



# Testing Water for Ions

## OBJECTIVES

- *Observe* chemical reactions involving aqueous solutions of ions.
- *Relate* observations of chemical properties to the presence of ions.
- *Infer* whether an ion is present in a water sample.
- *Apply* concepts concerning aqueous solutions of ions.

## MATERIALS

- 24-well microplate lid
- fine-tipped dropper bulbs, labeled, with solutions, 10
- overhead projector (optional)
- paper towels
- solution 1: reference (all ions)
- solution 2: distilled water (no ions)
- solution 3: tap water (may have ions)
- solution 4: bottled spring water (may have ions)
- solution 5: local river or lake water (may have ions)
- solution 6: solution X, prepared by your teacher (may have ions)
- solution A: NaSCN solution (test for  $\text{Fe}^{3+}$ )
- solution B:  $\text{Na}_2\text{C}_2\text{O}_4$  solution (test for  $\text{Ca}^{2+}$ )
- solution C:  $\text{AgNO}_3$  solution (test for  $\text{Cl}^-$ )
- solution D:  $\text{Sr}(\text{NO}_3)_2$  solution (test for  $\text{SO}_4^{2-}$ )
- white paper

## BACKGROUND

The physical and chemical properties of aqueous solutions are affected by small amounts of dissolved ions. For example, if a water sample has enough  $\text{Mg}^{2+}$  or  $\text{Ca}^{2+}$  ions, it does not create lather when soap is added. This is common in places where there are many minerals in the water (hard water). Other ions, such as  $\text{Pb}^{2+}$  and  $\text{Co}^{2+}$ , can accumulate in body tissues; therefore, solutions of these ions are poisonous.

Because some sources of water may contain harmful or unwanted substances, it is important to find out what ions are present. In this experiment, you will test various water samples for the presence of four common, nontoxic ions:  $\text{Fe}^{3+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Cl}^-$ , and  $\text{SO}_4^{2-}$ . Some of the samples may contain these ions in very small concentrations, so make very careful observations.

## SAFETY



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

## PREPARATION

1. Create a data table in your lab notebook following your teacher's instructions. Record all of your observations in your data table.
2. Place the 24-well microplate lid in front of you on a white background. Label the columns and rows as instructed by your teacher. The coordinates will designate the individual circles. For example, the circle in the top right corner would be 1-D.

## PROCEDURE

1. Obtain labeled dropper bulbs containing the six different solutions from your teacher.