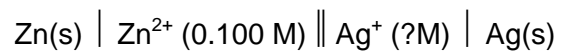


3. The electrochemical cell below is constructed and has a cell voltage of $E_{\text{cell}} = +1.250 \text{ V}$.



- a. What is the balanced anode half reaction? (2 points)

- b. What is the balanced cathode half reaction? (2 points)

- c. If $E_{\text{cell}} = +1.250 \text{ V}$, what is the $[\text{Ag}^+]$ in the cell? (7 points)

Possibly Useful Information

$\Delta G = \Delta H - T\Delta S$	$\Delta G = -nFE$	$E = E^\circ - \frac{2.303RT}{nF} \log Q$
$R = 8.31441 \text{ J/molK}$	$F = 96485 \text{ C/mol e}^-$	$\frac{2.303RT}{F} = 0.05916 \text{ V at } 25^\circ\text{C}$

Selected Standard Reduction Potentials

All species aqueous (aq) unless otherwise noted

Reaction	E°, V
$\text{Al}^{3+} + 2\text{e}^- \rightarrow \text{Al(s)}$	-1.676
$\text{Zn}^{2+} + 2\text{e}^- \rightarrow \text{Zn(s)}$	-0.763
$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$	0.000
$\text{I}_2(\text{s}) + 2\text{e}^- \rightarrow 2\text{I}^-$	+0.535
$\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag(s)}$	+0.800
$2\text{IO}_3^- + 12\text{H}^+ + 10\text{e}^- \rightarrow \text{I}_2(\text{s}) + 6\text{H}_2\text{O}(\ell)$	+1.200
$\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}(\ell)$	+1.330
$\text{MnO}_4^- + 8\text{H}^+ + 2\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}(\ell)$	+1.510

1 1A	2 2A												13 3A	14 4A	15 5A	16 6A	17 7A	18 8A																	
1 H 1.00794	2 He 4.00260												3 Li 6.941	4 Be 9.01218					5 B 10.811	6 C 12.011	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.1797											
11 Na 22.9898	12 Mg 24.3050	3 B 10.811	4 C 12.011	5 N 14.0067	6 O 15.9994	7 F 18.9984	8 Ne 20.1797	9 Na 22.9898	10 Mg 24.3050	11 Al 26.9815	12 Si 28.0855	13 P 30.9738	14 S 32.066	15 Cl 35.4527	16 Ar 39.948	17 K 39.0983	18 Ca 40.078	19 Sc 44.9559	20 Ti 47.88	21 V 50.9415	22 Cr 51.9961	23 Mn 54.9381	24 Fe 55.847	25 Co 58.9332	26 Ni 58.693	27 Cu 63.546	28 Zn 65.39	29 Ga 69.723	30 Ge 72.61	31 As 74.9216	32 Se 78.96	33 Br 79.904	34 Kr 83.80		
37 Rb 85.4678	38 Sr 87.62	39 Y 88.9059	40 Zr 91.224	41 Nb 92.9064	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.906	46 Pd 106.42	47 Ag 107.868	48 Cd 112.411	49 In 114.818	50 Sn 118.710	51 Sb 121.757	52 Te 127.60	53 I 126.904	54 Xe 131.29	55 Cs 132.905	56 Ba 137.327	57 *La 138.906	72 Hf 178.49	73 Ta 180.948	74 W 183.84	75 Re 186.207	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.967	80 Hg 200.59	81 Tl 204.383	82 Pb 207.2	83 Bi 208.980	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.025	89 *Ac 227.028	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Ds (271)	111 Rg (272)																									

*Lanthanide series	58 Ce 140.115	59 Pr 140.908	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.965	64 Gd 157.25	65 Tb 158.925	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.967
†Actinide series	90 Th 232.038	91 Pa 231.036	92 U 238.029	93 Np 237.048	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)