

Hydrolysis of granular starch at sub-gelatinization temperature using a mixture of amylolytic enzymes.

Abstract

Native granular starches (corn, cassava, mung bean, and sago) were hydrolyzed using a mixture of alpha-amylase and glucoamylase at 35 °C for 24 h. Hydrolyzed starches were analyzed for the degree of hydrolysis and for physicochemical and functional properties. Corn starch showed the highest degree of hydrolysis, as evidenced by the presence of distinct pores penetrating deep into the granules. Enzymatic erosion occurred mainly at the surface for cassava, whereas isolated porous structures were observed in hydrolyzed mung bean and sago starch. The amylose content was significantly lower in all starches except for sago starch. The powder X-ray diffraction of all starches showed no significant changes after hydrolysis, but hydrolyzed starches showed a more crystalline nature. The action of enzymes caused significant changes in some pasting properties and in the swelling/solubility of starches. Evidently, enzymes were able to hydrolyze granular starches to a variable degree at sub-gelatinization temperature, and produced a relatively high degree of conversion.

Keyword: Sub-gelatinization temperature; Enzymatic hydrolysis; Amylase; Glucoamylase; Corn; Mung bean; Cassava; Sago.