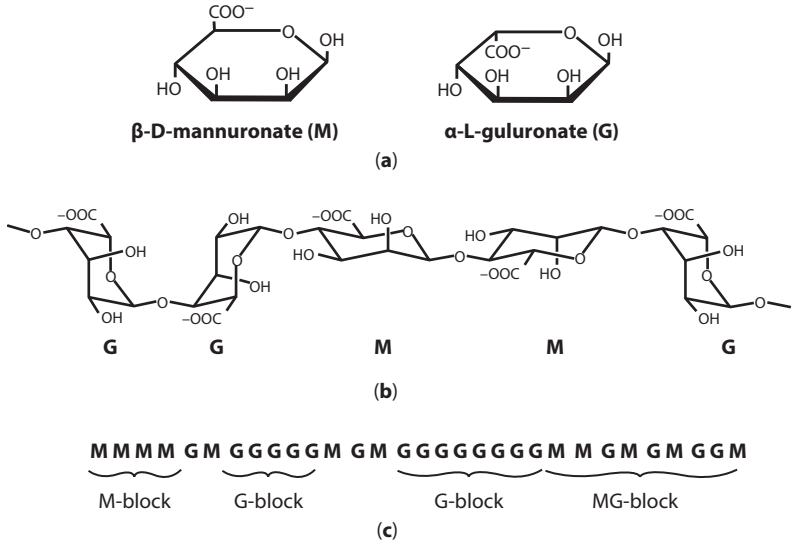

Figure 9.2 Structural characteristics of alginates: (a) alginate monomers, (b) chain conformation, and (c) block distribution [12].

acid are two basic linear blocks, which are linked together by 1–4 linkages in the alginate biopolymer, as shown in Figure 9.2 [10].

9.3 Physicochemical Properties of the Alginate Biopolymer

The physical properties of the alginate biopolymer depend upon the chemical structure, molecular weight, length of the polymer chain, and concentration of the alginate. The gel-to-sol transformation property of the alginate is varied with a concentration of the multivalent cations (Ca^{+}) [13, 14]. The viscosity of the alginate solution changes with the concentration and number of monomers in the chain. The guluronic acid-based alginate has more solubility in the water as compared to the mannuronic acid-based alginate. Another important physical property of alginate is its thermal stability. In general, between 0 and 100 °C temperature ranges, the alginate gel is formed. The noncovalent polymer segments help to protect deformation of the alginate at below the boiling temperature of the water. But the stability of the alginate gel reduces with increasing temperature. The most vital property of alginate is the sol-to-gel transformation property. The alginate solution is transferred from sol state to gel state by using