OXFORD
INTERNATIONAL
AQA EXAMINATIONS

International GCSE

Chemistry

9202/2 Paper 2

Mark scheme

9202

June 2018

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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 / ; 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.

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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.

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

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
01.1	bar for oxygen at 21	accept any line between 20 and 22	1	AO2 3.1.1.a	E
01.2	200 × (21/100) 42 (dm^3)	an answer of 42 (dm^3) scores 2 marks allow 1 mark for 4200	1 1	AO2 3.1.1a	E
01.3	Condensing		1	AO1 3.1.1.a	A
01.4	(fractional) distillation		1	AO1 3.10.1.c	E
01.5	glowing splint relights		1	AO1 3.4.2.b	E
01.6	water carbon dioxide	any order accept H_2O accept CO_2	1 1	AO2 3.6.1.a 3.10.1.2.d	E

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
01.7	lower rate of reaction (in air) (because) lower concentration / percentage of oxygen Or less energy released / less exothermic (1) (because) incomplete combustion (1)	allow reacts with oxygen faster / less efficient combustion	1 1	AO2 3.10.1.2.d 3.10.1.2.e	E
Total			**10**		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
02.1	unsaturated		1	AO1 3.10.1.3b	E
02.2	(from) orange (to) colourless	allow yellow ignore brown ignore transparent / clear if no other mark awarded, allow one mark for bromine water decolourises	1 1	AO1 3.10.1.3.d	E
02.3	a single bond between the two carbon atoms two trailing/connecting bonds through brackets		1 1	AO1 3.10.2.a	E
02.4	(polymers from cornstarch are) biodegradable less space needed in landfill	allow decay / decompose naturally / broken down by microbes / decompose quicker allow made from renewable resource / reduction of plastic in environment ignore eco friendly / sustainable	1 1	AO1 3.10.2.e 3.10.2.f	E
02.5	produced using (one from) • different catalysts • different reaction conditions	allow different temperature / pressure ignore different conditions	1	AO1 3.10.2.b	E

02.6	nylon highest strength		1 1	AO3 3.10.2d	E

02.7	PVC stiff/strong/little water absorption	allow one mark for a sensible reason for an alternative choice	1 1	AO3 3.10.2.d	E

Total			**12**

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
03.1	extrapolation as far as astatine correct reading from the line	 allow a tolerance of +/- half a small square	1 1	AO2 3.7.1.d	E
03.2	more than one isotope average value for the isotopes		1 1	AO2 3.1.2k	E
03.3	6 electrons on each outer shell of each atom 1 pair of shared electrons		1 1	AO2 3.2.1.g	E
03.4	iodine chlorine is more reactive than iodine (so) chlorine displaces iodine	do not allow iodide	1 1 1	AO2/AO3 3.7.1e	E
03.5	redox		1	AO1 3.8.4.c	E
03.6	(fluorine) gains oxygen	allow fluorine loses electrons	1	AO1 3.8.4.a	E

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
03.7	2.75 lowest % of children with decayed teeth	allow 2.7–2.8 if MP1 not awarded, MP2 can still be awarded if associated with lowest % on graph	1 1	AO3 3.7.1c	E
Total			**13**		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
04.1	(moles of NaOH = 0.400 x 28.0/1000 =) 0.0112 mol (concentration of HCl =) 0.0112 / 0.025 0.448 (mol/dm^3)	an answer of 0.448 of 0.45 (mol/dm^3) scores 3 marks an answer of 448 scores 2 marks	1 1 1	AO2 3.6.4.a 3.6.4.c	E
04.2	sulfur		1	AO2 3.6.1.b	A
04.3	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.		5–6	A04 3.8.1.c 3.8.1.a	E
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.		3–4		
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.		1–2		
	No relevant content		0		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
	Indicative content Method: • Measure out volume of acid • Measure out volume of thiosulfate • Place a cross underneath the conical flask • Add solutions together in conical flask and start stopwatch • Time until cross can no longer be seen • Repeat with different temperatures of sodium thiosulfate • Temperature to be changed using water bath / fridge Fair test: • Same/set volume of acid • Same/set volume of sodium thiosulfate • Same/set concentration of acid				
04.4	particles move faster or particles have more energy. greater frequency of collisions. more of the particles / collisions have energy equal to / greater than the activation energy		1 1 1	AO1/2 3.8.1.c 3.8.1.b	E

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
04.5		an answer of 0.0127 (mol/dm^3) scores 4 marks an answer of 0.01265… (mol/dm^3) scores 3 marks an answer of 12.7 scores 3 marks an answer of 12.658… scores 2 marks		AO2 3.6.2.a 3.6.4.a	E
	(relative formula mass of $Na_2S_2O_3$) = 158		1		
	(mass of $Na_2S_2O_3$ = 40.0 x 50/1000) = 2 (g)		1		
	(moles of $Na_2S_2O_3$ =) 2/158		1		
	= 0.0127 (moles)	answer expressed to 3 sig.figs.	1		

Total			17

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
05.1	3		1	AO2 3.1.2.a	G
05.2	6		1	AO2 3.1.2.b	G
05.3	diffuse / diffusion (white solid formed closer to left hand end because) Ammonia diffuses / moves faster than hydrogen chloride (ammonia diffuses faster because) its molecules are smaller / M_r is 17 compared with 36.5	 comparison of mass must be linked to movement / diffusion	1 1 1	AO2 3.1.1.b	E
05.4	8.0		1	AO2 3.9.2c	E
05.5	temperature decreases	ignore takes in energy (from the surroundings)	1	AO1 3.9.1.c	E

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
05.6	(initially, as the mass of ammonium chloride increases) final temperature decreases or change in temperature increases (then) final temperature / change in temperature becomes constant 20 g given as limit of first trend or second trend		1 1 1	AO3 3.9.2c	E
05.7	change (any one from): • Use a plastic beaker • Place a lid on the beaker • Wrap the beaker in insulating material. reason: Minimise heat **gain**	 do not allow heat loss	1 1	AO4 3.9.2c	E
05.8	A: activation energy B: overall energy change	 allow enthalpy change / energy taken in	1 1	AO1 3.9.2d	E
05.9	energy taken in / supplied to break bonds energy given out / released to form bonds more energy taken in than given out		1 1 1	AO1 3.9.2e 3.9.2.g	E

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
05.10	temperature change is halved	allow final temperature = 16 (°C) allow temperature change/drop = 3 (°C)	1	AO3 3.9.2.a	E
05.11	(1370 / 1000 =) 1.37 (kJ) (1.37/0.100 =) 13.7 (kJ/mol) +(13.7)	an answer of +13.7 (kJ/mol) scores 3 marks an answer of 13700 scores 1 mark an incorrect answer for one step does not prevent allocation of marks for subsequent steps	1 1 1	AO2 3.9.1a 3.9.2.b	E
Total			**21**		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
06.1	1×10^{-1} g		1	AO2 3.3.1.2b	A
06.2		MP2 dependent on MP1		AO4 3.3.1.2b	E
	wear gloves / lab coat	ignore safety clothing / eye protection	1		
	so does not contact skin / to protect your skin		1		
	OR				
	wear goggles (1)	ignore safety glasses			
	so does not contact eyes / to protect your eyes (1)				
		if no other mark awarded, allow one mark for acid is irritant/corrosive			
06.3	$CaCO_3$ + HCl		1	AO2 3.6.1.a	E
	$CaCO_3$ + 2HCl		1	3.6.1.b	
	(s) (aq) (aq) (l) (g)		1		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
06.4	as time increases mass decreases decreasing at a decreasing rate after 200 s / 98.4g mass stops decreasing		1 1 1	AO3 3.8.1.e 3.8.1.a	E
06.5	(99.1 – 98.7 =) 0.4 (g) (change in mass/time =) 0.4/50 0.008 (unit) g/s	allow answer that uses tangent at 75 s allow ecf from incorrect change in mass allow g s^{-1}	1 1 1 1	AO3 3.8.1.a	E
06.6	line starts at 100.0 g and is more steep at the start. line plateaus at 98.4 g before 200 secs.		1 1	AO3 3.8.1.f	E

06.7	add more acid if marble chips impure no reaction / if acid had been used up reaction will occur. or test with pH paper (1) if green, acid has been used up / if red, marble chips are impure (1) or add more marble chips (1) if no more bubbles/effervescence then acid used up (1) or repeat using a different sample of marble chips (1) if all the marble chips react the first sample was impure (1)		1 1	AO4 3.3.1.2b	E

Total			**17**