CONCEPT: STANDARD POTENTIALS

Voltage (E) represents the amount of work done in an electrochemical cell as electrons travel from one electrode to another.

Reduction Half-Reactions	E° (V)
$F_2\,(g) + 2e^- \rightleftharpoons 2F^-$	2.890
$O_3\,(g) + 2H^+ + 2e^- \rightleftharpoons O_2\,(g) + H_2O$	2.075
$MnO_4^- + 8H^+ + 5e^- \rightleftharpoons Mn^{2+} + 4H_2O$	1.507
$Ag^+ + e^- \rightleftharpoons Ag\,(s)$	0.799
$Cu^{2+} + 2e^- \rightleftharpoons Cu\,(s)$	0.339
$2H^+ + 2e^- \rightleftharpoons H_2\,(g)$	0.000
$Cd^{2+} + 2e^- \rightleftharpoons Cd\,(s)$	-0.402
$K^+ + e^- \rightleftharpoons K\,(s)$	-2.936
$Li^+ + e^- \rightleftharpoons Li\,(s)$	-3.040

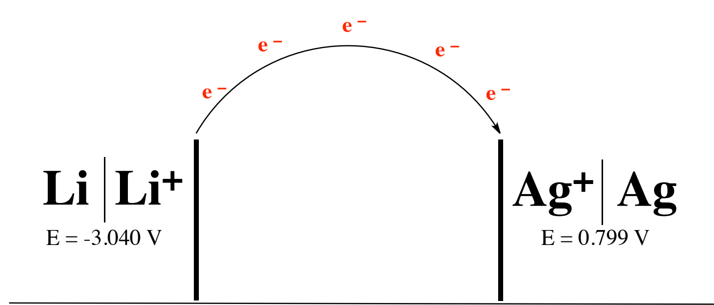
When combining two half-cell reactions together the cell potential for the total net reaction is given (when the concentrations approach unity) by:

$$E_{Cell} = E_+ - E_-$$

E_+ = Represents the _______________ electrode.

E_- = Represents the _______________ electrode.

EXAMPLE: Determine the electric potential that results from the given galvanic cell.



PRACTICE: STANDARD POTENTIALS CALCULATIONS 1

EXAMPLE 1: Use the standard half-cell potentials listed below to calculate the standard cell potential for the following reaction occurring in an electrochemical cell at 25°C. Assume the concentrations have approached unity.

$$3\ Cl_2\ (g) + 2\ Fe\ (s) \rightleftharpoons 6\ Cl^{-}\ (aq) + 2\ Fe^{3+}\ (aq)$$

$Cl_2\ (g) + 2\ e^{-} \longrightarrow 2\ Cl^{-}\ (aq)$ $\qquad E° = + 1.396\ V$

$Fe^{3+}\ (aq) + 3\ e^{-} \longrightarrow Fe\ (s)$ $\qquad E° = – 0.040\ V$

EXAMPLE 2: For the a voltaic cell with the overall reaction:

$$Zn\ (s) + Cu^{2+}\ (aq) \rightleftharpoons Zn^{2+}\ (aq) + Cu\ (s) \qquad E°_{cell} = 1.10\ V$$

Given that the standard reduction potential of Zn^{2+} to Zn (*s*) is – 0.762 V, calculate the standard reduction potential for:

$Cu^{2+}\ (aq) + 2\ e^{-} \longrightarrow Cu\ (s)$