Relative Charge Density Model on Chitosan-Fucoidan Electrostatic Interaction: Qualitative approach with Element Analysis

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A relative charge density model of prepared chitosan-fucoidan nanoparticles (CFNs) was proposed to provide insight into an analysis of the ionic interactions in terms of polyelectrolyte complexes. Using the relative charge density model, the extent of the ionic interactions is predicted in terms of the pH (2 through 6) and used fucoidan to chitosan mass ratio (FCMR) (1:0.05 through 1:1), through which the formation of CFNs can be controlled to be ranked qualitatively according to size and stability. It was confirmed by the measurements of their zeta potentials and sizes and by the analysis of their decay with time. Moreover, the relative charge density model was validated to predict the isoelectric condition of a polyelectrolyte complexed suspension of CFNs. In a pH 2-environment, there were locally intensive electrostatic interactions with a low yield to form sulfate group-rich CFNs. In contrast, in a pH 6-environment, extensive electrostatic interactions occurred to form sulfate group-poor CFNs with a high yield.