

# Batteries

Lesson 2.3

# Key Concepts

- What was the first battery made of?
- How does an electrochemical cell work?



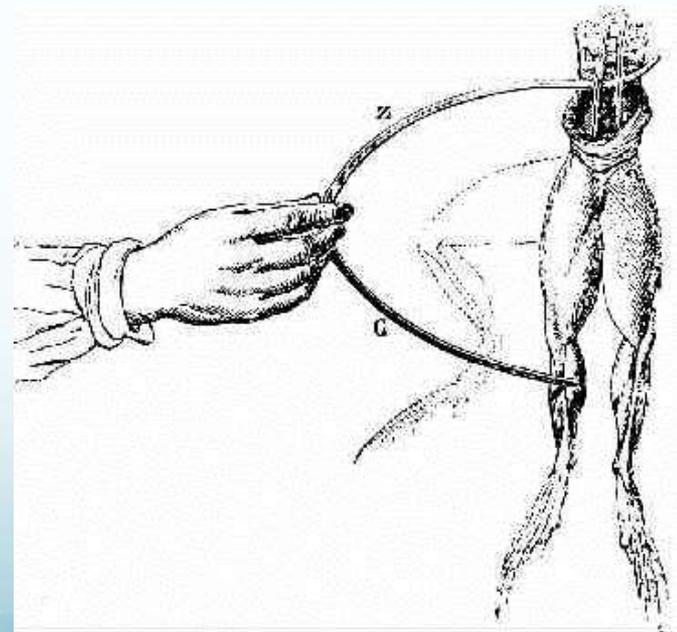
# Chemical Energy

- Batteries transform chemical energy into electrical energy.
- **Chemical energy** is energy stored in chemical compounds.



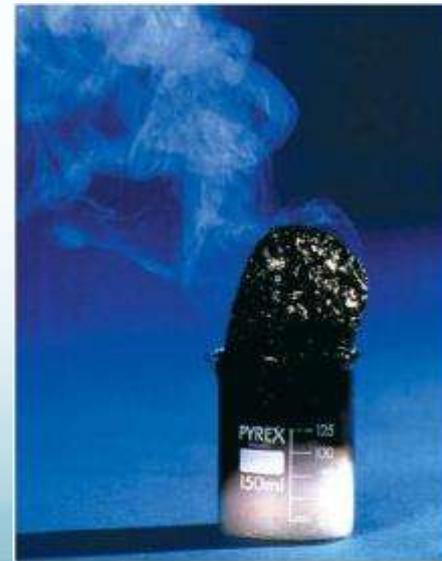
# “Animal Electricity”

- The research that led to the development of the battery was done in the 1780s by Luigi Galvani.
- Galvani observed a twitch in frogs that he hypothesized was some kind of “animal electricity.”



# Chemical Reaction

- The Italian scientist Alessandro Volta hypothesized that what Galvani had observed was actually a result of a chemical reaction.
- A **chemical reaction** is a process in which substances change into new substances with different properties.



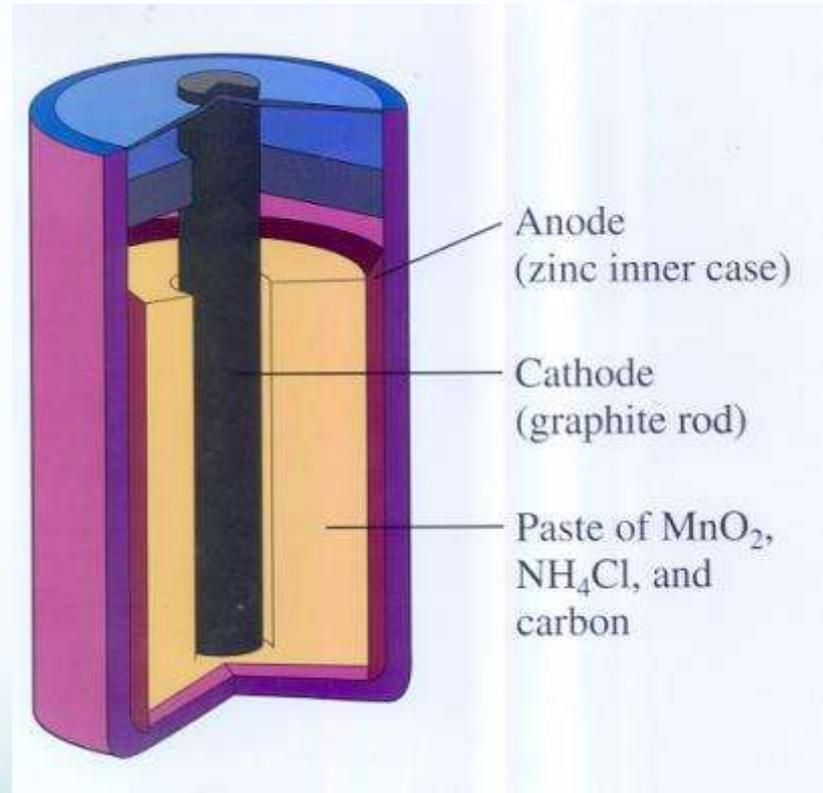
# First Electric Battery

- **Volta built the first electric battery by layering zinc, paper soaked in salt water, and silver.**
- When he connected wires to the metals, there was a current through the wires.



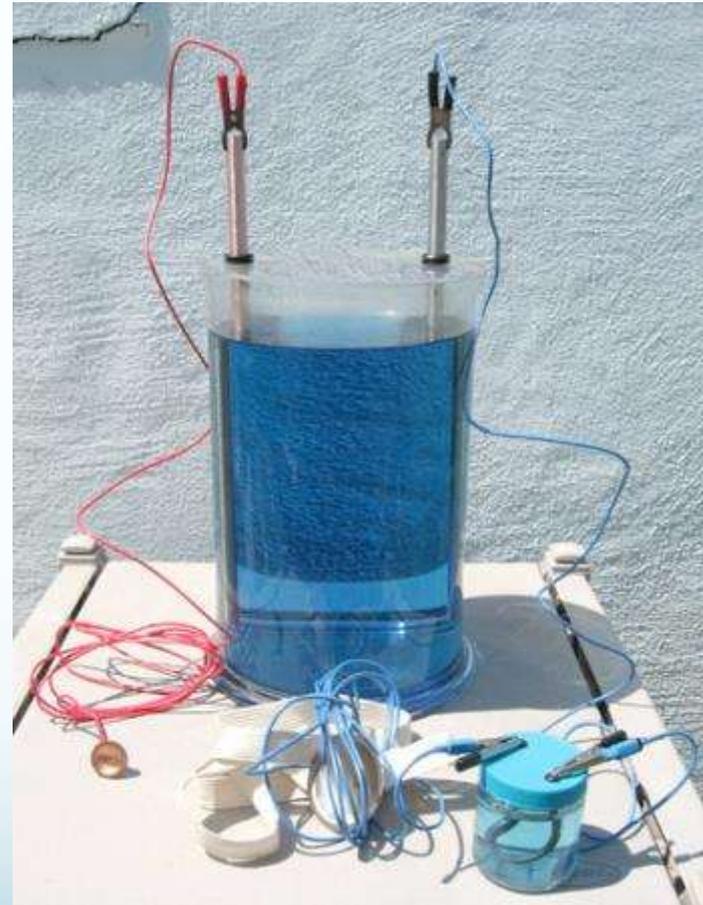
# Electricity from Chem-RXN

- This experiment proved that electricity could be produced as a result of a chemical reaction.
- Volta's battery was the basis of more powerful modern batteries.



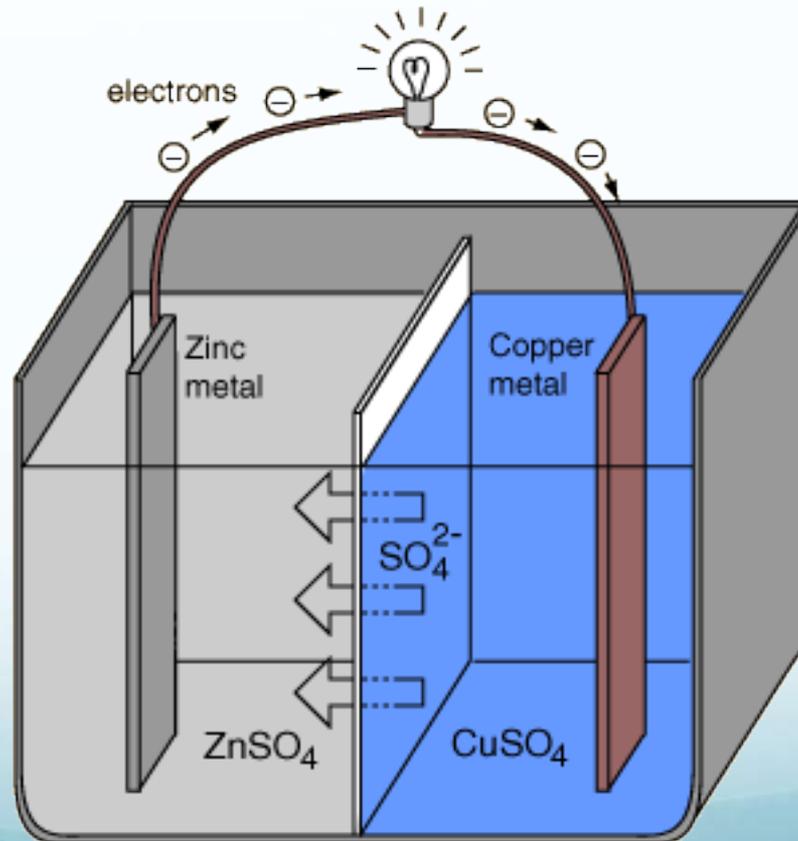
# Key Concepts

- What was the first battery made of?
- How does an electrochemical cell work?



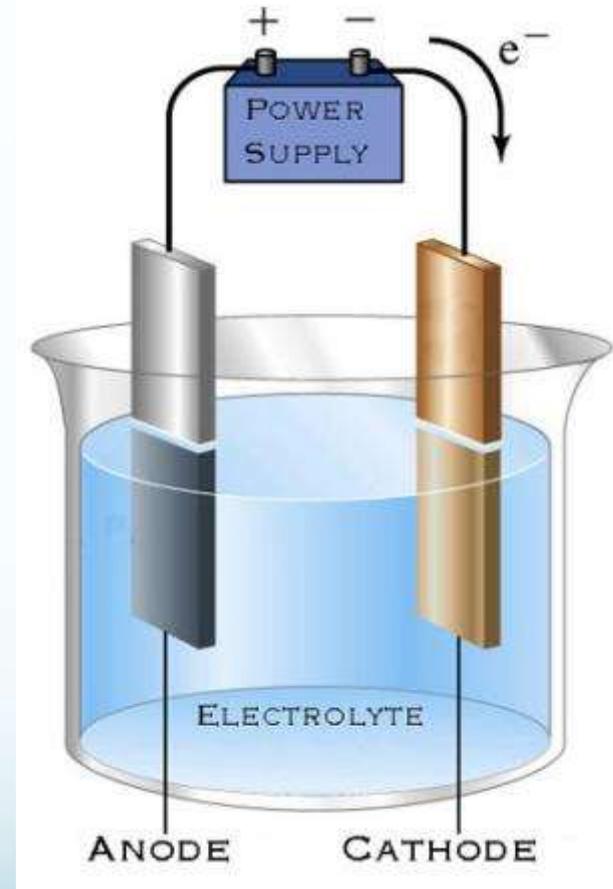
# Electrochemical Cell

- An **electrochemical cell** is a device that transforms chemical energy into electrical energy.



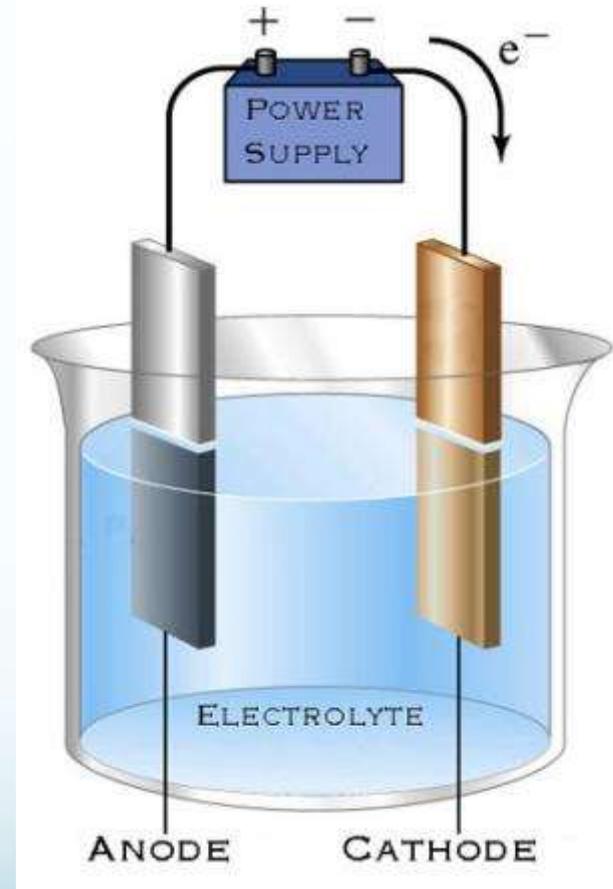
# Electrodes & Electrolyte

- An electrochemical cell is made of two different metals called **electrodes**, which are immersed in an electrolyte.
- An **electrolyte** is a substance that conducts electric current.



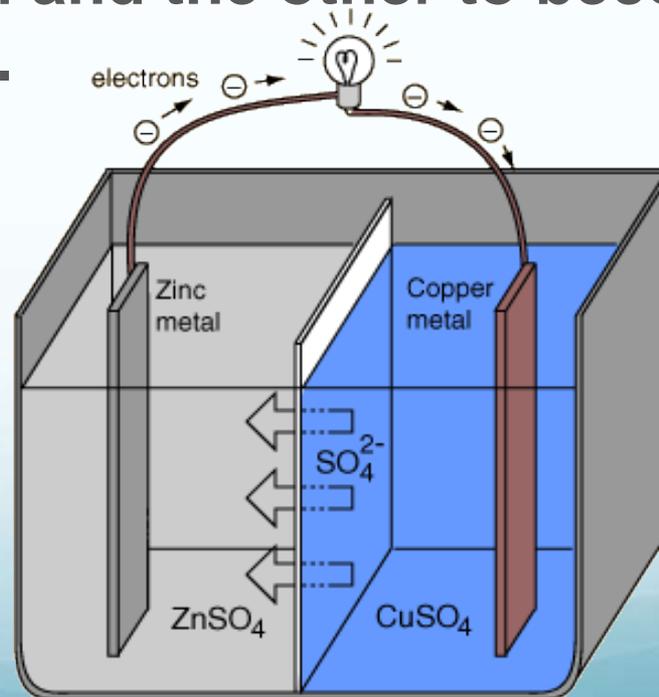
# Terminals

- The part of an electrode above the surface of the electrolyte is called a **terminal**.
- The terminals are used to connect the cell to a circuit.



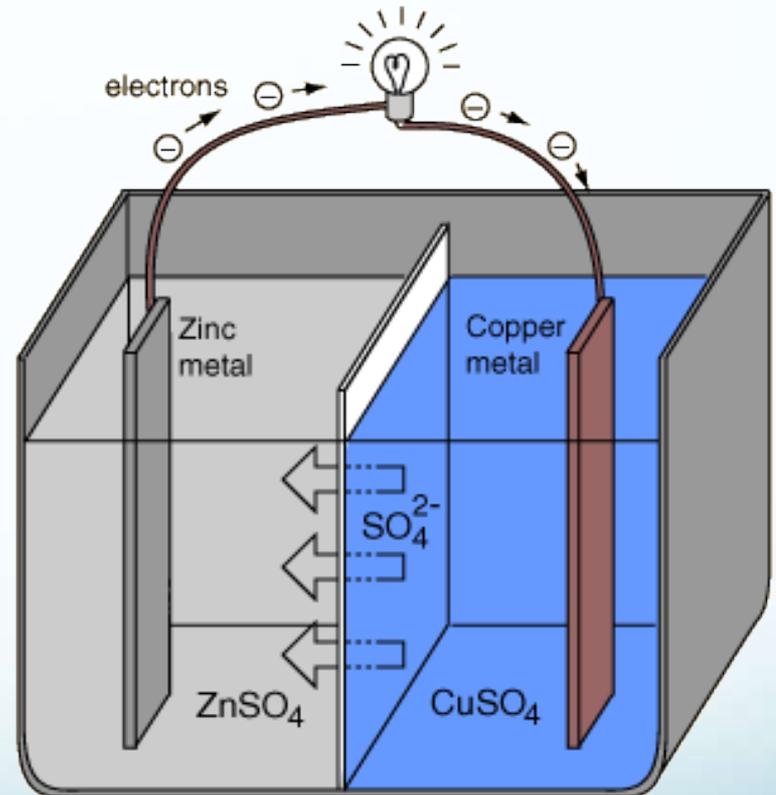
# Potential Difference

- Chemical reactions occur between the electrolyte and the electrodes in an electrochemical cell.
- These reactions cause one electrode to become negatively charged and the other to become positively charged.



# Voltage – Complete Circuit

- Because the electrodes have opposite charges, there is a voltage between them.
- If the terminals are connected by a wire, charge will flow from one terminal to the other.
- Charges flow back through the electrolyte to make a complete circuit.



# Batteries

- A **battery** is a combination of two or more electrochemical cells in a series.
- Today, single cells are often referred to as “batteries.”





# Types of Cells

- There are two kinds of electrochemical cells:
  1. wet cells
  2. and dry cells.



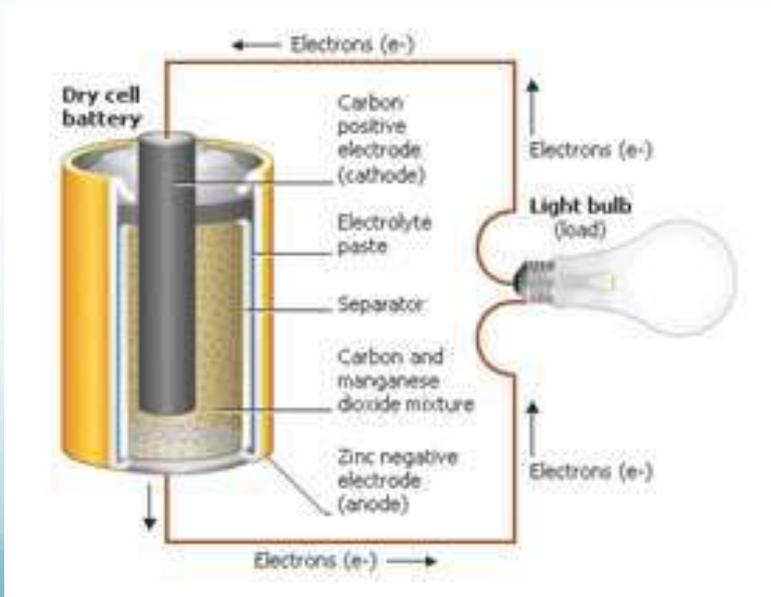
# Wet Cells

- An electrochemical cell in which the electrolyte is a liquid is a **wet cell**.
- An automobile battery is an example of a wet cell.



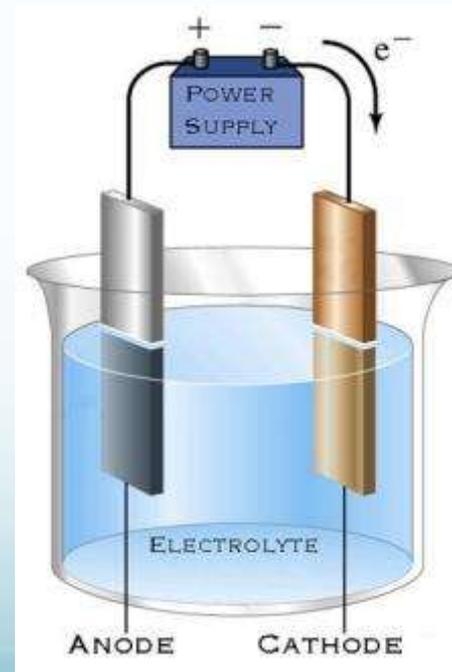
# Dry Cells

- A **dry cell** is an electrochemical cell in which the electrolyte is a paste.
- Flashlights and many other devices use dry cells.



# Key Concepts

- What was the first battery made of?
- How does an electrochemical cell work?



# Skill Check 2.3

1. Volta built the first electric battery by...
  - a) layering zinc, paper soaked in salt water, and silver.
  - b) creating the energy stored in chemical compounds.
  - c) observing a twitch in frogs that he hypothesized was some kind of “animal electricity.”

# Skill Check 2.3

2. An electrochemical cell is...
  - a) two different metals which are immersed in an electrolyte.
  - b) the part of an electrode above the surface of the electrolyte.
  - c) a device that transforms chemical energy into electrical energy.

# Skill Check 2.3

3. A battery is...
- a) an electrochemical cell in which the electrolyte is a liquid.
  - b) a combination of two or more electrochemical cells in a series.
  - c) an electrochemical cell in which the electrolyte is a paste.

# Skill Check 2.3

1. Volta built the first electric battery by...
  - a) layering zinc, paper soaked in salt water, and silver.
  - b) creating the energy stored in chemical compounds.
  - c) observing a twitch in frogs that he hypothesized was some kind of “animal electricity.”

# Skill Check 2.3

2. An electrochemical cell is...
- a) a substance that conducts electric current.
  - b) the part of an electrode above the surface of the electrolyte.
  - c) a device that transforms chemical energy into electrical energy.

# Skill Check 2.3

3. A battery is...
- a) an electrochemical cell in which the electrolyte is a liquid.
  - b) a combination of two or more electrochemical cells in a series.
  - c) an electrochemical cell in which the electrolyte is a paste.