



Figure 3-2 Emulsion formulations. (A) Large volume—typical formulation—soybean oil (10–20%) (linoleic, oleic, palmitic oils; unsaturated fatty acid triglycerides), egg yolk phospholipid (1.2%), glycerin (2.5%), Water for Injection. *Source:* Courtesy of Baxter Healthcare Corporation. (B) Small volume—typical formulation—soybean oil, egg lecithin, glycerin, Water for Injection, pH approximately 8.0—for example, Propofol[®], Vitalipid[®], Limethason[®], Lipfen[®], Liple[®], Diazemuls[®], Fluosol[®]. *Source:* Courtesy of Teva Pharmaceuticals.

However, if the solid formulation can be crystallized, then powder filling can be a viable alternative to lyophilization. Most injectable cephalosporins, because they can be crystallized, are filled as sterile powders. Some proteins are prepared by spray drying techniques and filled as sterile powders. Sterile solids are reconstituted prior to administration with a suitable diluent. Chapters 10 and 20 cover formulation and processing, respectively, of lyophilized (freeze-dried) solids.

Another category of solids, for a lack of a better place to introduce this type of solid, are the solid implants, surgically inserted within bodily tissue, primarily for prolonged action pharmaceuticals. These are discussed in the following text in section “Polymeric Implants.”

LARGE VOLUME INJECTABLES

LVIIs include electrolytes, carbohydrates, proteins, fatty emulsions, peritoneal dialysis solutions, and irrigating solutions. Table 3-1 gives a more complete example of commercially available large volume products (courtesy of a Baxter product listing).

Electrolyte Solutions

These solutions are primarily sodium chloride (0.9%) isotonic solutions, other concentrations of sodium chloride (0.45%, 3%), potassium chloride (20–40 mEq/L), Ringer’s, lactated Ringer’s, sodium lactate, sodium bicarbonate, and various combinations of sodium chloride, potassium chloride, and/or dextrose.

Carbohydrate Solutions

Dextrose 5% in water (D5W) is the most common and popular large volume carbohydrate. Dextran solutions are also included here along with combinations of dextrose and sodium chloride, dextrose and potassium chloride, dextrose and Ringer’s or Lactated Ringer’s, and other combinations thereof.