effects of monocarboxylic acids and potassium persulfate on preparation of chitosan nanoparticles

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Abstrak

In this research, we studied the preparation of nanochitosan from the addition of potassium persulfate as an initiator for monomer polymerization and monocarboxylic acid—namely acetic acid, lactic acid, and formic acid—to a chitosan solution. To obtain the dried form of chitosan nanoparticles, we investigated the effects of oven and spray drying systems toward the physicochemical properties and morphology of chitosan nanoparticles. Successfully prepared chitosan nanoparticles were characterized by Fourier transform infrared spectroscopy (FTIR), Field Emission Scanning Microscopy/Energy Dispersive X-ray Analysis (FESEM-EDX), and a particle size analyzer (PSA). The structures of nanochitosan prepared in different acids were quite similar based on the FTIR spectra. By increasing the concentrations of potassium persulfate, the yields of chitosan nanoparticles also increased. The concentration of potassium persulfate had a significant influence on the production of chitosan nanoparticles. The lowest concentration of potassium persulfate (0.6 mmol) did not produce an observable formation of chitosan nanoparticles. By using formic acid and potassium persulfate in various concentrations from 1.2–3.0 mmol, chitosan nanoparticles were obtained. A particle size distribution of chitosan nanoparticles was produced from a formic acid solution having a smaller size compared to others. The acidity effect of monocarboxylic acids in the formation of chitosan nanoparticles was better compared to the addition of other acids. Furthermore, synthesized chitosan nanoparticles (50–110 nm) produced from formic acid solutions have potential applications for drug carrier purposes.