

Batteries

Lesson 2.3

Key Concepts

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



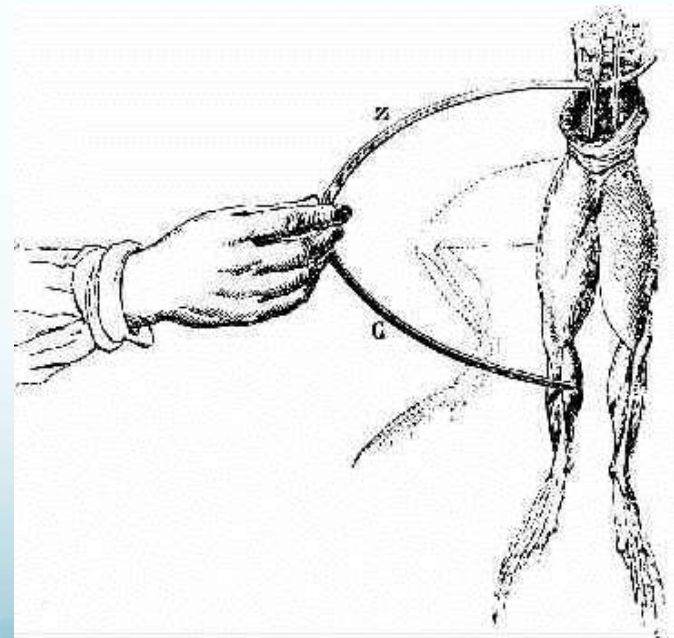
Chemical Energy

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



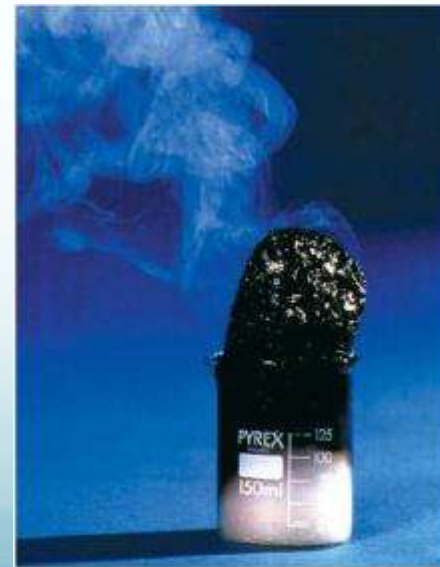
“Animal Electricity”

- 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.



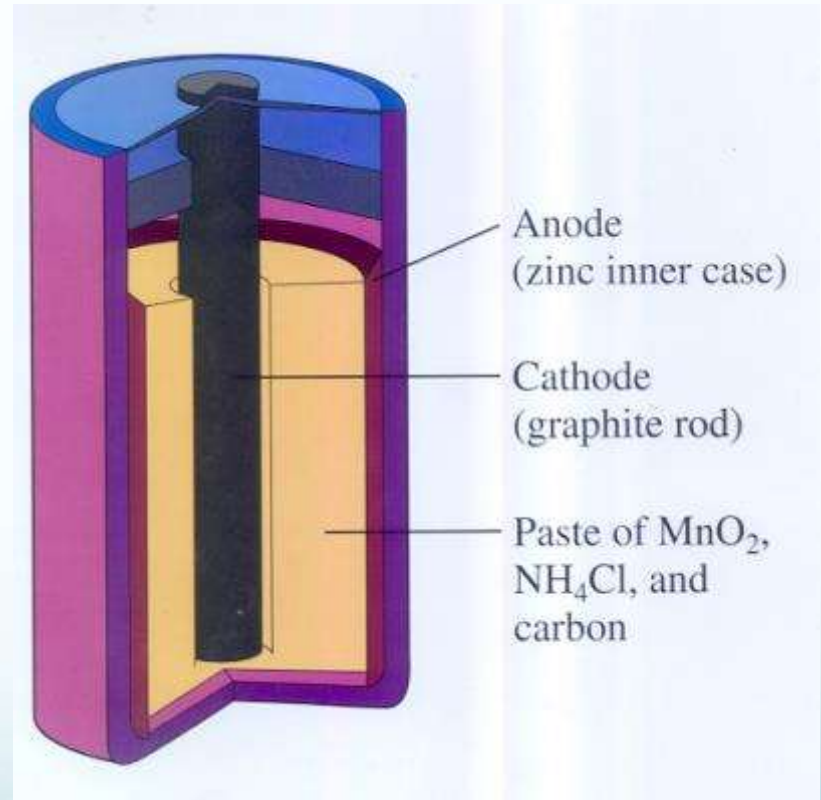
First Electric Battery

- **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.



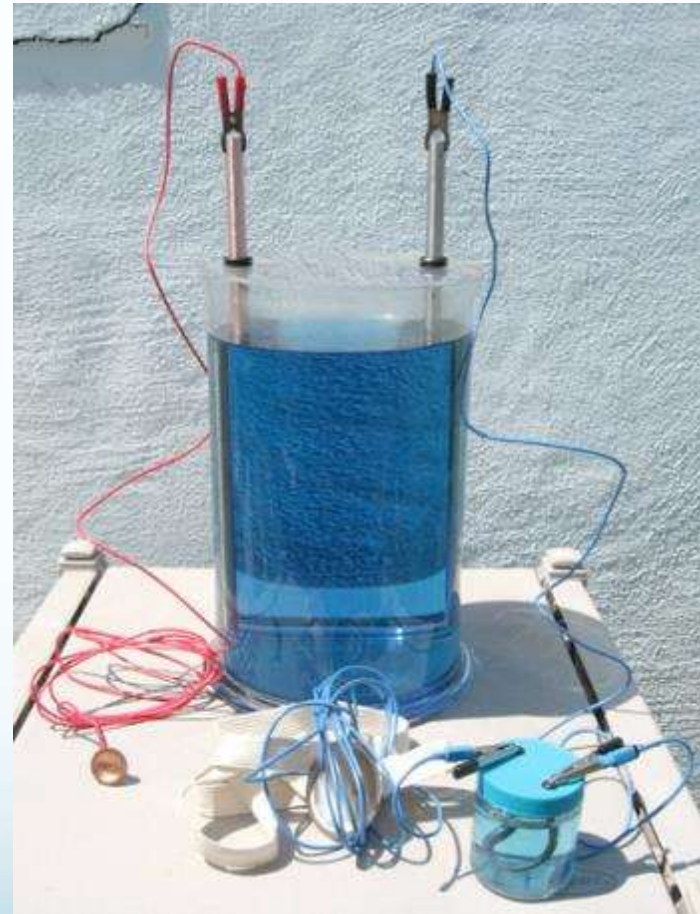
Electricity from Chem-RXN

- 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.



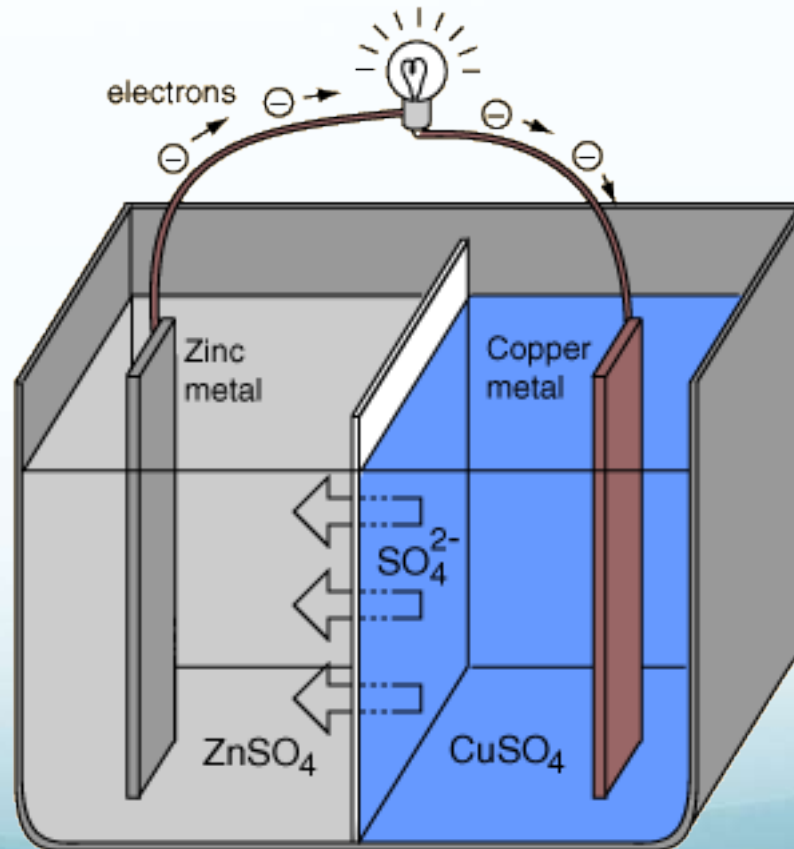
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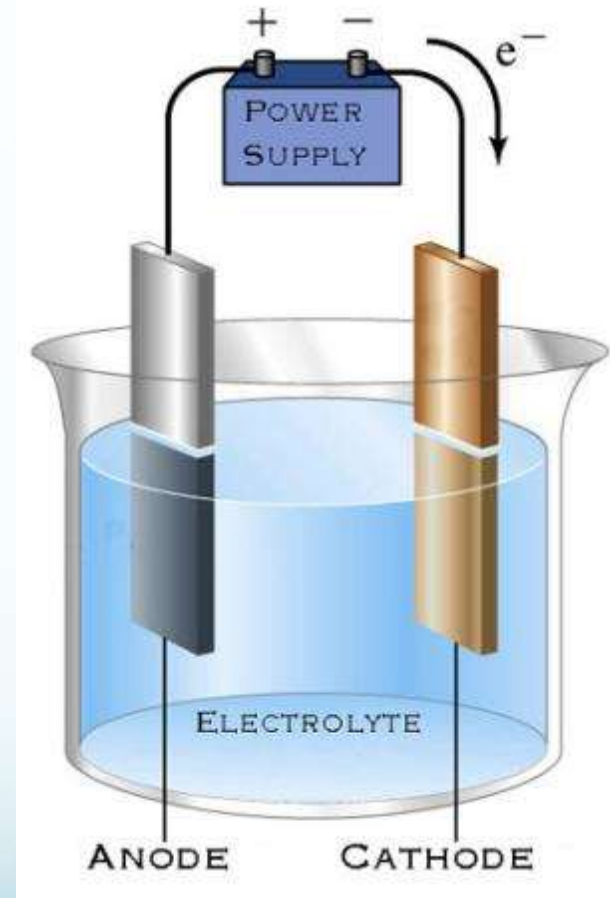
Electrochemical Cell

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



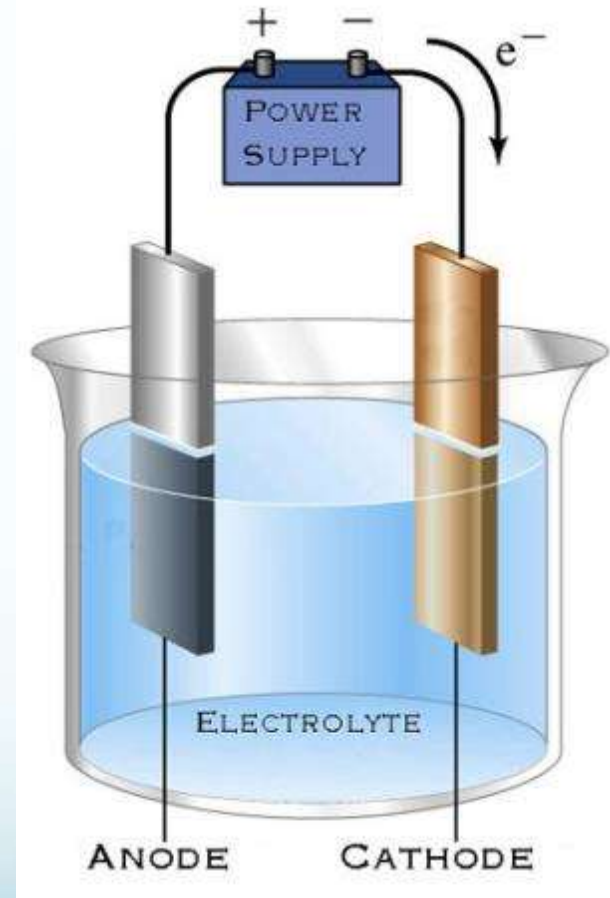
Electrodes & Electrolyte

- 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.



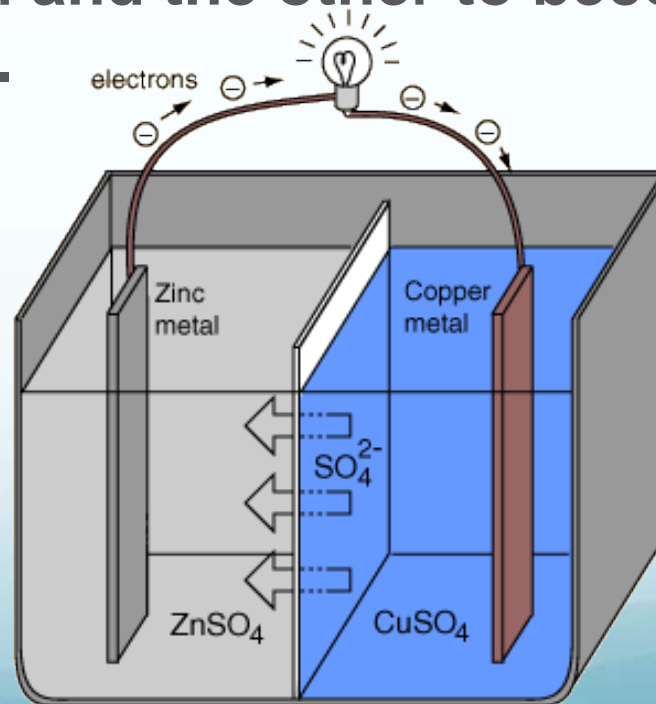
Terminals

- 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.



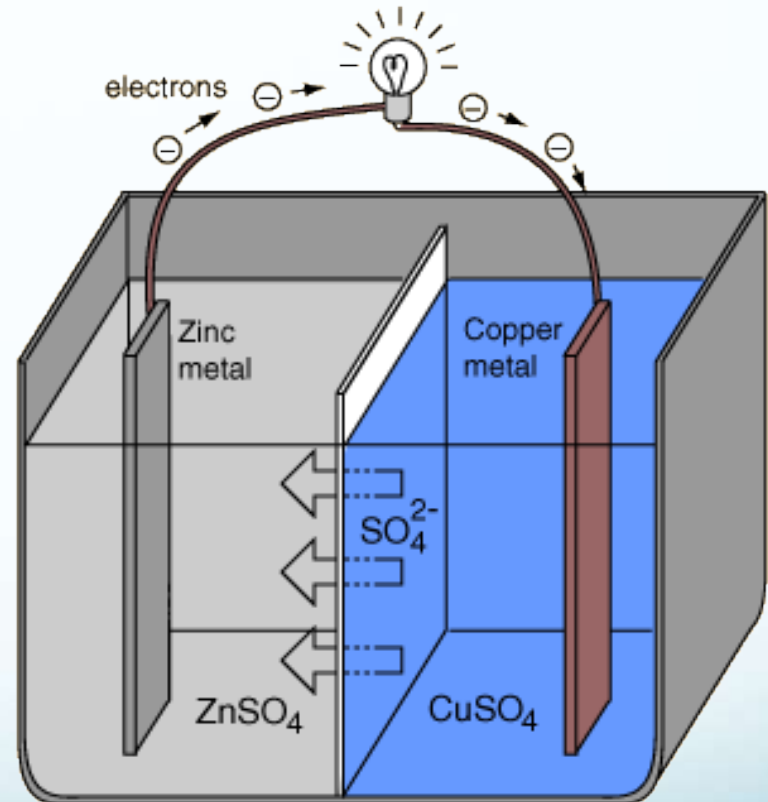
Potential Difference

- 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.”



Total Voltage

- In a battery, the positive terminal of one cell is connected to the negative terminal of the next.
- The voltage of the battery is the sum of the voltages of the cells.



Types of Cells

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



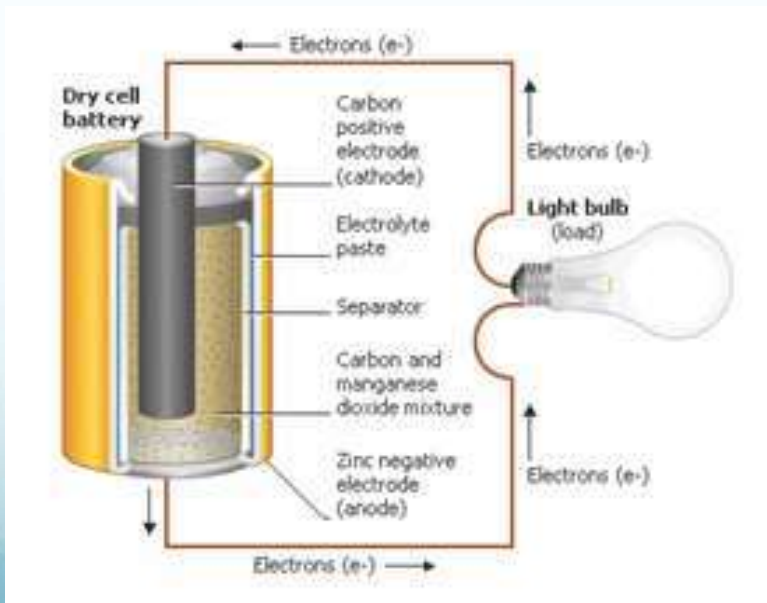
Wet Cells

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



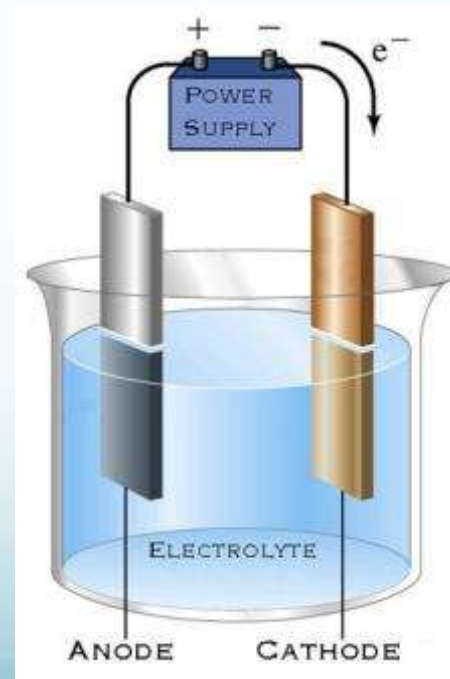
Dry Cells

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



Key Concepts

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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.