

E.C.C. Stanford in 1881 [7, 11]. It consists of a group of anionic polysaccharides, which is obtained from the cell wall of brown algae and various species of *Ascophyllum*, *Durvillaea*, *Ecklonia*, *Laminaria*, *Lessonia*, *Macrocystis*, *Sargassum*, and *Turbinaria* [8]. It is also known as algin, alginate, or alginic acid belonging to polysaccharide category of the biomaterial, carrying anionic charge on it. On the basis of two sugars—mannuronic (M) and guluronic (G) acid—alginates are built and both sugars belong to the category of urinate [9–11]. Alginates are a biopolymer of linear chain made up of 1,4 linked  $\beta$ -D-mannuronic acid and 1,4  $\alpha$ -L-gluconic acid group arranged in homogeneous (poly M, poly G) or heterogeneous (MG) block-like pattern [13]. According to the initial source, the composition and sequence of G and M block in alginates vary [12–15]. Alginate molecule contains different proportion of M, G, and MG blocks [18] so it can be regarded as a block copolymer varying with the seaweed source. Different types of alginate contribute different properties due to the difference in the proportion of blocks present in them such as alginates, which possess high G block found to have good gel strength, while alginates with high proportion of M block have immune-stimulating behavior [16, 17]. There are different derivatives of alginates such as sodium alginate, propylene glycol alginate, and ammonium alginate, which possess different properties [19]. Natural origin-based biodegradable films have been widely discovered for biomedical purpose such as structural supporting biomaterial for tissue reconstruction including wound healing due to its biodegradability, biocompatibility, and similarity in human tissue properties [1–3, 20]. There are various other applications of alginate in the field of pharmaceutical, biomedical, cosmetic, textile, and food industry. The salts of alginate are considered safe, biocompatible, and nonimmunogenic. In this section, basic information about the alginate is provided, along with its characteristic behavior and different applications [21–24].

Specifically, this chapter deals with basic information about the alginate, along with its characteristic behavior and application in various fields involving pharmaceutical industries, food industries, and cosmetic industries and in other fields such as in textile printing, welding rods, paper industries, etc. [25–27].

## 6.2 Structure of Alginate

Alginate is an unbranched binary copolymer or we can say alginate is a true block copolymer composed of homopolymeric region of M and G, called as M and G block [4–7], which have no regular repeating units [28]. These blocks (M and G) provide unique features to the alginates; for example,