



Is It an Acid or a Base?

OBJECTIVES

- *Design* an experiment to solve a chemical problem.
- *Relate* observations of chemical properties to identify unknowns.
- *Infer* a conclusion from experimental data.
- *Apply* acid-base concepts.

MATERIALS

- 24-well microplate or 24 small test tubes
- labeled pipets containing solutions numbered 1–8
- toothpicks

For other supplies, check with your teacher.

BACKGROUND

When scientists uncover a problem that they need to solve, they think carefully about the problem and then use their knowledge and experience to develop a plan for solving it. In this experiment, you will be given a set of eight colorless solutions. Four of them are acidic solutions (dilute hydrochloric acid), and four are basic solutions (dilute sodium hydroxide). The concentrations of both the acidic and the basic solutions are 0.1 M, 0.2 M, 0.4 M, and 0.8 M. Phenolphthalein has been added to the acidic solutions.

First, write a procedure to determine which solutions are acidic and which are basic. Then, carry out your procedure. Next, develop and carry out procedure that allows you to list the acidic and basic solutions in order from lowest to highest concentration. As you plan your procedures, consider the properties of acids and bases that are discussed in Chapter 14. Predict what will happen to a solution of each type and concentration when you do each test. Then, compare your predictions with what actually happens. You will have limited amounts of the unknown solutions to work with, so use them carefully. Ask your teacher what additional supplies (if any) will be available to you.

SAFETY



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

PREPARATION

1. Make two data tables in your lab notebook. For Data Table 1, make two columns, one labeled “Acids” and the other labeled “Bases.”

