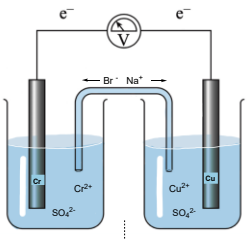
CONCEPT: CELL NOTATION

- Cell notation (cell diagram) is a quicker method to describe the overall redox reaction in an electrochemical cell.
  - □ Phase Boundary (___): The condition where two phases of the _____ substance can coexist at equilibrium.
  - □ Physical Boundary (___): The physical space that separates the _____ and the _____.

Cell Notation

Electrochemical Cell



Anode ( ) | Cathode ( )

_____ | _____

Half-Reduction Reactions

Canceling out the _____ gives the overall rxn

Cathode: _____ + _____ ⇌ _____

Anode: _____ ⇌ _____ + _____

Overall: _____ + _____ ⇌ _____ + _____

Cell Notation

Memory Tool Cell Notation is as easy as ____, ____, ____.

_____ Oxidation State | _____ Oxidation State || _____ Oxidation State | _____ Oxidation State

| | || |

EXAMPLE: Consider an electrochemical cell where the following reaction takes place:

$$3\ Sn^{2+}\ (aq)\ +\ 2\ Al\ (s) \longrightarrow 3\ Sn\ (s)\ +\ 2\ Al^{3+}\ (aq)$$

What is the cell notation for this cell?

PRACTICE: Write the half reactions as well as the overall net ionic equation for the following line notation:

$$Fe\ (s)\ |\ Fe^{2+}\ (aq)\ ||\ Mg^{2+}\ (aq)\ |\ Mg\ (s)$$

CONCEPT: CELL NOTATION

PRACTICE: The cell notation for a redox reaction is given as the following at (T= 298 K). Calculate the cell potential for the reaction at 25ºC.

$$Zn\ (s)\ |\ Zn^{2+}\ (aq,\ 0.37\ M)\ ||\ Ni^{2+}\ (aq,\ 0.059\ M)\ |\ Ni\ (s)$$

Standard Reduction Potentials

$Zn^{2+}\ (aq) + 2\ e^- \longrightarrow Zn\ (s)$ $\qquad E°_{red} = -\ 0.7621$

$Ni^{2+}\ (aq) + 2\ e^- \longrightarrow Ni\ (s)$ $\qquad E°_{red} = -\ 0.2300$

PRACTICE: What is the $[Cu^{2+}]$ for the following cell notation diagram if the cell potential is 0.4404 V?

$$Cu\ |\ Cu^{2+}\ (aq,\ ?\ M)\ ||\ Ag^{+}(aq,\ 0.50\ M)\ |\ Ag$$

Standard Reduction Potentials

$Cu^{2+}\ (aq) + 2\ e^- \longrightarrow Cu\ (s)$ $\qquad E°_{red} = +\ 0.3394$

$Ag^{+}\ (aq) + e^- \longrightarrow Ag\ (s)$ $\qquad E°_{red} = +\ 0.8000$