

## **500f The Effect of Temperature, Moisture Content and Oil Content on Rheology of Soy Flour**

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The rheological properties of soy flour at different temperatures (50 to 110°C), moisture contents (17% to 50%), oil contents (<1% to 19%) and varieties (Kottman WE, 3818WE and 3409WE) were determined. The apparent viscosity, consistency coefficient ( $k$ ) and flow behavior index ( $n$ ) were measured using capillary rheometer, dynamic mechanical spectrometer and oscillatory squeezing flow. It is shown that there are differences on rheology for different varieties. For the low shear rate range (1 to 10 s<sup>-1</sup>), the viscosity of variety Kottman WE appeared to be 2.5 times larger than the viscosity of 3818WE. It was also found that temperature, moisture, oil content and variety all affect the apparent viscosity of the soy products. There is a five-fold difference in apparent viscosity over the temperature range from 65 to 110°C at moisture content of 17%. The  $n$  value decreases with increases in temperature for moisture contents of 20% and 25%. Wall slip occurs when using capillary rheometer and affects the soybean rheology. The dynamic viscosity found from oscillatory squeezing flow is shown in agreement with the one measured with mechanical spectrometry. Cox-Merz rule with horizontal shift factor is applicable for converting the dynamic viscosity into shear viscosity of soy. Therefore, in the higher shear rate region which wall-slip usually occurs in shear-based instrument, oscillatory squeezing flow can be used in place of capillary rheometer. A master curve and a model were obtained from the result. A good fit ( $R$ -square=0.9663) was found and the model could be used to approximate the viscosity of soy dough in different shear rate for various temperature, moisture and oil contents.