

ABSTRACT

Crystallinity, Thermal and Morphological Characteristics of Resistant Starch Type III Produced by Hydrothermal Treatment of Debranched Cassava Starch

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Cassava starch was debranched using pullulanase and the linear glucans recrystallized by incubation at 60°C or by temperature cycling at 120/60°C, and further subjected to heat-moisture treatment (HMT). Resistant starch (RS III) contents increased from 21.4 g/100 g in the debranched starch (DS) to 67.3 g/100 g in the debranched starch incubated at 60°C (DRS) and 47.8 g/100 g in the debranched starch subjected to temperature cycling (DCS), and further to 84.8 g/100 g and 88.4% g/100 g in HMT-DRS and HMT-DCS, respectively. Total crystallinity varied between 31.4-59.8% and the crystalline type was C in DS and DRS and A in DCS, HMT-DRS and HMT-DCS. The melting properties were characterized by broad endotherms, but the exact melting region and enthalpy were dependent on recrystallization method. The main endothermic peaks of DS and DRS occurred at 103.9 and 109.8°C, respectively, whereas DCS exhibited split endotherms at 113.6 and 138.1°C. Heat-moisture treatment broadened the endotherms and increased their enthalpies. Scanning electron micrographs revealed surface topography differences related to size and aggregation of individual crystalline bodies.

Keywords: Resistant Starch Type III, Hydrothermal Treatment, Debranched Cassava Starch, Crystallinity, Thermal Characteristics