as (1-4) heterogeneous or homogenous pattern in which blocks relate to "G" and "M." This structure is present in the tetrahydropyran ring form. The sources of isolation are organs and tissues; thus, they differ in sequence as well as composition [7].

3.3 Sources

These are extracted from the plant's materials like starch and cellulose. But the production of alginate is also done by using algal source. Nowadays, the production is preferred from fermentation process through microbes for increasing their properties and applications and to provide a more advanced form of alginate. The bacterial genera and seaweed are required to produce this polysaccharide. Mostly the seawoods become the source when they are large brown algae. Specifically *Pseudomonas aeruginosa* and *Azotobacter vinelandii* are used as extracellular polymers [8]. The difference between the bacterial and algal alginates is that the bacterial alginate is acetylated. These bacterial alginates are not used mostly, but they can be the best alternative. Prolonged presence of seaweed alginates produces marine pollution; hence, use of bacterial alginates is the best approach. Bacterial alginate is available in the form of powder and paste. It can be mixed with water for the reaction. It can also be considered as a renewable resource and can be derived from brown algae [9]. It gives flexibility and strength to algal tissues. Alginate extraction is done by drying the raw material and then treating it with diluted mineral acid. Purification is done and it is converted into a water-soluble form [10]. The process of extraction was done in 1881 by Stanford. The product made was crude containing nitrogen in high levels. The procedure is shown in Figure 3.2.

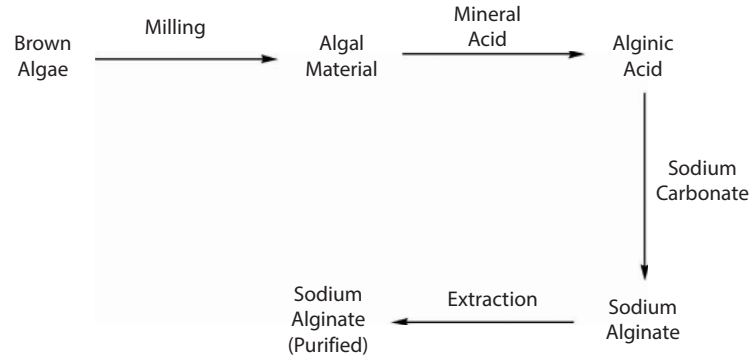

Figure 3.2 Procedure of alginate.