any additional stress on the gel [4]. This makes the gel an ideal biomaterial for drug encapsulation. The physical properties of the gel may be regulated by varying the molecular weight of the alginate and that of the cross-linker [5] molecule. The cross-linking molecule is also a hydrophilic group containing macromolecules to restore the water retention property of the gel.

The condensation reaction is generally carried out under mild conditions using an acid or alkali as a catalyst. Sometimes, the polymerization reaction is initiated by light and known as photo cross-linking process [6, 7].

8.3 Pharmaceutical and Biomedical Chemistry of Alginates

Alginate is nontoxic and can be tailor-made for particular pharmaceutical and biomedical applications. It may be used as a stimulant (known as excipient) that can only modify drug release or drug absorption rate. Alginates are mostly used as a thickening, gel-forming, and stabilizing agent. For example, sodium alginate is used as a binding and disintegrating agent in tablets and as a suspending and thickening agent in water-miscible gels, lotions, and creams; it also acts as a stabilizer of emulsions [8–10].

Uses of alginate as polymeric- or alginate-controlled drug delivery systems [11] is more common. In controlled drug release, the drug releases slowly, reducing down the toxic effect of concentrated drug (toxic drug level). This also allows target-specific delivery (i.e., drug reaches target before degradation and full drug potency is used up), and bioavailability of the drug at the target site becomes optimum.

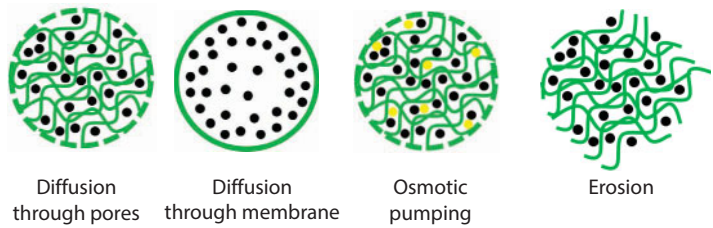

Figure 8.2 Different mechanisms of drug release (reproduced with permission [9]).