DRAFT SPECIMEN MATERIAL

GCSE CHEMISTRY

PAPER 1H

Mark scheme

Specimen 2018

Version 0.1

This draft qualification has not yet been accredited by Ofqual. It is published to enable teachers to have early sight of our proposed approach to GCSE Chemistry. Further changes may be required and no assurance can be given that this proposed qualification will be made available in its current form, or that it will be accredited in time for first teaching in September 2016 and first award in August 2018.

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 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	The forces between iodine molecules are stronger		1	AO1/1 4.2.2.4
01.2	anything in range +30 to +120		1	AO3/2a 4.1.2.6
01.3	Brown		1	AO2/1 4.1.2.6
01.4	$2\ I^- + Cl_2 \rightarrow I_2 + 2\ Cl^-$		1	AO2 /1 4.1.2.6 4.1.1.1
01.5	It contains ions which can move		1	AO1/1 4.2.2.3
01.6	hydrogen iodine		1	AO2/1 4.4.3.4
Total			**6**	

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	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
02.2	they have the same number of electrons in outer energy level/shell	do **not** accept any number of electrons in outer energy level unless it is three	1	AO1/1 4.1.2.1

Question 2 continues on the next page

Question 2 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02	**Level 3:** A number of properties of transition metals and Group 1 metals have been listed. There has been at least one comparison of properties made.		5–6	AO1/1 4.1.2.5 4.1.3.1 4.1.3.2
	Level 2: A number of chemical and physical properties are considered.		3–4	
	Level 1: One or more physical or chemical properties of transition metals or Group 1 metals.		1–2	
	Nothing written worthy of credit.		0	
	Indicative content Physical Transition metals • high melting points • high densities • strong • hard Group 1 • low melting points • low densities • soft Chemical Transition metals • 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			

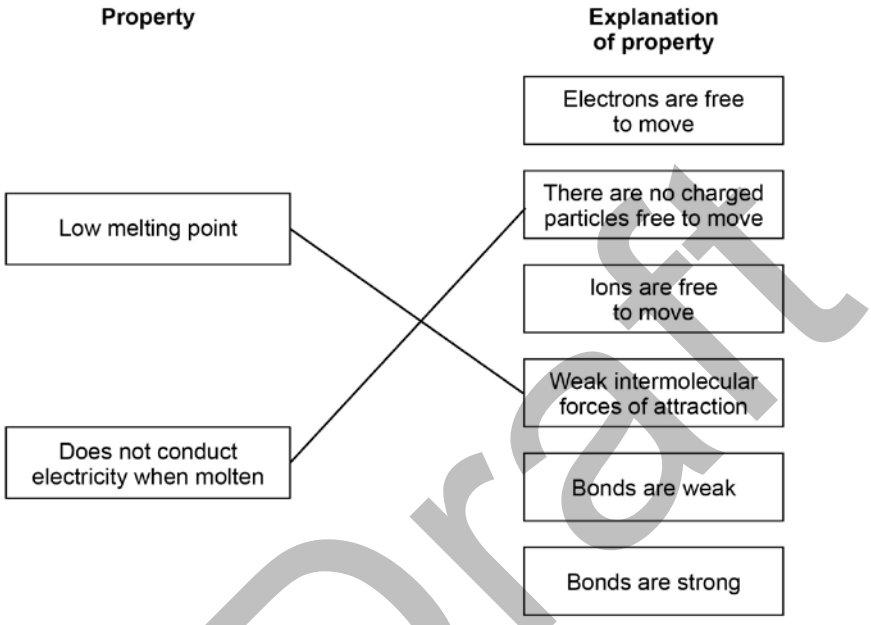
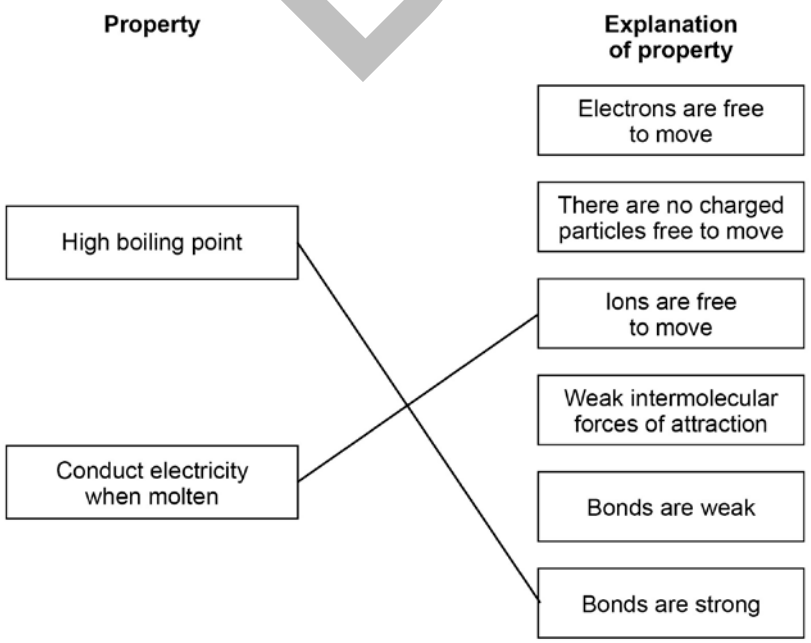
Total		10

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	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		5	AO2/1 AO1/1 AO2/1 AO1/1 AO2/1 4.2.1.2
03.2	there are not gaps between the ions **or** the ions are touching each other (in the ionic model)	ratio in model is not correct	1	AO1/1 4.2.1.3
03.3	seven		1	AO2/1 4.1.1.1
03.4	(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
03.5	34(g)	ignore units even if incorrect	1	AO2/1 4.2.1.4

Question 3 continues on the next page

Question 3 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6			2	AO1/1 4.2.2.4
03.7			2	AO1/1 4.2.2.3
Total			**14**	

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **one** from: • heat • stir		1	AO3/3b 4.1.1.2 4.4.2.3
04.2	filter	accept use a centrifuge accept leave longer (to settle)	1	AO3/3b 4.1.1.2 4.4.2.3
04.3	any **one** from: • wear safety spectacles • wear an apron		1	AO3/3b 4.1.1.2 4.4.2.3
04.4	Distillation		1	AO1/2 4.1.1.2 4.10.1.2
04.5	Evaporation	allow boiling	1	AO2/2 4.2.2.1 4.10.1.2
04.6	Condensing/condensation		1	AO2/2 4.2.2.1 4.10.1.2
Total			**6**	

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	Copper carbonate - the reading would drop because a gas/carbon dioxide is leaving the flask/reaction mixture Copper oxide - mass does not change nothing enters or leaves (both required)	 ignore carbon dioxide/gas is made	4	AO2/2 4.3.1.3
05.2	add excess copper carbonate (to dilute hydrochloric acid) filter (to remove excess copper carbonate) heat filtrate to evaporate some water **or** heat to point of crystallisation leave to cool (so crystals form)	accept alternatives to excess, such as 'until no more reacts' reject heat until dry accept leave to evaporate or leave in evaporating basin until crystals form	4	AO1/2 4.4.2.2 4.4.2.3
05.3	10.1(0037175)	correct answer scores **4** marks If incorrect then apply ecf and award **1** mark each, to a maximum of **3** marks for: M_r $CuCl_2$ = 134.5 M_r $CuCO_3$= 123.5 Moles $CuCl_2$ = (11.0/134.5) = 0.0817843866 Mass $CuCO_3$ = 0.08178 x 123.5	4	AO2/1 4.3.2.2
05.4	79(.0909 … %)		1	AO2/1 4.3.3.1

Question 5 continues on the next page

Question 5 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	any **one** from: • reaction did not go to completion • loss of material when transferring • competing reactions		1	AO2/2 4.3.3.1
05.6	atom economy using carbonate lower because an additional product is made **or** carbon dioxide is made as well	or converse second mark dependent on first	1 1	AO3/2b AO2/1 4.3.3.2
Total			**16**	

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	loss of electrons		1	AO1/1 4.4.1.4
06.2	magnesium is the most reactive because it gave the most positive voltage when it was metal 2 **or** it gave the biggest voltage with silver		1 1	AO3/1a AO3/2a 4.5.2.1
06.3	0.0 V they gave the same voltage with magnesium/silver/vanadium so have the same reactivity		1 1 1	AO3/2a AO3/2b AO3/2b 4.5.2.1
06.4	use <u>five/5</u> Ni-Cd cells connected in <u>series</u>		1 1	AO2/1 AO1/1 4.5.2.1
06.5	potential difference	accept voltage / electricity / electric current	1	AO1/1 4.5.2.2
06.6	$H_2 \rightarrow 2H^+ + 2e^-$ $O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$		1 1	AO1/1 4.5.2.2
Total			**11**	

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	(delivery) tube sticks into the acid the acid would go into the water **or** the acid would leave the flask or go up the delivery tube	 ignore no gas collected	1 1	AO3/3a 4.4.2.2 4.3.5
07.2	any **one** from: • bung not put in firmly/properly • gas lost before bung put in • leak from tube		1	AO3 /3a 4.4.2.2
07.3	all points plotted correctly scores 2 two straight lines	5, 6 or 7 points scores 1 if two straight lines drawn are joined by a curve or do not meet, max 1	4	AO2/2 4.4.2.2
07.4	all of the acid has reacted		1	AO2/2 4.3.2.4 4.4.2.2
07.5	take more readings around 0.44 g	accept anything in range 0.34 g to 0.54 g take more readings is insufficient ignore repeat	1	AO3/3a 4.3.2.4 4.4.2.2

Question 7 continues on the next page

Question 7 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	use a pipette/burette to measure the acid because it is more accurate volume than a measuring cylinder **or** greater precision than a measuring cylinder **or** use a gas syringe to collect the gas so it will not dissolve in water **or** use a flask with a divider so no gas escapes when bung removed	accept description of tube suspended inside flask	2	AO3/3b 4.3.2.4 4.4.2.2
07.7	they should be collected because carbon dioxide is left in flask at end and it has the same volume as the air collected/displaced		1 1	AO3/2b 4.3.2.4 4.4.2.2
Total			**13**	

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	(sulfuric acid is) completely/ fully ionised In aqueous solution **or** when dissolved in water		1 1	AO1/1 4.4.2.5
08.2	$H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$	allow multiples **1** mark for equation **1** mark for state symbols	2	AO1/1 4.4.2.5
08.3	adds indicator eg phenolthalein/methyl orange/ litmus added to the sodium hydroxide (in the conical flask) (adds the acid from a) burette with swirling **or** dropwise towards the end point **or** until the indicator just changes colour until the indicator changes from pink to colourless (for phenolphthalein) or yellow to red (for methyl orange) or blue to red (for litmus)	do **not** accept universal indicator	1 1 1 1	AO1/1 4.3.4 4.4.2.4
08.4	$27.10cm^3$	correct answer with or without working scores **2** marks. If answer incorrect award **1** mark for choosing titrations 3 and 4 or $\frac{27.05 + 27.15}{2}$ or 27.5(75) average of all 4	2	AO2/2 4.3.4 4.4.2.4

Question 8 continues on the next page

Question 8 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	0.217 mol/dm^3	correct answer to 3 significant figures with or without working = **5** marks if answer incorrect award a maximum of **4** marks for the following steps Moles H_2SO_4 = 0.00271 Moles NaOH = 0.00542 Concentration NaOH = $\frac{\text{0.00542 or number of moles NaOH}}{0.025}$ answer to 3 significant figures allow ecf from 8.4	5	AO2/2 4.3.4 4.4.2.4
08.6	10 000 000 000		1	AO2/1 4.4.2.5
Total			**16**	

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	line goes up before it goes down energy given out correctly labelled activation energy labelled correctly		3	AO1/1 4.5.1.3
09.2	193 (kJ/mole)	correct answer with or without working scores **3** marks -193/mole scores **2** marks If answer is not correct award up to two marks for the following steps bonds broken – bonds formed = -95kJ/mole bonds formed = 900 (kJ/mole) **or** 2548	3	AO2/1 4.5.1.3
09.3	(The reaction is exothermic because) less energy is required to break the bonds in the reactants than is produced when the bonds are formed in the products.		2	AO1/1 4.5.1.3
Total			**8**	