CHITOSAN-BASED NANOPARTICLES FOR BIOMEDICAL APPLICATIONS

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6.1 CHITOSAN AS A BIOPOLYMER

In recent years, progress in the field of biotechnology and nanotechnology has made a huge impact on biomedical fields. In addition to the improvement in mechanical devices, nanoparticles have emerged as a multifunctional platform for both diagnosis and therapy of various diseases [1,2]. Researchers have developed various kinds of nanoparticles using polymers, lipids, iron, gold, silica, and so on [3,4]. Among them, polymers are the most widely used components in fabricating nanoparticles [5]. Their major advantage is that their physical or chemical properties can be easily controlled by changing the molecular weights or chemical structures [6]. Therefore, a number of polymer-based nanoparticles have been developed and applied to biomedical fields [7].

Chitosan is one of the representative natural polymers, which is derived from chitin and frequently used for the development of nanoparticles [8,9]. Chitin is the main component of crustacean shell and is composed of β-(1,4)-2-acetamido-D-glucose linked via (1–4) glycosidic bonds. Chitosan is produced by deacetylation of chitin, and the number of amine groups is dependent on the degree of deacetylation. These amine groups endow many useful characteristics with chitosan.

Water solubility of chitosan is mainly dependent on the protonation of amine groups. Because the pK_a value of this amine group is about 6.5, chitosan is generally

Pharmaceutical Sciences Encyclopedia: Drug Discovery, Development, and Manufacturing, Edited by Shayne C. Gad