.2.2 5.4.2.3 5.4.2.4 Standard

02.2	**Level 2:** The plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	4–6	AO3 AO3 5.3.1.4 5.4.2.1 Standard
	Level 1: The plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–3	
	No relevant content	0	
	Indicative content  **an ideal plan would be:** • use a rule to measure the length / use a balance to find the mass of the piece of magnesium • put magnesium into conical flask • use measuring cylinder for dilute hydrochloric acid • add dilute hydrochloric acid to conical flask • connect bung (& delivery tube) into conical flask • measuring cylinder is filled with water and inverted / upside down in bowl of water **or** uses a gas syringe • hydrogen flows through a delivery / rubber tube into measuring cylinder • wait until all magnesium reacts / use excess dilute hydrochloric acid • record volume when bubbles stop **other things they could mention:** • use accurate / 2 dp balance • to collect gas use measuring cylinder / gas syringe with best resolution • add bung quickly to ensure no gas escapes • gas is collected in graduated apparatus (not test tube) • repeat experiment (with same length / mass of magnesium) • repeat at same temperature since volume of gas will be different		

02.3	(working) $\frac{\text{change in y-axis}}{\text{change in x-axis}}$ (answer) 0.8 (g of Cu per g of CuO)	data from candidate's graph	1 1	AO2 5.4.1.2 Standard

02.4	(working on graph) extension of straight line and finding y value when x = 7.5 factor of ×10 (answer) 60 (g) **or** (using gradient) y = 0.8 x accept ecf from question 02.4 0.8 × 75 accept 02.4 × 75 60 **or** (stoichiometric method) $\frac{\text{mass of copper oxide}}{M\text{r of copper oxide}} \times M_r$ (Cu) $\frac{75}{79.5} \times 63.5$ = 59.9 (g)		1 1 1	AO3 5.4.1.2 Standard

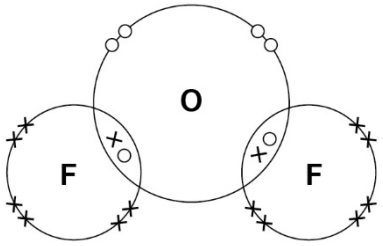
Total			**14**

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
03.1	intermolecular		1	AO1 5.2.1.4 5.2.2.4 Standard
03.2	sulfur		1	AO2 5.2.2.4 Std./High
03.3	ions fixed in solid mobile in liquid		1 1 1	AO1 AO2 5.2.2.3 Std./High
03.4	layers of atoms slide over each other	allow ions	1 1	AO1 AO2 5.2.2.7 Std./High
03.5	copper		1	AO1 5.2.2.7 Standard
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
04.1	**Level 2:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.		3–4	AO2 AO1 5.2.1.2 5.4.1.4 Std./High
	Level 1: 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	
	Indicative content Ca / calcium (atom) loses two electrons / both outer electrons and is oxidised to Ca^{2+} ion F / fluorine (atom) gain one / an electron and is reduced to F^- ion **supporting points** • fluorine / F (atoms) gain electron(s) • negative ion produced • calcium (atoms) lose electron(s) • positive ion produced • reduction is gain of electrons • oxidation is loss of electrons			
04.2	(because there are) strong electrostatic forces of attraction **or** ionic bonding		1	AO1 5.2.1.3 Std./High
	between Ca^{2+} and F^- ions / oppositely charged ions		1	
	(in a) giant structure / lattice		1	
	so a lot of energy is needed to overcome / break this attraction		1	

04.3	amount of $F_2 = \frac{0.95}{38} = 0.025$ moles	mark is for ÷ 38	1	AO2 5.3.2.2 Standard Std./High High
	amount of $SF_6 = \frac{1}{3} \times 0.25 = 0.008333$ moles	mark is for ×1/3	1	
	mass of $SF_6 = 0.008333 \times 146$	mark is for ×146	1	
	mass = 1.2166666		1	
	mass = 1.22 (g) 3 sig figs		1	

Total			**13**

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
05.1		two shared pair of electrons all outer shells complete	1 1	AO2 5.2.1.4 Standard
05.2	gas small molecules (with) intermolecular forces (so require) little energy to overcome		1 1 1 1	AO1 AO2 5.2.2.1 5.2.2.4 Std./High High
05.3	calculates sum of all bonds broken: 4× (C–H) + 2× (O=O) = (4×412) + (2×496) = 2640 calculates sum of all bonds made: 4× (O–H) + 2(C=O) = (4×463) + (2×803) = 3458 overall energy change = bonds broken – bonds made = 2640 – 3458 = (–)**818**		1 1 1	AO2 5.5.1.3 Std./High High
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
06.1	silver		1	AO1 5.4.3.4
	$Ag^+ + e^- \rightarrow Ag$		1	5.4.3.5 Std./High
	oxygen		1	High
	$4OH^- \rightarrow O_2 + 2H_2O + 4e^-$		1	
06.2	4 ions at start: H^+ OH^- Na^+ Cl^-		1	AO1 AO3
	H^+ ion discharged at negative electrode		1	5.4.2.4 5.4.3.4 Std./High
	Cl^- ion discharged at positive electrode		1	High
	so OH^- and Na^+ remain in solution		1	
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
07.1	electron proton neutron	this order only all 3 correct = **2** marks 1 or 2 correct = **1** mark	2	AO1 5.1.1.3 Std./High
07.2	**A** = electron has less mass so is deflected more **or** electron deflected towards positive because it is negatively charged **B** = neutron because the neutron's path does not change as not charged **C** = proton <u>and</u> proton has greater mass (accept heavier) so is deflected less (than electron) **or** proton is deflected towards negative because it is positively charged this is because the lower plate is negative **or** upper plate is positive		1 1 1 1	AO2 AO3 5.1.1.4 5.1.1.5 Std./High High
07.3	$\frac{23}{6.02 \times 10^{23}}$ 3.82×10^{-23}	 answer to 3 significant figures	1 1	AO2 5.1.1.6 5.3.2.1 High
07.4	2.27×10^{-14}		1	AO2 5.1.1.5 High
Total			**9**	