

## Rheological Characteristics of Ice Slurries Based on Propylene- and Ethylene-Glycol at High Ice Fractions

**Authors :** Senda Trabelsi, Sébastien Poncet, Michel Poirier

**Abstract :** Ice slurries are considered as a promising phase-changing secondary fluids for air-conditioning, packaging or cooling industrial processes. An experimental study has been here carried out to measure the rheological characteristics of ice slurries. Ice slurries consist in a solid phase (flake ice crystals) and a liquid phase. The later is composed of a mixture of liquid water and an additive being here either (1) Propylene-Glycol (PG) or (2) Ethylene-Glycol (EG) used to lower the freezing point of water. Concentrations of 5%, 14% and 24% of both additives are investigated with ice mass fractions ranging from 5% to 85%. The rheological measurements are carried out using a Discovery HR-2 vane-concentric cylinder with four full-length blades. The experimental results show that the behavior of ice slurries is generally non-Newtonian with shear-thinning or shear-thickening behaviors depending on the experimental conditions. In order to determine the consistency and the flow index, the Herschel-Bulkley model is used to describe the behavior of ice slurries. The present results are finally validated against an experimental database found in the literature and the predictions of an Artificial Neural Network model.

**Keywords :** ice slurry, propylene-glycol, ethylene-glycol, rheology

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