

ABSTRACT

Determination of Optimum Conditions for Enzymatic Debranching of Cassava Starch and Synthesis of Resistant Starch Type III using Central Composite Rotatable Design

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Cassava starch was debranched by treatment with isoamylase and pullulanase and the yield of resistant starch type III (RS III) optimized with respect to starch solids concentration (7.5-15%, w/v), incubation time (8-24 h) and enzyme concentration using central composite rotatable design. Higher concentrations of pullulanase (10-35 U/g starch) compared to isoamylase (30–90 mU/g starch) were required to give a similar degree of starch hydrolysis within the experimental domain. A clear debranching end-point was identifiable by following the reducing value, blue value and β -hydrolysis limit of cassava starches debranched using isoamylase. It was difficult to define a debranching endpoint of pullulanase treatment by these parameters due to contaminating α -D-(1 $\rightarrow$ 4) activity. The yield of RS III was significantly higher in isoamylolysates and increased steadily with increasing degree of hydrolysis to peak at 57.3%. Purification of the debranched material further increased the RS III yield to 64.1%. Prolonged (24 h) hydrolysis of cassava starch with high concentration of pullulanase (35 U/g) gave lower RS III contents in the purified (34.2%) and unpurified (36.2%) hydrolysates compared to 49.5 and 62.4%, respectively, at moderate pullulanase concentration (22.5 U/g) and incubation time (16 h).

Keywords: Resistant Starch, Cassava, Starch, Enzymatic Debranching, Central Composite Rotatable Design, Starch Modification