

Mark Scheme (Results) January 2010

GCE O

GCE O Chemistry (7081) Paper 01

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Question Number	Acceptable Answers	Reject	Mark
1 (a)	B ³⁺ C ²⁻ 7		(1) (1) (1)
1 (b)	magnesium bromide ammonium carbonate iron(II) sulphate/ferrous sulphate bromoethane/ethyl bromide	ammonia carbonate	(1) (1) (1) (1)

(Total 7 Marks)

Question Number	Acceptable Answers	Reject	Mark
2 (a)	condensation/liquefaction		(1)
2 (b)	addition/hydrogenation/reduction		(1)
2 (c)	neutralisation		(1)
2 (d)	evaporation/vaporisation		(1)

(Total 4 Marks)

Question Number	Acceptable Answers	Reject	Mark
3 (a)	period		(1)
3 (b)	5 electrons/same number of electrons		(1)
3 (c)	similar/the same/identical		(1)
3 (d)	chromium / Cr		(1)
3 (e)	cobalt, nickel (either order) or Co, Ni (either order)		(1)
3 (f)	noble/inert		(1)
3 (g)	22,26 (in that order)		(1)
3 (h)	covalent		(1)

(Total 8 Marks)

Question Number	Acceptable Answers	Reject	Mark
4 (a)	copper(II) oxide/copper oxide/CuO		(1)
4 (b)	nitric oxide/nitrogen monoxide/nitrogen(II) oxide/NO		(1)
4 (c)	poly(propene)/polypropene/polypropylene		(1)
4 (d)	sulphur/S/S ₈		(1)
4 (e)	anhydrous cobalt chloride/anhydrous CoCl ₂		(1)
4 (f)	ammonia/NH ₃		(1)
4 (g)	nitrogen/N ₂ or argon/Ar		(1)

(Total 7 Marks)

Question Number		Acceptable Answers	Reject	Mark
5	(a)	20		(1)
5	(b)	3		(1)
5	(c)	5		(1)
5	(d)	3		(1)
5	(e)	8		(1)

(Total 5 Marks)

Question Number		Acceptable Answers	Reject	Mark
6		covalent		(1)
		weak intermolecular forces/weak forces/van der Waals forces		(1)
		slide/move over each other		(1)
		delocalised electrons/electrons that can move		(1)
		tetrahedral		(1)
		hard/rigid		(1)
		used in bonding		(1)

(Total 7 Marks)

Question Number	Acceptable Answers	Mark
N.B. The test must be correct if any further marks are to be awarded.		
7	(a) add silver nitrate (and nitric acid)	(1)
	white precipitate	(1)
	(pale) yellow precipitate	(1)
	Alternative test:	
	add Cl ₂ / bromine water	
	no reaction	
	red-brown solution / black (or dark grey) ppt	
7	(b) add an acid	(1)
	bubbles of gas/effervescence/fizzes (ignore any additional lime water test if mark already awarded; if just 'gas evolved' followed by 'pass through limewater which turns milky' then award mark.)	(1)
	no reaction/no bubbles/no gas	(1)
	Alternative test:	
	add FeSO ₄ (aq) + conc. H ₂ SO ₄ (to form lower layer)	
	no reaction/no brown ring	
	brown ring formed	
	Alternative test:	
	add NaOH + Devarda's alloy/ aluminium powder (and warm).	
	no reaction/no ammonia evolved	
	ammonia evolved – turns (red) litmus blue	
7	(c) add water	(1)
	turns blue	(1)
	no change in colour/stays white/colourless solution	(1)
	Alternative test: flame test	
	(blue-)green flame	
	yellow flame (accept orange-yellow but not 'orange')	
	Alternative test:	
	add water and/or aq. NH ₃ /NaOH	
	blue ppt (allow <u>dark</u> blue solution if aq. NH ₃ used)	
	colourless solution / no reaction	

(Total 9 Marks)

Question Number	Acceptable Answers	Mark
8	(a) M_r urea = 60	(1)
	44 g \rightarrow 60 g or 2000 mol \rightarrow 2000 mol	(1)
	88 kg \rightarrow 120 kg mass = 2000 x 60g = 120000g / 120 kg	(1)
8	(b) 28/60 x 100% (use of 28 divided by M_r from (a))	(1)
	= 46.7% (accept 47%)	(1)
8	(c) ammonium nitrate is (very) soluble (and would get washed away) / it dissolves in water	(1)
	urea remains in soil for longer/ would not get washed away	(1)

(Total 7 Marks)

Question Number	Acceptable Answers	Mark
9	(a) (i) $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$	(1)
	(ii) catalyst/speeds up the reaction	(1)
	(iii) relights a glowing splint	(1)
9	(b) (i) $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$	(1)
	(ii) oxidising agent	(1)
	(iii) bleaches (moist) litmus paper	(1)
	(iv) variable valency/variable oxidation number/different oxidation states/different colours/form coloured compounds	(1)

(Total 7 Marks)

Question Number	Acceptable Answers	Mark
10	(a) <i>marking across</i>	
	moves to left	(1)
	increases rate	(1)
	moves to left	(1)
	increases rate	(1)
	no effect	(1)
	increase rate	(1)
10	(b) range 800-1000 °C	(1)
	platinum/platinum-rhodium/ Pt/Pt-Rh	(1)
10	(c) reaction is exothermic/reaction gives out heat	(1)

(Total 9 Marks)

Question Number		Acceptable Answers	Mark
11	(a)	A is copper(II) carbonate/copper carbonate/CuCO ₃	(1)
		B is copper(II) oxide/copper oxide/CuO	(1)
		C is carbon dioxide/CO ₂	(1)
11	(b)	D is potassium/K	(1)
		E is hydrogen/H ₂	(1)
		F is potassium hydroxide/KOH	(1)
11	(c)	G is iron(III) sulphate/Fe ₂ (SO ₄) ₃	(1)
		H is iron(III) hydroxide/Fe(OH) ₃	(1)

(Total 8 Marks)

Question Number			Acceptable Answers	Mark
12	(a)	(i)	a displayed formula for butane/methylpropane	(1)
			a displayed formula for C ₄ H ₈	(1)
			'saturated' is when all the bonds are single bonds	(1)
			'unsaturated' is when a double bond is present	(1)
		(ii)	a displayed formula for methylpropane/butane	(1)
			isomerism is where molecules/compounds have the same (molecular) formula but different structures/different structural formulae/arrangement of bonds (or atoms)	(1)
12	(b)	(i)	add bromine (water)	(1)
			no reaction with C ₄ H ₁₀ / colour remains, etc.	(1)
			decolourised by C ₄ H ₈	(1)
			minimum is C ₄ H ₈ + Br ₂ → C ₄ H ₈ Br ₂	(1)

(Total 10 Marks)

Question Number	Acceptable Answers	Mark
13	(a) $M^{2+}(aq) + 2I^{-}(aq) \rightarrow MI_2(s)$	
	formulae + balance	(1)
	state symbols	(1)
	(b) $0.040 \times 0.1 = 0.004$ (mol)	(1)
	(c) $0.010 \times 0.1 = 0.001$ (mol)	(1)
	(d) At the start, there is small amount of $M(NO_3)_2$ present (relative to KI) /increases as more $M(NO_3)_2$ reacts with KI	(1)
	At 20 cm^3 , there is 1:2 (mole) ratio /correct ratio (according to the equation) / need 0.002 mol $M(NO_3)_2$ for reaction with KI	(1)
	25 and 30 cm^3 is an excess of $M(NO_3)_2$ (so not enough KI for more precipitate to form)	(1)
	(e) $M_r(MI_2) = 0.922/0.002$	(1)
	$= 461$	(1)
	$M + 2(127) = 461$	(1)
	$M = 207$	(1)
	M is lead/Pb	(1)

(Total 12 Marks)

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