

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)	<u>fractional</u> distillation	fractionally distil(ling)	just distillation / simple distillation	1
			Total	5

Question number	Expected Answer			Accept	Reject	Marks
	pH at start	pH at end	Correct letter			
2	7	7	A			1
	7	11	E			1
	14	7	C			1
	7	6	B			1
					Total	4

Question number	Answer		Accept	Reject	Marks
3 (a)	Highest temperature	Temperature rise	Readings to 1dp only if zero		2
	28	3			
	30	6			
	32	9			
	32	9			
	1 mark for each column correct. mark temp. rise csq on highest temp. IGNORE incorrect units				
(b) (i)	M1 & M2 - all points correctly plotted to the nearest gridline				2
	[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 and 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				1
(ii)	0.75 (g)		correct reading to nearest gridline from candidate's graph	incorrect unit	1

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/lower 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 M2 - drawn to correct height			1 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)	<p><u>A/buried underground</u> because</p> <p>Any two from:</p> <ul style="list-style-type: none"> • M1 (plastics) do not produce carbon dioxide/carbon emissions / toxic / poisonous gases <p>IGNORE harmful/dangerous/polluting gases / sulfur dioxide</p> <ul style="list-style-type: none"> • M2 (plastics) do not contribute to global warming /climate change / greenhouse effect / acid rain • M3_Does not pollute the <u>soil</u> / cause damage to the <u>soil</u>. <p>IGNORE references to effect on wildlife/habitats / cost</p> <p>OR</p> <p><u>B/burned</u> because</p> <ul style="list-style-type: none"> • 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 <p>IGNORE just provides energy</p>	<p>ORA</p> <p>carbon monoxide / nitrogen dioxide / hydrogen chloride / chlorine / formulae</p>	<p>References to ozone layer for M2 only</p>	<p>1</p> <p>1</p> <p>OR</p> <p>1</p> <p>1</p>
			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 <u>or</u> 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)	<p>M1 and M3 can be scored from labelled diagrams</p> <p>sodium:</p> <p>M1 – positive ions/cations/Na⁺ <u>and</u> (delocalised/sea of) electrons IGNORE metal ions</p> <p>M2 – (electrostatic) forces/attraction between positive ions/cations/Na⁺ and (delocalised) electrons IGNORE references to metallic bonding</p> <p>sodium chloride:</p> <p>M3 – positive <u>and</u> negative ions/cations <u>and</u> anions / Na⁺ <u>and</u> Cl⁻ (ions)</p> <p>M4 – <u>electrostatic</u> forces/attraction between (oppositely charged/positive and negative) ions / cations and anions / Na⁺ and Cl⁻ IGNORE references to ionic bonding</p> <p>comparison:</p> <p>M5 - forces in Na are weaker (than forces in NaCl) can be awarded even if an incorrect description of the forces has been given.</p> <p>[standalone]</p>	<p>Sodium / metal ions</p> <p>oppositely charged ions</p> <p>chlorine ions if stated as being negative</p> <p>less energy required to overcome forces in Na</p> <p>bonds / lattice for forces</p> <p>ORA</p>	<p>atoms/molecules nuclei</p> <p>intermolecular forces</p> <p>atoms/molecules nuclei</p> <p>intermolecular forces</p> <p>reference to covalent loses M4</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>

Question number	Answer	Accept	Reject	Marks
6 (c)	<p>M1 - $n(\text{Na}) = \frac{0.138}{23}$ or 0.006</p> <p>M2 - $n(\text{H}_2) = \frac{1}{2} \times \text{M1}$ or 0.003</p> <p>M3 - vol. $\text{H}_2 = 24\,000 \times \text{M2}$ or 72 (cm^3)</p> <p>[Mark consequentially. $n(\text{Na})$ and $n(\text{H}_2)$ need not be evaluated.]</p> <p>correct final answer on its own without working scores 3</p>	0.072 <u>dm</u> ³		<p>1</p> <p>1</p> <p>1</p>

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
(ii)	M3 dependent on M2			
	Reason – it fizzed / a gas was evolved OR sodium hydroxide would not fizz / produce a gas	sodium hydroxide is soluble		1
	IGNORE incorrect identification of gas			1
	X = <u>sodium</u> carbonate / <u>sodium</u> hydrogencarbonate			
(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)	Solution	Negative electrode	Positive electrode	Substance left	correct formulae throughout	O for oxygen	1 2
	silver sulfate	silver					
	potassium nitrate		oxygen	potassium nitrate			
(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)				number of <u>molecules</u> of hydrogen (produced) is twice that of oxygen	explanations based on atoms	1
	IGNORE explanations based on forming water						
(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					Incorrect units	1
	M2 - $n(\text{H}_2) = \frac{1}{2} \times \text{M1}$ or 2.5						1
	Final answer on its own without working scores 2						
						Total	9
						Total for paper	60

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