Effect of Temperature and Concentration on Crystallization Kinetics of Xylose from Coffee Skin Waste

Supervisor: Dr. Silvia Oktavia Nur Yudiastuti, S.TP., M.TP.

Raja Liem Sinaga

Study Program of Food Engineering Technology
Majoring of Agriculture Technology

ABSTRACT

Xylose is a compound with five carbon atoms that belongs to low-calorie dietary sugars. Xylose can be produced using hydrolysis method from various kinds of lignocellulosic biomass, one of which is coffee skin. To obtain high xylose content, additional treatment was carried out, namely the pretreatment process with 3% NaOH and the addition of 6% PEG 6000 surfactant. The xylose content produced after the hydrolysis process was 0.628 mg/ml. To obtain higher product purity, liquid xylose was crystallized. The crystallization process is related to crystallization kinetics. The purpose of this study was to observe the data of xylose crystallization kinetics at variable cooling temperatures of 5ºC, 25ºC, 40ºC, and initial concentrations of 800 ppm, 1000 ppm, and 1200 ppm. The observed data include: nucleation induction time, crystallization time, crystal growth rate, as well as additional observation data, namely solubility value, degree of whiteness, and calorific value. The data obtained showed that the fastest crystallization occurred at 40ºC, but the difference in concentration did not significantly affect the crystallization speed. Crystals formed at 5ºC, and 25ºC are more uniform. Crystals formed at 40ºC are more likely to grow from secondary nucleation. The solubility, whiteness, and calorific value of xylose sugar were higher at 5ºC.

Keywords: Temperature, Concentration, Xylose, Crystallization, and Crystallization Kinetics