

cholestyramine (Questran, Par), used in the management of hyperlipidemia, and barium sulfate (Barosperse, Mallinckrodt), used orally or rectally as a radiopaque contrast medium to visualize the gastrointestinal tract as an aid to diagnosis. Barium sulfate was introduced into medicine about 1910 as a contrast medium for roentgen ray examination of the gastrointestinal tract. It is practically insoluble in water, and thus its administration even in the large doses required is safe because it is not absorbed from the gastrointestinal tract. The pharmacist must be careful not to confuse barium sulfate with other forms of barium, such as barium *sulfide* and barium *sulfite*, which are soluble salts and are poisonous. Barium sulfate is a fine, nongritty, odorless, and tasteless white powder. When prepared as a suspension and administered orally, it is used to diagnose conditions of the hypopharynx, esophagus, stomach, small intestine, and colon. The barium sulfate renders the gastrointestinal tract opaque to the x-ray so as to reveal any abnormality in the anatomic features of the tract. When administered rectally, barium sulfate allows visualization of the features of the rectum and colon.

Commercially, barium sulfate for diagnostic use is available as a bulk powder containing the required suspending agents for effective reconstitution to an oral suspension or enema. Enema units, which contain prepared suspension in a ready-to-use and disposable bag, are also available.

EMULSIONS

An emulsion is a dispersion in which the dispersed phase is composed of small globules of a liquid distributed throughout a vehicle in which it is immiscible (Fig. 14.8). In emulsion terminology, the dispersed phase is the *internal phase*, and the dispersion medium is the *external* or *continuous phase*. Emulsions with an oleaginous internal phase and an aqueous external phase are *oil-in-water* (o/w) emulsions. Conversely, emulsions having an aqueous internal phase and an oleaginous external phase are termed *water-in-oil* (w/o) emulsions. Because the external phase of an

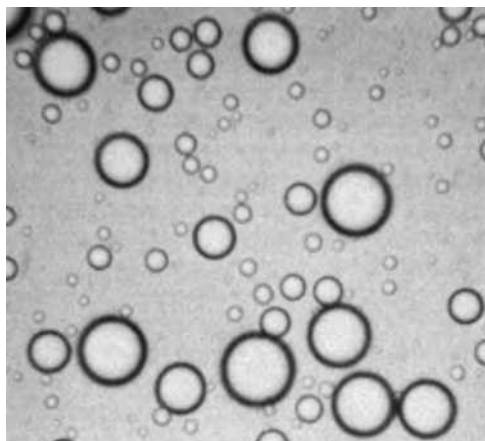


FIGURE 14.8 Mineral oil-in-water emulsion. The largest oil globule measures approximately 0.04 mm. (Courtesy of James C. Price, PhD, College of Pharmacy, University of Georgia.)

emulsion is continuous, an o/w emulsion may be diluted or extended with water or an aqueous preparation and a w/o emulsion, with an oleaginous or oil-miscible liquid. Generally, to prepare a stable emulsion, a third phase, an *emulsifying agent*, is necessary. Depending on their constituents, the viscosity of emulsions can vary greatly, and pharmaceutical emulsions may be prepared as liquids or semisolids. Based on the constituents and the intended application, liquid emulsions may be employed orally, topically, or parenterally and semisolid emulsions topically. Many pharmaceutical preparations that are actually emulsions are not classified as such because they fit some other pharmaceutical category more appropriately. For instance, emulsions include certain lotions, liniments, creams, ointments, and commercial vitamin drops that are discussed in this book under these various designations.

Purpose of Emulsions and of Emulsification

Emulsification enables the pharmacist to prepare relatively stable and homogeneous mixtures of two immiscible liquids. It permits administration of a liquid drug in the form of minute globules rather than in bulk. For orally administered emulsions, the o/w type permits palatable administration of