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Mark Scheme (Results)

Summer 2013

International GCSE
Chemistry (4CH0) Paper 2C

Edexcel Level 1/Level 2 Certificate
Chemistry (KCH0) Paper 2C

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Question number	Answer	Accept	Reject	Marks
1 (a)	filtration	filtering		1
(b)	(simple) distillation	distilling	fractional distillation	1
(c)	dissolving			1
(d)	chromatography			1
(e)	**fractional** distillation	fractionally distil(ling)	just distillation / simple distillation	1
			Total	**5**

<table>
<tr><th>Question number</th><th>Expected Answer</th><th>Accept</th><th>Reject</th><th>Marks</th></tr>
<tr><td>2</td><td>
<table>
<tr><th>pH at start</th><th>pH at end</th><th>Correct letter</th></tr>
<tr><td>7</td><td>7</td><td>A</td></tr>
<tr><td>7</td><td>11</td><td>E</td></tr>
<tr><td>14</td><td>7</td><td>C</td></tr>
<tr><td>7</td><td>6</td><td>B</td></tr>
</table>
</td><td></td><td></td><td>1
1
1
1</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td></tr>
</table>

<table>
<tr><th>Question number</th><th>Answer</th><th>Accept</th><th>Reject</th><th>Marks</th></tr>
<tr><td>3 (a)</td><td>
<table>
<tr><th>Highest temperature</th><th>Temperature rise</th></tr>
<tr><td>28</td><td>3</td></tr>
<tr><td>30</td><td>6</td></tr>
<tr><td>32</td><td>9</td></tr>
<tr><td>32</td><td>9</td></tr>
</table>
1 mark for each column correct.
mark temp. rise csq on highest temp.
IGNORE incorrect units</td><td>Readings to 1dp only if zero</td><td></td><td>2</td></tr>
<tr><td>(b) (i)</td><td>M1 & M2 - all points correctly plotted to the nearest gridline

[Deduct 1 mark for each incorrectly plotted point up to a max. of 2]

M3 - <u>straight</u> lines drawn through points 1 to 3 <u>and</u> through points 3 to 5
line does not need to be extrapolated to (0,0)
<u>must</u> be drawn with the aid of a ruler</td><td></td><td></td><td>2

1</td></tr>
<tr><td>(ii)</td><td>0.75 (g)</td><td>correct reading to nearest gridline from candidate’s graph</td><td>incorrect unit</td><td>1</td></tr>
</table>

Question number	Answer	Accept	Reject	Marks
3 (c)	copper sulfate/copper ions completely reacted / been used up / run out **IGNORE** copper completely reacted/magnesium is in excess/references to saturated solution / reactant(s) used up	all of the copper has been displaced / deposited reaction complete		1
(d)	**M1** – smaller/larger <u>with magnesium</u> **M2** - fewer moles of metal/zinc added / less copper displaced/fewer moles of copper sulfate reacted / fewer moles of copper ions reacted **IGNORE** references to particles / surface area M2 DEP on M1	less/low<u>er</u> less heat <u>produced</u> ORA less amount fewer atoms of metal/zinc added less (mass/moles of) copper displaced	less mass of metal/zinc added	1 1
			Total	**9**

Question number	Answer	Accept	Reject	Marks
4 (a) (i)	poly(ethene)	polyethene / polythene / polyethylene		1
(ii)	cracking			1
(b) (i)	**M1** - bar labelled 9			1
	M2 - drawn to correct height			1
(ii)	(boiling point/it) increases as number of carbon atoms increases	ORA as one goes up, the other goes up positive correlation	(directly) proportional	1

Question number	Answer	Accept	Reject	Marks
4 (c)	**A/buried underground** because **Any two from:** • **M1** (plastics) do not produce carbon dioxide/carbon emissions / toxic / poisonous gases **IGNORE** harmful/dangerous/polluting gases / sulfur dioxide • **M2** (plastics) do not contribute to global warming /climate change / greenhouse effect / acid rain • **M3** Does not pollute the soil / cause damage to the soil. **IGNORE** references to effect on wildlife/habitats / cost OR **B/burned** because • **M1** (burning) space in landfill not taken up / does not cause landfill sites to get filled up **/** will not run out of space for landfills • **M2** it provides heat **/** can be used to generate electricity IGNORE just provides energy	ORA carbon monoxide / nitrogen dioxide / hydrogen chloride / chlorine / formulae	References to ozone layer for M2 only	1 1 **OR** 1 1
			Total	**7**

Question number	Answer	Accept	Reject	Marks
5 (a) (i)	unsaturated			1
(ii)	**M1** - (unsaturated) colourless **IGNORE** clear/transparent/looks like water	no colour	discoloured	1
	M2 - (saturated) orange	yellow / brown and any combination	any other colour either on its own or in combination with an accepted colour	1
(iii)	addition			1
(b) (i)	A			1
(ii)	C **and** D	C , D	C or D	1
(iii)	each colouring has a different mixture/combination/patterns of dyes IGNORE references to different heights / distances and solubilities.	Spots / dots for dyes		1
			Total	**7**

Question number	Answer	Accept	Reject	Marks
6 (a)	(giant) ionic **IGNORE** three-dimensional / lattice		any other answer	1
(b)	M1 and M3 can be scored from labelled diagrams **sodium:** **M1** – positive ions/cations/Na^+ <u>and</u> (delocalised/sea of) electrons **IGNORE** metal ions **M2** – (electrostatic) forces/attraction between positive ions/cations/Na^+ and (delocalised) electrons **IGNORE** references to metallic bonding **sodium chloride**: **M3** – positive <u>and</u> negative ions/cations <u>and</u> anions / Na^+ <u>and</u> Cl^- (ions) **M4** – <u>electrostatic</u> forces/attraction between (oppositely charged/positive and negative) ions / cations and anions / Na^+ and Cl^- **IGNORE** references to ionic bonding **comparison:** **M5** - forces in Na are weak<u>er</u> (than forces in NaCl) can be awarded even if an incorrect description of the forces has been given. [standalone]	Sodium / metal ions oppositely charged ions chlorine ions if stated as being negative less energy required to overcome forces in Na bonds / lattice for forces ORA	atoms/molecules nuclei intermolecular forces atoms/molecules nuclei intermolecular forces reference to covalent loses M4	1 1 1 1 1

Question number	Answer	Accept	Reject	Marks
6 (c)	**M1** - $n(Na) = \frac{0.138}{23}$ or 0.006			1
	M2 - $n(H_2)$ = ½ x **M1** or 0.003			1
	M3 - vol. H_2 = 24 000 x **M2** or 72 (cm^3)	0.072 $\underline{dm^3}$		1
	[Mark consequentially. $n(Na)$ and $n(H_2)$ need not be evaluated.]			
	correct final answer on its own without working scores 3			

Question number	Answer	Accept	Reject	Marks
6 (d) (i)	**M1** - (add dilute) <u>nitric</u> acid	addition of silver nitrate before nitric acid for both M1 and M2		1
	M2 - (add aqueous) silver nitrate	correct formulae throughout		1
	M3 - <u>white</u> precipitate / solid / suspension			1
	M3 dependent on **M2**			
(ii)	**Reason** – it fizzed / a gas was evolved **OR** sodium hydroxide would not fizz / produce a gas **IGNORE** incorrect identification of gas	sodium hydroxide is soluble		1
	X = <u>sodium</u> carbonate / <u>sodium</u> hydrogencarbonate			1
(e)	**M1** - 8 electrons around Na	any combination of dots and crosses 0 electrons		1
	M2 - 8 electrons around Cl. **IGNORE** inner shells even if incorrect **IGNORE** starting diagrams showing atoms either with or without arrow to show movement of electron			1
	M3 - correct charge on <u>both</u> Na and Cl [standalone]			1
(f)	**M1** - potassium is more reactive than sodium	reactivity increases down Group 1 ORA		1
	M2 - (but) bromine is less reactive than chlorine	reactivity decreases down Group 7 ORA	-ide endings	1
			Total	**19**

Question number	Answer	Accept	Reject	Marks
7 (a)	<table><tr><th>Solution</th><th>Negative electrode</th><th>Positive electrode</th><th>Substance left</th></tr><tr><td>silver sulfate</td><td>silver</td><td></td><td></td></tr><tr><td>potassium nitrate</td><td></td><td>oxygen</td><td>potassium nitrate</td></tr><tr><td></td><td></td><td></td><td></td></tr></table>	correct formulae throughout	O for oxygen	1 2
(b) (i)	platinum	carbon / graphite copper/ silver / gold / titanium		1
(ii)	to increase its (electrical) conductivity / to make it a (better) (electrical) conductor / to lower its (electrical) resistance IGNORE references to carrying current / charge / adds hydrogen ions	to increase the concentration/number of ions		1
(c) (i)	<u>Moles/amount</u> of hydrogen (produced) = 2 x <u>moles/amount</u> of oxygen (produced) IGNORE explanations based on forming water	number of <u>molecules</u> of hydrogen (produced) is twice that of oxygen	explanations based on atoms	1
(ii)	(some of the) oxygen dissolves in water/acid	(some of the) oxygen reacts with the (carbon) electrode/to form CO_2 (which then dissolves)	oxygen reacts with water/(sulfuric) acid	1
(d)	**M1** - number of faradays = $\frac{482\,500}{96\,500}$ **or** 5 **M2** - $n(H_2)$ = ½ x **M1 or** 2.5 Final answer on its own without working scores 2		Incorrect units	1 1
			Total	**9**
			Total for paper	**60**

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