

Quantitative Analysis on Electrostatic Interactions for the Formation of Chitosan-Fucoidan Nanoparticles

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We predicted the stoichiometric distributions of both positive amino groups and negative sulfate ions loaded in chitosan-fucoidan nanoparticles quantitatively by correlating the separate yields of loaded chitosan and fucoidan, and a proposed relative charge density model as well as we obtained them by deriving the expression of their loaded concentrations directly from experimental data. Both the model-prediction and experimental derivations were remarkably consistent with each other except at pH 2. The discrepancy was explained by the increase in the sulfate group loading on account of the most intensive electrostatic interactions at pH 2. The ratio of the CFN-free net charge density shielded by counter-ions in the solution entrapped in CFNs to their counter-ion-crosslinking charge density was suggested to be a quantitative criterion for determining the size distribution of chitosan-fucoidan nanoparticles.