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Mark Scheme (Results)

Summer 2013

International GCSE
Chemistry (4CH0) Paper 2CR

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Question number	Answer	Notes	Marks
1 (a)	gallium / Ga		1
(b)	sodium / magnesium / aluminium / Na / Mg / Al		1
(c)	fluorine / F / F_2		1
(d)	nitrogen / N / N_2		1
(e)	neon / argon / krypton / xenon / radon / Ne / Ar / Kr / Xe / Rn		1
		Total	**5**

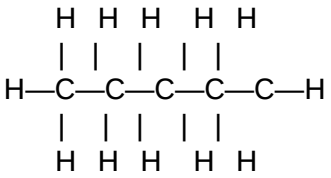
Question number	Answer	Notes	Marks
2 (a)	B A D C		1 1 1 1
(b)	Mixture Compound Mixture		1 1 1
		Total	**7**

Question number	Answer	Notes	Marks
3 (a)	hydrogen / H_2 burns with a pop/squeak OR use burning/lit splint/flame to see if pop/squeak	Ignore H Must be reference to test and result Reference to splint/match with no indication of flame is not enough Reject reference to glowing splint Ignore flame extinguished 'Squeaky pop test' on its own is not sufficient	1 1
(b) i	AgCl (dilute) nitric acid / HNO_3	Ignore names even if wrong Accept sufuric acid / H_2SO_4 Reject hydrochloric acid / HCl Ignore conc(entrated) acid Ignore acid(ified) without a named acid Reject other named acids	1 1
ii	iron nitrate	Accept ferrous nitrate and ferric nitrate Ignore oxidation states (II) and (III) Reject other oxidation states	1

Question number	Answer	Notes	Marks
3 (c)	(add) sodium hydroxide (solution) / NaOH	Any group I hydroxide / ammonium hydroxide / barium or calcium hydroxide / ammonia solution (names or formulae) If reagent incorrect, then 0/3 If reagent missing , then then M2 and M3 can be awarded If near miss (eg ammonia hydroxide) then M2 and M3 can be awarded	1
	green precipitate	Ignore qualifiers such as light / pale / dark Accept solid / suspension / ppt(e) in place of precipitate Reject all other colours Ignore names and formulae even if incorrect	1
	brown precipitate	Ignore qualifiers such as light / pale / dark / rusty / foxy / orange Accept red-brown Accept solid / suspension / ppt(e) in place of precipitate Reject all other colours Ignore names and formulae even if incorrect	1
		If both colours correct, penalise missing precipitate once only Do not award M2 or M3 for two correct observations in the wrong order Ignore references to bubbles etc	
		Total	**8**

Question number	Answer	Notes	Marks
4 (a)	bubbles / fizzing / effervescence	Accept gas given off/evolved/formed/produced Accept hydrogen gas Ignore identity of gas	2
	sodium moves / darts / floats sodium gets smaller / disappears sodium melts / forms ball white trail	Accept equivalents such as shoots/skims Accept dissolves Do not apply list principle Assume that it = sodium Ignore flames / sparks Any two for 1 each	
(b)	Do not apply list principle	Assume that it = sodium	1
(c) i	hydrogen / H_2	Ignore H	1
ii	K^+		1

Question number	Answer	Notes	Marks
4 (d)	Na is 2.8.1 K is 2.8.8.1	Accept other punctuation and no punctuation and diagrams in place of full stops If neither of M1 and M2 scored, allow potassium has more (electron) shells (or numbers of shells stated)/energy levels for 1 mark?	1 1
	outer/valence electron / outer shell / electron lost in K further from nucleus/protons	Ignore potassium further from nucleus	1
	less attracted by nucleus	Accept (electron) more easily removed/lost /less energy needed to remove (electron) Accept potassium more willing to lose electron If no reference to nucleus or protons, then neither M3 nor M4 can be awarded A correct reference to nucleus/protons is needed before M3 and M4 can be awarded Ignore references to shielding Accept reverse arguments for sodium in M3 and M4	1
		Total	**9**

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>5 (a)</td><td>
<table>
<tr><th>Statement</th><th>Fractional distillation</th><th>Cracking</th></tr>
<tr><td>Crude oil is heated</td><td>(✓)</td><td></td></tr>
<tr><td>A catalyst may be used</td><td></td><td>✓</td></tr>
<tr><td>Alkenes are formed</td><td></td><td>✓</td></tr>
<tr><td>Decomposition reactions occur</td><td></td><td>✓</td></tr>
<tr><td>Fuels are obtained</td><td>✓</td><td>✓</td></tr>
<tr><td>Separation is the main purpose</td><td>✓</td><td></td></tr>
</table>
</td><td>1 mark for each line correct</td><td>5</td></tr>
<tr><td>(b) i</td><td>C_5H_{12}</td><td>Accept $H_{12}C_5$</td><td>1</td></tr>
<tr><td>ii</td><td>  </td><td></td><td>1</td></tr>
<tr><td>iii</td><td>C_5H_{12}</td><td>Accept $H_{12}C_5$</td><td>1</td></tr>
<tr><td>iv</td><td>pentane</td><td></td><td>1</td></tr>
<tr><td>v</td><td>C_nH_{2n+2}</td><td>Accept x and other letters in place of n
Accept answers like $C_nH_{2n}+2$
Ignore 2(n+1)</td><td>1</td></tr>
</table>

Question number	Answer	Notes	Marks
5 (c) i	(products) 2 2 (oxygen) 3	 M1 and M2 independent	1 1
ii	4 electrons shared between 2 (carbon) atoms 4 electron pairs between 2C and 4H atoms	Ignore inner electrons even if wrong Ignore number of hydrogen atoms Accept all permutations of dots and crosses Ignore intersecting circles Accept H atoms at all angles At least one C or one H atom must be labelled – max 1 if not Max 1 if more than 2 C atoms Max 1 if wrong number of electrons in outer shell of any atom	1 1
(d) i	phosphoric acid / H_3PO_4 any value in range 250 – 350 °C	Ignore concentrated / dilute Accept value without unit Accept 523 – 623 K Marks independent	1 1
ii	20 (mol) M1 × 24 480 (dm^3)	 Accept 480 000 cm^3 If M1 incorrect but 480 is final answer, then only M3 can be awarded If no answer to amount of ethene, then 20 x 24 = 480 scores M2 and M3	1 1 1
		Total	**19**

Question number	Answer	Notes	Marks
6 (a)	ethanol/it is more volatile/evaporates more quickly/more easily/evaporates in a shorter time	Accept has a lower boiling point (than water) Ignore reference to melting point(s) Accept reverse arguments for water	1
(b) i	0.3(0) (g)		1
ii	some copper did not stick to (negative) electrode/cathode some copper removed during washing/drying positive electrode/anode impure OR formed (anode) sludge	Accept some copper dropped off Any two for 1 each	2

Question number	Answer	Notes	Marks
6 (c) i	all 9 points plotted correctly to nearest gridline	Deduct 1 mark for each error Award these marks if points too faint to be seen under correct line Ignore point at 0.55	
	straight line of best fit	Must be drawn with a ruler Must go through origin Ignore extrapolation beyond (16,0.5)	
ii	point at (7.40, 0.20) circled		
iii	no charge/current/electricity passed AND no copper deposited/no change in mass/no electrolysis	OWTTE, eg charge = 0, so mass (increase) = 0 Ignore references to direct proportion	
iv	line is straight / fixed gradient AND goes through origin	Ignore re-statements of the information given in the question, eg the greater the charge, the greater the mass (increase)	
v	graph line extrapolated to (at least) 0.55 correct value from candidate graph	Probably 17.4 - 17.8 M2 not dependent on extrapolation	
		Total	**12**
		Total for paper	**60**

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