the core. In this chapter, we focus our discussions on uses of alginates as a drug delivery material, its potentiality, and versatile applications.

8.2 Chemistry of Alginates

Alginate, also known as alginic acid, is an anionic polysaccharide obtained from cell walls of brown seaweed.

Alginates are found in three different forms of linear polymers of D-mannuronic acid (M) or L-guluronic acid (G) residues or copolymer of D-mannuronic acid (M) and L-guluronic acid (G) (as shown in Figure 8.1). D-mannuronic acid (M) and L-guluronic acid (G) residues are epimers (D-mannuronic acid converted to L-guluronic by an enzyme) and only differ at C5. Bacterial alginates are additionally O-acetylated on the two and/or three positions of the D-mannuronic acid residues. Three types of polymers of alginates are possible: GGGG, MMMM, and GMGM structures. As suggested by the name in GGGG polymer, all monomers are G alginic acid and it is a homopolymer, whereas in MMMM polymer, all monomers are M alginic acid and it is also a homopolymer. Only in the case of GMGM do the alternate groups of G and M residue form a copolymer structure. Alginates may be of a wide range of average molecular weights (50–100,000 residues) for appropriate application.

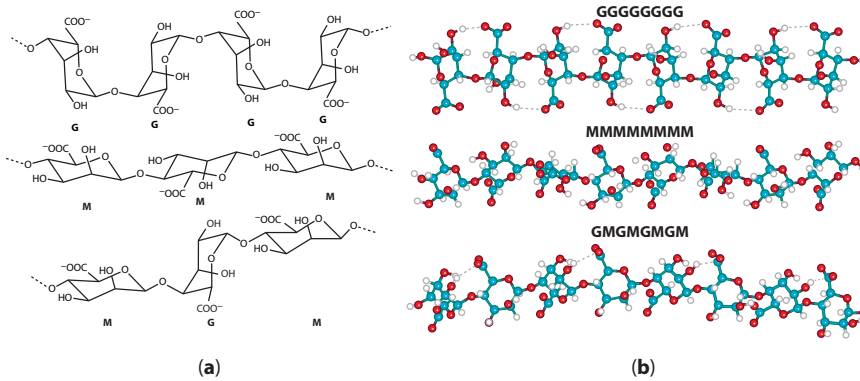

Figure 8.1 (a) Different forms of linear polymers of alginate [1]. (b) L-guluronic acid (G) residues forming hydrogen bonds and D-mannuronic acid (M) is non-hydrogen bonded (web source: http://www1.lsbu.ac.uk/water/alginate.html).