

Effects of buffer properties on cyclodextrin glucanotransferase reactions and cyclodextrin production from raw sago (*Cycas revoluta*) starch

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Results from the present study have shown that the ionic species of buffers, pH values and reaction temperature can affect the enzyme unit activities and product specificity of Toruzyme[®] (Novo Nordisk A/S Bagsvaerd, Denmark) CGTase (cyclodextrin glucanotransferase). Applying a similar reaction environment (acetate buffer, pH 6.0; temperature, 60 °C), the CGTase was found to be capable of producing pre dominantly β -cyclodextrin from either raw or gelatinized sago (*Cycas revoluta*) starch. Changing the buffer from acetate to phosphate reduced the yield of β -cyclodextrin from 2.48 to 1.42 mg/ml and also affected the product specificity, where production of both α - and β -cyclodextrins were more pronounced. The decrease in the production of cyclodextrins in phosphate buffer was significant at both pH 6.0 and 7.0. However, changing the buffer to Tris/HCl (pH 7.0) showed a significant increase in β -cyclodextrin production. Increasing the ionic strength of sodium acetate and Tris/HCl buffers at pH 6.0 and 7.0 to equivalent ionic strength of phosphate buffers showed no significant effects on cyclodextrin production. Higher yield of cyclodextrins at pH 7.0 when Tris/HCl was used might be due to the binding of chloride ions at the calcium-binding sites of the CGTase, resulting in the shift of the optimum pH close to physiological environment, leading to an increase in the activities and specificity.

Key words: buffer types, cyclodextrin glucanohydrolase (CGTase), cyclodextrin, ionic strengths, pH, raw sago (*Cycas revoluta*) starch.

Abbreviation used: CGTase, cyclodextrin glucanotransferase.

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