SPECIMEN MATERIAL

GCSE
CHEMISTRY

PAPER 1F

Mark scheme

Specimen 2018

Version 1.0

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 and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- the Assessment Objectives 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 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient are 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.

Do not allow 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.

Level of response marking instructions

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 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. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in 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 and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 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.

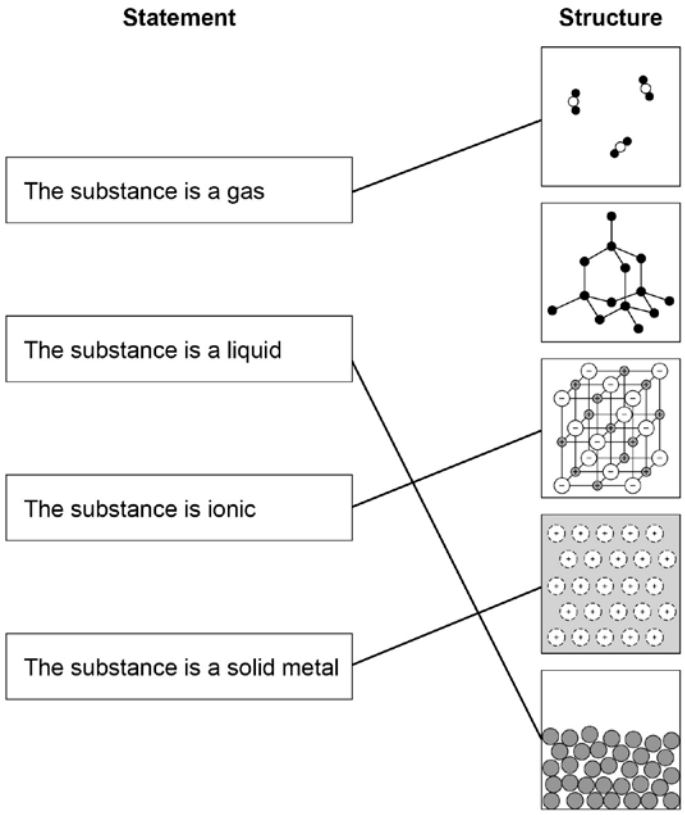
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

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 1

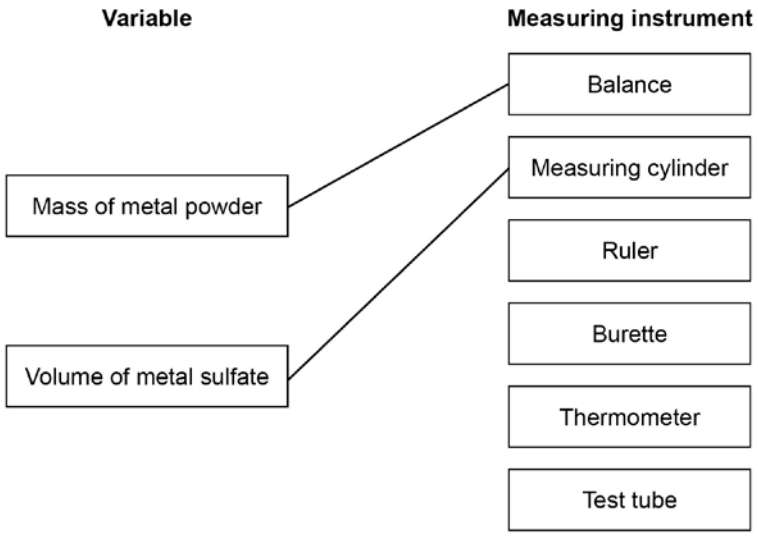
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	 more than one line drawn from a variable negates the mark		4	AO1/1 4.2.2.1 4.2.2.3 4.2.1.3 4.2.1.5
01.2	Carbon		1	AO1/1 4.2.3.2 4.2.2.6
01.3	It has delocalised electrons		1	AO1/1 4.2.3.2
01.4	the atoms/particles/ions are different sizes so there are no rows/layers to slide	do **not** accept molecules accept the layers are disrupted	1 1	AO1/1 4.2.2.7

Question 1 continues on the next page

Question 1 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	$\frac{2}{27} \times 100$ 7.4%	 allow 7.4% with no working shown for **2** marks	1 1	AO2/2 4.2.2.7
01.6	Mixture		1	AO1/1 4.1.1.2 4.2.2.7
Total			**11**	

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	Whether there was a reaction or not		1	AO2/2 4.4.1.2
02.2	brown/orange/dark deposit on zinc **or** blue solution turns colourless/paler		1	AO2/2 4.4.1.2
02.3	 more than one line drawn from a variable negates the mark		1 1	AO2/2 4.4.1.2
02.4	(Most reactive) **Magnesium** **Zinc** (Least reactive) **Copper**	must all be correct	1	AO3/2b 4.4.1.2
02.5	would not be safe **or** too reactive	allow too dangerous	1	AO3/2a 4.4.1.2

Question 2 continues on the next page

Question 2 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	Gold		1	AO1/1 4.4.1.3
02.7	$2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$	allow multiples	1	AO2/1 4.4.1.3
02.8	carbon		1	AO2/1 4.4.1.3
02.9	Loss of oxygen		1	AO1/1 4.4.1.3
Total			**10**	

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	36 cm^3		1	AO2/2 4.4.2.2
03.2	all points correct	± ½ small square allow **1** mark if 6 or 7 of the points are correct	2	AO2/2 4.4.2.2
	2 best fit lines drawn	must not deviate towards anomalous point allow **1** mark if 1 line correct	2	AO3/2a
03.3	The bung was not pushed in firmly enough. The measuring cylinder was not completely over the delivery tube.		1 1	AO3/3a 4.4.2.2
03.4	as mass of l ithium carbonate increases volume of gas produced increases linear/(directly) proportional		1 1	AO3/1a 4.4.2.2
03.5	A gas/carbon dioxide is produced.	allow because the air in the tube expands	1	AO2/1 4.6.1.2

Question 3 continues on the next page

Question 3 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	any **one** from: • Potassium carbonate does not decompose to produce carbon dioxide/ a gas. • Potassium carbonate does not decompose at the temperature of the Bunsen burner **or** the Bunsen burner is not hot enough to decompose potassium carbonate. • When potassium carbonate decomposes a gas is not formed.		1	AO3/2b 4.6.1.2
Total			**11**	

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **two** from: • concentration/volume of dilute hydrochloric acid • mass of metal powder • surface area of metal powder • stirring (of any)/rate of stirring	allow reacted for the same length of time	2	AO1/2 4.4.1.2
04.2	4.2 °C and any **one** from: • lower mass of magnesium added • surface area of magnesium too low • magnesium coated in magnesium oxide (so took a while to start reacting) • not stirred • not stirred as quickly as the other metals • not reacted for as long a time as the other metals	allow Magnesium Test 2 allow reason for break in circuit	1 1	AO3/1a AO3/3a 4.4.1.2

Question 4 continues on the next page

Question 4 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	17.4(°C)		1	AO2/2 4.4.1.2
04.4	bubbles of gas more (bubbles) seen with calcium than other metals	 allow any correct comparison between two metals	1 1	AO3/2a 4.4.1.2
04.5	any value between 7.9 °C and 12.3 °C		1	AO3/2a 4.4.1.2
Total			**8**	

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	any **one** from: • there was a flame • energy was given out • a new substance was formed • the magnesium turned into a (white) powder	answers must be from **Figure 8**	1	AO2/1 4.1.1.1 4.5.1.1
05.2	Magnesium oxide		1	AO2/1 4.4.1.1
05.3	The reaction has a high activation energy		1	AO3/2b 4.5.1.2
05.4	9		1	AO1/2 4.4.2.4
05.5	They have a high surface area to volume ratio		1	AO1/1 4.2.4.1
05.6	any **one** from: • Better coverage • More protection from the Sun's ultraviolet rays		1	AO1/1 4.2.4.2
05.7	any **one** from: • Potential cell damage to the body • Harmful effects on the environment		1	AO1/1 4.2.4.2

Question 5 continues on the next page

Question 5 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.8	indication of $\frac{1}{1.6} = 0.625$ **and** use of indices $10^{-9} - 10^{-6} = 10^{3}$ $0.625 \times 1000 =$ 625 (times bigger)	Both steps must be seen to score first mark	1 1	AO2/1 4.2.4.1
Total			**9**	

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	s l	Answers **must** be in the correct order.	1 1	AO1/1 AO2/1 4.2.2.2 4.4.2.2, 3
06.2	A gas was lost from the flask		1	AO2/2 4.3.1.3 4.4.2.2, 3

Question 6 continues on the next page

Question 6 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	**Level 3:** A coherent method is described with relevant detail, and in correct sequence which demonstrates a broad understanding of the relevant scientific techniques and procedures. The steps in the method are logically ordered. The method would lead to the production of valid results.		5–6	AO1/2 X 6 4.4.2.2, 3
	Level 2: The bulk of the method is described with mostly relevant detail, which demonstrates a reasonable understanding of the relevant scientific techniques and procedures. The method may not be in a completely logical sequence and may be missing some detail.		3–4	
	Level 1: Simple statements are made which demonstrate some understanding of some of the relevant scientific techniques and procedures. The response may lack a logical structure and would not lead to the production of valid results.		1–2	
	No relevant content		0	
	Indicative content • sulfuric acid in beaker (or similar) • add copper carbonate one spatula at a time • until copper carbonate is in excess or until no more effervescence occurs * • filter using filter paper and funnel • filter excess copper carbonate • pour solution into evaporating basin/dish • heat using Bunsen burner • leave to crystallise/leave for water to evaporate/boil off water • decant solution • pat dry (using filter paper) • wear safety spectacles/goggles *Students. may choose to use a named indicator until it turns a neutral colour, record the number of spatulas of copper carbonate added then repeat without the indicator.			

Question 6 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	Total mass of reactants = 221.5 $\frac{159.5}{221.5}$ 72.0 (%)	 allow ecf from step 1 allow 72.0 with no working shown for **3** marks	1 1 1	AO2/2 4.3.3.2
06.5	any **one** from: • Important for sustainable development • Economic reasons • Waste products may be pollutants/greenhouse gases		1	AO1/1 4.3.3.2
Total			**13**	

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	**B**		1	AO2/1 4.1.1.4 4.1.2.1
07.2	**D**		1	AO2/1 4.1.2.1 4.1.2.6
07.3	**E**		1	AO2/1 4.1.2.1 4.1.2.6
07.4	**C**		1	AO2/1 4.1.2.4 4.1.2.6
07.5	92.5 × 6 **and** 7× 7.5 $\frac{607.5}{100}$ 6.075 6.08	allow 6.08 with no working shown for **4** marks	1 1 1 1	AO2/2 4.1.1.6
Total			**8**	

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	13 (protons) 14 (neutrons) 13 (electrons)	The answers must be in the correct order. if no other marks awarded, award **1** mark if number of protons and electrons are equal	1 1 1	AO2/1 4.1.1.4, 5
08.2	has three electrons in outer energy level/shell	allow electronic structure is 2.8.3	1	AO1/1 4.1.2.1

Question 8 continues on the next page

Question 8 continued

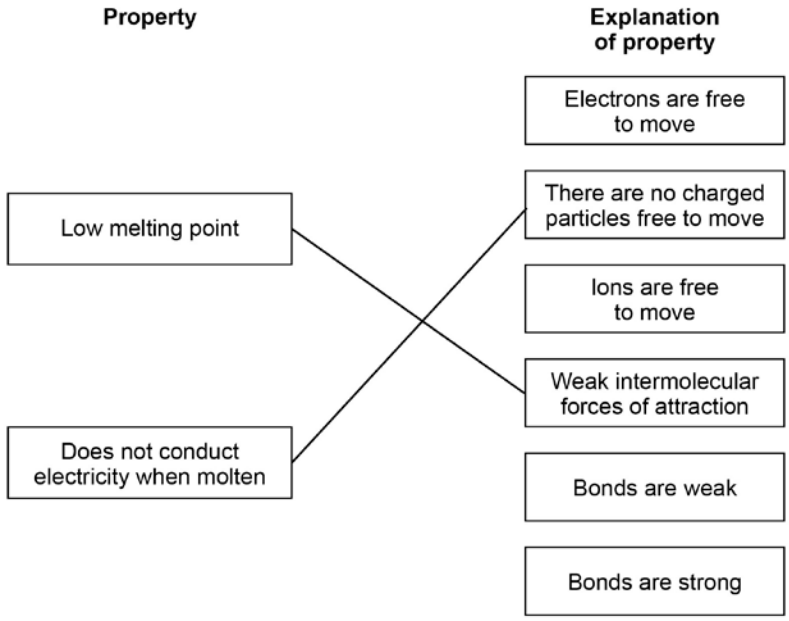
Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	**Level 3:** A detailed and coherent comparison is given, which demonstrates a broad knowledge and understanding of the key scientific ideas. The response makes logical links between the points raised and uses sufficient examples to support these links.		5–6	AO1/1 4.1.2.5 4.1.3.1 4.1.3.2
	Level 2: A description is given which demonstrates a reasonable knowledge and understanding of the key scientific ideas. Comparisons are made but may not be fully articulated and / or precise.		3–4	
	Level 1: Simple statements are made which demonstrate a basic knowledge of some of the relevant ideas. The response may fail to make comparisons between the points raised.		1–2	
	No relevant content.		0	
	Indicative content Physical Transition elements • high melting points • high densities • strong • hard Group 1 • low melting points • low densities • soft Chemical Transition elements • low reactivity/react slowly (with water or oxygen) • used as catalysts • ions with different charges • coloured compounds Group 1 • very reactive/react (quickly) with water/non-metals • not used as catalysts • white/colourless compounds • only forms a +1 ion			
Total			**10**	

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	electrons transferred from potassium to sulfur two potassium atoms each lose one electron forming K^+/1+ ions sulfur atoms gain 2 electrons forming S^{2-}/2- ions		1 1 1 1 1	AO2/1 AO1/1 AO2/1 AO1/1 AO2/1 4.2.1.2
09.2	there are no gaps/sticks between the potassium ions and sulfide ions		1	AO1/1 4.2.1.3
09.3	(two) shared pairs between H and S rest correct - no additional hydrogen electrons and two non-bonding pairs on sulfur	second mark dependent on first	1 1	AO2/1 4.2.1.4
09.4	342	allow **1** mark for evidence of (2 × 27) + 3[32 + (16 × 4)]	2	AO2/1 4.2.1.4 4.3.1.2

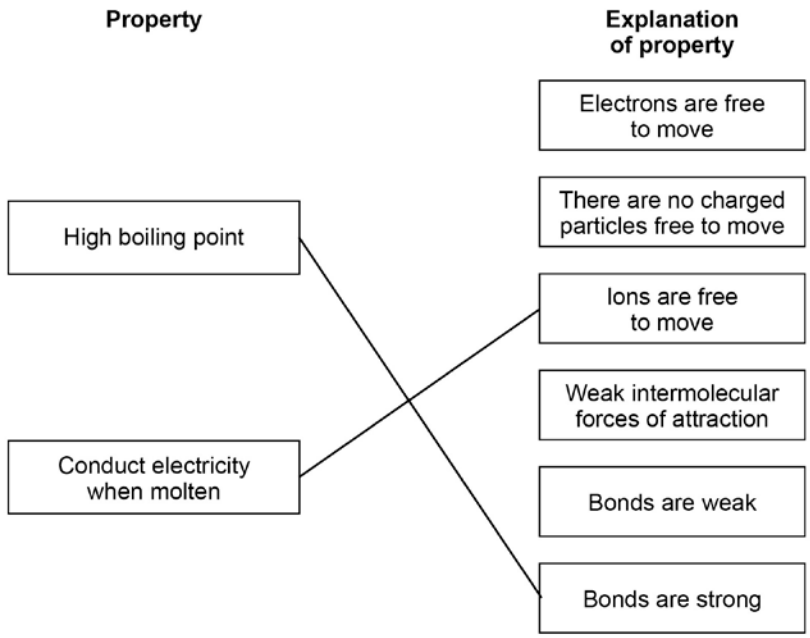
Question 9 continues on the next page

Question 9 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	 more than one line drawn from a variable negates the mark		2	AO1/1 4.2.2.4

Question 9 continues on the next page

Question 9 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.6	 more than one line drawn from a variable negates the mark		2	AO1/1 4.2.2.3
Total			**14**	

Question 10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	any **one** from: • heat • stir		1	AO3/3b 4.1.1.2 4.4.2.3
10.2	filter	accept use a centrifuge accept leave longer (to settle)	1	AO3/3b 4.1.1.2 4.4.2.3
10.3	any **one** from: • wear safety spectacles • wear an apron		1	AO3/3b 4.1.1.2 4.4.2.3
10.4	evaporation at **A** condensation at **B**		1 1	AO2/2 4.1.1.2
10.5	100		1	AO2/1 4.1.1.2
Total			**6**	