Ansel's Pharmaceutical Dosage Forms and Drug Delivery Syste

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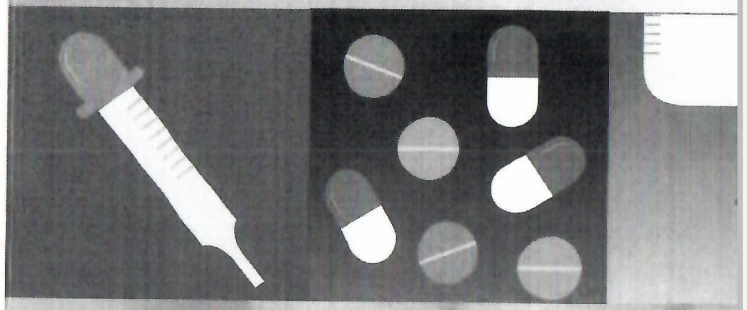

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EIGHTH EDITION

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Chapter at a glance

Cation exchange:

$$\text{H-resin} + M^- + X^- + H_2O \rightarrow$$
$$\text{M-resin} + H^+ + X^- + H_2O \text{ (pure)}$$

Anion exchange:

$$\text{Resin-NH}_2 + H^+ + X^- + H_2O \rightarrow$$
$$\text{Resin-NH}_2 \cdot HX + H_2O \text{ (pure)}$$

Water purified in this manner, referred to as demineralized or deionized water, may be used in any pharmaceutical preparation or prescription calling for distilled water.

Reverse Osmosis

Reverse osmosis is one of the processes referred to in the industry as cross-flow (or tangential flow) membrane filtration (3). In this process, a pressurized stream of water is passed parallel to the inner side of a filter membrane core. A portion of the feed water, or influent, permeates the membrane as filtrate, while the balance of the water sweeps tangentially along the membrane to exit the system without being filtered. The filtered portion is called the permeate because it has permeated the membrane. The water that has passed through the system is called the concentrate because it contains the concentrated contaminants rejected by the membrane. Whereas in osmosis, the flow through a semipermeable membrane is from a less concentrated solution to a more concentrated solution, the flow in this cross-flow system is from more concentrated to a less concentrated solution; thus the term reverse osmosis. Depending on their pore size, cross-flow filter membranes can remove particles defined in the range of microfiltration (0.1–2 μg, e.g., bacteria); ultrafiltration (0.01–0.1 μg, e.g., virus); nanofiltration (0.001–0.01 μg, e.g., organic compounds in the molecular weight range of 300–1000); and reverse osmosis (particles smaller than 0.001 μg). Reverse osmosis removes virtually all viruses, bacteria, pyrogens, and organic molecules and 90 to 99% of ions (3).

Preparation of Solutions

Most pharmaceutical solutions are unsaturated with solute. Thus the amounts of solute to be dissolved are usually well below the capacity of the volume of solvent employed. The strengths of pharmaceutical preparations are usually expressed in terms of percent strength, although for very dilute preparations, expressions of ratio strength may be used. These expressions and examples are shown in Table 13.4.

The symbol % used without qualification (as with w/v, v/v, or w/w) means percent weight in volume for solutions or suspensions of solids in liquids; percent weight in volume for solutions of gases in liquids; percent volume in volume

TABLE 13.4 COMMON METHODS OF EXPRESSING THE STRENGTHS OF PHARMACEUTICAL PREPARATIONS

EXPRESSION	ABBREVIATED EXPRESSION	MEANING AND EXAMPLE
Percent weight in volume	% w/v	Grams of constituent in 100 mL of preparation (e.g., 1% w/v = 1 g constituent in 100 mL preparation)
Percent volume in volume	% v/v	Milliliters of constituent in 100 mL of preparation (e.g., 1% v/v 1 mL constituent in 100 mL preparation)
Percent weight in weight	% w/w	Grams of constituent in 100 g of preparation (e g., 1% w/w = 1 g constituent in 100 g preparation)
Ratio strength:weight in volume	–:— w/v	Grams of constituent in stated milliliters of preparation (e.g., 1:1000 w/v = 1 g constituent in 1000 mL preparation)
Ratio strength:volume in volume	–:— v/v	Milliliters of constituent in milliliters of preparation (e.g., 1:1000 v/v = 1 mL constituent in 1000 mL preparation)
Ratio strength:weight in weight	–:— w/w	Grams of constituent in stated number of grams of preparation (e.g., 1:1000 w/w = 1 g constituent in 1000 g preparation)

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