

Mark Scheme (Results)

January 2012

International GCSE Chemistry (4CH0)
Paper 2C

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INTERNATIONAL GCSE CHEMISTRY 4CH0 2C – JANUARY 2012

Question number	Expected Answer	Accept	Reject	Marks												
1 (a)	<table><tr><td></td><td>Proton</td><td>Neutron</td><td>Electron</td></tr><tr><td>relative mass</td><td>1</td><td>1</td><td></td></tr><tr><td>relative charge</td><td></td><td>0</td><td>-1</td></tr></table> 1 mark for each correct answer		Proton	Neutron	Electron	relative mass	1	1		relative charge		0	-1	+1	– 1 / one Zero minus one /negative	4
	Proton	Neutron	Electron													
relative mass	1	1														
relative charge		0	-1													
(b) (i)	Protons <u>AND</u> electrons = 1 neutrons = 2	one two		1 1												
(ii)	<u>atoms</u> of the same element with different masses Ignore references to electrons	atoms with same atomic number / number of protons / proton number with different mass numbers / different numbers of neutrons / different neutron numbers	molecules / compounds for first mark only different relative atomic masses for second mark only	1 1												

Question number	Expected Answer	Accept	Reject	Marks
1 (c)	$((79 \times 50.7) + (81 \times 49.3))/100$ OR $(79 \times 0.50.7) + (81 \times 0.493)$ $= 79.99$ Allow 1 mark for a single transcription error (e.g. 43.9 instead of 49.3) Ignore units such as grams	Correct answer on its own scores 2		1 1
			Total	10

Question number	Answer	Accept	Reject	Marks
2 (a) (i)	B			1
(ii)	A			1
(iii)	E			1
(iv)	C			1
(b) (i)	Atomic number			1
(ii)	Electrons in the outer shell			1
			Total	6

Question number	Answer	Accept	Reject	Marks
3 (a)	(i) any named soluble metal sulfate / ammonium sulfate / (dilute) sulfuric acid	correct formula	<u>concentrated</u> sulfuric acid	1
	(ii) correct formulae for all compounds (mark consequentially on the sulfate given in (a)(i), even if insoluble, except lead(II) sulfate)	$\text{Pb}^{2+} + \text{SO}_4^{2-} \rightarrow \text{PbSO}_4$ for 2 marks		1
	balanced			1
	(iii) filter			1
	wash / rinse (with distilled / deionised water) If no reference to what is being washed, assume that the residue is being washed			1
	filter paper / kitchen roll / blotting paper / absorbent paper / leave (to dry) / (place in) desiccator / (place in warm) oven / heat			1
	If no filtration MAX 1. If implication that filtrate is washed or evaporated , neither M2 nor M3 can be awarded Do not penalise careless use of solution or liquid for reaction mixture			

Question number	Expected Answer	Accept	Reject	Marks
3 (b)	Any two from bubbles (of gas) / fizzing / effervescence Ignore carbon dioxide solid / lead(II) carbonate disappears solution formed / colourless liquid Ignore incorrect starting colours Ignore heat produced and temperature change	gas given off dissolves / less solid	any specific colour	2
			Total	8

Question number	Answer	Accept	Reject	Marks
4 (a) (i)	to allow air / oxygen to enter (the crucible) / to come into contact with the magnesium / solid Ignore references to visual checks of reaction completion	to allow the magnesium to burn / react to make sure that the (all) magnesium has reacted		1
	(ii) to make sure that <u>all</u> of the magnesium has reacted	to complete the reaction		1
(b)	mass of crucible (and lid) + MgO — mass of crucible (and lid) lids must be in both or neither ignore any references to the table of results on page 8	mass of crucible (and lid) at end — mass of crucible (and lid)		1
(c) (i)	all points plotted correctly to nearest gridline (subtract 1 mark for each error)			2
	<u>correct</u> straight line of best fit (need not pass through origin) (must be drawn with the aid of a rule)	line as evidence of correct plotting when points cannot be seen		1
	(ii)			1
	(iii) anomalous point at (0.26, 0.64) circled csq on candidate's graph Units not needed, ignore incorrect units			1
			Total	8

[illegible]

Question number	Answer	Accept	Reject	Marks
5 (c) (i)	$(10 / 2) = 5$	12000 cm ³		1
	(ii) (5×24)			1
	$= 120 \text{ dm}^3$ (units required) mark part (ii) consequentially on part (i) award second mark only for use of 22.4 Final answer must be to 2 or more sig fig			1
			Total	7

Question number	Answer	Accept	Reject	Marks
6 (a)	Cu(OH) ₂ penalise incorrect use of cases and subscript ignore names	Formula showing correct charges on the ions		1
(b)	to remove carbonate (ions) / to avoid precipitating any other (named) insoluble (barium) compounds / to remove ions that would form (white) precipitates	to remove compounds that would form (white) precipitates		1
(c)	CuSO ₄ .5H ₂ O / CuSO ₄ 5H ₂ O (i.e. no dot)	formula showing correct charges on the ions		1
(d)	(use a clean) wire / glass rod / silica rod ignore references to hydrochloric acid (to put) solid in <u>non-luminous</u> / <u>Bunsen</u> flame No marks if solid is in container eg test tube / tray / crucible	any method of introducing the solid / solution into the flame. e.g. (wet) wooden spill / tip or sprinkle in Bunsen/non-luminous anywhere in answer Burner in place of flame Blue for non-luminous	copper rod / any metal that will burn or melt in a flame (eg magnesium, aluminium)	1 1
			Total	5

Question number	Answer	Accept	Reject	Marks
7 (a)	it /gasoline is used (as a fuel) for cars ignore references to uses of fuel oil and gasoline burning better	there are more cars than ships	Any other wrong use, eg domestic heating, aeroplanes, ships, etc	1
(b) (i)	C ₄ H ₈	2C ₂ H ₄		1
	(ii) Catalyst - silica / silicon dioxide / silicon(IV) oxide / alumina / aluminium oxide	zeolite(s) / aluminosilicates		1
	Temperature – 600 – 700(°C) If more than catalyst given, all must be correct	Any temperature or any range within 600-700(°C) Equivalent temperatures in Kelvin		1

Question number	Answer	Accept	Reject	Marks
7 (c) (i)	Cracking – any two from: <ul style="list-style-type: none"> • continuous process • pure(r) product • fast(er) process • takes place on large(r) scale • high(er) percentage yield • 100% atom economy ignore references to cost		reusable resource	2
	(ii) Fermentation – any two from: <ul style="list-style-type: none"> • sugar is a renewable resource / uses a renewable resource • country has suitable climate/ enough land to grow sugar cane / plentiful supply of sugar (cane) • country has no / little crude oil • (ethanol produced) suitable for making alcoholic drinks / vinegar • takes place at lower temperature / uses less energy ignore references to cost			2
			Total	8

Question number	Answer	Accept	Reject	Marks
8 (a)	(15.0 ÷ 1000) × 0.0010			1
	= 1.5(0) × 10 ⁻⁵	1.5 × 10 ⁻² for 1 mark		1
(b)	answer to (a)			1
(c)	$\frac{\text{answer to (b)} \times 1000}{25.0}$			1
	correct evaluation (= 0.0006(0))	answer to (b) ÷ 25 for 1 mark		1
(d)	M_r of SO ₂ = 64			1
	answer to (c) × M_r of SO ₂ (= 0.038(4))			1
	Final answer must be to 2 or more sig fig			
(e)	The wine is drinkable Ignore any explanations	consequential on (d)		1
			Total	8

PAPER TOTAL: 60 MARKS

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