

# Chemistry 3.7

## Redox Chemistry

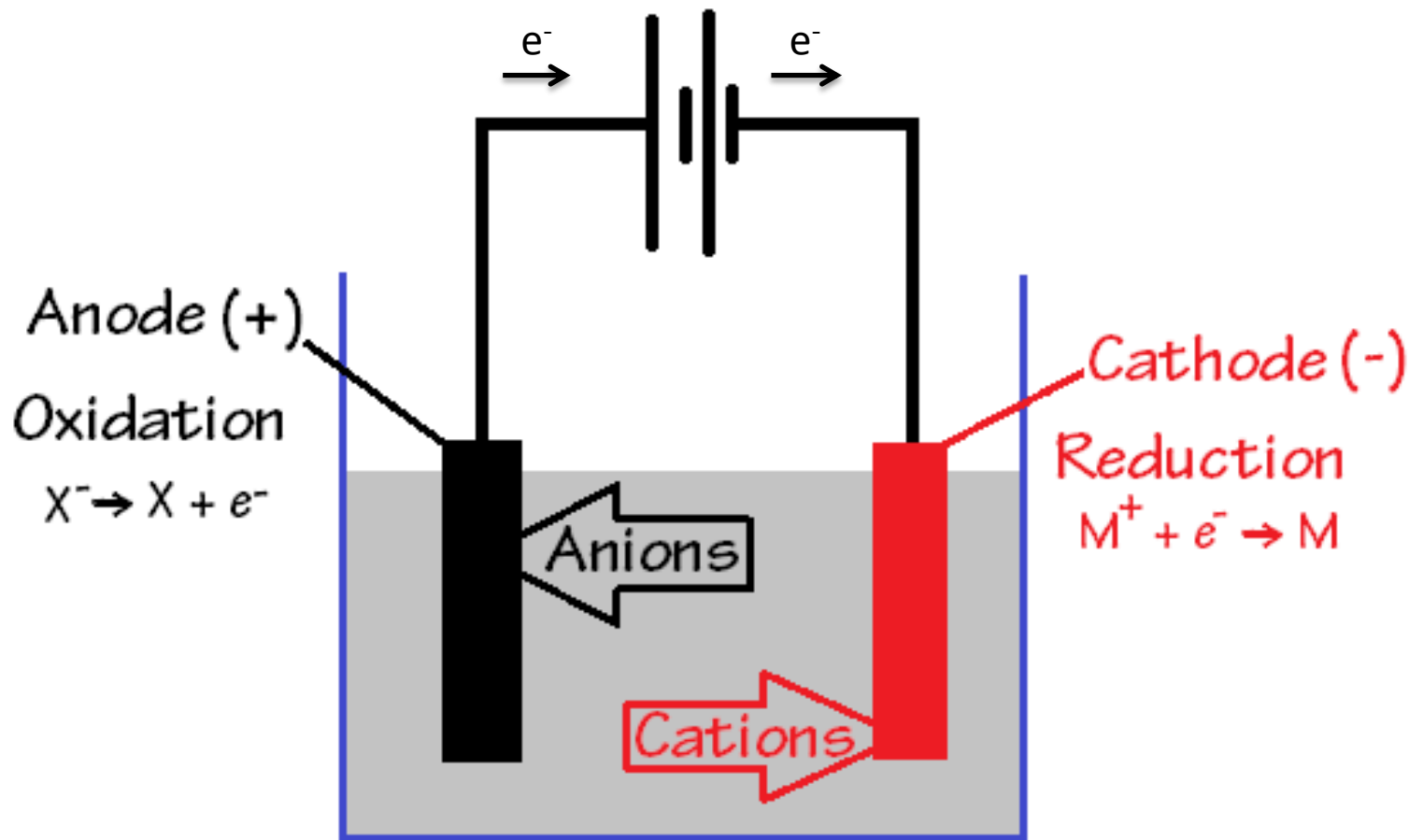
Electrolysis

# Definition

- Electrolysis is the process of using an electrical current to force a chemical reaction to occur.
  - Electro- = Electricity
  - -lysis = cut
- Using electricity to break a chemical bond
- More specifically, reverse the formation of ions by “pumping” electrons to cation and “stealing” electrons from anion.

# We need...

- This process requires
  - Moveable ions in a medium called electrolyte
    - Aqueous solution
    - Molten
  - Power supply
  - Electrode
    - Cathode- The negative electrode where the reduction occurs. (Cations)
    - Anode- The positive electrode where the oxidation occurs. (Anions)



Remember!

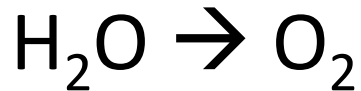
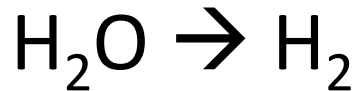


An Ox

Red Cat

# Example

## Electrolysis of water



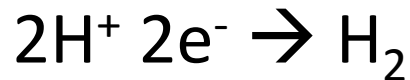
Write the balanced  $\frac{1}{2}$  equation

Write the overall equation

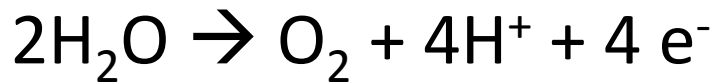
Identify the product in cathode and anode

# Observation

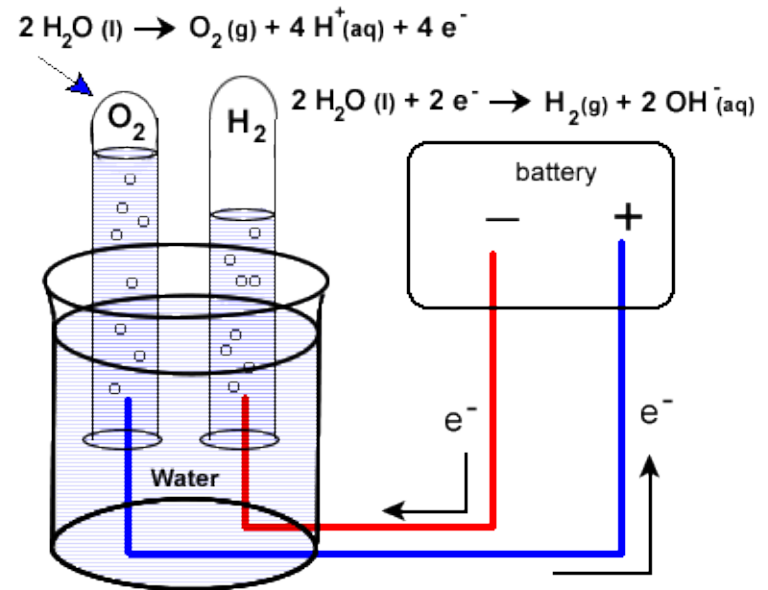
- Hydrogen gas is being produced in the **Cathode**



- Oxygen gas is being produced in the **Anode**



- The rate of producing hydrogen gas is twice as fast as the rate of producing oxygen gas.

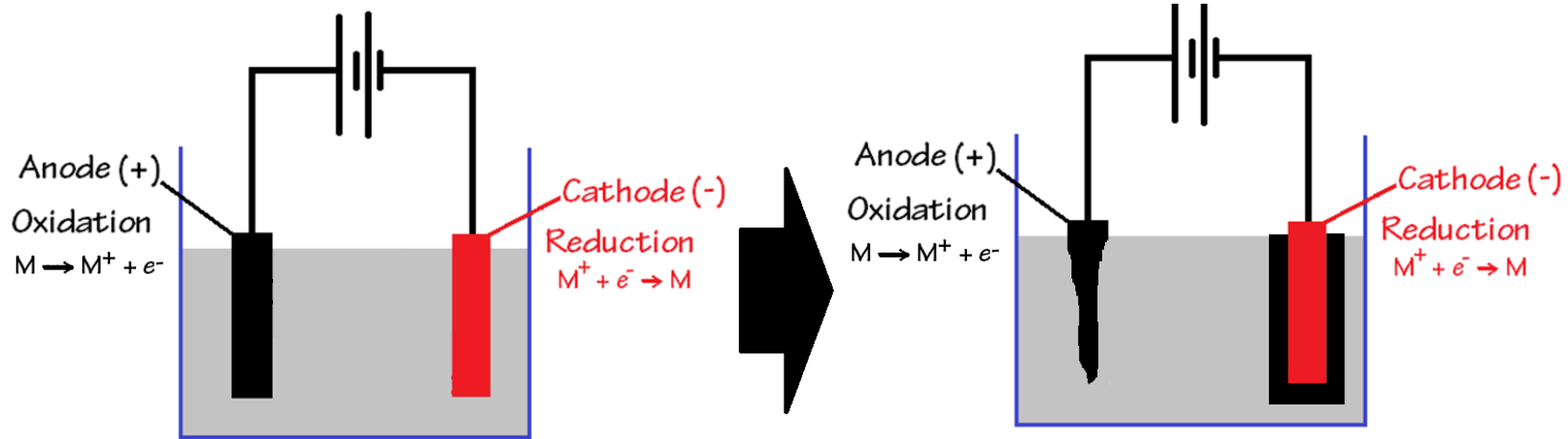


# Electroplating

- Aim
  - Coat an object with a metal desired
  - Purify metal
- What you need?
  - Electrode of the metal desired (anode)
  - Metal ion solution of the metal desired
  - Object that you want to coat (cathode)



- **Oxidize metal atoms** in the **electrode (anode)** to become ions in the solution
- **Reduce metal ions** in solution to metal atoms. Metal atoms **deposit** on the **object (Cathode)**
- The **solution** is just acting as an “**wire**” for **transferring** metal atom **from anode** to **cathode**.



# Observation

- **Anode decreases** in mass as metal atom in the anode being oxidized to become metal ion
- **Cathode increases** in mass as metal ion in the solution being reduced to become metal atom
- There is **no change** in the concentration of metal ion in **solution** as for each metal ion being formed from atom, there will be an atom formed from ion