MICRO LAB

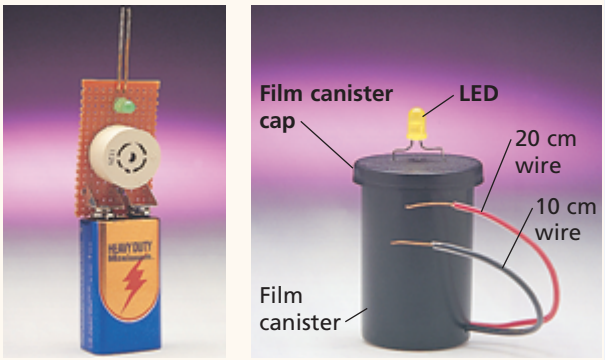
Measuring K_a for Acetic Acid

OBJECTIVES

- ***Compare*** **the conductivities of solutions of known and unknown hydronium ion concentrations.**
- ***Relate*** **conductivity to the concentration of ions in solution.**
- ***Explain*** **the validity of the procedure on the basis of the definitions of strong and weak acids.**
- ***Compute*** **the numerical value of K_a for acetic acid.**

MATERIALS

- **1.0 M acetic acid, CH_3COOH**
- **1.0 M hydrochloric acid, HCl**
- **24-well plate**
- **distilled or deionized water**
- **LED conductivity testers**
- **paper towels**
- **thin-stemmed pipets**



Teacher-made LED conductivity tester

BACKGROUND

The acid dissociation constant, K_a, is a measure of the strength of an acid. Strong acids are completely ionized in water. Because weak acids are only partly ionized, they have a characteristic K_a value. Properties that depend on the ability of a substance to ionize, such as conductivity and colligative properties, can be used to measure K_a. In this experiment, you will compare the conductivity of a 1.0 M solution of acetic acid, CH_3COOH, a weak acid, with the conductivities of solutions of varying concentrations of hydrochloric acid, HCl, a strong acid. From the comparisons you make, you will be able to estimate the concentration of hydronium ions in the acetic acid solution and calculate its K_a.

SAFETY

For review of safety, please see **Safety in the Chemistry Laboratory** in the front of your book.

PREPARATION

1. Create a table with two columns for recording your observations. Head the first column "HCl concentration." A wide second column can be headed "Observations and comparisons."

PROCEDURE

1. Obtain samples of 1.0 M HCl solution and 1.0 M CH_3COOH solution.
2. Place 20 drops of HCl in one well of a 24-well plate. Place 20 drops of CH_3COOH in an adjacent well. Label the location of each sample.
3. Test the HCl and CH_3COOH with the conductivity tester. Note the relative intensity of the