Chemical Modification and Characterization of Chitosan for Pharmaceutical Applications

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Abstract

Nine crosslinked chitosan derivatives (CLCS) were prepared using three different types of crosslinkers: glutaraldehyde, glyoxal and terephthaldehyde. The prepared CLCS were used to control the acyclovir (ACV) release in order to improve its oral bioavailability. The CLCS were prepared by Schiff based reaction and characterized by means of infrared spectroscopy (FTIR), x-ray diffraction measurements, thermogravimetric inspection, differential scanning calorimetry, and scanning electron microscopy (SEM). Establishment of an imine (C=N) bond was evidenced in FTIR. Compared to raw chitosan, the crosslinked chitosan derivatives showed more amorphous structure and exhibited more water holding capacity that increased with raising the crosslinking percent. In SEM, the CLCS demonstrated areas with rough surfaces and grooves that did not present in the smooth chitosan surface. The difference in swelling degree with varying crosslinker amount was also examined. The crosslinked chitosan displayed less swelling and the degree of swelling decreased with increasing the density of crosslinking agent. The CLCS investigated in controlling the release of acyclovir by being incorporated with ACV in granules formulations. In vitro drug release results exhibited sustained release of ACV affected by the type and percent of crosslinker.

Keywords

Chitosan ; crosslinked chitosan ; Schiff base ; glyoxal ; glutaraldehyde ; terephthaldehyde ; sustained release

Main Subjects

Pharmaceutical Chemistry