glucose to fructose, and for the production of L-amino acids, which are used in foods, after hydrolysis of penicillin G for the synthesis of new penicillins, whole cells are used in order to convert starch to ethanol (for beer brewing), and for the continuous production of yoghurt. The concentrated biocatalysts are used, when these processes had to be carried out at a moderate to large scale, and for reuse, these should be recoverable from the process [135].

By "immobilizing" these enzymes/cells, the process can be achieved by their entrapment in a material that allows the penetration by a converted or changed substance. Target enzymes is usually isolated in pure form and are useful in catalyzing specific conversions. These conversions can also be achieved via use of whole cells and have been found economical. An additional advantage of immobilization is that the cells last longer. The suspended cells could have better activity for just 1–2 days, whereas immobilized cells could last for 30 days. The first materials to be used for immobilization are the beads, which are made with calcium alginate. The cells are fully suspended in a solution containing sodium alginate, and this solution is further added drop by drop to a calcium chloride solution. The beads are resultantly formed in the same way as previously described for artificial cherries. While in use, they are tightly packed in a column and a solution of a substance which is to be converted is allowed to be added drop by drop into a column to flow through beads bed containing immobilized biocatalyst in the cell. The product comes out at the bottom through the conversion process. In order to immobilize yeast cells, a simple example is to flow a solution of sugar on through the beads, and this sugar is converted to alcohol.

6.8 Conclusion

In summary, specific property, mucoadhesive property, swelling capacity, and ability of sol/gel alginate have gained a place in the developed advance drug delivery systems. These multifunctionalized, natural polymers have been studied in the design of microsized particulate systems for manageable release, targeted drug delivery, and biomedical application (as a matrix for 3-D tissue cultures, adjuvant of antiviral agents and antibiotics, or in transplantation of cell in diabetes and treatment of neurodegenerative diseases). In addition, more absorbent alginate-based hydrogels with viscoelastic properties and mechanical stability are used as an application for wound dressing. To sum up, this chapter highlighted alginates, possible modifications in their chemical structure, and their application in the field of pharmaceuticals at the lab and commercial levels.