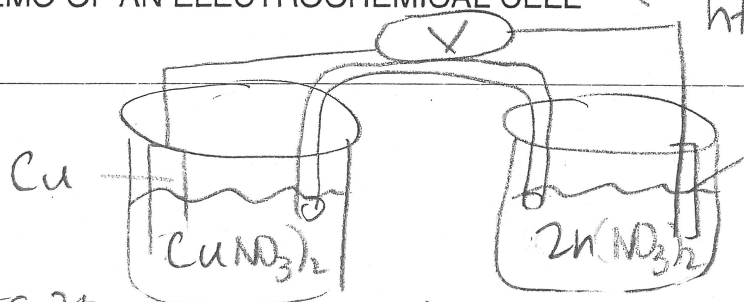
Name: Key
Blk:_____ Date:_____

Chemistry 12
Electrochemistry Lesson #1

Electrochemistry is the branch of chemistry in which chemical energy is converted into electrical energy (and or vice versa)

DEMO OF AN ELECTROCHEMICAL CELL (demo of a voltaic cell http://content.blackgold.ca



$Cu^{2+} + 2e^- \rightarrow Cu(s)$ $\quad Zn(s) \rightarrow Zn^{2+} + 2e^-$

Equation:

$Zn\ (s) + Cu^{2+}\ (aq)$ -----> $Zn^{2+}\ (aq) + Cu\ (s)$

The voltmeter reveals that electrons are flowing through the wire, from the zinc strip to the copper strip.

The above reaction involves the loss and gain of electrons. The reaction has been split so that the Cu^{2+} is reacting in the left half of the electrochemical cell:

$$Cu^{2+} + 2\ e^- \text{ ----> } + Cu\ (s)$$

while the zinc is reacting in the right:

$$Zn\ (s) \text{ -----> } Zn^{2+} + 2\ e^-$$

Each half is call a HALF CELL and the reaction that occurs in a half-cell is called a HALF-CELL REACTION or a HALF- REACTION

IMPT: if the salt bridge is removed the reaction STOPS IMEDIATELY!!!
allows ions to move from one 1/2 cell to balance the charges

OXIDATION- the half reaction in which a species losses electrons

REDUCTION- the half reaction in which a species gain electrons

"LEO the Lion says GER"

Loss of Electrons = OXIDATION
Gain of Electrons = REDUCTION

For every reduction reaction there must be a corresponding oxidation reaction, therefore it is called a REDUCTION-OXIDATION reaction or a REDOX reaction.

In the reaction:
$Zn\ (s) + Cu^{2+}\ (aq)$ -----> $Zn^{2+}\ (aq) + Cu\ (s)$

Cu is said to be the "agent" that causes Zn to become oxidized
Cu = oxidizing agent

Zn is said to be the "agent' that causes Cu to become reduced
Zn = reducing agent

IN OTHER WORDS
The **oxidizing agent** is **reduced**
The **reducing agent** is **oxidized**

How to tell which species is being oxidized or reduced?

OXIDIZATION = loss of electrons OR becoming more **POSITIVE**:

Zn ---> $Zn^{2+} + 2e$

REDUCTION = gain of electrons OR becoming more **NEGATIVE**:

$Cu^{2+} + 2e$ ---> Cu

Example 1: In the equation $Zn^{2+} + Mg$ ---> $Zn + Mg^{2+}$
write out the half-reactions:
Mg ---> $Mg^{2+} + 2e$

$Zn^{2+} + 2e$ ---> Zn

What is happening to Mg? lossing electrons = OXIDIZATION
What is happening to Zn? gaining electrons = REDUCTION

Mg is the reducing agent, while Zn^{2+} is the oxidizing agent.