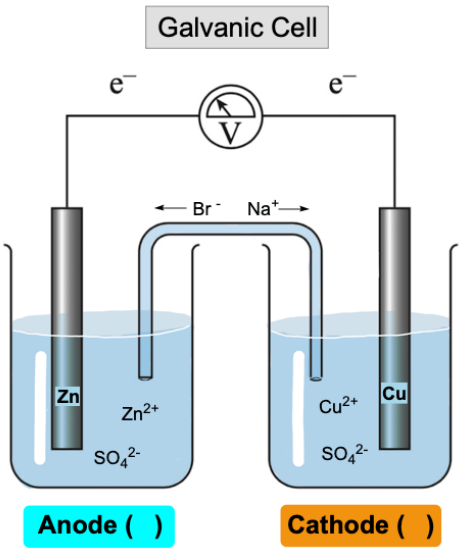
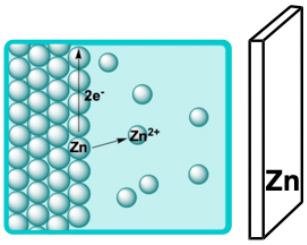
CONCEPT: GALVANIC CELL (SIMPLIFIED)

- **Galvanic Cell** (Voltaic Cell) is a _____ cell that produces or discharges electricity, making it a battery.
  - □ It uses stored _____ energy and converts it into _____ energy.
  - □ **Anode** (__): The metal electrode and compartment where _____ occurs. (_____ electrons)
  - □ **Cathode** (__): The metal electrode and compartment where _____ occurs. (_____ electrons)
  - □ **Salt Bridge:** A tube that connects both half cells to one another and allows for the flowing of _____ ions.
    - _____ **Ions:** Ions within solution that possess _____ acidic or basic properties.
  - □ **Voltmeter**: The device that records the amount of _____ generated by the galvanic cell.

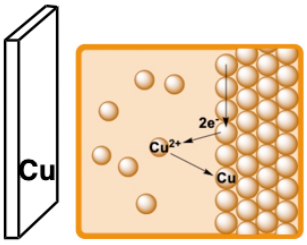


EXAMPLE: The purpose of a galvanic cell is to:

a) Purify solids b) Allow for only oxidation c) Generate electricity d) To consume electricity



Zn is _____ to Zn^{2+}



Cu^{2+} is _____ to Cu

Anode Reaction: _____

Cathode Reaction: _____

Overall Reaction: _____

EXAMPLE: How many electrons are transferred between the zinc and copper electrodes in the galvanic cell?

a) 1 b) 2 c) 3 d) 4

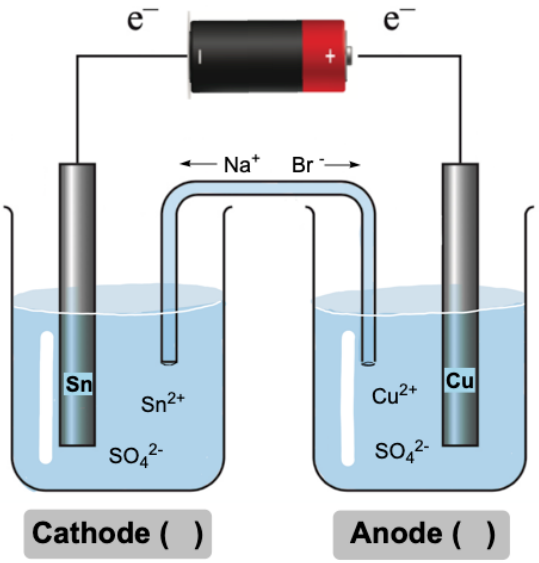
CONCEPT: GALVANIC CELL (SIMPLIFIED)

Electrolytic Cell

- A nonspontaneous cell that utilize *electrolysis* in order to operate.
  - □ **Electrolysis:** Chemical Reactions that consume external _____ energy in order to occur.
  - □ No matter the cell, the cathode is the site of _____ and the anode is the site of _____.
    - Since the process is nonspontaneous, the cathode is _____ and the anode is _____.
    - Electrolytic cells are the _____ of galvanic cells.

EXAMPLE: Identify the location within an electrolytic cell where the loss of electrons will occur.

a) Cathode b) Anode c) Salt Bridge d) Electrode e) Voltmeter



Sn^{2+} is _____ to Sn **Cu is _____ to Cu^{2+}**

Cathode Reaction: _____

Anode Reaction: _____

Overall Reaction: _____

- **Application of an Electrolytic Cell**: _____ batteries or _____ lithium batteries.

EXAMPLE: Which of the following is true about an electrolytic cell?

a) It changes chemical energy into electrical energy.

b) It uses a positive cathode.

c) It uses an electrical current to make a nonspontaneous reaction go.

d) All of the above.

CONCEPT: GALVANIC CELL (SIMPLIFIED)

PRACTICE: Which of the following statements is true for a salt bridge?

a) Contains neutral atoms that interact with the ions in both half-cell compartments.

b) Serves as a route through which ions can flow freely.

c) Serves as the site of oxidation.

d) Serves as the site of reduction.

PRACTICE: Which of the following statements is TRUE for a voltaic cell, but FALSE for an electrolytic cell?

I. The flow of electrons is spontaneous.

II. Oxidation occurs at the anode.

III. Electrons flow from the anode to the cathode.

a) Only I b) I and II c) II and III d) I, II, and III e) Only II

PRACTICE: What is the balanced half reaction that occurs at the anode in the overall cell reaction of a voltaic cell?

$$3\ MnO_4^-\ (aq) + 5\ Fe\ (s) \longrightarrow 3\ Mn^{2+}\ (aq) + 5\ Fe^{3+}\ (aq)$$

a) $MnO_4^-\ (aq) + 8\ H^+\ (aq) + 5\ e^- \longrightarrow Mn^{2+}\ (aq) + 4\ H_2O\ (l)$

b) $2\ MnO_4^-\ (aq) + 12\ H^+\ (aq) + 6\ e^- \longrightarrow 2\ Mn^{2+}\ (aq) + 3\ H_2O\ (l)$

c) $Fe\ (s) \longrightarrow Fe^{3+}\ (aq) + 3\ e^-$

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

e) $Fe^{2+}\ (s) \longrightarrow Fe^{3+}\ (aq) + e^-$