

# Mark Scheme (Results)

## November 2009

IGCSE

### IGCSE Chemistry (4335) Paper 2H

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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 i	M1	(number of) protons and neutrons		1
		M2	35		1
	ii	M1	18		1
	c i	M1	5		1
	ii	M1	isotopes		1
				<b>TOTAL</b>	<b>9</b>

Question		Mark	Acceptable answers	Notes	Total
2	a	M1	white		1
		M2	blue		1
	b i	M1	fractional		1
		M2	distillation		1
	ii	M1	different boiling points / boiling point of propanone lower than that of water		1
	iii	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
	c	M1	cross in column 1 box 4		1
		M2	cross in column 2 box 2		1
				<b>TOTAL</b>	<b>10</b>

Question	Mark	Acceptable answers	Notes	Total
3	a	M1 loses an electron/electrons		1
		M2 Na <sup>+</sup>		1
	b	M1 gains <u>two</u> electrons		1
		M2 O <sup>2-</sup>		1
	c	M1 sodium oxide		1
		M2 Na <sub>2</sub> O		1
			<b>TOTAL</b>	<b>6</b>

Question	Mark	Acceptable answers	Notes	Total
4	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 <sub>2</sub>	1
		iii	M1 brine / sodium chloride solution / NaCl(aq)	1
			Accept concentrated/saturated NaCl Ignore sea water	
	c	i	M1 chlorine + sodium bromide → M2 bromine + sodium chloride	2
		ii	M1 displacement / redox	1
			Accept reduction / oxidation Ignore substitution	
		iii	M1 (chlorine) more reactive (than bromine)	1
			<b>TOTAL</b>	<b>9</b>

Question	Mark	Acceptable answers	Notes	Total	
5	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	
	g	i	M1	F	1
		ii	M1	poly(ethene) / polyethene / polythene	1
		iii	M1	addition	1
				<b>TOTAL</b>	<b>11</b>

SECTION A TOTAL: 45 MARKS

## SECTION B

Question			Mark	Acceptable answers	Notes	Total
6	a	i	M1	red	Reject orange-red and brick red	1
		ii	M1	Li <sup>+</sup>		1
	b		M1	yellow		1
			M2	OH <sup>-</sup>		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	1
			M2		M2 balancing	1
	d	i	M1	flame / explosion	Accept any more extreme observation from ci, eg 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, eg 9 - 12	1
					<b>TOTAL</b>	<b>10</b>

Question			Mark	Acceptable answers	Notes	Total
7	a	i	M1	reagents wrong way round / in wrong places / calcium carbonate is solid and hydrochloric acid is liquid or solution	Accept any wording that clearly suggests that calcium carbonate should be in the conical flask and hydrochloric acid in the funnel Do not penalise wrong terms for funnel, eg pipette/burette	1
		ii	M1	carbon dioxide denser/heavier than air		1
			M2	over water / in gas syringe / by downward delivery / <u>upward</u> displacement of air / have gas jar other way round		1
		iii	M1 M2 M3	$\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$	M1 correct formulae M2 balancing M3 state symbols	1 1 1
	b		M1	bright/brilliant/dazzling/white flame/light	M1 Accept burn instead of flame/light	1
			M2	white solid	Do not accept glow/spark/flash M2 Accept other words in place of solid, eg smoke/ash/residue/deposit/compound but not fumes/precipitate Accept in either order	1

Question			Mark	Acceptable answers	Notes	Total
7	c	i	M1	strong (electrostatic) attractions/ionic bonds	M1 Accept attractions/bonds hard to overcome/need much energy to overcome If atoms instead of ions, M1 can still score	1
			M2	between ions		1
					No marks if mention of molecules / covalent / sharing electrons / intermolecular	
		ii	M1	ions have greater/double charge(s)	M1 Accept correct comparison of either cation or anion, eg $Mg^{2+}$ and $Na^{+}$ or $O^{2-}$ and $Cl^{-}$	1
			M2	stronger (electrostatic) attractions/(ionic) bonds / attractions/bonds harder to overcome/need more energy to overcome		1
					No marks if mention of molecules / covalent / sharing electrons / intermolecular	
					<b>TOTAL</b>	<b>12</b>



Question	Mark	Acceptable answers	Notes	Total	
8	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, eg iron(II) oxide, Fe <sub>3</sub> O <sub>4</sub>	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	
			<b>TOTAL</b>	<b>14</b>	

Question			Mark	Acceptable answers	Notes	Total
9	a	i	M1 M2	$\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$	M1 correct formulae M2 balancing	1 1
		ii	M1	iron loses electrons and chlorine gains electrons	Accept correct statement and definition for either iron or chlorine for 1 mark, eg iron loses electrons and is oxidised, or chlorine gains electrons and is reduced	1
			M2	oxidation is loss and reduction is gain of electrons		1
	b		M1	green precipitate/solid/suspension	Ignore grey / dirty / bubbles	1
			M2	brown/rust precipitate/solid/suspension	Accept orange / foxy red Ignore red	1
					Award 1 mark for two correct colours with no mention of precipitate	
	c	i	M1	(pale) blue	Reject green / dark / deep Ignore bright	1
		ii	M1	solution forms / precipitate dissolves	Accept disappears Ignore liquid	1
			M2	colour darkens / goes dark/deep blue	Accept royal blue	1
		iii	M1	complex		1
		iv	M1	silver nitrate / $\text{AgNO}_3$ (solution)		1
			M2	(dilute) nitric acid / $\text{HNO}_3$		1
			M3	white precipitate/solid/suspension	Do not award M3 if no mention of silver nitrate	1
					<b>TOTAL</b>	<b>13</b>

Question		Mark	Acceptable answers		Notes	Total
10	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	$0.200 \times 21.05 \div 1000$	Correct final answer scores 2 marks Ignore units Award 1 for 4.21 Accept answers to 2 or more sf	1
		M2	0.00421			1
		ii	M1	$0.00421 \div 0.025$	CQ on bi Correct final answer scores 2 marks Ignore units Accept answers to 2 or more sf	1
			M2	0.168(4)		1
	c	i	M1	85	Ignore units	1
		ii	M1	$0.00421 \times 85$	CQ on bi and ci	1
			M2	0.35785 (g)	Accept answers to 2 or more sf 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
			M3	cool and filter / leave solution to evaporate/dry		
				OR		
			M1	leave in warm place/on window ledge		
			M2	for stated time		
			M3	to allow water to evaporate / filter		
					<b>TOTAL</b>	<b>12</b>

Question	Mark	Acceptable answers	Notes	Total	
1 1	a	i	M1 vapour/hydrocarbons/molecules/fractions / compounds / substances rise(s) / collect at different heights	1	
			M2 condense/turn back to liquid (at different heights/temperatures)	1	
		ii	M1 heavier / bigger / greater $M_r$	1	
			M2 (fuel oil molecules) boil/condense at higher temperature	1	
		iii	M1 formula of type $C_xH_y$ where $x = 5$ to $12$ and $y = 2x$ or $2x + 2$	1	
		iv	M1 bitumen	1	
	b	i	M1 $C_{14}H_{30}$	1	
		ii	M1 carbon-to-carbon/C-C / C-H bonds break	Do not accept C=C bonds break	1
			M2 C=C bonds form	If neither mark scored as shown, award 1 mark for single bonds break and double bonds form	1
	c	i	M1 phosphoric acid / $H_3PO_4$	1	
		ii	M1	M1 Reactants	1
			M2	M2 Product	1
				Max 1 if unbalanced	
	d	i	M1 redox / oxidation / reduction	1	
		ii	M1 ethanoic acid / ethanal	1	
				<b>TOTAL</b>	<b>14</b>

SECTION B TOTAL: 75 MARKS

PAPER TOTAL: 120 MARKS

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