Stimulation of thermal stability of α-amylase from Bacillus icheniformis ATCC 6346 by treating with cations

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Abstract

α-Amylases (1,4-α-D-glucan glucanohydrolase; E.C.3.2.1.1) catalyze the cleavage of α-1,4-glucosidic linkages in starch, glycogen, and various oligosaccharides. Thermostable α-amylases from*Bacillus* species are of great industrial importance in the production of corn syrup or dextrose. In this study effect of different cations on the enhancement of stability of α-amylase from *Bacillus licheniformis* ATCC 6346 was examined. Optimal activity of the enzyme was at pH 7.0 and 85 °C. α-Amylase activity was strongly inhibited by Cu2+, Hg2+ and Mn2+ but less affected by Mg2+ and Ba2+. Ca2+ and Na+ stimulated the enzyme activity at 85 °C and at pH 7.0. Addition of 0.01 M Na+enhanced the enzyme stability from 1-33% for 60 min at 85 °C and pH 7.0. With 0.1M Na+, 100 % of initial enzyme activity was retained for 150 min and 70 min at 60 °C and 70 °C, respectively and 88% activity was retained at 80 °C, at pH 7.0 for 60 min. In the presence of 1 mM Ca2+, no loss of activity was observed in 60 min, at 85 °C and pH 7.0. Combined addition of 1mM Ca2+ and 0.1 M Na+, retained 17.3 % of the enzyme activity for180 min. But the enzyme in the presence of 1 mM Ca2+ and 0.1 M Na+ separately, lost its total activity in 120 min and 90 min, respectively at 95 °C and pH 7.0.