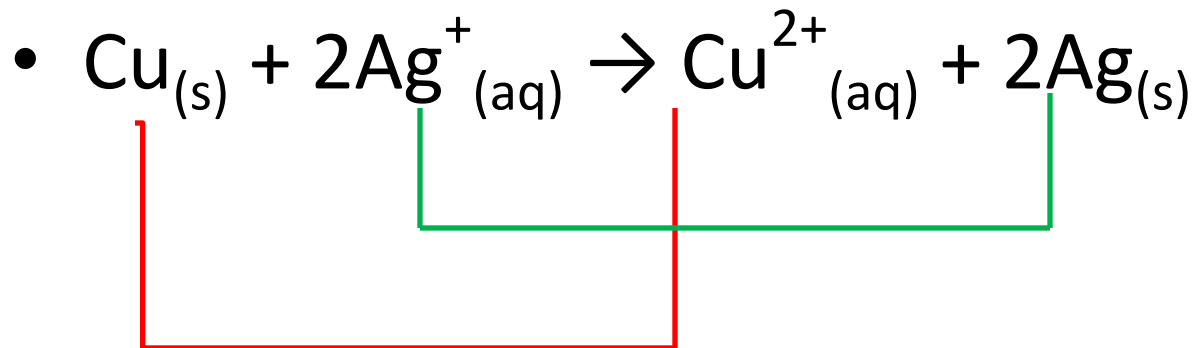


# Electrochemistry

- Electrochemistry involves REDOX - Reduction Oxidation reactions
- Let us start with the understanding of REDOX
- What is oxidation?
  - Loss of electrons
- What is reduction?
  - Gain of electrons – a reduction on oxidation number

# Examples of REDOX Reactions



- Two things are happening here:
  - Cu(s) is losing electrons
    - $\text{Cu}_{(s)} \rightarrow \text{Cu}^{2+} + 2e^-$
  - $\text{Ag}^+_{(aq)}$  gains an electron
    - $\text{Ag}^+_{(aq)} + e^- \rightarrow \text{Ag}_{(s)}$
  - These are called half reactions

- The half reactions are combined to make a full reaction
- $\text{Cu}_{(s)} + 2\text{Ag}^+_{(aq)} \rightarrow \text{Cu}^{2+}_{(aq)} + 2\text{Ag}_{(s)}$
- Electrons are transferred from the oxidized species to reduced one
- Which of the following are oxidized/reduced?
  - $\text{ClO}_3^- + \text{I}^- \rightarrow \text{I}_2 + \text{Cl}^-$
  - $\text{NO}_3^- + \text{Sb} \rightarrow \text{Sb}_4\text{O}_6 + \text{NO}$

# Identifying Oxidizing and Reducing Agents

- Assign oxidation numbers
- Identify the elements whose oxidation numbers have changed
  - Oxidation is
    - An increase in oxidation number
  - Reduction is
    - A decrease in oxidation number
- $2\text{MnO}_{2(s)} + \text{H}_{2(g)} \rightarrow \text{Mn}_2\text{O}_{3(s)} + \text{H}_2\text{O}_{(l)}$

- Let us see the oxidation numbers in this reaction – on the side of reactants:
  - Oxygen is always -2 when combined with another element, but there are exceptions
  - The sum of oxidation numbers in a neutral compound should be zero
  - If in this reaction O is -2, then for the sum of oxidation numbers to be zero Mn must be +4
- What is the situation on the side of products?