

Physicochemical Properties of Soy Protein Isolate (SPI): Starch Conjugates Treated by Sonication

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Abstract : In recent years there is growing interest in using soy protein because of several advantages compared to other protein sources, such as high nutritional value, steady supply, and low cost. Soy protein isolate (SPI) is the most refined soy protein product. It contains 90% protein in a moisture-free form and has some desirable functionalities. Creating a protein-polysaccharide conjugate to be the emulsifying agent rather than the protein alone can markedly enhance its stability. This study was undertaken to examine the effects of ultrasound treatments on the physicochemical properties of SPI-starch conjugates. The soy protein isolate (SPI, Pro-Fam® 955) samples were obtained from the Archer Daniels Midland Company. Protein concentrations were analyzed by the Bradford method using BSA as the standard. The volume-weighted mean diameters $D_{[4,3]}$ of protein-polysaccharide conjugates were measured by dynamic light scattering (DLS). Surface hydrophobicity of the conjugates was measured by using 1-anilino-8-naphthalenesulfonate (ANS) (Sigma-Aldrich, St. Louis, MO, USA). Increasing the pH from 2 to 12 resulted in increased protein solubility. The highest solubility was 69.2% for the sample treated with ultrasonication at pH 12, while the lowest (9.13%) was observed in the Control. For the other pH conditions, the protein solubility values ranged from 40.53 to 49.65%. The ultrasound treatment significantly decreased the particle sizes of the SPI-modified starch conjugates. While the $D_{[4,3]}$ for the Control was 731.6 nm, it was 293.7 nm for the samples treated by sonication at pH 12. The surface hydrophobicity (H_0) of SPI-starch at all pH conditions were significantly higher than those in the Control. Ultrasonication was proven to be effective in improving the solubility and emulsifying properties of soy protein isolate-starch conjugates.

Keywords : particle size, solubility, soy protein isolate, ultrasonication

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