

Mark Scheme (Results) November 2009

IGCSE

IGCSE Science (Double Award) (4437) Paper 5H

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SECTION A

Question		Mark	Acceptable answers	Notes	Total
1	a	M1	(electron) 1/1836 / negligible	Accept value in range 1/2000 to 1/1800 and 0.0005 to 0.00056 Ignore zero	1
		M2	(neutron) 0		1
		M3	(proton) 1		1
		M4	(proton) +1		1
	b	M1	(number of) protons and neutrons		1
		M2	35		1
		M1	18		1
	c	M1	5		1
		M1	isotopes		1
				TOTAL	9

Question			Mark	Acceptable answers	Notes	Total
2	a	i	M1	different boiling points / boiling point of propanone lower than that of water		1
		ii	M1	heat / boil		1
			M2	propanone boils/collects (first)		1
			M3	stop collecting liquid above 56 °C	Accept wording that indicates that water collected separately or not at all	1
	b		M1	cross in column 1 box 4		1
			M2	cross in column 2 box 2		1
					TOTAL	6

Question			Mark	Acceptable answers	Notes	Total
3	a		M1	(bromine) liquid		1
			M2	grey / black		1
	b	i	M1	any indication of chlorine in left hand tube		1
		ii	M1	hydrogen / H ₂		1
		iii	M1	brine / sodium chloride solution / NaCl(aq)	Accept concentrated/saturated NaCl Ignore sea water	1
	c		M1 M2	chlorine + sodium bromide → bromine + sodium chloride	M1 reagents M2 products	2
					TOTAL	7

Question	Mark	Acceptable answers	Notes	Total	
4	a	M1	double bond / C=C / not all bonds are single	1	
	b	M1	contains bromine / another element/atom does not contain only carbon and hydrogen	1	
	c	M1	B and E	1	
	d	M1	A and B / A and E / C and F	1	
	e	M1	alkane(s)	1	
		M2	C_nH_{2n+2}	Accept other symbols such as x	1
	f	M1	yellow / orange / brown	1	
		M2	colourless / decolorised	Ignore clear	1
				If only colourless stated, assume it is final colour	
				TOTAL	8

SECTION A TOTAL: 30 MARKS

SECTION B

Question			Mark	Acceptable answers	Notes	Total
5	a	i	M1	red	Reject orange-red and brick red	1
		ii	M1	Li ⁺		1
	b		M1	yellow		1
			M2	OH ⁻		1
	c	i	M1	melts / becomes a ball		1
			M2	moves (on surface)	M2 Accept other words indicating movement such as darts / whizzes / skids / skates / shoots	1
			M3	fizzes / bubbles / effervescence		1
			M4	disappears / dissolves / becomes smaller		1
			M5	white trail	Reject white precipitate	1
					Any two for 1 each Ignore flames/fires	
		ii	M1	$2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$	M1 all formulae correct M2 balancing	1
			M2			1
	d	i	M1	flame / explosion	Accept any more extreme observation from ci, e.g. moves more quickly, faster bubbling, but not just reacts faster/more violently	1
		ii	M1	10 - 14 / value within this range	Reject range outside this, e.g. 9 - 12	1
					TOTAL	10

Question			Mark	Acceptable answers	Notes	Total
6	a	i	M1	ammonia		1
			M2	hydrogen chloride		1
		ii	M1	reversible		1
		iii	M1	endothermic		1
	b		M1	white solid		1
			M2	colourless gas		1
	c		M1	forward and reverse reactions still occur		1
			M2	at equal rates	Accept concentrations of reactants and products equal	1
	d		M1	increased		1
			M2	increased		1
			M3	decreased		1
	e		M1	rate increased		1
			M2	particles closer together		1
			M3	particles collide more often		1
					TOTAL	14

Question	Mark	Acceptable answers	Notes	Total
7	a	M1 (J) coke / coal	Ignore carbon / iron ore / iron oxide	1
		M2 (K) limestone	Ignore chalk / marble / calcium carbonate Reject lime	1
		M3 (L) air	Ignore oxygen	1
	b	i M1 produces heat/energy / exothermic / raises the temperature		1
		ii M1 reducing agent / removes oxygen from iron oxide / converts iron oxide to iron	Do not penalise reference to correct name or formula of any oxide of iron, e.g. iron(II) oxide, Fe ₃ O ₄	1
		iii M1	M1 reactants	1
		M2	M2 products	1
			Max 1 if unbalanced	
	c	M1 calcium silicate / slag		1
		M2 less dense / lighter		1
	d	M1 strong / hard / durable / malleable / ductile		1
		M2 catalyst / speeds up the reaction		1
	e	i M1 (hydrated) iron (III) oxide	Not any other oxide, and not just iron oxide	1
		ii M1 zinc more reactive (than iron) / higher in reactivity series / better reducing agent / better at losing electrons / transfers electron(s) to iron	Ignore very reactive	1
		M2 reacts/corrodes/oxidises instead of/before iron	Ignore rusts	1
			TOTAL	14

Question	Mark	Acceptable answers	Notes	Total								
8	a	M1	% of oxygen = 11.2	1								
		M2	<table style="margin-left: 40px; border-collapse: collapse;"> <tr> <td style="padding-right: 20px;">Cu</td> <td>O</td> </tr> <tr> <td style="padding-right: 20px;"><u>88.8</u></td> <td><u>11.2</u></td> </tr> <tr> <td style="padding-right: 20px;">63.5</td> <td>16</td> </tr> <tr> <td style="padding-right: 20px;">= 1.4</td> <td>= 0.7</td> </tr> </table>	Cu	O	<u>88.8</u>	<u>11.2</u>	63.5	16	= 1.4	= 0.7	1
Cu	O											
<u>88.8</u>	<u>11.2</u>											
63.5	16											
= 1.4	= 0.7											
		M3	Cu ₂ O	1								
	b	i	M1	blue	1							
		ii	M1	solid dissolves / solution forms	1							
		M2		goes darker/deeper blue	1							
		iii	M1	complex	1							
	c	i	M1	add sodium hydroxide / NaOH (solution)	1							
		M2		warm / heat	1							
		M3		test gas with red litmus paper	1							
		M4		goes blue	1							
		ii	M1	add barium chloride (solution)	1							
		M2		(dilute) hydrochloric acid	1							
		M3		white precipitate	1							
				TOTAL	14							

Question		Mark	Acceptable answers		Notes	Total
9	a		M1	colourless	If only one colour given, assume it is the final colour If both colours correct but wrong way round, award 1 mark	1
			M2	pink / red		1
	b	i	M1	85	Ignore units	1
		ii	M1	0.020×85		1
			M2	1.7 (g)	Penalise incorrect units	1
	d		M1	heat/boil/evaporate the solution		1
			M2	to crystallisation/saturation point / to remove some water	If clear statement that all the water is evaporated by heating, then M2 and M3 cannot be awarded	1
			M3	cool and filter / leave solution to evaporate/dry		1
				OR		
			M1	leave in warm place/on window ledge		
			M2	for stated time		
			M3	to allow water to evaporate / filter		
					TOTAL	8

SECTION B TOTAL: 60 MARKS

PAPER TOTAL: 90 MARKS

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