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Experimental data and estimation of sucrose solubility in impure solutions

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Abstract

Although sucrose solubility has been widely studied, the presence of impurities, which is invariably true in sucrose industrial crystallization, affects its solubility and the extent of this influence is not fully addressed in the literature. This study aimed to obtain experimental data of sucrose solubility in aqueous pure and impure solutions from 10 to 100°C and evaluate prediction ability of SLE models. Experimental data shows that impurities in sugarcane juice, i.e. reducing sugars and salts, in levels studied (with 92.8% of sucrose up to pure solutions) increase sucrose solubility. Evaluating existing models for SLE showed that they generally provide poor prediction. However, a proposed modification in the Nývlt Equation of solubility provides a small mean deviation (2.54%) between experimental and calculated data in pure and impure aqueous solutions, making this SLE model useful for solubility calculation in crystallization studies, especially when syrups containing typical impurities of sugarcane juice are used.

Keywords: Impurities, Mathematical modelling, Solid-Liquid Equilibrium, Solubility, Sucrose.

Chemical compounds studied in this article:

Sucrose (PubChem CID: 5988); Glucose (PubChem CID: 79025); Fructose (PubChem CID: 5984)

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