431i Preparation and Characterization of Nanospheres Composed of Water-Soluble Chitosan and Proteins by Spg (Shirasu Porous Glass) Membrane Process for Use as a Delivery System of Bioactive Ingredient

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In the present study, chitosan-protein nanospheres were prepared by SPG membrane process, using various proteins such as gelatin, SPI, casein and gluten. In addition, the physicochemical properties of these nanospheres were determined and evaluated for drug release behavior in vitro. The continuous phase (oil phase) consisted of soybean oil and Tween 80, the dispersed phase (water phase) consisted of 0.1% chitosan and 0.1 % protein solution. In the O/W emulsions, the nanospheres composed of chitosan/gelatin/soybean oil, were prepared using SPG membrane process with pore diameter of Dm=0.1, 0.3, 0.5, 1.0, 1.4 mm. Microscopic observations indicated that the emulsions with Dm=0.3 and 0.5 mm were reasonably formed. The mean diameter of emulsion basically depended upon the SPG membrane pore diameter, meanwhile it was linearly correlated to the amount of Tween 80 with a correlation constant of 0.93-0.99. Chitosan-protein nanospheres which royal jelly added were prepared by the fixation with polyacrylic emulsion. For this, four proteins were used: gelatin (CHT/GEL), SPI (CHT/SPI), casein (CHT/CAS) and gluten (CHT/GLU). DSC studies revealed that all chitosan-protein nanospheres showed a different thermal transition patterns compared to that of control which was prepared by conventional homogenization. This result suggested that complex coacervation may be occurred between chitosan, proteins and royal jelly. SEM microscope showed that CHT/GEL and CHT/GLU were more porous and smaller than that of control, and remained in the form of aggregation. Interestingly, the results of confocal laser scanning microscope of these nanospheres indicated that these particles were distributed in the chitosan-protein matrix.