In the following problems, you are given a pair of reduction half-reactions. If a cell were constructed in which the pairs of half-reactions were possible, what would be the balanced equation for the overall cell reaction that would occur? Write the half-reactions that occur at the cathode and anode, and calculate the cell voltage.

621. $Cl_2 + 2e^- \rightleftarrows 2Cl^-$
$Ni^{2+} + 2e^- \rightleftarrows Ni$

622. $Fe^{3+} + 3e^- \rightleftarrows Fe$
$Hg^{2+} + 2e^- \rightleftarrows Hg$

623. $MnO_4^- + e^- \rightleftarrows MnO_4^{2-}$
$Al^{3+} + 3e^- \rightleftarrows Al$

624. $MnO_4^- + 8H^+ + 5e^- \rightleftarrows Mn^{2+} + 4H_2O$
$S + 2H^+ + 2e^- \rightleftarrows H_2S$

625. $Ca^{2+} + 2e^- \rightleftarrows Ca$
$Li^+ + e^- \rightleftarrows Li$

626. $Br_2 + 2e^- \rightleftarrows 2Br^-$
$MnO_4^- + 8H^+ + 5e^- \rightleftarrows Mn^{2+} + 4H_2O$

627. $Sn^{2+} + 2e^- \rightleftarrows Sn$
$Fe^{3+} + e^- \rightleftarrows Fe^{2+}$

628. $Zn^{2+} + 2e^- \rightleftarrows Zn$
$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightleftarrows 2Cr^{3+} + 7H_2O$

629. $Ba^{2+} + 2e^- \rightleftarrows Ba$
$Ca^{2+} + 2e^- \rightleftarrows Ca$

630. $Hg_2^{2+} + 2e^- \rightleftarrows 2Hg$
$Cd^{2+} + 2e^- \rightleftarrows Cd$

For problems 599–606

Reduction Half-reaction	***Standard Electrode Potential, E^0 (in volts)***	***Reduction Half-reaction***	***Standard Electrode Potential, E^0 (in volts)***
$MnO_4^- + 8H^+ + 5e^- \rightleftarrows Mn^{2+} + 4H_2O$	+1.50	$Fe^{3+} + 3e^- \rightleftarrows Fe$	−0.04
$Au^{3+} + 3e^- \rightleftarrows Au$	+1.50	$Pb^{2+} + 2e^- \rightleftarrows Pb$	−0.13
$Cl_2 + 2e^- \rightleftarrows 2Cl^-$	+1.36	$Sn^{2+} + 2e^- \rightleftarrows Sn$	−0.14
$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightleftarrows 2Cr^{3+} + 7H_2O$	+1.23	$Ni^{2+} + 2e^- \rightleftarrows Ni$	−0.26
$MnO_2 + 4H^+ + 2e^- \rightleftarrows Mn^{2+} + 2H_2O$	+1.22	$Cd^{2+} + 2e^- \rightleftarrows Cd$	−0.40
$Br_2 + 2e^- \rightleftarrows 2Br^-$	+1.07	$Fe^{2+} + 2e^- \rightleftarrows Fe$	−0.45
$Hg^{2+} + 2e^- \rightleftarrows Hg$	+0.85	$S + 2e^- \rightleftarrows S^{2-}$	−0.48
$Ag^+ + e^- \rightleftarrows Ag$	+0.80	$Zn^{2+} + 2e^- \rightleftarrows Zn$	−0.76
$Hg_2^{2+} + 2e^- \rightleftarrows 2Hg$	+0.80	$Al^{3+} + 3e^- \rightleftarrows Al$	−1.66
$Fe^{3+} + e^- \rightleftarrows Fe^{2+}$	+0.77	$Mg^{2+} + 2e^- \rightleftarrows Mg$	−2.37
$MnO_4^- + e^- \rightleftarrows MnO_4^{2-}$	+0.56	$Na^+ + e^- \rightleftarrows Na$	−2.71
$I_2 + 2e^- \rightleftarrows 2I^-$	+0.54	$Ca^{2+} + 2e^- \rightleftarrows Ca$	−2.87
$Cu^{2+} + 2e^- \rightleftarrows Cu$	+0.34	$Ba^{2+} + 2e^- \rightleftarrows Ba$	−2.91
$S + 2H^+(aq) + 2e^- \rightleftarrows H_2S(aq)$	+0.14	$K^+ + e^- \rightleftarrows K$	−2.93
$2H^+(aq) + 2e^- \rightleftarrows H_2$	0.00	$Li^+ + e^- \rightleftarrows Li$	−3.04