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Mark Scheme (Results)

January 2016

International GCSE
Chemistry (4CH0) Paper 2C

Pearson Edexcel Certificates in
Chemistry (KCH0) Paper 2C

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

<table>
<tr><th colspan="3">Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>
<table>
<tr><th></th><th></th><th>Quantity</th><th>Unit</th></tr>
<tr><td>A</td><td>balance</td><td>mass</td><td>M1 g</td></tr>
<tr><td>B</td><td>clock</td><td>M2 time</td><td>s</td></tr>
<tr><td>C</td><td>gas syringe</td><td>M3 volume</td><td>M4 cm^3</td></tr>
<tr><td>D</td><td>ruler</td><td>M5 length</td><td>M6 cm</td></tr>
</table>
</td><td>Accept other correct metric units, such as
M1 kg / mg
Ignore imperial units such as lb / oz
Reject units impossible in a laboratory, such as t and m^3

M4 dm^3 / ml / l

M6 mm / m

Do not penalise use of capital letters, such as KG / CM
Accept word equivalents, such as gram(s), second(s), centimetre(s)

M5 alternatives - accept distance / height / width / depth / diameter

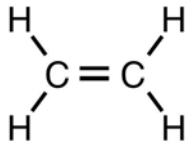
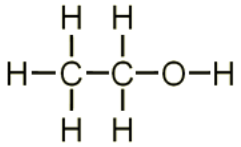
Do not penalise references to specific examples, such as volume of gas / length of line</td><td>6</td></tr>
<tr><td></td><td>(b)</td><td></td><td>C (ruler)</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Total for Question 1</td><td>7</td></tr>
</table>

<table>
<tr><th colspan="3">Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>2</td><td>(a)</td><td></td><td>
<table>
<tr><th>Substance</th><th>Element or compound</th><th>Type of bonding</th></tr>
<tr><td>ammonia</td><td>compound</td><td>covalent</td></tr>
<tr><td>hydrogen chloride</td><td>(compound)</td><td>covalent</td></tr>
<tr><td>oxygen</td><td>element</td><td>(covalent)</td></tr>
<tr><td>magnesium oxide</td><td>compound</td><td>ionic</td></tr>
</table>
</td><td>Ignore qualifiers for covalent, eg polar / dative

All 6 correct = 3 marks
5 or 4 correct = 2 marks
3 or 2 correct = 1 mark
1 or 0 correct = 0 marks</td><td>3</td></tr>
<tr><td></td><td>(b)</td><td></td><td>B (MgO)</td><td></td><td>1</td></tr>
<tr><td></td><td>(c)</td><td></td><td>B (g)</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Total for Question 2</td><td>5</td></tr>
</table>

Question number			Answer	Notes	Marks
3	(a)		does not easily lose / gain electrons	Accept has a complete/full outer shell/octet (of electrons) Accept has 8 electrons in outer shell Ignore references to being stable / inert / a noble gas	1
	(b)		B (2.8.18.8)		1
	(c)	(i)	M1 for idea of electron transfer / loss and gain of electron(s) M2 for direction of transfer M3 for number of electrons transferred	0/3 for electron sharing Ignore covalent eg calcium loses, chlorine gains electrons eg calcium loses 2, (each) chlorine gains 1 Penalise use of chloride in place of chlorine once only All marks may be scored from a correctly labelled diagram	3
		(ii)	Ca^{2+}	Accept Ca^{+2} / Ca^{++} Reject all other ions Penalise incorrect use of lower and upper case letters and position of charge If equation written containing calcium ion formula, the ion must be identified in some way, such as circling or underlining	1
		(iii)	A calcium (and) calcium		1

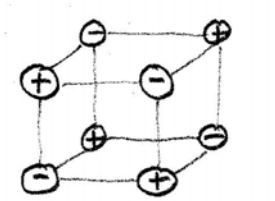
Question number			Answer	Notes	Marks
3	(d)		M1 (step 1) dip a platinum wire into some concentrated **hydrochloric acid** M2 (step 3) place the wire and sample into **non-luminous** Bunsen flame	Accept complete statements or changes M1 Do not penalise references to dilute instead of concentrated Accept hydrochloric acid / HCl M2 Accept blue flame / roaring flame Ignore references to hot / hotter / hottest flame	2
	(e)		B (lilac)		1
				Total for Question 3	**10**

<table>
<tr><th colspan="3">Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>4</td><td>(a)</td><td></td><td>B (a pressure of 65 atm)</td><td></td><td>1</td></tr>
<tr><td></td><td>(b)</td><td></td><td>
<table>
<tr><th></th><th>Displayed formula</th></tr>
<tr><td>ethene</td><td>  </td></tr>
<tr><td>ethanol</td><td>  </td></tr>
</table>
</td><td>All atoms and bonds must be shown

Ignore bond angles</td><td>2</td></tr>
</table>

Question number			Answer	Notes	Marks
4	(c)		M1 (saturated because) there are only single bonds / all the bonds are single M2 (not a hydrocarbon) because it contains oxygen/another element	Accept no double bonds / no multiple bonds Accept contains an OH group / an alcohol group Accept does not contain only hydrogen and carbon	2
	(d)		Any three of the following: M1 correct statement about connection between crude oil and ethene, eg: crude oil is converted /fractionally distilled /cracked to obtain ethene M2 correct statement about connection between sugar cane or glucose and ethanol, eg: sugar/glucose is converted into ethanol / sugar/glucose fermented to make ethanol M3 correct statement about effect of crude oil being less available, eg: less ethene available /ethene more expensive / ethene production (more) difficult OR process 1 used less / less favoured / (more) expensive	Ignore references to time taken to obtain ethene or ethanol Ignore references to purity of ethene or ethanol Ignore references to global warming / finite and renewable resources	3

			M4 correct statement about effect of climate change, eg: more sugar can be fermented / more ethanol can be produced / ethanol cheaper / ethanol production easier/easy OR process 2 used more / more favoured / less expensive		
				Total for Question 4	**8**

Question number			Answer	Notes	Marks
5	(a)			M1 for front face all correct M2 for rear face all correct M2 DEP on M1 Do not penalise X in place of + Ignore symbols such as K and Cl Do not penalise use of Na^+ in place of K^+	2
	(b)	(i)	M1 (damp blue/red) litmus (paper) M2 bleached / goes colourless / goes white	Ignore red as intermediate colour Accept use of universal indicator (paper) / pH paper	2
		(ii)	$2H_2O + 2e^- \rightarrow H_2 + 2OH^-$ OR $2H^+ + 2e^- \rightarrow H_2$	M1 for H_2O on lhs AND H_2 and OH^- on rhs and no other formulae M1 for H^+ on lhs AND H_2 on rhs and no other formulae M2 for $e^{(-)}$ and balancing of correct equation Accept M1 $H^+ + e^- \rightarrow H$ M2 $2H \rightarrow H_2$ M2 DEP on M1 Ignore state symbols	2

		(iii)	M1 alkaline / alkali formed M2 OH^-	Accept pH above 7 Ignore names Mark independently	2

Question number			Answer	Notes	Marks
5	(c)	(i)	0.0250 ÷ 2 / 0.0125 (mol)		1
		(ii)	M1 24 × 0.0125 OR 24000 × 0.0125	CQ on (c)(i)	
			M2 0.3(0) dm^3 / 300 cm^3 / 0.0003(0) m^3	Unit needed for M2 Accept 1 or more significant figures Correct final answer with no working scores (2)	2
				Total for Question 5	**11**

Question number			Answer	Notes	Marks
6	(a)		M1 23.60 M2 2.25 M3 21.35	Award 1 mark for both M1 and M2 correct but in wrong order Penalise missing zero in 2nd dp once only CQ on M1 and M2	3
	(b)	(i)	ticks in columns 3 and 4		1
		(ii)	M1 $\frac{23.50 + 23.70}{2}$ M2 23.6(0) (cm^3)	If no results ticked in (i), then only use of concordant titres can score in (ii) If only one result ticked, then no marks can be scored in (ii) Otherwise, both marks CQ on ticked results Answers with zero as 2nd dp do not need trailing zero Answers obtained by averaging other titre values do require 2nd dp Correct final answer with no working scores (2)	2
	(c)	(i)	M1 $\frac{0.107 \times 25.0}{1000}$ M2 0.00268 (mol)	If no division by 1000, only M2 can be scored Accept 2 or more significant figures	2
		(ii)	(2 × 0.00268 =) 0.00535 (mol)	CQ on (c)(i)	1
		(iii)	M1 $\frac{0.00535}{0.02285}$ M2 0.234 (mol/dm^3)	CQ on (c)(ii) Accept 2 or more significant figures	2

Question number			Answer	Notes	Marks
6	(d)	(i)	white precipitate	Ignore names and formulae Apply list principle for incorrect observations such as bubbles	1
		(ii)	barium sulfate	Accept $BaSO_4$ If both name and formula given, mark name only	1
				Total for Question 6	**13**

Question number			Answer	Notes	Marks
7	(a)		M1 decrease M2 no effect M3 increase		3
	(b)		M1 amount of pentane = 1.88 ÷ 72 / 0.026 (mol) M2 molar enthalpy change = 51900 ÷ 0.026 / 1996153 J M3 = (-)2000 (kJ/mol)	Accept answer in kJ Correct final answer with correct units scores (3) Accept 2 or more significant figures Accept answer in range 1987 - 2000	3
				Total for Question 7	**6**

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