

# IGCSE Double Award Science (Chemistry) 4437/5H

## Mark Scheme (Results)

November 2008

IGCSE

## IGCSE Double Award Science - Chemistry (4437/5H)

The following acronyms are used

<b>owtte</b>	or words to that effect
<b>ecf</b>	error carried forward
<b>dop</b>	dependent on previous
<b>nwn</b>	no working necessary

Question Number	Correct Answer	Notes	Mark
1 (a) (i)	hydrogen peroxide → water + oxygen		(1)

Question Number	Correct Answer	Notes	Mark
1 (a) (ii)	catalyst		(1)

Question Number	Correct Answer	Notes	Mark
1 (b)	over water / displacement of air with downward delivery / upward displacement of air. Could be shown on a diagram.	Accept "through water".	(1)

Question Number	Correct Answer	Notes	Mark
1 (c)	relights a glowing splint	Reject "glows more brightly"	(1)

Question Number	Correct Answer	Notes	Mark
1 (d) (i)	Red (ignore pale/dark), crimson / scarlet	Reject references to orange / yellow /pink	(1)

Question Number	Correct Answer	Notes	Mark
1 (d) (ii)	electron transfer from lithium to oxygen Li atoms each lose one electron and O atom gains two electrons	Covalent / sharing scores zero	1 1 1 (3)

Question Number	Correct Answer	Notes	Mark
1 (d) (iii)	Li <sup>+</sup> O <sup>2-</sup>	Both correct but reversed scores 1	1 1 (2)

(Total 10 marks)

Question Number	Correct Answer	Notes	Mark
2 (a)	Brown / red brown (reject "light", accept "dark") Grey (reject "light", accept "dark")/ black	Reject red alone or reference to orange Reject purple or violet	1 1 (2)

Question Number	Correct Answer	Notes	Mark
2 (b) (i)	diffusion		(1)

Question Number	Correct Answer	Notes	Mark
2 (b) (ii)	$\text{Br}_2(\text{l}) \rightarrow \text{Br}_2(\text{g})$ <i>Reactants = 1, products = 1</i>		(2)

Question Number	Correct Answer	Notes	Mark
2 (b) (iii)	moving (faster) further apart owtte		1 1 (2)

Question Number	Correct Answer	Notes	Mark
2 (c) (i)	bromine + hydrogen $\rightarrow$ hydrogen bromide	Ignore "gas"	(1)

Question Number	Correct Answer	Notes	Mark
2 (c) (ii)	<b>hydrobromic (acid)</b>		(1)

(Total 9 marks)



section B

Question Number	Correct Answer	Notes	Mark
4 (a) (i)	number of electrons in outer shell is same as group OR number of shells with electrons in is same as period		(1)

Question Number	Correct Answer	Notes	Mark
4 (a) (ii)	2.8.8.2	Accept any punctuation	(1)

Question Number	Correct Answer	Notes	Mark
4 (b)	ATOMS with (If atoms omitted, max 1) same atomic number/same number of protons/same element(1) different numbers of neutrons/mass number (1)	Ignore same electrons	(2)

Question Number	Correct Answer	Notes	Mark																				
4 (c) (i)	<table border="1"> <thead> <tr> <th>Number of neutrons</th> <th>Number of protons</th> <th>Atomic number of isotope</th> <th>Mass number of isotope</th> <th>Percentage isotope in the element</th> </tr> </thead> <tbody> <tr> <td>12 (1)</td> <td>12(1)</td> <td>12</td> <td>24</td> <td>79</td> </tr> <tr> <td>13</td> <td>12</td> <td>12</td> <td>25(1)</td> <td>10(1)</td> </tr> <tr> <td>14</td> <td>12</td> <td>12(1)</td> <td>26</td> <td>11</td> </tr> </tbody> </table>	Number of neutrons	Number of protons	Atomic number of isotope	Mass number of isotope	Percentage isotope in the element	12 (1)	12(1)	12	24	79	13	12	12	25(1)	10(1)	14	12	12(1)	26	11		(5)
	Number of neutrons	Number of protons	Atomic number of isotope	Mass number of isotope	Percentage isotope in the element																		
	12 (1)	12(1)	12	24	79																		
	13	12	12	25(1)	10(1)																		
14	12	12(1)	26	11																			

Question Number	Correct Answer	Notes	Mark
5 (c) (ii)	cq on percentages in table. If use only two isotopes max 1. evidence of multiplication of mass numbers by percentages  correct answer answer to 3 sig figs. 24.3 = 3 24.32 = 2	If divide by 10 or 1000 rather than 100, max 1 First step nonsense = 0	1  1 1  (3)

(Total 12 marks)

Question Number	Correct Answer	Notes	Mark
5 (a)	left hand electrode labelled (pure) copper right hand electrode labelled impure copper electrolyte labelled as any soluble copper salt (solution)	Accept cathode Accept anode	1 1 1 (3)

Question Number	Correct Answer	Notes	Mark
5 (b) (i)	solution has lower melting point/melting point of aluminium oxide is too high. <i>allow lowers mp of aluminium oxide.</i>		(1)

Question Number	Correct Answer	Notes	Mark
5 (b) (ii)	Carbon (accept graphite)		(1)

Question Number	Correct Answer	Notes	Mark
5 (c)	Copper: electrical wires / coins / water pipes / allow pans / Associated property (conductor must be qualified). Aluminium: overhead cables/ specified transport/ pans / cooking foil / drink cans Associated property (conductor must be qualified).	Reject coins	1 1 1 1 (4)

Question Number	Correct Answer	Notes	Mark
5 (d)	either:  electrolysis (1) more reactive than C/can not be reduced by C/similar reactivity to Al/Al is extracted by electrolysis. (1)  OR  react with a NAMED more reactive metal (1) Ti less reactive than metal used/metal used more reactive than Ti/ metal will displace Ti. (1)		(2)

(Total 11 marks)

Question Number	Correct Answer	Notes	Mark
6 (a)	exothermic/gives out (heat) energy		(1)

Question Number	Correct Answer	Notes	Mark
6 (b)	$\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$ formulae (1) balancing (1)		(2)

Question Number	Correct Answer	Notes	Mark
6 (c)	<ul style="list-style-type: none"> <li>• make chlorides into solutions/add water</li> <li>• green ppt</li> <li>• brown ppt</li> <li>• correct linking of at least one observation to a cation</li> </ul>		(4)

(Total 7 marks)



Question Number	Correct Answer	Notes	Mark
7 (a) (i)	contain oxygen/contains an element other than C and H		(1)

Question Number	Correct Answer	Notes	Mark
7 (a) (ii)	CH <sub>3</sub> / H <sub>3</sub> C		(1)

Question Number	Correct Answer	Notes	Mark
7 (a) (iii)	any TWO from <ul style="list-style-type: none"> <li>• same general formula</li> <li>• members differ by CH<sub>2</sub></li> <li>• same/similar chemical reactions /same functional group</li> <li>• gradation in physical properties</li> </ul>	Accept trend in stated property	(2)

Question Number	Correct Answer	Notes	Mark
7 (a) (iv)	poly(propene)/polypropene/polypropylene		(1)

Question Number	Correct Answer	Notes	Mark
7 (a) (v)	1 correct repeat unit shown with continuation bonds (dependent on correct structure)		1 1 (2)

Question Number	Correct Answer	Notes	Mark
7 (a) (vi)	E has double bond/unsaturated polymer no double bond/saturated		1 1 (2)

Question Number	Correct Answer	Notes	Mark
7 (b)	three correct structures from: but-1-ene but-2-ene methylpropene cyclobutane methylcyclopropane	Penalise CH <sub>3</sub> or CH <sub>2</sub> once Penalise sticks once	(3)

(Total 12 marks)

Question Number	Correct Answer	Notes	Mark
8 (a) (i)	carbon monoxide		1
	toxic / poisonous / kills you		1
	correct reference to hemoglobin or statement that it prevents oxygen being carried round body		1
			(3)

Question Number	Correct Answer	Notes	Mark
8 (a) (ii)	= 64	Ignore units	(1)

Question Number	Correct Answer	Notes	Mark
8 (b) (i)	Ca(OH) <sub>2</sub>		(1)

Question Number	Correct Answer	Notes	Mark
8 (b) (ii)	water/H <sub>2</sub> O		1
	carbon dioxide/CO <sub>2</sub>		1
			(2)

(Total 7 marks)

Question Number	Correct Answer	Notes	Mark
9 (a)	giant / macromolecular	Reject ionic	(1)

Question Number	Correct Answer	Notes	Mark
9 (b)	<ul style="list-style-type: none"> <li>break covalent bonds (between atoms)</li> <li>covalent bonds strong</li> <li>need lots of energy to overcome/break</li> </ul>	If ionic / hydrogen bonds / vdw forces / delocalised electrons / molecules = 0	(3)

Question Number	Correct Answer	Notes	Mark
9 (c)	<ul style="list-style-type: none"> <li>weak forces between layer</li> <li>slide/slip</li> </ul>		(2)

Question Number	Correct Answer	Notes	Mark
9 (d) (i)	<ul style="list-style-type: none"> <li>weak forces between molecules</li> <li>little energy to overcome</li> <li>no (covalent) bonds broken / in diamond (covalent) bonds broken</li> </ul>		(3)

Question Number	Correct Answer	Notes	Mark
9 (d) (ii)	<p>if yes:</p> <p>any two from</p> <ul style="list-style-type: none"> <li>(molecules) round/balls/football shaped</li> <li>weak forces between molecules</li> <li>roll</li> </ul> <p>if no:</p> <ul style="list-style-type: none"> <li>(strong) covalent bonds</li> <li>hold atoms in place/need lots of energy to break (dependent on M1)</li> </ul>		(2)

(Total 11 marks)