

Modelling of rheological behaviour of soursop juice concentrates using shear rate-temperature-concentration superposition

ABSTRACT

The effect of temperature and concentration on rheological behaviour of freeze dried soursop juice concentrates were investigated using a rheometer over a wide range of temperatures (10–70 °C) and concentrations (10–50 °Brix) at shear rates of 0–400 1/s. The Power law is the best fitted model to the rheological data due to the high value of coefficient of determination ($R^2 = 0.9989$). The soursop juice concentrates exhibited shear thinning or pseudoplastic behaviour with $n < 1$. The consistency coefficients dependency on temperature and concentration were well described by Arrhenius relationship and exponential relationship respectively. The flow activation energy of soursop juice concentrates were 8.32–30.48 kJ/mol. The superposition technique with Power law model sufficiently modelled the overall rheological characteristics of soursop juice concentrates into a single master curve using shift factors based on double shifting steps with $R^2 = 0.9184$. This technique also showed that the soursop juice concentrates increases in viscosity and pseudoplasticity behaviour with concentration.

Keyword: Rheology; Modelling; Power law; Master curve; Soursop juice concentrates