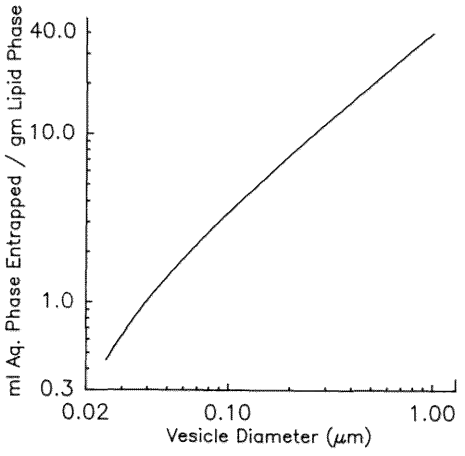

Figure 16.1 Theoretical relationship of captured volume to diameter of unilamellar vesicles.

the hydrating buffer, and L is the total mass quantity of lipid in the cleaned-up preparation.

Another liposomal property, *percent entrapment* or *percent encapsulation*, is an important parameter for characterizing the efficiency of the hydrating process. It is defined as the fraction of the total aqueous compartment sequestered within liposomal membranes and is calculated from

$$\text{Captured volume} \times \text{lipid concentration} \times 100\% = \% \text{ entrapment} \quad [2]$$

There is a practical upper limit (approximately 70%, see Table 1) to the percent entrapment of a highly water-soluble marker in purely aqueous phase. This is due to geometric limits of packing spheroids into a given volume during the hydrating process.

This geometric constraint does not apply if the active ingredient adsorbs to the bilayer or partitions into the lipid phase. Under these conditions, it is more accurate to describe the apparent efficiency of drug association with liposomes as the *percent incorporation* of active ingredient.

In addition, estimates of parameters such as the average number of lamellae per vesicle and interlamellar spacing (2), and the number of vesicles and total surface area of a liposome suspension (3) can be derived from the captured volume, average vesicle size, and lipid concentration.