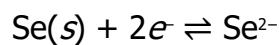


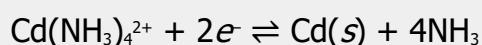
Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{Li}^+(\text{aq}) + \text{e}^- \rightleftharpoons \text{Li(s)}$	-3.040
$\text{Rb}^+ + \text{e}^- \rightleftharpoons \text{Rb (s)}$	-2.98
$\text{K}^+(\text{aq}) + \text{e}^- \rightleftharpoons \text{K(s)}$	-2.93
$\text{Ba}^{2+} + 2\text{e}^- \rightleftharpoons \text{Ba(s)}$	-2.92
$\text{Cs}^+(\text{aq}) + \text{e}^- \rightleftharpoons \text{Cs(s)}$	-2.92
$\text{Ba}^{2+}(\text{aq}) + 2\text{e}^- \rightleftharpoons \text{Ba(s)}$	-2.91
$\text{Sr}^{2+}(\text{aq}) + 2\text{e}^- \rightleftharpoons \text{Sr(s)}$	-2.89
$\text{Ca}^{2+}(\text{aq}) + 2\text{e}^- \rightleftharpoons \text{Ca(s)}$	-2.84
$\text{Na}^+(\text{aq}) + \text{e}^- \rightleftharpoons \text{Na(s)}$	-2.713
$\text{Mg(OH)}_2(\text{s}) + 2\text{e}^- \rightleftharpoons \text{Mg(s)} + 2\text{OH}^-$	-2.687
$\text{La}^{3+} + 3\text{e}^- \rightleftharpoons \text{La(s)}$	-2.38
$\text{Mg}^{2+}(\text{aq}) + 2\text{e}^- \rightleftharpoons \text{Mg(s)}$	-2.356
$\text{Ce}^{3+} + 3\text{e}^- \rightleftharpoons \text{Ce(s)}$	-2.336
$\text{Al(OH)}_4^- + 3\text{e}^- \rightleftharpoons \text{Al(s)} + 4\text{OH}^-$	-2.310
$\text{BaO(s)} + 2\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{Ba(s)} + \text{H}_2\text{O(l)}$	-2.166

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{AlF}_6^{3-} + 3e^- \rightleftharpoons \text{Al}(s) + 6\text{F}^-$	-2.07
$\text{Be}^{2+} + 2e^- \rightleftharpoons \text{Be}(s)$	-1.99
$\text{B(OH)}_4^- + 3e^- \rightleftharpoons \text{B}(s) + 4\text{OH}^-$	-1.811
$\text{Al}^{3+}(\text{aq}) + 3e^- \rightleftharpoons \text{Al}(s)$	-1.676
$\text{U}^{3+} + 3e^- \rightleftharpoons \text{U}(s)$	-1.66
$\text{ZnO}_2 + 4\text{H}^+ + 4e^- \rightleftharpoons \text{Zn}(s) + 2\text{H}_2\text{O}$	-1.473
$\text{SiF}_6^{2-} + 4e^- \rightleftharpoons \text{Si}(s) + 6\text{F}^-$	-1.37
$\text{Zn(CN)}_4^{2-} + 2e^- \rightleftharpoons \text{Zn}(s) + 4\text{CN}^-$	-1.34
$\text{Zn(OH)}_4^{2-} + 2e^- \rightleftharpoons \text{Zn}(s) + 4\text{OH}^-$	-1.285
$\text{Mn}^{2+} + 2e^- \rightleftharpoons \text{Mn}(s)$	-1.17
$\text{CdS}(s) + 2e^- \rightleftharpoons \text{Cd}(s) + \text{S}^{2-}$	-1.17
$\text{V}^{2+} + 2e^- \rightleftharpoons \text{V}(s)$	-1.13
$2\text{SO}_3^{2-} + 2\text{H}_2\text{O}(l) + 2e^- \rightleftharpoons \text{S}_2\text{O}_4^{2-} + 4\text{OH}^-$	-1.13
$\text{Zn}(\text{NH}_3)_4^{2+} + 2e^- \rightleftharpoons \text{Zn}(s) + 4\text{NH}_3$	-1.04
$\text{O}_2(\text{aq}) + e^- \rightleftharpoons \text{O}_2^-(\text{aq})$	-1.0

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{Cd}(\text{CN})_4^{2-} + 2e^- \rightleftharpoons \text{Cd}(s) + 4\text{CN}^-$	-0.943
$\text{MoO}_4^{2-} + 4\text{H}_2\text{O}(l) + 6e^- \rightleftharpoons \text{Mo}(s) + 8\text{OH}^-$	-0.913
$\text{SO}_4^{2-} + \text{H}_2\text{O}(l) + 2e^- \rightleftharpoons \text{SO}_3^{2-} + 2\text{OH}^-$	-0.936
$\text{SiO}_2(s) + 4\text{H}^+ + 4e^- \rightleftharpoons \text{Si}(s) + 2\text{H}_2\text{O}(l)$	-0.909
$\text{Cr}^{2+} + 2e^- \rightleftharpoons \text{Cr}(s)$	-0.90
$\text{B}(\text{OH})_3 + 3\text{H}^+ + 3e^- \rightleftharpoons \text{B}(s) + 3\text{H}_2\text{O}(l)$	-0.890
$2\text{H}_2\text{O}(l) + 2e^- \rightleftharpoons \text{H}_2(g) + 2\text{OH}^-(aq)$	-0.828
$\text{Zn}^{2+}(aq) + 2e^- \rightleftharpoons \text{Zn}(s)$	-0.7618
$\text{Co}(\text{OH})_2(s) + 2e^- \rightleftharpoons \text{Co}(s) + 2\text{OH}^-$	-0.746
$\text{Cr}^{3+}(aq) + 3e^- \rightleftharpoons \text{Cr}(s)$	-0.74
$\text{Ni}(\text{OH})_2 + 2e^- \rightleftharpoons \text{Ni}(s) + 2\text{OH}^-$	-0.72
$\text{Ag}_2\text{S}(s) + 2e^- \rightleftharpoons 2\text{Ag}(s) + \text{S}^{2-}$	-0.71

Standard Cathode (Reduction) Half-Reaction**Standard Reduction Potential E° (volts)**

-0.67 in 1 M NaOH



-0.622



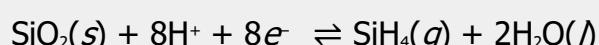
-0.576 in 1 M NaOH



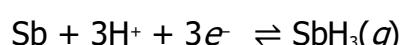
-0.56



-0.52



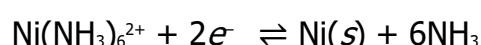
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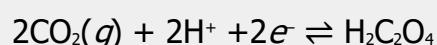
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-0.50



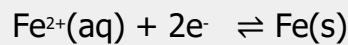
-0.49



-0.481

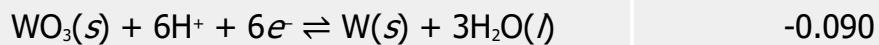
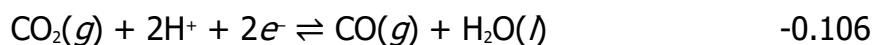
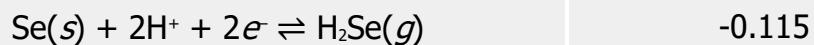
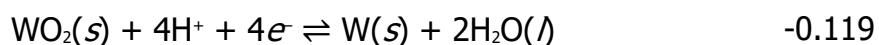
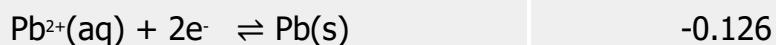
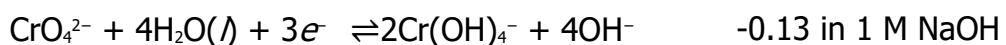
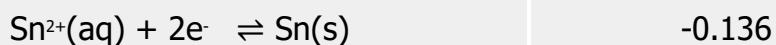
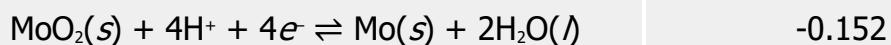
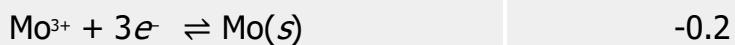


-0.424

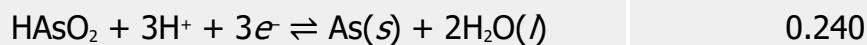
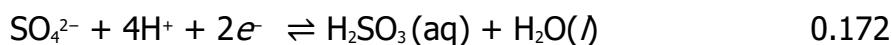
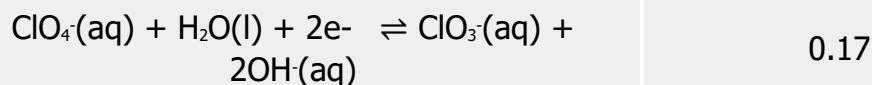
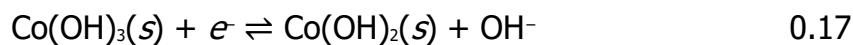


-0.44

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$S(s) + 2e^- \rightleftharpoons S^{2-}$	-0.407
$Cd^{2+}(aq) + 2e^- \rightleftharpoons Cd(s)$	-0.4030
$Ag(NH_3)_2^+ + e^- \rightleftharpoons Ag(s) + 2NH_3$	-0.373
$Ti^{3+} + e^- \rightleftharpoons Ti^{2+}$	-0.37
$PbSO_4(s) + 2e^- \rightleftharpoons Pb(s) + SO_4^{2-}$	-0.356
$Co^{2+}(aq) + 2e^- \rightleftharpoons Co(s)$	-0.277
$2SO_4^{2-} + 4H^+ + 2e^- \rightleftharpoons S_2O_6^{2-} + 2H_2O(l)$	-0.25
$N_2(g) + 5H^+ + 4e^- \rightleftharpoons N_2H_5^+$	-0.23
$H_3PO_4 + 2H^+ + 2e^- \rightleftharpoons H_3PO_3 + H_2O(l)$	-0.28
$Ni^{2+}(aq) + 2e^- \rightleftharpoons Ni(s)$	-0.257
$V^{3+} + e^- \rightleftharpoons V^{2+}$	-0.255
$As + 3H^+ + 3e^- \rightleftharpoons AsH_3(g)$	-0.225

Standard Cathode (Reduction) Half-Reaction**Standard Reduction Potential E° (volts)**

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{Hg}_2\text{I}_2(s) + 2e^- \rightleftharpoons 2\text{Hg}(l) + 2\text{I}^-$	-0.0405
$\text{Fe}^{3+}(\text{aq}) + 3e^- \rightleftharpoons \text{Fe}(s)$	-0.037
$2\text{H}^+(\text{aq}) + 2e^- \rightleftharpoons \text{H}_2(g)$	0.00
$\text{P}(s, \text{white}) + 3\text{H}^+ + 3e^- \rightleftharpoons \text{PH}_3(g)$	0.06
$\text{AgBr}(s) + e^- \rightleftharpoons \text{Ag}(s) + \text{Br}^-$	0.071
$\text{S}_4\text{O}_6^{2-} + 2e^- \rightleftharpoons 2\text{S}_2\text{O}_3^{2-}$	0.080
$\text{Co}(\text{NH}_3)_6^{3+} + e^- \rightleftharpoons \text{Co}(\text{NH}_3)_6^{2+}$	0.1
$\text{Ru}(\text{NH}_3)_6^{3+} + e^- \rightleftharpoons \text{Ru}(s) + \text{Ru}(\text{NH}_3)_6^{2+}$	0.10
$\text{S}(s) + 2\text{H}^+ + 2e^- \rightleftharpoons \text{H}_2\text{S}$	0.144
$\text{Sn}^{4+}(\text{aq}) + 2e^- \rightleftharpoons \text{Sn}^{2+}(\text{aq})$	0.154
$\text{Cu}^{2+}(\text{aq}) + e^- \rightleftharpoons \text{Cu}^+(\text{aq})$	0.159
$\text{UO}_2^{2+} + e^- \rightleftharpoons \text{UO}_2^+$	0.16

Standard Cathode (Reduction) Half-Reaction**Standard Reduction Potential E° (volts)**

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{Bi}^{3+} + 3e^- \rightleftharpoons \text{Bi}(s)$	0.317
$\text{UO}_2^{2+} + 4\text{H}^+ + 2e^- \rightleftharpoons \text{U}^{4+} + 2\text{H}_2\text{O}(l)$	0.327
$\text{VO}^{2+} + 2\text{H}^+ + e^- \rightleftharpoons \text{V}^{3+} + \text{H}_2\text{O}(l)$	0.337
$\text{Cu}^{2+}(\text{aq}) + 2e^- \rightleftharpoons \text{Cu}(s)$	0.3419
$\text{ClO}_3^-(\text{aq}) + \text{H}_2\text{O}(l) + 2e^- \rightleftharpoons \text{ClO}_2^-(\text{aq}) + 2\text{OH}^-(\text{aq})$	0.35
$\text{Fe}(\text{CN})_6^{3-} + e^- \rightleftharpoons \text{Fe}(\text{CN})_6^{4-}$	0.356
$\text{O}_2(g) + 2\text{H}_2\text{O}(l) + 4e^- \rightleftharpoons 4\text{OH}^-$	0.401
$\text{ClO}^- + \text{H}_2\text{O}(l) + e^- \rightleftharpoons \frac{1}{2}\text{Cl}_2(g) + 2\text{OH}^-$	0.421 in 1 M NaOH
$\text{Ag}_2\text{C}_2\text{O}_4(s) + 2e^- \rightleftharpoons 2\text{Ag}(s) + \text{C}_2\text{O}_4^{2-}$	0.47
$\text{Cu}^+(\text{aq}) + e^- \rightleftharpoons \text{Cu}(s)$	0.52
$\text{I}_2(s) + 2e^- \rightleftharpoons 2\text{I}^-(\text{aq})$	0.5355
$\text{I}_3^- + 2e^- \rightleftharpoons 3\text{I}^-$	0.536

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{Cu}^{2+} + \text{Cl}^- + e^- \rightleftharpoons \text{CuCl}(s)$	0.559
$\text{H}_3\text{AsO}_4 + 2\text{H}^+ + 2e^- \rightleftharpoons \text{HAsO}_2 + 2\text{H}_2\text{O}(l)$	0.560
$\text{S}_2\text{O}_6^{2-} + 4\text{H}^+ + 2e^- \rightleftharpoons 2\text{H}_2\text{SO}_3$	0.569
$\text{ClO}_2^{-}(\text{aq}) + \text{H}_2\text{O}(l) + 2e^- \rightleftharpoons \text{ClO}^{-}(\text{aq}) + 2\text{OH}^{-}(\text{aq})$	0.59
$\text{MnO}_4^{-} + 2\text{H}_2\text{O}(l) + 3e^- \rightleftharpoons \text{MnO}_2(s) + 4\text{OH}^{-}$	0.60
$\text{Sb}_2\text{O}_5(s) + 6\text{H}^+ + 4e^- \rightleftharpoons 2\text{SbO}^+ + 3\text{H}_2\text{O}(l)$	0.605
$\text{PtCl}_6^{2-} + 2e^- \rightleftharpoons \text{PtCl}_4^{2-} + 2\text{Cl}^-$	0.68
$\text{RuO}_2(s) + 4\text{H}^+ + 4e^- \rightleftharpoons \text{Ru}(s) + 2\text{H}_2\text{O}(l)$	0.68
$\text{O}_2(g) + 2\text{H}^+ + 2e^- \rightleftharpoons \text{H}_2\text{O}_2$	0.695
$\text{PtCl}_4^{2-} + 2e^- \rightleftharpoons \text{Pt}(s) + 4\text{Cl}^-$	0.73
$\text{H}_2\text{SeO}_3 + 4\text{H}^+ + 4e^- \rightleftharpoons \text{Se}(s) + 3\text{H}_2\text{O}(l)$	0.74
$\text{Tl}^{3+} + 3e^- \rightleftharpoons \text{Tl}(s)$	0.742

Standard Cathode (Reduction) Half-Reaction**Standard Reduction Potential E° (volts)**

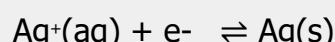
0.77 in 1 M HCl



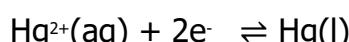
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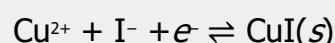
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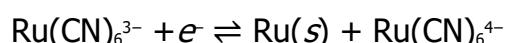
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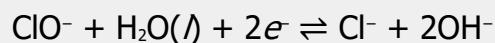
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0.86



0.86



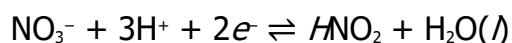
0.890 in 1 M NaOH



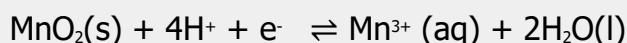
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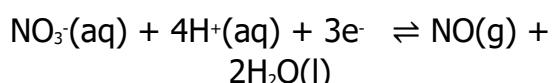
0.926



0.94



0.95



0.96

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{HIO} + \text{H}^+ + 2e^- \rightleftharpoons \text{I}^- + \text{H}_2\text{O}(l)$	0.985
$\text{HNO}_2 + \text{H}^+ + e^- \rightleftharpoons \text{NO}(g) + \text{H}_2\text{O}(l)$	0.996
$\text{VO}_2^{2+} + 2\text{H}^+ + e^- \rightleftharpoons \text{VO}^{2+} + \text{H}_2\text{O}(l)$	1.000
$\text{AuCl}_4^- + 3e^- \rightleftharpoons \text{Au}(s) + 4\text{Cl}^-$	1.002
$\text{NO}_2(g) + \text{H}^+(aq) + e^- \rightleftharpoons \text{HNO}_2(aq)$	1.07
$\text{Br}_2(l) + 2e^- \rightleftharpoons 2\text{Br}^-(aq)$	1.087
$\text{Fe(phen)}_6^{3+} + e^- \rightleftharpoons \text{Fe(phen)}_6^{2+}$	1.147
$\text{SeO}_4^{3-} + 4\text{H}^+ + e^- \rightleftharpoons \text{H}_2\text{SeO}_3 + \text{H}_2\text{O}(l)$	1.151
$\text{ClO}_3^- + 2\text{H}^+ + e^- \rightleftharpoons \text{ClO}_2(g) + \text{H}_2\text{O}$	1.175
$\text{ClO}_3^- + 3\text{H}^+ + 2e^- \rightleftharpoons \text{HClO}_2 + \text{H}_2\text{O}$	1.181
$\text{IO}_3^- + 6\text{H}^+ + 5e^- \rightleftharpoons \frac{1}{2}\text{I}_2(s) + 3\text{H}_2\text{O}(l)$	1.195
$\text{Pt}^{2+} + 2e^- \rightleftharpoons \text{Pt}(s)$	1.2

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{ClO}_4^- + 2\text{H}^+ + 2e^- \rightleftharpoons \text{ClO}_3^- + \text{H}_2\text{O}$	1.201
$\text{O}_2(\text{g}) + 4\text{H}^+(\text{aq}) + 4e^- \rightleftharpoons 2\text{H}_2\text{O}(\text{l})$	1.229
$\text{MnO}_2(\text{s}) + 4\text{H}^+ + 2e^- \rightleftharpoons \text{Mn}^{2+} + 2\text{H}_2\text{O}(\text{l})$	1.23
$2\text{HNO}_2 + 4\text{H}^+ + 4e^- \rightleftharpoons \text{N}_2\text{O}(\text{g}) + 3\text{H}_2\text{O}(\text{l})$	1.297
$\text{HOBr} + \text{H}^+ + 2e^- \rightleftharpoons \text{Br}^- + \text{H}_2\text{O}(\text{l})$	1.341
$\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 14\text{H}^+(\text{aq}) + 6e^- \rightleftharpoons 2\text{Cr}^{3+}(\text{aq}) + 7\text{H}_2\text{O}(\text{l})$	1.36
$\text{Au}^{3+} + 2e^- \rightleftharpoons \text{Au}^+$	1.36
$\text{Hg}_2\text{Br}_2(\text{s}) + 2e^- \rightleftharpoons 2\text{Hg}(\text{l}) + 2\text{Br}^-$	1.392
$\text{Cl}_2(\text{g}) + 2e^- \rightleftharpoons 2\text{Cl}^-(\text{aq})$	1.396
$\text{Hg}_2\text{Br}_2(\text{s}) + 2e^- \rightleftharpoons 2\text{Hg}(\text{l}) + 2\text{Br}^-$	1.392
$\text{Ce}^{4+}(\text{aq}) + e^- \rightleftharpoons \text{Ce}^{3+}(\text{aq})$	1.44
$\text{PbO}_2(\text{s}) + 4\text{H}^+ + 2e^- \rightleftharpoons \text{Pb}^{2+}(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$	1.46

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{BrO}_3^- + 6\text{H}^+ + 6e^- \rightleftharpoons \text{Br}^- + 3\text{H}_2\text{O}$	1.478
$\text{Mn}^{3+} + e^- \rightleftharpoons \text{Mn}^{2+}$	1.5
$\text{BrO}_3^- + 6\text{H}^+ + 5e^- \rightleftharpoons \frac{1}{2}\text{Br}_2(l) + 3\text{H}_2\text{O}$	1.5
$\text{MnO}_4^-(aq) + 8\text{H}^+(aq) + 5e^- \rightleftharpoons \text{Mn}^{2+}(aq) + 4\text{H}_2\text{O}(l)$	1.51
$\text{Au}^{3+} + 3e^- \rightleftharpoons \text{Au}(s)$	1.52
$2\text{NO}(g) + 2\text{H}^+ + 2e^- \rightleftharpoons \text{N}_2\text{O}(g) + \text{H}_2\text{O}(l)$	1.59
$\text{HOBr} + \text{H}^+ + e^- \rightleftharpoons \frac{1}{2}\text{Br}^- + \text{H}_2\text{O}(l)$	1.604
$\text{HClO}_2 + 2\text{H}^+ + 2e^- \rightleftharpoons \text{HOCl} + \text{H}_2\text{O}$	1.64
$\text{PbO}_2(s) + \text{SO}_4^{2-} + 4\text{H}^+ + 2e^- \rightleftharpoons \text{PbSO}_4(s) + 2\text{H}_2\text{O}(l)$	1.690
$\text{MnO}_4^- + 4\text{H}^+ + 3e^- \rightleftharpoons \text{MnO}_2(s) + 2\text{H}_2\text{O}(l)$	1.70
$\text{Ce}^{4+} + e^- \rightleftharpoons \text{Ce}^{3+}$	1.72

Standard Cathode (Reduction) Half-Reaction	Standard Reduction Potential E° (volts)
$\text{N}_2\text{O}(g) + 2\text{H}^+ + 2e^- \rightleftharpoons \text{N}_2(g) + \text{H}_2\text{O}(l)$	1.77
$\text{H}_2\text{O}_2(\text{aq}) + 2\text{H}^+(\text{aq}) + 2e^- \rightleftharpoons 2\text{H}_2\text{O}(l)$	1.763
$\text{Au}^+ + e^- \rightleftharpoons \text{Au}(s)$	1.83
$\text{Co}^{3+}(\text{aq}) + e^- \rightleftharpoons \text{Co}^{2+}(\text{aq})$	1.92
$\text{S}_2\text{O}_8^{2-} + 2e^- \rightleftharpoons 2\text{SO}_4^{2-}$	1.96
$\text{O}_3(g) + 2\text{H}^+(\text{aq}) + 2e^- \rightleftharpoons \text{O}_2(g) + \text{H}_2\text{O}(l)$	2.07
$\text{F}_2(g) + 2e^- \rightleftharpoons 2\text{F}^-(\text{aq})$	2.87
$\text{F}_2(g) + 2\text{H}^+ + 2e^- \rightleftharpoons 2\text{HF}$	3.053

The table provides E° for selected reduction reactions. Values are from the following sources: Bard, A. J.; Parsons, B.; Jordon, J., eds. *Standard Potentials in Aqueous Solutions*, Dekker: New York, 1985; Milazzo, G.; Caroli, S.; Sharma, V. K. *Tables of Standard Electrode Potentials*, Wiley: London, 1978; Swift, E. H.; Butler, E. A. *Quantitative Measurements and Chemical Equilibria*, Freeman: New York, 1972.

The table is ordered such that the stronger (more reactive) reductants are at the top and the stronger oxidants are at the bottom.