Depending on the preparation, tinctures contain alcohol in amounts ranging from approximately 15% to 80%. The alcohol content protects against microbial growth and keeps the alcohol-soluble extractives in solution. In addition to alcohol, other solvents, such as glycerin, may be employed. The solvent mix of each tincture is important in maintaining the integrity of the product. Tinctures cannot be mixed successfully with liquids too diverse in solvent character because the solute may precipitate. For example, compound benzoin tincture, prepared with alcohol as the sole menstruum, contains alcohol-soluble principles that are immediately precipitated from solution upon addition of water.

Because of the alcoholic content, tinctures must be tightly stoppered and not exposed to excessive temperatures. Also, because many of the constituents found in tinctures undergo a photochemical change upon exposure to light, many tinctures must be stored in light-resistant containers and protected from sunlight.

Medicated tinctures taken orally include Paregoric, USP, or camphorated tincture of opium. Usually, patients requiring oral medication nowadays prefer to take a tablet or capsule or a pleasant-tasting elixir or syrup. Tinctures have a rather high alcoholic content, and some physicians and patients alike prefer other forms of medication. Opium Tincture, USP, or laudanum, is much more potent than paregoric, and the two should not be confused. Opium Tincture contains 10% opium (which equates to 1% morphine) and camphorated tincture of opium contains 0.4% opium (which equates to 0.04% morphine). Any prescription for either one should be carefully evaluated and the dose checked and confirmed.

## PROPER ADMINISTRATION AND USE OF LIQUID PERORAL DOSAGE FORMS

Most of the dosage forms discussed in this chapter are to be administered by mouth. Conveniently, these can be measured in a teaspoon or tablespoon, depending on the desired dosage. Preferably, however, these medicines should be measured out in calibrated devices for administration. These devices ensure that the correct dose will be received, and household flatware can vary dramatically in the volume delivered. Even though these are liquids, it is recommended that the patient follow the administration of the liquid dosage form with a glassful of water.

The pharmacist must be careful in the selection of liquid products, given the patient's history and other concurrent medicines. For example, some syrups contain sucrose or another sugar, and the pharmacist must recall that such syrups would not be suitable for use in an oral prescription intended for a diabetic patient. Similarly, a product that is formulated as an elixir or syrup containing alcohol would not be suitable for a patient who receives concurrent medicines that possess an Antabuse-like activity; the patient may get violently ill from the concurrent ingestion of alcohol. Metronidazole and chlorpropamide have been implicated to cause this reaction when mixed with alcohol. Furthermore, if the patient is receiving another drug that causes drowsiness, the pharmacist must consult the prescribing physician to determine whether the prescribed elixir could be harmful to the patient.

## TOPICAL SOLUTIONS AND TINCTURES

Generally, the topical solutions employ an aqueous vehicle, whereas the topical tinctures characteristically employ an alcoholic vehicle. As required, cosolvents or adjuncts to enhance stability or the solubility of the solute are employed.

Most topical solutions and tinctures are prepared by simple dissolving. However, certain solutions are prepared by chemical reaction; these, in particular, are discussed later in this section. Of the tinctures for topical use, one, compound benzoin tincture, is prepared by maceration of the natural components in the solvent; the others are prepared by simple solution.

Because of the nature of the active constituents or the solvents, many topical solutions and tinctures are self-preserved. Those that are not may contain suitable preservatives. Topical solutions and tinctures should be