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## Introductory Chapter: Polysaccharides and their Solubility

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Essential for living organisms, polysaccharides are polymeric carbohydrate molecules composed of long chains of monosaccharide units bound together by glycosidic linkages and on hydrolysis releases the constituent monosaccharides or oligosaccharides [1, 2], including storage polysaccharides (such as starch and glycogen) and structural polysaccharides (cellulose and chitin). Starch is universally existed in plants, with cellulose and chitin found in the cell walls of plants, fungi, and other organisms [3]. Based on the component units, polysaccharides are classified into homopolysaccharide (distinctive types) and heteropolysaccharides (different types). Unbranched polysaccharides contain only  $\alpha$ -1, 4 linkages, however, branched polysaccharides compose molecular linkage via  $\alpha$ -1, 4 and  $\alpha$ -1, 6 glycosidic bonds [4–6]. The rate of the bonds formation may vary. The plant-based amylopectin and the animal-based glycogen contain a branch every 30 and 10 units, respectively. During digestion, as a major catalyst on the branched polysaccharides,  $\alpha$ -amylase only digests  $\alpha$ -1, 4 glycosidic bonds, and the rest disaccharide/polysaccharide fragments contains  $\alpha$ -1, 6 bonds [7]. Homoglycans with two types of saccharide linkages or heteroglycans composed of two types of saccharide are more soluble than purely homogeneous polymers [5]. However, poor solubility of polysaccharides significantly limits its development and application.

In this book, the principles on polysaccharides solubility and structure, methodologies and application of polysaccharides have been reviewed. The five chapters in this book include polysaccharides structure and solubility, osmotic properties of polysaccharides solutions, polysaccharides in solution experimental and computational studies, antioxidative activity of sulfated seaweed polysaccharides by variety-assisted extraction and starch galactomannans mixtures rheological and viscosity behavior in aqueous systems for food modeling.

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