

## Effect of Drying Methods on Rheological Properties and Particle Size Characteristics of Soy Protein Isolate

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### Abstract

Rheological properties and particle size distribution of soy protein isolates (SPI) play a vital role in food formulation along with its physicochemical and functional properties. Ultrafiltration was used to produce SPI solution and the obtained solution was dried using different drying methods (oven, freeze and spray drying). Rheological properties, particle size distribution and protein solubility of dried SPI powders were compared with commercially available SPI. With the change in angular frequency, commercial SPI showed almost constant storage modulus while others showed a gradual increase whereas loss modulus of all samples shown increment. Commercial SPI showed a decrease in complex viscosity (shear thinning behavior) while other dried samples exhibited a slight increase in complex viscosity values (shear thickening behavior), with the increase in angular frequency. Loss tangent values for commercial SPI and oven dried SPI (60°C for 48 hours) were constant and less than unity (solid or gel property), whereas for spray dried SPI (190°C inlet temperature and 0.25-0.3 kg/cm<sup>2</sup> air flow rate) decreased from 1.05 to 0.42 (transition from liquid or sol like characteristics to liquid or gel like characteristics). Commercial SPI had lesser uniformity compared to other dried samples. Highest water solubility index and water absorption capacity were shown by spray dried SPI samples while freeze dried and oven dried samples had comparable lower values. The drying has a significant influence on rheological properties, particle size distribution and solubility characteristics of SPI obtained through ultrafiltration which in turn decides the functionality and end use in food applications.

**Keywords:** Soy protein isolate; rheological properties; spray dryer; freeze dryer; oven dryer; particle size distribution; storage and loss modulus