OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE
Chemistry

9202/1 – Paper 1

Mark scheme

9202

June 2018

Version/Stage: 1.0 Final

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	heat electricity layers	Heat and electricity in either order in first two spaces Allow rows/lines	1 1 1	AO1/ 3.3.1a	G
01.2	alloys		1	AO1/ 3.3.1b	A
01.3	magnesium (atoms) lose electron 2 electrons oxygen (atoms) gain electron(s)	Allow magnesium transfers 2 electrons to oxygen 3 marks Allow magnesium transfers electrons to oxygen 2 marks Allow electrons transferred 1 mark	1 1 1	AO1/AO2 3.2.1c	E
01.4	M_r of MgO = 40		1	AO2 3.6.2a	E
01.5	% = 24/40 × 100 = 60(%)	Allow ECF from 01.4	1	AO2 3.6.2b	E

01.6	electrostatic forces of attraction/bonds between oppositely charged ions (in a) giant structure/Lattice (therefore) lots of energy is needed (to break forces/bonds)	do not allow intermolecular forces allow strong forces of attraction/bonds (between ions) if no other mark awarded	1 1 1 1	AO1 3.2.1f 3.2.2a	E

Total			**13**

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
02.1	**Two** from: • same concentration of acid • same volume of water • same volume of acid • same mass of metal • same surface area/dimensions metal • same temperature	Allow same size of metal	2	AO4/ Appendix 6.1 3.3.1.1a	E
02.2	D most reactive B A C least reactive		1	AO3/ 3.3.1.1a	G
02.3	$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$	1 mark for correct formulae 1 mark for balancing Allow multiples No marks for correct balancing of an incorrect equation	2	AO2/ 3.6.1a	E
02.4	lighted splint makes a pop (sound)		1	AO1/ 3.4.2a	E

02.5	red/brick red/orange red (flame)	not scarlet red or crimson	1	AO1/ 3.4.3a	G
02.6	reaction is exothermic zinc (solid) forms	allow energy is released allow zinc is displaced allow formulae of substances	1 1	AO2/ 3.9.1b 3.3.1.1b	E
02.7	$Mg + Zn^{2+} \rightarrow \mathbf{Zn + Mg^{2+}}$	1 mark for both correct products	1	AO2/ 3.3.1.1b	E
Total			**10**		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
03.1	Electrical energy		1	AO1/ 3.9.3b	A
03.2	hydrogen + oxygen → water	Allow correct balanced symbol equation	1	AO2/ 3.9.3b 3.6.1a	G
03.3	100 nm		1	AO1/ 3.2.4	A
03.4	**One** from: • faster (rate of) reaction • greater surface area • use less platinum • save money • lighter fuel cell		1	AO2/ 3.2.4 3.8.1f	E
03.5	$2H^+ + 2\ e^-$	1 mark for H^+ in products 1 mark for correct balancing	1 1	AO2/ 3.3.2f	E
03.6	(hydrogen) loses electrons		1	AO2/ 3.3.2d	E

	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 considers both sides of the argument.	5–6	AO1/AO2 3.9.3b 3.10.1.2d	E
	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		
03.7	**Indicative content** Hydrogen is a renewable fuel Water is the only product (less pollution) Hydrogen produces no gases that may contribute towards climate change Hydrogen is explosive Hydrogen is difficult to store Fuel cells are new technology (expensive) Good marketing opportunity – clean fuel Hydrocarbons are readily available (cheap) Combustion produces carbon dioxide and other pollutants Hydrocarbons are from crude oil (non-renewable) Use of polluting vehicles restricted in cities		3.9.3 3.10.1.2	

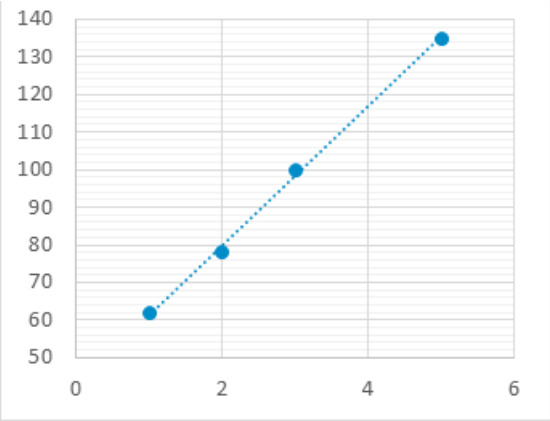
Total			**13**

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
04.1	Have ions with +1 charge React with water, releasing hydrogen		1 1	AO1/ 3.7.1a 3.7.2	A
04.2	protons 11 neutrons 12		1 1	AO2/ 3.1.2f	G
04.3	same number of protons and electrons protons positive (charge) and electrons negative (charge)		1 1	AO1/ 3.1.2d 3.1.2e	E
04.4	potassium is more reactive (because it) is further down Group 1 potassium (is more reactive because) it has an outer electron in higher energy level/further from nucleus so the electron is more easily lost	allow converse argument for sodium allow correct reference to shielding effect allow electron is less strongly attracted	1 1 1 1	AO1 3.7.1b,f	E
Total			**10**		

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
05.1	**positive** (copper) ions /Cu^{2+} **attracted** to negative (electrode)		1 1	AO1/ 3.3.2c	E
05.2	ions not free to move/fixed in place		1	AO2/ 3.3.2a	E
05.3	electrode will be wet/have solution on it the mass would be larger so not correct		1 1	AO4/ 3.3.2c	E
05.4	5.2 (grams)		1	AO3/ 3.3.2c	E
05.5	5.2/5 1.04 (g/min)	Allow ecf from 05.4 Correct answer with no working gains 2 marks	1 1	AO3/ 3.3.2c	E
05.6	Any one from • no copper ions left in solution • concentration of copper sulfate solution decreases to zero • reaction has finished • all copper has been removed		1	AO2/ 3.3.2c	E

05.7	(mass of electrode does not change because) metal/solid not formed (at electrode) hydrogen is formed at the negative electrode/cathode oxygen is formed at the positive electrode/anode	allow sodium not formed because it is more reactive than hydrogen allow only gases formed allow oxygen is formed from the hydroxide ion allow 1 mark for hydrogen and oxygen are the gases (produced at the electrodes)	1 1 1	AO2/AO3 3.3.2g	E

Total			**12**

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
06.1	7		1	AO1/ 3.10.3.1.b 3.5.1f	A
06.2	2 marks if all points plotted correctly 1 mark if 2 or 3 points plotted correctly 1 mark for line of best fit  	Line of best fit is a straight line passing through or very close to first and last point Allow a tolerance in plotting of +/- 1/2 small square	2 1	AO2/ 6.3.9 3.10.3.1a	E
06.3	117	Accept range 116–118 Allow correct value from candidates graph +/- 1/2 small square	1	AO3	E

06.4	0.05 0.1 4.4 (g) **OR** *M*r ethanol = 46 and *M*r CO_2 =44 (1) 88/46 x 2.3 (1) 4.4(g) (1)	An answer of 4.4(g)scores 3 marks 2.3 ÷ 46 Allow ecf for incorrect moles of ethanol or CO_2 0.05 × 2 0.1 × 44	1 1 1	AO2/ 3.6.1d	E

06.5	bonds made = (4 × 805) **or** 3220 (6 × 464) **or** 2784 = 6004	An answer of 6004 scores all 3 marks Ignore unit and sign	1 1 1	AO2/ 3.9.2f	E

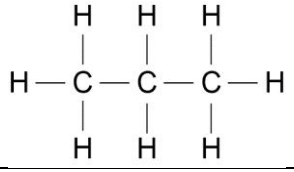
06.6	(energy reaction = 4728–6004) = (–)1276	An answer of 1276 without working gains 1 mark Allow ecf from 06.5 Ignore sign Ignore unit	1	AO2/ 3.9.2f	E

Total			**12**

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
07.1	H_2SO_4		1	AO1 3.8.3d	A
07.2	vanadium (V) oxide	Ignore (V) but penalise wrong roman numeral Allow V_2O_5 Allow vanadium pentoxide	1	AO1 3.8.3d	G
07.3	catalyst increases rate of reaction less fuel used / lower temperature is used / a high temperature is used for a shorter time	allow lowers the activation energy	1 1	AO1/AO2 3.8.1h	E
07.4	yield increases fewer moles on the right/products		1 1	AO1/AO2 3.8.2d	E

07.5	total moles gas = 640 (mol) total volume gas = 15 360 (dm^3)	Award 2 marks for 15 000 and 15 400 and 15 360	1 1	AO2 3.6.4d	E

Total			**8**

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
08.1			1	AO2 3.10.1.2b	E
08.2	C_nH_{2n+2}		1	AO1 3.10.1.2a	A
08.3	sulfur (impurities) in the fuel (burn in oxygen)	Allow sulfur impurities react with oxygen	1	AO2 3.10.1.2d	E
08.4	limited/restricted supply of oxygen/air		1	AO1 3.10.1.2d	E
08.5	carbon / C		1	AO1 3.10.1.2d	E

08.6	link between volume of traffic and mass of particulates in the morning no link in the afternoon	Allow 2 marks for an answer of 'no' link using data from the graphs.	1 1	AO3 3.10.1.2d Appendix 6.1	E

08.7	**One** from: • use more sample points • collect data for longer periods • carry out investigation on different days • consider control variables such as weather		1	AO3 3.10.1.2d Appendix 6.1	E

08.8	giant structure/lattice covalent bond each silicon is bonded to 4 oxygens each oxygen is bonded to 2 silicons	Allow macromolecular. Do not allow intermolecular Do not allow electrostatic	1 1 1 1	AO1/AO3 3.2.2f	E

Total			**12**