OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE CHEMISTRY

9202/1

PAPER 1
Mark scheme

Specimen material

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.

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
01.1	transition/transitional metals/ elements/d-block		1
01.2	it forms coloured compounds it forms compounds that are catalysts		1 1
01.3	any **two** from: • bubbles/effervescence/ fizzing • lithium disappears/gets smaller • lithium moves on the surface of the water • (universal indicator) turns blue / purple.	 ignore gas/hydrogen produced allow dissolves do **not** allow melts/burns ignore floats	2
01.4	2 LiOH + H_2	first mark is for correct products second mark is for correct balancing	2
01.5	all have 1 electron in their outer shell/energy level	allow have the same number of electrons in their outer shell/ energy level	1
01.6	because (in potassium) the outer shell electron is further away from the nucleus **or** because potassium atoms are larger than lithium atoms therefore the outer shell electron is less strongly attracted to the nucleus or is more shielded from the attraction of the nucleus and so the outer shell electron in potassium is more easily lost	it should be clear that the candidate is referring to the outer shell electron: if this is not clear a maximum of **2** marks can be awarded **3** marks can be scored for answering the question in terms of lithium	1 1 1
Total			**11**

Question 2

Question	Answers	Extra information	Mark
02.1	sulfur dioxide	allow sulfur oxide	1
02.2	oxygen is removed by carbon **or** carbon gains oxygen **or** carbon displaces copper because carbon is more reactive than copper		1 1
02.3	iron is cheap	allow iron is (much) more abundant than copper	1
02.4	displacement		1
02.5	$Fe + Cu^{2+} \rightarrow Fe^{2+} + Cu$		1
02.6	any **two** from: • less expensive / energy to extract the small amounts of copper • plants will remove carbon dioxide from the atmosphere as they grow • can release energy when plants are burned.	ignore generalised statements (eg better for the environment or plants are natural)	2
02.7	not continuous as it takes a long time for plants to grow	accept supply not continuous as plants only harvested once/ twice a year	1
Total			**9**

Question	Answers	Extra information	Mark
03.1	as the temperature increases, the yield of reaction increases		1
03.2	2 molecules/volumes become 4 **or** more molecules/volumes of product than reactant **or** fewer moles/particles on the left of the equation		1

03.3	Examiners should also refer to the information on page 3.			6
0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**	
No relevant content.	The student has written about some basic points from the table but has not added any extras knowledge. The student may have included advantages or disadvantages.	The student has attempted an evaluation using the points from the table and their own knowledge. The student has included advantages **and** disadvantages	The student has given an evaluation that includes both advantages and disadvantages. The student has clearly linked points from the table with their own knowledge and uses appropriate scientific terminology.	

Examples of points made in the response:

Advantages of using hydrogen:

- its combustion only produces water
- combustion of hydrogen does not produce carbon dioxide or does not contribute to climate change
- petrol requires much more oxygen to burn so partial combustion is possible producing carbon monoxide
- combustion of hydrogen does not produce any particulates or does not contribute to global dimming
- petrol comes from a non-renewable source or there are renewable ways of producing hydrogen, eg electrolysis of water.

Disadvantages of using hydrogen:

- hydrogen has to be stored at high pressure or risk of explosion or larger volume needed for storage.
- much less energy produced from the combustion of hydrogen or need to refuel more often
- most methods of producing hydrogen need fossil fuels.

Total			**8**

Question 4

Question	Answers	Extra information	Mark
04.1	can be from diagram chlorine (2.8).7	allow chlorine needs one more electron	1
	can be from diagram shares a pair of electrons		1
	shared pair of electrons is a **covalent bond**	do **not** accept ionic bond	1
04.2	Magnesium loses electrons		1
	two electrons		1
	chlorine gains electrons		1
	two atoms of chlorine		1
		magnesium loses electrons and chlorine gains electrons scores **2** marks	
		magnesium loses two electrons and two chlorines each gain one electron will score **4** marks	
04.3	because it has electrostatic forces of attraction or attraction between oppositely charged ions		1
	giant structure/lattice or many bonds	allow attraction between positive and negative ions	1
		do **not** accept atoms	
	that need lots of energy to overcome/break		1
		any mention of covalent bonds or molecules or intermolecular forces max **2**	
Total			**10**

Question 5

Question	Answers	Extra information	Mark
05.1	D		1
05.2	mass of magnesium temperature		1 1
05.3	particles have more energy/ more kinetic energy/move faster particles collide more often/ frequently greater number of particles have greater than the required activation energy		1 1 1
05.4	(0.5 x 25)/1000 0.0125	 allow 0.013 allow 0.0125/0.013 without working shown for **2** marks	1 1
05.5	0.0125 moles	allow ecf from their 05.4	1
05.6	0.0125/0.3 0.0417 dm^3 or	 allow 41.7 cm^3 allow 0.0417 dm^3 or 41.7cm^3 with no working shown for **2** marks	1 1
Total			**11**

Question 6

Question	Answers	Extra information	Mark
06.1	(argon has) a full outer shell (of electrons)	allow energy level for shell allow does not lose or gain electrons do **not** accept does not form bonds **or** react **or** is a noble or inert gas	1
06.2	oxygen would react/burn/oxidise (with metal)	allow oxygen is reactive ignore metal would react	1
06.3	tungsten has a very high melting point		1
06.4	giant lattice atoms in grapheme are covalently bonded and covalent bonds are strong or need a lot of energy to be broken	allow each carbon atom is joined to three others allow difficult to break max **2** marks if any reference to incorrect type of bonding	1 1 1
06.5	because graphene has delocalised electrons which can move throughout the structure	allow each carbon atom has one free electron do not accept just electrons can move	1 1
06.6	weak forces between layers layers can move over each other	allow no bonds between layers	1 1
Total			**10**

Question 7

Question	Answers	Extra information	Mark
07.1	ΔT = (64 – 17) = 47 °C 750 x 4.2 x 47 148 050 **or** 148(.085) kJ	 allow 148 050 with no working shown for **3** marks ignore sign	1 1 1
07.2	1085.7	allow ecf from 07.1 correctly calculated for **2** marks	2
07.3	5, 4	both needed for the mark	1
07.4	test: bubble through lime water/ calcium hydroxide solution observation: (white) precipitate/ goes cloudy		1 1
07.5	6 / 44 = 0.136 0.136 x 3 = 0.409 (moles) 0.409 x 44 = 18 (g)		1 1 1
Total			**11**

Question 8

Question	Answers	Extra information	Mark
08.1	covalent	allow correct description	1
08.2	has simple/small molecules the intermolecular forces/ intermolecular bonds are weak	allow molecular covalent do **not** accept weak covalent bonds **or** reference to incorrect bonding	1 1
08.3	$S + 3F_2 \rightarrow SF_6$	first mark is for correct formulae second mark is for correct balancing	2
08.4	any **three** from: • non-flammable so it will not burn etc • extremely unreactive so it will not react with materials in the transformer • does not conduct electricity so it can insulate the transformer • gas so it has freedom to move and insulate whole area.		3
08.5	one nitrogen atom joined to three hydrogen atoms correct pairs of electrons		1 1
Total			**10**

Question 9

Question	Answers	Extra information	Mark
09.1	4 E (H-O) = 4 × 464 = 1856 **and** 2 E (O-O) = 2 × l46 = 292 2148	 allow 2148 with no working shown for **2** marks allow 1074 with no working shown for **1** mark	1 1
09.2	4 E (H-O) = 4 × 464 = 1856 **and** E (O=O) = 498 2354	 allow 2354 with no working shown for **2** marks allow 1426 with no working shown for **1** mark	1 1
09.3	206	 allow ecf correctly calculated from 09.2 and 09.3	1
09.4	exothermic because more heat is given out (than put in) **or** ΔH is negative **or** answer to 09.3 is negative.		1
09.5	minimum energy for reaction **or** energy needed to start a reaction **or** energy needed to break bonds **or** energy needed to make two substances react		1
09.6	B		1
09.7	lowers activation energy **or** needs less energy to start reaction **or** less energetic route so more particles collide with energy equal to or greater than the activation energy		1 1
Total			**10**