Polymeric-controlled systems [8, 9] can be separated into three distinct types:

(i) Polymer coatings dissolve slower than the drug. The drug comes to the aqueous environment only after degradation or dissolution of the coatings. This is also known as degradation-controlled release of the drug. Degradation-controlled drug delivery may occur in several ways like physical degradation and chemical degradation. Physical degradation of drug-encapsulated vesicle may occur by frictional interaction with another surface known as adhesion. It may take place by abrasion, i.e., some material is lost due to press, or by fatigue where the surface is weakened by application of load. Cavitations and corrosions may also rupture the drug-encapsulated surface. Chemical degradation of cross-linked network of polymer or breaking of drug–polymer link in drug–polymer conjugates occurs through hydrolysis reaction. Alginate is effectively used in chemical degradation route of drug delivery as alginates undergo acid-catalyzed hydrolysis, which depends on pH and temperature. Apart from degradation-controlled release, diffusion control and osmotic pressure-regulated drug release are also important, particularly when the drug is encapsulated within alginate vesicles.

(ii) Diffusion-controlled. Here, the rate of diffusion of the drug through the polymer membrane controls its release to the biofluid.

(iii) Osmotic pressure-regulated release. Here, water molecules pass through the semipermeable membrane of the encapsulating polymeric membrane due to osmotic pressure difference, and dissolve the drug, which gets out through pores.

8.3.1 Factors Governing Drug Encapsulation and Drug Delivery Processes

8.3.1.1 Delivery and Encapsulation of Small Drugs

Alginate microsphere or conventional Ca^{2+} cross-linked alginate matrix acts as polymeric vessels [12, 13] for drug encapsulation. In both cases, drug