

## Chapter 22

Use with Section 3

## ENRICHMENT

## ● Acids and Bases

## Electrolytic Solutions

Svante Arrhenius was a Swedish chemist born in 1859. As a doctoral student, Arrhenius studied the capacity of certain solutions to conduct electricity. The solutions he determined could conduct electricity were referred to as electrolytic solutions. Those solutions that couldn't conduct electricity were referred to as nonelectrolytic solutions. He hypothesized that electrolytic compounds broke into particles when they dissolved. Arrhenius also proposed a new way of thinking about acids and bases. He said that acids are compounds containing hydrogen that ionize to yield hydrogen ions in solution. He also said that bases are compounds that ionize to form hydroxide ions in solution. Therefore, both acids and bases form electrolytic solutions. After presenting his findings as part of his dissertation defense, Arrhenius was given the lowest possible passing grade. Finally, however, his work was recognized when he won the Nobel Prize for chemistry in 1903.

### Materials



- orange juice
- vinegar
- water
- milk
- measuring cup
- 9-volt battery
- #43 bulb, or a flashlight lightbulb
- coated wire
- small nonmetallic container
- aluminum foil
- knife

### Procedure

1. Cut three pieces of wire into approximately 25–30-cm lengths.
2. Trim about 1.5 to 2 cm of the coating off of each end of the wires.
3. Attach one end of one of the wires to the negative post on the battery.
4. Attach one end of another wire to the positive post on the battery.
5. Choose one of the ends and attach it to the base of the bulb.
6. Pour one of the solutions into the non-metallic container.  
**Note:** Attach 5–sq cm pieces of aluminum foil to the ends of each wire that you are going to put into the solution. Attach them by folding them over the exposed parts of the wires.
7. Place the exposed end of the wire attached to the battery into the solution.
8. Attach one of the ends of the third wire to the base of the bulb and put the other end into the solution.

Describe what happened for each of the solutions and identify them as either electrolytic or nonelectrolytic.

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