

Mark Scheme (Results) Summer 2010

IGCSE

IGCSE Chemistry (4335) Paper 1F

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Publications Code UG024203

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SECTION A

Question			Mark	Acceptable answers	Notes	Total
1	a	i	M1	neutron		1
			M2	proton		1
			M3	electron		1
		ii	M1	nucleus		1
			M1	12		1
	iv	M1	5		1	
		M1	2.3	Accept any punctuation (eg , / -) or none	1	
	b	i	M1	helium / beryllium / magnesium / calcium / strontium / barium / radium / He / Be / Mg / Ca / Sr / Ba / Ra		1
				hydrogen / helium / H / He	Accept H ₂	1
	c			it has isotopes / atoms have different numbers of neutrons / it is an average	Reject different numbers of protons / electrons	1

Question			Mark	Acceptable answers	Notes	Total
2	a	i	M1	air / atmosphere	Ignore any reference to method	1
		ii	M1	natural gas / North Sea gas / hydrocarbons / named fraction / water / steam	Ignore methane	1
	b	i	M3	iron / Fe	Ignore reference to oxide(s) / oxidation states II and III	1
		ii	M1	350 - 500		1
			M2	100 - 350		1
		iii	M1	cross in box 3		1
			M2	cross in box 4		1
			M3	cross in box 5		1

Question		Mark	Acceptable answers	Notes	Total
3	a	M1	phosphorus	Accept answers in either order Ignore symbols	1
		M2	potassium		1
	b	i	cross in box 1	Consequential marking from bi	1
		ii	cross in same box as in bi		1

Question		Mark	Acceptable answers	Notes	Total
4	a	M1	denser than air / greater molar mass than air or nitrogen or oxygen	Accept heavier than air/nitrogen/oxygen	1
	b	M1	limewater / aqueous calcium hydroxide / $\text{Ca(OH)}_2(\text{aq})$	Accept (aq) / solution / dissolved in water as equivalent to aqueous	1
		M2	milky / cloudy / chalky / white precipitate / white solid	Ignore bubbles	1
	c	M1	copper(II) carbonate \rightarrow copper(II) oxide + carbon dioxide	Both (II) needed Reject any other substances Ignore heat	1
	d	M1	green	Ignore qualifiers such as light / dark	1
		M2	black	Reject all other colours	1

Question		Mark	Acceptable answers	Notes	Total
5	a	M1	cross in box 1		1
		M2	cross in box 4		1
	b	M1	filter or filtration / centrifuge and decant	Accept description of process Reject any wrong method	1
	c	M1	wash (with water) / add water and filter	Accept description of process	1
		M2	dry / heat / warm / evaporate / leave in warm place / spread onto filter paper / place in (warm) oven	Accept description of process Ignore wrong consequence (eg heat to remove sodium nitrate)	1
				If M1 and M2 in wrong order, award 1/2 Reject any wrong method in both M1 and M2	

Question		Mark	Acceptable answers	Notes	Total	
6	a	M1	covalent		1	
	b	M1	low		1	
		M2	weak	If high given for M1, then accept strong	1	
		M3	molecules		1	
	c				Mark b independently except that if high given for M1, then accept strong for M2	
		M1	shared pairs of electrons between O and both H atoms		Electrons can be shown as dots / crosses / e / any combination of these	1
		M2	two electrons in O inner shell AND four more electrons in O outer shell AND no extra electrons in H		Accept these electrons paired or unpaired	1
	d	i			M2 dependent on M1	
			M1	blue	Ignore qualifiers such as light / dark Reject all other colours	1
			M2	white / grey / pale(r) blue	Accept all combinations of these Reject all other colours	1
ii		M1	anhydrous copper(II) sulphate	(II) not needed	1	
iii		M1	becomes blue / heat produced / temperature rises / forms hydrated copper(II) sulphate / goes back to original colour	If different colour given in di(M1), accept this colour here	1	

Question			Mark	Acceptable answers	Notes	Total
7	a	i	M1	propene / propylene	Accept prop-1-ene	1
		ii	M1	yellow / orange / brown	Accept any combination of these colours Reject red	1
			M2	(goes) colourless / decolourised	Ignore clear Ignore discoloured	1
					Do not award mark for single colour if not clear whether start or finish	
	b	i	M1	(contains) hydrogen and carbon / H and C (atoms)	Reject molecules / ions	1
			M2	only	Accept other words with equivalent meaning, such as purely / solely / entirely Award M2 only if correct elements mentioned in M1	1
		ii	M1	only single bonds / no double bonds / no multiple bonds		1
		iii	M1	double bond between two carbon atoms		1
			M2	each carbon bonded to two hydrogen atoms	M2 dependent on M1	1
	c		M1	cross in box 1		1
		M2	cross in box 5		1	
d		M1	C_2H_4 / CH_2CH_2 / $CH_2=CH_2$	Accept in either order Ignore state symbols Award 1 mark for both correct formulae but incorrect coefficients Accept H_4C_2 and OH_2	1	
		M2	H_2O		1	

SECTION A TOTAL: 55 MARKS

SECTION B

Question			Mark	Acceptable answers	Notes	Total
8	a	i	M1	bubbles / fizzing / effervescence / metal gets smaller / white trail	Ignore metal dissolves / gas produced Reject all answers in a(ii)	1
		ii	M1	melts / forms a ball / darts / moves (on surface) / floats	Ignore reference to flames Reject all answers in a(i)	1
	b	i	M1	calcium hydroxide		1
		ii	M1	NaOH		1
	c		M1	hydrogen / H ₂	Ignore H	1
			M2	(squeaky) pop with burning splint / burns with a (squeaky) pop	Accept other words such as explosion / lighted spill or taper Reject glowing splint Ignore references to air/splint extinguished No CONSEQ from wrong gas	1
	d	i	M1	blue / purple	Ignore qualifiers such as light / dark / bright	1
			M2	OH ⁻ / hydroxide	Ignore hydroxyl	1
		ii	M1	yellow / orange	Ignore qualifiers such as light / dark / golden / bright Reject all other colours	1

Question		Mark	Acceptable answers	Notes	Total	
9	a	M1	hydrogen peroxide		1	
		M2	manganese(IV) oxide / manganese dioxide		1	
	b	M1	(gas) syringe		1	
	c	M1	catalyst / to speed up the reaction / lower activation energy		1	
	d	i	M1	(s) for both PbS and PbSO ₄		1
			M2	(aq) for H ₂ O ₂ and (l) for H ₂ O		1
		ii	M1	PbS / lead sulphide / sulphide ion / S ²⁻ / sulphur in lead sulphide	Ignore oxidation numbers if given	1
			M2	gains oxygen/O/O ₂ increase in oxidation state	only award if M1 correct or sulphur ignore loss of electrons	1
	e	i	M1	S + O ₂ → SO ₂	Ignore state symbols Accept S ₂ or S ₈	1
			M1	acidic / (forms) H ⁺ (ions) / sulphurous acid / sulphuric(IV) acid	Reject sulphuric acid / sulphuric(VI) acid	1
			iii	M1	orange	
			M2	green	Accept blue-green	1

Question		Mark	Acceptable answers	Notes	Total
10	a	M1	electron transfer	All marks can be scored from suitably annotated diagrams Award 0/3 if any reference to sharing electrons Ignore covalent M3 dependent on M2	1
		M2	from magnesium/Mg to chlorine/Cl		1
		M3	Mg loses two electrons and (each) Cl gains one electron		1
	b	M1	magnesium / Mg		1
		M2	loss of electrons / increase in oxidation state	Ignore number of electrons M2 independent of M1	1
	c	M1	+ and - ions / oppositely charged ions / Mg^{2+} and Cl^{-}	Need idea of + and - charge	1
		M2	strong (electrostatic) attractions (within lattice)	accept strong (ionic) bonds reject covalent bonds / molecular attraction	1
		M3	<u>lot of</u> energy needed to overcome attractions / break bonds / separate ions	Do not accept “loosening bonds” Ignore “hard to break”	1
				any mention of “intermolecular” or “intramolecular” loses M1 and M2 So “strong intermolecular forces need lots of energy to overcome” scores M3	

Question			Mark	Acceptable answers	Notes	Total
11	a	i	M1	fractional distillation / fractionation		1
		ii	M1	crude oil heated	M1 given even if describe laboratory process. Only M1 possible if describe lab process or mention cracking/breaking bonds	1
			M2	(vapour) passed into column/tower	If crude oil heated in fractionating column, then give only 1 mark for M1 and M2	1
			M3	fractions collected at different heights		1
			M4	correct reference to boiling point / molecular size / temperature gradient/hot at bottom cooler at top	Do not award if specified temperature gradient is wrong way round	1
					All marks can be gained from suitable diagram	
	b	i	M1	bitumen		1
		ii	M1	gasoline		1
		iii	M1	bitumen		1
		iv	M1	refinery gases	Accept answers in either order	1
			M2	fuel oil	Accept naphtha in place of either	1
	c		M1	oxygen	Ignore air	1
			M2	carbon dioxide	Accept answers in either order	1
			M3	water	Accept steam in place of water	1
					All marks in c are independent	
					Ignore heat	

	d	i	M1	C_nH_{2n+2}	Accept other letters/symbols such as x accept $C_nH_{2(n+1)}$	1
		ii	M1	same/similar chemical properties / same functional group	reject trend in chemical properties reject same/similar physical properties Ignore references to general formula and references to saturation/unsaturation/specific functional group Accept any two for 1 mark each	
		M2	gradation in physical properties / gradation in specified physical property (eg boiling point)			
		M3	neighbouring members differ by CH_2	2		

SECTION B TOTAL: 45 MARKS

PAPER TOTAL: 100 MARKS

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