

STANDARD REDUCTION POTENTIALS (25°C)

1 atm or 1 M concentration for all species in the half reaction

HALF REACTIONS	E° (V)	HALF REACTIONS	E° (V)
$\frac{1}{2} \text{F}_2(\text{g}) + \text{H}^+ + \text{e}^- \rightleftharpoons \text{HF}(\text{aq})$	+3.06	$\text{H}_3\text{AsO}_3 + 3 \text{H}^+ + 3 \text{e}^- \rightleftharpoons \text{As} + 3 \text{H}_2\text{O}$	+0.248
$\text{F}_2 + 2 \text{e}^- \rightleftharpoons 2 \text{F}^-$	+2.65	$\text{AgCl}(\text{s}) + \text{e}^- \rightleftharpoons \text{Ag} + \text{Cl}^-$	+0.2222
$\text{S}_2\text{O}_8^{2-} + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons 2 \text{HSO}_4^-$	+2.123	$\text{Sb}^{3+} + 3 \text{e}^- \rightleftharpoons \text{Sb}$	+0.208
$\text{O}_3 + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{O}_2 + \text{H}_2\text{O}$	+2.07	$\text{SO}_4^{2-} + 4 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{SO}_3 + \text{H}_2\text{O}$	+0.17
$\text{S}_2\text{O}_8^{2-} + 2 \text{e}^- \rightleftharpoons 2 \text{SO}_4^{2-}$	+2.010	$\text{Co}(\text{OH})_3 + \text{e}^- \rightleftharpoons \text{Co}(\text{OH})_2 + \text{OH}^-$	+0.17
$\text{Co}^{3+} + \text{e}^- \rightleftharpoons \text{Co}^{2+}$	+1.82	$\text{Cu}^{2+} + \text{e}^- \rightleftharpoons \text{Cu}^+$	+0.161
$\text{H}_2\text{O}_2(\text{aq}) + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons 2 \text{H}_2\text{O}$	+1.763	$\text{Sn}^{4+} + 2 \text{e}^- \rightleftharpoons \text{Sn}^{2+}$	+0.15
$\text{HBiO}_3 + 5 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{Bi}^{3+} + 3 \text{H}_2\text{O}$	+1.70	$\text{S} + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{S}(\text{g})$	+0.141
$\text{MnO}_4^- + 4 \text{H}^+ + 3 \text{e}^- \rightleftharpoons \text{MnO}_2 + 2 \text{H}_2\text{O}$	+1.695	$\text{Co}(\text{NH}_3)_6^{3+} + \text{e}^- \rightleftharpoons \text{Co}(\text{NH}_3)_6^{2+}$	+0.1
$\text{PbO}_2 + 4 \text{H}^+ + \text{SO}_4^{2-} + 2 \text{e}^- \rightleftharpoons 2 \text{H}_2\text{O} + \text{PbSO}_4$	+1.685	$\text{S}_4\text{O}_6^{2-} + 2 \text{e}^- \rightleftharpoons 2 \text{S}_2\text{O}_3^{2-}$	+0.10
$\text{Ce}^{4+} + \text{e}^- \rightleftharpoons \text{Ce}^{3+}$	+1.61	$\text{P} + 3 \text{H}^+ + 3 \text{e}^- \rightleftharpoons \text{PH}_3$	+0.06
$\text{IO}_4^- + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{O} + \text{IO}_3^-$	+1.589	$\text{HCOOH} + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{HCHO} + \text{H}_2\text{O}$	+0.056
$\text{MnO}_4^- + 8 \text{H}^+ + 5 \text{e}^- \rightleftharpoons 4 \text{H}_2\text{O} + \text{Mn}^{2+}$	+1.51	$\text{Cu}(\text{NH}_3)_4^{2+} + \text{e}^- \rightleftharpoons \text{Cu}(\text{NH}_3)_2^+ + 2 \text{NH}_3$	0.0
$\text{HClO} + \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{O} + \text{Cl}^-$	+1.49	$2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2(\text{g})$	0.00000
$\text{ClO}_3^- + 6 \text{H}^+ + 5 \text{e}^- \rightleftharpoons 3 \text{H}_2\text{O} + \frac{1}{2} \text{Cl}_2$	+1.458	$\text{MnO}_2 + 2 \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{Mn}(\text{OH})_2 + 2 \text{OH}^-$	-0.05
$\text{PbO}_2 + 4 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{Pb}^{2+} + 2 \text{H}_2\text{O}$	+1.455	$\text{O}_2 + 2 \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{O}_2 + 2 \text{OH}^-$	-0.076
$\frac{1}{2} \text{Cl}_2 + \text{e}^- \rightleftharpoons \text{Cl}^-$	+1.3595	$2 \text{H}_2\text{SO}_3 + \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{HS}_2\text{O}_4^- + 2 \text{H}_2\text{O}$	-0.08
$\text{Cr}_2\text{O}_7^{2-} + 14 \text{H}^+ + 6 \text{e}^- \rightleftharpoons 7 \text{H}_2\text{O} + 2 \text{Cr}^{3+}$	+1.33	$\text{Pb}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Pb}$	-0.126
$\text{O}_3 + \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{O}_2 + 2 \text{OH}^-$	+1.24	$\text{CrO}_4^{2-} + 4 \text{H}_2\text{O} + 3 \text{e}^- \rightleftharpoons 5 \text{OH}^- + \text{Cr}(\text{OH})_3$	-0.13
$\text{MnO}_2(\text{s}) + 4 \text{H}^+ + 2 \text{e}^- \rightleftharpoons 2 \text{H}_2\text{O} + \text{Mn}^{2+}$	+1.23	$\text{Sn}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Sn}$	-0.136
$\text{O}_2(\text{g}) + 4 \text{H}^+ + 4 \text{e}^- \rightleftharpoons 2 \text{H}_2\text{O}$	+1.229	$\text{Ni}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Ni}$	-0.250
$\text{Br}_2(\text{aq}) + 2 \text{e}^- \rightleftharpoons 2 \text{Br}^-$	+1.065	$\text{H}_3\text{PO}_4 + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_3\text{PO}_3 + \text{H}_2\text{O}$	-0.276
$\text{HNO}_2 + \text{H}^+ + \text{e}^- \rightleftharpoons \text{NO} + \text{H}_2\text{O}$	+1.00	$\text{Co}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Co}$	-0.277
$\text{HOI} + \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{I}^- + \text{H}_2\text{O}$	+1.00	$\text{PbSO}_4(\text{s}) + 2 \text{e}^- \rightleftharpoons \text{SO}_4^{2-} + \text{Pb}$	-0.356
$\text{NO}_3^- + 4 \text{H}^+ + 3 \text{e}^- \rightleftharpoons 2 \text{H}_2\text{O} + \text{NO}(\text{g})$	+0.96	$\text{Se} + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{Se}$	-0.40
$2 \text{Hg}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Hg}_2^{2+}$	+0.92	$\text{Cd}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Cd}$	-0.403
$\text{HO}_2^- + \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons 3 \text{OH}^-$	+0.88	$\text{Cr}^{3+} + \text{e}^- \rightleftharpoons \text{Cr}^{2+}$	-0.42
$\text{Hg}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Hg}(\text{l})$	+0.854	$\text{Fe}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Fe}$	-0.44
$\text{NO}_3^- + 2 \text{H}^+ + \text{e}^- \rightleftharpoons \text{NO}_2 + \text{H}_2\text{O}$	+0.80	$\text{CrO}_4^{2-} + 4 \text{H}_2\text{O} + 3 \text{e}^- \rightleftharpoons \text{Cr}(\text{OH})_4^- + 4 \text{OH}^-$	-0.48
$\text{Ag}^+ + \text{e}^- \rightleftharpoons \text{Ag}$	+0.7993	$2 \text{CO}_2(\text{g}) + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{C}_2\text{O}_4$	-0.49
$\text{Hg}_2^{2+} + 2 \text{e}^- \rightleftharpoons 2 \text{Hg}(\text{l})$	+0.789	$\text{H}_3\text{PO}_3 + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_3\text{PO}_2 + \text{H}_2\text{O}$	-0.50
$\text{Fe}^{3+} + \text{e}^- \rightleftharpoons \text{Fe}^{2+}$	+0.771	$\text{As} + 3 \text{H}^+ + 3 \text{e}^- \rightleftharpoons \text{AsH}_3$	-0.60
$\text{BrO}^- + \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{Br}^- + 2 \text{OH}^-$	+0.76	$\text{Cr}^{3+} + 3 \text{e}^- \rightleftharpoons \text{Cr}$	-0.74
$\text{O}_2(\text{g}) + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{O}_2$	+0.682	$\text{Sn}(\text{OH})_4^{2-} + 2 \text{e}^- \rightleftharpoons \text{Sn} + 4 \text{OH}^-$	-0.76
$\text{H}_3\text{AsO}_4 + 2 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{H}_2\text{O} + \text{H}_3\text{AsO}_3$	+0.575	$\text{Zn}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Zn}$	-0.763
$\text{MnO}_4^- + 2 \text{H}_2\text{O} + 3 \text{e}^- \rightleftharpoons \text{MnO}_2 + 4 \text{OH}^-$	+0.57	$\text{Sn}(\text{OH})_6^{2-} + 2 \text{e}^- \rightleftharpoons \text{Sn}(\text{OH})_4^{2-} + 2 \text{OH}^-$	-0.90
$\text{MnO}_4^- + \text{e}^- \rightleftharpoons \text{MnO}_4^{2-}(\text{acid})$	+0.564	$\text{SO}_4^{2-} + \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{SO}_3^{2-} + 2 \text{OH}^-$	-0.93
$\text{MnO}_4^- + \text{e}^- \rightleftharpoons \text{MnO}_4^{2-}(\text{base})$	+0.54	$\text{CNO}^- + \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{CN}^- + 2 \text{OH}^-$	-0.97
$\text{I}_3^- + 2 \text{e}^- \rightleftharpoons 3 \text{I}^-$	+0.535	$\text{PO}_4^{3-} + 2 \text{H}_2\text{O} + \text{e}^- \rightleftharpoons \text{HPO}_3^- + 3 \text{OH}^-$	-1.12
$\text{Cu}^+ + \text{e}^- \rightleftharpoons \text{Cu}$	+0.518	$2 \text{SO}_3^{2-} + 2 \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{S}_2\text{O}_4^{2-} + 4 \text{OH}^-$	-1.12
$\text{IO}^- + \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{I}^- + 2 \text{OH}^-$	+0.49	$\text{Mn}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Mn}$	-1.18
$\text{NiO}_2 + 2 \text{H}_2\text{O} + 2 \text{e}^- \rightleftharpoons \text{Ni}(\text{OH})_2 + 2 \text{OH}^-$	+0.49	$\text{Al}^{3+} + 3 \text{e}^- \rightleftharpoons \text{Al}$	-1.66
$\text{H}_2\text{SO}_3 + 4 \text{H}^+ + 2 \text{e}^- \rightleftharpoons \text{S} + 3 \text{H}_2\text{O}$	+0.45	$\text{Al}(\text{OH})_4^- + 3 \text{e}^- \rightleftharpoons \text{Al} + 4 \text{OH}^-$	-2.35
$\text{O}_2 + 2 \text{H}_2\text{O} + 4 \text{e}^- \rightleftharpoons 4 \text{OH}^-$	+0.401	$\text{Mg}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Mg}$	-2.37
$\text{Cu}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Cu}$	+0.339	$\text{Na}^+ + \text{e}^- \rightleftharpoons \text{Na}$	-2.714
$\text{Fe}(\text{CN})_6^{3-} + 1 \text{e}^- \rightleftharpoons \text{Fe}(\text{CN})_6^{4-}$	+0.36	$\text{Ca}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Ca}$	-2.87
$\text{Bi}^{3+} + 3 \text{e}^- \rightleftharpoons \text{Bi}$	+0.308	$\text{Ba}^{2+} + 2 \text{e}^- \rightleftharpoons \text{Ba}$	-2.90
$\text{N}_2(\text{g}) + 8 \text{H}^+ + 6 \text{e}^- \rightleftharpoons 2 \text{NH}_4^+$	+0.274	$\text{K}^+ + \text{e}^- \rightleftharpoons \text{K}$	-2.925
$\text{Hg}_2\text{Cl}_2(\text{s}) + 2 \text{e}^- \rightleftharpoons 2 \text{Cl}^- + \text{Hg}(\text{l})$	+0.2680	$\text{Li}^+ + \text{e}^- \rightleftharpoons \text{Li}$	-3.045