Q	Part	Sub Part	Marking Guidance	Mark	Comments
7	(a)		Hydrogen /H_2 <u>gas/bubbles</u>	1	
			1.0 mol dm^{-3} HCl / H^+	1	
			At 298K and 100kPa	1	Allow 1 bar instead of 100 kPa Do not allow 1 atm
			Pt (electrode)	1	
7	(b)		$Li^+ + MnO_2 + e^- \rightarrow LiMnO_2$	1	Ignore state symbols
			–0.13(V)	1	
7	(c)		Fe^{3+} ions reduced to Fe^{2+}	1	Can score from equation/scheme
			Because $E(Fe^{3+}/Fe^{2+}) > E(H^+/H_2)$ /E(hydrogen)	1	Allow emf/E_{cell} +ve/0.77V Allow Fe^{3+} better oxidising agent than H^+ Allow H_2 better reducing agent than Fe^{2+} Only award this explanation mark if previous mark given

7	(d)		Moles $Cr_2O_7^{2-}$ $=\underline{23.7 \times 0.01/1000}$ $= 2.37 \times 10^{-4}$	1	
			1 mol $Cr_2O_7^{2-}$ reacts with 6 mol Fe^{2+} so moles Fe^{2+} in 25 cm^3 $= 6 \times 2.37 \times 10^{-4} = 1.422 \times 10^{-3}$	1	M1 x 6
			Moles Fe^{2+} in 250 cm^3 $= 1.422 \times 10^{-2}$	1	M2 x 10 or M4/10
			Original moles Fe^{2+} $= \underline{10.00/277.9} = 0.0360$	1	Independent mark
			Moles Fe^{2+} oxidised $= 0.0360 - 0.0142 = 0.0218$	1	M4 – M3
			% oxidised $= (0.0218 \times 100)/0.0360 = 60.5\%$	1	(M5 x 100)/M4 Allow 60 to 61 Note Max 3 if mol ratio for M2 wrong eg 1:5 gives 67.1% 1:1 gives 93.4% Note also, 39.5% (39-40) scores M1, M2, M3 and M4 (4 marks)