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Mark Scheme 2815/06 June 2006

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2815/06

Mark Scheme

		T
Abbreviations,	/ = alternative and acceptable answers for the same marking	point
annotations and	; = separates marking points	F-5
conventions	NOT = answers which are not worthy of credit	
used in the Mark	() = words which are not essential to gain credit	
	= (underlining) key words which must be used to gain credit	
Scheme	ecf = error carried forward	
	AW = alternative wording	
	ora = or reverse argument	
,		
Question	Expected Answers	Marks
1 (a)	Emf / voltage / potential difference	· 1
]	Half cell combined with standard hydrogen electrode	
	Standard conditions 298K, 1 mol dm ⁻³ , 1 atm	1
	(all 3 required for 1 mark)	1
	(am a required rot r titality	
(b)(i)	Diagram shows:	
(-)(-)	Voltmeter + salt bridge + complete circuit	1
	Solution labelled Cu ²⁺ and electrode labelled Ag	
	Salt bridg	
	Sair bridg	le
		
Cu		
ļ		
	Ag(s)	
	71	
}		
		<u> </u>
Cu ²⁺	Ag ⁺ (a	q)
Cu	(aq)	
L		
(ii)	Direction from Cu(s) to Ag(s) (must be in / close to wire)	1
(iii)	0.80 - 0.34 = 0.46 V	1
(iv)		
, ,	Cu + 2Ag ⁺ → Cu ²⁺ + 2Ag	1
(c)	Standard Electrode Potential for chlorine is more positive than	
	Fe ³⁺ therefore it is a better oxidising agent than Fe ³⁺ (do not	1
	accept E° is larger or smaller)	•
	Standard Electrode Potential for iodine is less positive than	
	Fe ³⁺ therefore it is a poorer oxidising agent than Fe ³⁺	1
	(Accept release of electrons/equilibrium arguments)	1.
	(noocht release of electrons/equilibrium arguments)	
		Total: 10
		1

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Question	Expected Answers	Marks	
2 (a)	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 3d ⁸ (Do not accept [Ar]3d ⁸)	1	
(b)	Blue / violet / indigo / lilac (not purple / magenta / mauve) Because spectrum shows absorbance in yellow / orange / red (allow green if part of a list)	1	
(c) (i)	Ring around O ⁻ Ring around N (Accept ring around O of C=O as an alternative to O ⁻)	1	
(ii)	Lone pair (of electrons) / non-bonding pair	1	
		Total: 6	

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(ii) $x = -2$ y = 0 1	
$\hat{y} = 0$	
(i) cis isomer drawn 1	
trans isomer drawn	
(ignore any charges)	
(ignore any charges)	
CI NH ₃ CI NH ₃	
Pt	
CI NH ₃ NH ₃ CI	
CI NH ₃ NH ₃ CI	
an lateral de la companya de la comp	
(ii) cis / trans or geometric 1	
(iii) Binds with DNA (not binds with cell)	
Prevents replication/prevents cell dividing/prevents tumour	
growth (do not allow kills cell)	
Total: 10	

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Question	Expected Answers	Marks
4 (a)	Yellow → (green)→ blue → green → lilac (violet) VO ₃ ⁻ (Mix) VO ²⁺ V ³⁺ V ²⁺ 1 mark for VO ²⁺ 1 mark for V ³⁺ 2 marks for 4 correct colours with correct oxidation state 1 mark for 3 correct colours (First green (mix) can be missed out without penalty)	1 1 2
(b)	Moles $V^{2^+}=25.0\times0.100$ / $1000=0.0025$ mols Moles $MnO_4^-=30.0\times0.0500$ / $1000=0.00150$ mols 1 mole of MnO_4^- changes its Oxidation State by 5 to change the Oxidation State of 1.67 moles of V^{2^+} Oxidation State of V^{2^+} changes by 5 / 1.67 = 3	1 1 1 1
(c)	$3MnO_4^- + 5V^{2+} + 3H_2O \rightarrow 3Mn^{2+} + 5VO_3^- + 6H^+$ (1 mark for correct species, 1 mark for balanced)	2
		Total: 10

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Question	Expected Answers	Marks
5	[Co(H ₂ O) ₆] ²⁺ is pink / [Co(NH ₃) ₆] ²⁺ is light brown / [CoCl ₄] ²⁻ is blue	1
	[Co(H ₂ O) ₆] ³⁺ is blue / [Co(NH ₃) ₆] ³⁺ is dark brown	1
	Allow 1 mark for a correct +2 oxidation state ion with a correct colour and 1 mark for a correct +3 oxidation state ion with a correct colour	
	lons can be octahedral e.g. $[Co(H_2O)_6]^{2+}$ or tetrahedral e.g. $[CoCl_4]^{2-}$ (need example in both cases)	1
	Equation for suitable ligand exchange reaction e.g. $[Co(H_2O)_6]^{2^+} + 4C\Gamma \qquad [CoCl_4]^{2^-} + 6H_2O$	1
	$[Co(H_2O)_6]^{3+}$ is unstable / powerful oxidising agent and readily decomposes into $[Co(H_2O)_6]^{2+}$ $[Co(NH_3)_6]^{3+}$ is much more stable than $[Co(H_2O)_6]^{3+}$	1
	NH ₃ is a stronger ligand than H ₂ O / forms stronger dative covalent bonds than H ₂ O	1
	One mark awarded for correct spelling punctuation and grammar in at least two complete sentences	1
		Total: 9