
INTERNATIONAL GCSE CHEMISTRY

9202/2

Paper 2

Mark scheme

November 2018

Version 1.0 Final



igexams.com
Telegram group



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

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.

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	K		1	AO1 3.1.2.b	G
01.2	alkali		1	AO1 3.2.1d	G
01.3	rubidium		1	AO2 3.7.1.b	A
01.4	any one from: <ul style="list-style-type: none"> • wear gloves • goggles • do not touch the metal • store under oil 		1	AO4 3.7.1.a	E
01.5	lower density than water		1	AO2 3.7.1.a	E
01.6	(reacts with water) releasing a gas		1	AO2 3.7.1.a	E
01.7	exothermic reaction	allow energy transferred to surroundings	1	AO2 3.9.1.b	E
01.8	sodium hydroxide	answers can be in either order	1	AO2 3.2.1.d 3.7.1.a	E
	hydrogen		1		
Total			9		

Question	Answers	Extra information	Mark	AO/Spec. Ref.	ID
02.1	chromatography		1	AO1 3.4.1.d	E
02.2	so the line does not run/dissolve/wash away		1	AO4 3.4.1.d	E
02.3	the drink contains (at least) three colourings	allow the drink contains (at least) two unknown colourings	1	AO3 3.4.1.d	E
	the drink contains Sunset Yellow		1		
02.4	measure distance travelled by Sunset Yellow and measure distance travelled by solvent.		1	AO4 3.4.1.d	E
	divide distance travelled by Sunset Yellow by distance travelled by solvent.		1		
Total			6		

Question	Answers	Extra information	Mark	AO/Spec. Ref.	ID
03.1	Level 3: The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.		5–6	AO4 3.4.1c 3.5.2.c	
	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		
	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: <ul style="list-style-type: none"> collect samples of river water from different points along the river. choice of solution containing hydroxide ions eg calcium hydroxide solution add (calcium) hydroxide solution to each sample of river water filter to collect the precipitate wash the solid with distilled water dry the solid weigh the solid (removed from filter paper) compare the masses Fair test: <ul style="list-style-type: none"> use same volume of river water use same volume of (calcium) hydroxide solution use same concentration of (calcium) hydroxide solution 				
03.2	red		1	AO1 3.4.3.a	A
03.3	$\frac{1.2}{24}$	an answer of 0.05 (mol) scores 2 marks	1	AO2 3.6.3a	E
	0.05 (mol)		1		

03.4	MgCl ₂		1	AO2 3.2.1c	A
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Total			10		
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Question	Answers	Extra information	Mark	AO/Spec. Ref.	ID
04.1	surface area	allow volume / thickness of hydrogel	1	AO4 3.10.2.d	E
04.2	mass lost more quickly in A so A is better cooling effect but B stays moist for longer	allow converse throughout	1 1 1	AO3 3.10.2.d	E
04.3	$\frac{(12.4 - 8.4)}{12.4}$ = 32%	an incorrect answer in the first step does not prevent the allocation of marks in the second step an answer of 32.2 or 32.26 (%) scores 2 marks.	1 1	AO3 3.10.2.d	E
04.4	<p>Correct structure of polymer including linking bonds</p> $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ -\text{C} - \text{C}- \\ \quad \\ \text{H} \quad \text{OOC}_2\text{H}_3 \end{array}$ <p>Balancing</p> $n \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{C} = \text{C} \\ \quad \\ \text{H} \quad \text{OOC}_2\text{H}_3 \end{array} \longrightarrow \left(\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ -\text{C} - \text{C}- \\ \quad \\ \text{H} \quad \text{OOC}_2\text{H}_3 \end{array} \right)_n$		1 1	AO2 3.10.2.a	E
Total			8		

Question	Answers	Extra information	Mark	AO/Spec. Ref.	ID																								
05.1	any one from: <ul style="list-style-type: none"> • electrical wiring • plumbing • pipes • tanks 		1	AO1 3.3.1.c	E																								
05.2	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>(Cu)</th> <th>(Fe)</th> <th>(S)</th> </tr> </thead> <tbody> <tr> <td>%</td> <td>34.6</td> <td>30.5</td> <td>34.9</td> </tr> <tr> <td>Ar</td> <td>$\frac{63.5}{}$</td> <td>$\frac{56}{}$</td> <td>$\frac{32}{}$</td> </tr> <tr> <td>Moles</td> <td>0.545</td> <td>0.545</td> <td>1.091</td> </tr> <tr> <td>Ratio</td> <td>1</td> <td>1</td> <td>2</td> </tr> <tr> <td>Formula</td> <td colspan="3">CuFeS₂</td> </tr> </tbody> </table>		(Cu)	(Fe)	(S)	%	34.6	30.5	34.9	Ar	$\frac{63.5}{}$	$\frac{56}{}$	$\frac{32}{}$	Moles	0.545	0.545	1.091	Ratio	1	1	2	Formula	CuFeS ₂				1 1 1 1	AO2 3.6.2.c	E
	(Cu)	(Fe)	(S)																										
%	34.6	30.5	34.9																										
Ar	$\frac{63.5}{}$	$\frac{56}{}$	$\frac{32}{}$																										
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Ratio	1	1	2																										
Formula	CuFeS ₂																												
05.3	$2\text{CuO} + \text{C} \rightarrow 2\text{Cu} + \text{CO}_2$		1	AO2 3.6.1a	E																								
05.4	recycling	allow reuse	1	AO2 3.3.1.1.i	E																								
05.5	<p>no digging/mining</p> <p>so landscape not ruined/habitats not destroyed</p> <p>or</p> <p>plants take in CO₂ (1)</p> <p>so reduces carbon footprint/climate change (1)</p> <p>or</p> <p>plants are renewable (1)</p> <p>so can be grown again (1)</p>	allow converse throughout.	1 1	AO2 3.3.1.1.d 3.3.1.1.f 3.10.1.2.d	E																								
05.6	<p>different sized atoms</p> <p>atoms/layers unable to slide over each other</p>	allow layers are disrupted	1 1	AO2 3.3.1.a 3.3.1.b	E																								

05.7	higher percentage of zinc the higher the strength.		1	AO3 3.3.1.b	E
	except for H		1		
	H has other element in it that may affect the result.		1		

05.8	$\left(\frac{16 \times 28}{100}\right)$ 4.48 (kg)	an answer of 4.48 (kg) scores 2 marks	1	AO2/AO3 3.3.1.b	E
		an incorrect answer in the first step does not prevent the allocation of marks in the second step	1		

Total		16
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Question	Answers	Extra information	Mark	AO/Spec. Ref.	ID
06.1	hydrogen		1	AO1 3.5.1.f	G
06.2	partially ionised		1	AO1 3.10.3.2.b	G
06.3	salt		1	AO1/AO2 3.5.1.b	E
	green		1	3.5.1.f	
06.4	any three from: <ul style="list-style-type: none"> • adds alkali from pipette • adds acid from a burette • to use a white tile • swirling to mix • read the burette from the bottom of the meniscus • dropwise near end-point • stop when indicator changes colour • repeat experiment until gained concordant results 		1	AO1 3.6.4.b	E
			1		
			1		
06.5	(Volume of acid = $\frac{27.15}{1000}$) 0.02715dm ³ (Moles H ₂ SO ₄ = $0.100 \times \frac{27.15}{1000} =$) 2.715 × 10 ⁻³ mol (Mol NaOH = $2.715 \times 10^{-3} \times 2 =$) 5.43 × 10 ⁻³ mol (Conc NaOH = $\frac{5.43 \times 10^{-3}}{\left(\frac{25}{1000}\right)} =$) 0.22 (mol/dm ³)	an answer of 0.22 (mol/dm ³) scores 4 marks do not allow 0.0274 for MP1 an answer of 0.2172 gains 3 marks an incorrect answer in one step does not prevent the allocation of marks in subsequent steps the final answer must be expressed to 2 sig.fig.	1	AO2 3.6.4.b 3.6.4.c	E
			1		
			1		
			1		

06.6	methyl red		1	AO3 3.6.4.b 3.5.1.f	E
	because the pH range for colour change/pH 4.2–6.3 is within pH range of vertical section on the graph.		1		
	yellow to red	allow 1 mark for correct colour change of incorrect indicator	1		

Total		14
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Question	Answers	Extra information	Mark	AO/Spec. Ref.	ID
07.1	1 bonding pair between each N and H		1	AO1 3.2.1.g	E
	1 lone pair on nitrogen		1		
07.2	as temperature increases yield decreases	allow converse	1	AO2/AO3 3.8.2.c	E
	as forward reaction is exothermic		1		
07.3	as pressure increases yield increases.	allow converse	1	AO2/AO3 3.8.2.d	E
	as reaction favours side with least number of molecules		1		
07.4	air contains oxygen		1	AO2 3.8.4.a	E
	air/oxygen would react with/oxidise the hydrogen	allow oxidise the iron (catalyst)	1		
07.5	iron		1	AO1 3.8.3.c	G
07.6	more food needed for increasing population		1	AO3 3.8.3.b	E
	so more fertiliser needed to increase crop/food yield		1		
	so more ammonia needed as raw material for fertilisers		1		
07.7	945 + (3 × 436)		1	AO2 3.9.2.f	E
	2253 (kJ/mol)		1		

07.8	2253 – 2346	an answer of -93 (kJ/mol) scores 2 marks	1	AO2 3.9.1a 3.9.2.f	E
	-93 (kJ/mol)	allow 1 mark for +93 (kJ/mol)	1		

Total		16
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Question	Answers	Extra information	Mark	AO/Spec. Ref.	ID
08.1	giant structure/lattice		1	AO1 3.2.3.b	E
	4 (covalent) bonds per atom		1		
08.2	layers (of carbon atoms)		1	AO1 3.2.3.c	E
	layers/atoms can slide		1		
	(due to) weak (intermolecular) forces between layers		1		
08.3	delocalised electrons		1	AO1 3.2.3.d	E
	(electrons) can move (through the structure)		1		

08.4	Level 2: A judgement, linked and logically supported by a sufficient range of correct reasons, is given.	3–4	AO3 3.2.3e	E
	Level 1: Relevant points are made. They are not logically linked.	1–2		
	No relevant content.	0		
	Indicative Content: <ul style="list-style-type: none"> • as light intensity increases, percentage of light absorbed increases • so protection of eyes becomes greater as light intensity increases • useful up to 3 arbitrary units of light intensity • percentage of light absorbed becomes constant after 3 arbitrary units of light intensity • so the eye will be exposed to increasing levels of light • less useful after 3 arbitrary units of light intensity • this could be potentially dangerous at high light intensities • more evidence is need to link light intensity with eye damage 			
Total		11		