Properties of Acids and Bases

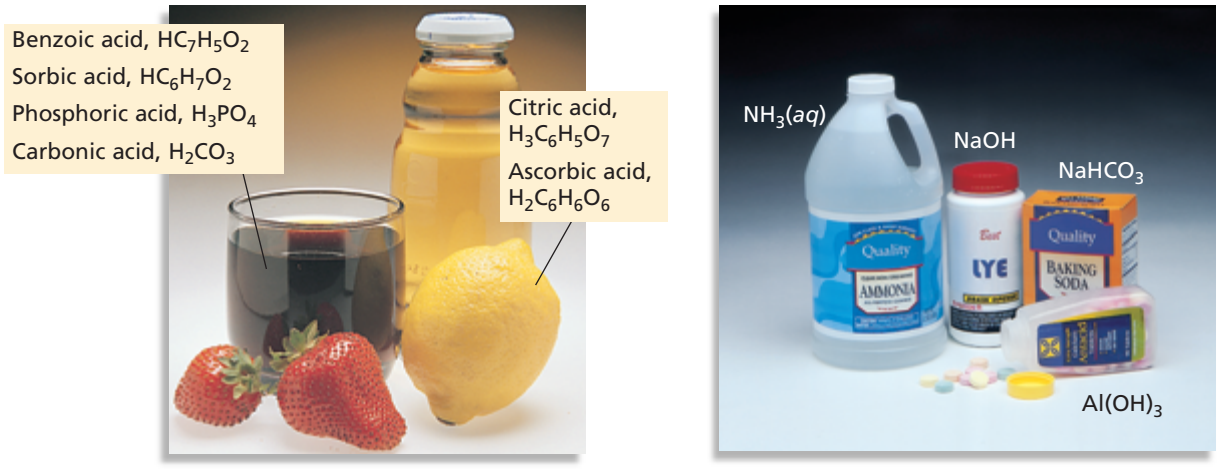
SECTION 1

Objectives

- List five general properties of aqueous acids and bases.
- Name common binary acids and oxyacids, given their chemical formulas.
- List five acids commonly used in industry and the laboratory, and give two properties of each.
- Define *acid* and *base* according to Arrhenius's theory of ionization.
- Explain the differences between strong and weak acids and bases.

How many foods can you think of that are sour? Chances are that almost all the foods you thought of, like those in **Figure 1a,** owe their sour taste to an acid. Sour milk contains *lactic acid.* Vinegar, which can be produced by fermenting juices, contains *acetic acid. Phosphoric acid* gives a tart flavor to many carbonated beverages. Most fruits contain some kind of acid. Lemons, oranges, grapefruits, and other citrus fruits contain *citric acid.* Apples contain *malic acid,* and grape juice contains *tartaric acid*.

Many substances known as bases are commonly found in household products, such as those in **Figure 1b.** Household ammonia is an ammonia-water solution that is useful for all types of general cleaning. Sodium hydroxide, NaOH, known by the common name *lye,* is present in some commercial cleaners. Milk of magnesia is a suspension in water of magnesium hydroxide, $Mg(OH)_2$, which is not very water-soluble. It is used as an antacid to relieve discomfort caused by excess hydrochloric acid in the stomach. Aluminum hydroxide, $Al(OH)_3$, and sodium hydrogen carbonate, $NaHCO_3$, are also bases commonly found in antacids.



(a) (b)

FIGURE 1 (a) Fruits and fruit juices contain acids such as citric acid and ascorbic acid. Carbonated beverages contain benzoic acid, phosphoric acid, and carbonic acid. (b) Many household cleaners contain bases such as ammonia and sodium hydroxide. Antacids contain bases such as aluminum hydroxide.