AQA

GCSE
COMBINED SCIENCE: TRILOGY
8464/C/1F

Chemistry Paper 1F

Mark scheme

June 2019

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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. 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. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. 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.

Further copies of this mark scheme are available from aqa.org.uk

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 / ; e.g. 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, i.e. 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.

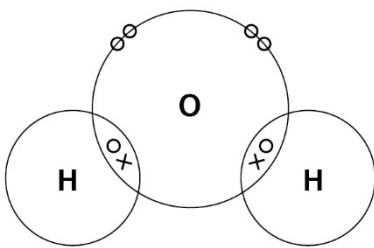| Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	sports injury pack		1	AO1 5.5.1.1
01.2	B		1	AO1 5.5.1.2
01.3	C		1	AO1 5.5.1.2
01.4	lower than		1	AO1 5.5.1.2
01.5	thermometer		1	AO1 5.5.1.2
01.6	27.4 (°C)	allow values in the range 27.2–27.5 (°C)	1	AO2 5.5.1.1
	(27.4–14.3 =) 13.1 (°C)	allow correct subtraction of incorrect temperature reading	1	
Total			**7**	

Question	Answers	Extra information	Mark	AO / Spec.
02.1	hydrochloric acid		1	AO1 5.4.2.3
02.2	(black) solid remains (after stirring)	allow copper oxide remains allow no more copper oxide reacts	1	AO1 5.4.2.3
02.3	first stage **B** second stage **A** third stage **C** fourth stage **D**	all 4 correct for **2** marks allow **1** mark if either first stage or fourth stage is correct	2	AO1 5.4.2.3
02.4	(negative electrode) copper (positive electrode) chlorine	allow Cu allow Cl_2 / Cl do **not** accept chloride or Cl^- if no other mark awarded allow **1** mark if elements are reversed	1 1	AO2 5.4.3.2

02.5	a reading of an increase in mass	e.g. 4 (mg) in 10 (mins) scores 2 marks	1	AO2 5.4.3.4
	correct linked reading of the increase in time		1	
	correct evaluation of gradient	e.g. ($\frac{4}{10}$ =) 0.4 (mg per min) allow correct calculation of gradient from incorrectly determined values for mass and/or time	1	

02.6	cryolite	this order only	1	AO1 5.4.3.3
	oxide		1	

| **Total** | | | **11** | |

Question	Answers	Extra information	Mark	AO / Spec.
03.1	atomic weight of element		1	AO1 5.1.2.2
03.2	gaps	allow spaces / blanks do **not** accept undiscovered elements	1	AO1 5.1.2.2
03.3	noble gases		1	AO1 5.1.2.4
03.4	18 22	this order only	1 1	AO2 5.1.1.5
03.5	isotopes		1	AO1 5.1.1.5
03.6	2,8,8		1	AO2 5.1.1.5
03.7	stable arrangement (of electrons)	allow full outer shell allow eight electrons in the outer shell allow does not need to gain or lose electrons	1	AO1 5.1.2.4
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	$2 Na + Cl_2 \rightarrow 2 NaCl$	allow multiples	1	AO1 5.1.2.2
04.2	7.1 (g)		1	AO2 5.3.1.1
04.3	silver	this order only	1	AO1 5.1.2.5
	green	allow yellow	1	
	yellow	allow white	1	
	white		1	
04.4	Na^+		1	AO1 5.2.1.2
	Cl^-		1	
		if no other mark awarded allow **1** mark for +(1) charge for sodium ion and –(1) charge for chloride ion		
04.5	an electron		1	AO2 5.1.2.5

04.6		allow converse for sodium mark independently		AO2 5.1.2.1 & 5.1.2.5
	potassium (atom) is larg<u>er</u>		1	
	potassium (atom) has more energy levels (of electrons) **or** potassium (atom) has more shells (of electrons)	do **not** accept more outer shells	1	

Total			**11**

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	(g)	allow g ignore formulae	1	AO1 5.2.2.2
05.2	40 (%)		1	AO2 5.1.1.1
05.3		an answer of 3.94 (g) scores **3** marks		AO2 5.3.1.3
	$\dfrac{3.76 + 3.98 + 4.09}{3}$ **or** $\dfrac{11.83}{3}$		1	
	= 3.943(33333333333333333)		1	
	= 3.94 (g)	allow a correctly written answer to 3 significant figures from an incorrectly calculated mean	1	
05.4		allow combination of circles, dots, crosses or e$^{(-)}$		AO1 5.2.1.4
	one shared pair in each overlap	do **not** accept extra electron(s) on outer shell of hydrogen	1	
	4 non-bonding electrons in outer shell of oxygen		1	
		ignore any inner shell electrons		

diagram scores 2 marks

05.5	covalent		1	AO1 5.2.2.1 5.2.2.4

05.6	hig<u>her</u> (than) strong<u>er</u> (than between oxygen molecules)		1 1	AO2 5.2.2.4

Total			**10**

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	Ca Mg Zn Cu		1	AO3 5.4.1.2
06.2	any **two** from: • mass (of metal / element) • surface area (of metal / element) • concentration (of acid) • volume (of acid) • temperature (of acid)	allow weight ignore size ignore length ignore pH ignore strength ignore room temperature	2	AO3 5.4.1.2
06.3	(type of) metal / element		1	AO2 5.4.1.2

06.4		allow converse answers for magnesium MP2 only if MP1 is correct		AO3 5.1.2.3 5.1.2.5 5.4.1.2
	(beryllium is) less reactive		1	
	any **one** from:		1	
	• greater attraction between nucleus and outer electrons • more energy is needed to remove electrons • loss of electrons is more difficult • outer electrons closer to nucleus • less shielding			
		allow higher in <u>group</u> allow reactivity increases down the <u>group</u> ignore reactivity series		

06.5		an answer of 64 (g per dm^3) scores **3** marks an incorrect answer for one step does **not** prevent allocation of marks for subsequent steps		AO2 5.3.2.5
	$\dfrac{50}{1000}$ (dm^3)		1	
	= 0.05 (dm^3)		1	
	$(\dfrac{3.2}{0.05})$ = 64 (g per dm^3)		1	
	alternative approach: $\dfrac{3.2}{50}$ (1) = 0.064 (1) (× 1000) = 64 (g per dm^3) (1) **alternative approach**: $\dfrac{1000}{50}$ (1) = 20 (1) (× 3.2) = 64 (g per dm^3) (1)			
		an answer of 0.16 / 0.064 / 0.64 / 6.4 / 6.4 × 10^{-5} (g per dm^3) gains **2** marks		

| **Total** | | | **9** | |

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	(aq)	allow aq ignore aqueous ignore formulae	1	AO1 5.2.2.2
07.2	HNO_3		1	AO1 5.1.1.1 5.4.2.2
07.3	red	allow orange or yellow do **not** accept green	1	AO1 5.4.2.4
	purple **or** blue	allow shades of purple e.g. violet	1	
07.4	D		1	AO3 5.4.2.4
07.5		an answer of 60 (%) scores **3** marks		AO2 5.3.1.2
	3 × 16 **or** 48		1	
	$\frac{48}{80}$ (×100)		1	
	60 (%)		1	
		an answer of 20 (%) scores **2** marks for: $\frac{16}{80}$ (× 100) (1) = 20 (%) (1)		

Question	Answers	Mark	AO/ Spec. Ref
07.6	**Level 3:** The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO3 AO2
	Level 2: The design/plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4	5.5.1.1
	Level 1: The design/plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content **Steps** - use a suitable container e.g. test tube - use insulation - add water - measure the initial water temperature (with a thermometer) - add stated mass e.g. 1g **or** 1 spatula - stir (to dissolve the solid) - measure the final (allow lowest or highest) temperature of the solution - calculate the temperature difference **or** determine graphically - repeat with different masses - repeat with the same volume of water to access level 3 there must be an indication of how the temperature change is determined using different masses dissolved in the same quantity of water		

| Total | | 14 | |