

Kinetic Studies of the Alkaline Thermostable Xylanases from Selected Bacterial Strains

Jesuthasan. S, Balakumar. S and Arasaratnam. V

Department of Biochemistry, University of Jaffna, Sri Lanka.

The number of potential applications of microbial xylanases in the pulp and paper industry is gradually increasing and several are approaching commercial use. This industry needs a xylanase, which is very active under alkaline and thermostable conditions. The objective of this study is to determine the kinetic properties of thermo stable alkaline xylanases from locally isolated strains named CS₁, CS₂, CS₃, & CS₄. Xylanase obtained from these four strains showed zero order kinetic for 4 minutes. Activities of the crude xylanase from all four strains were measured at different temperature ranging from 45- 65°C and different pH 7.0- 9.0. Xylanase from CS₁ gave highest activity [145.3(±0.26) UmL⁻¹] at 55°C and pH 8.4 while CS₂, [236.1(±0.17) UmL⁻¹] gave at 55°C and pH 8.0 and CS₃ [188.8(±0.43) UmL⁻¹] showed highest activity at 50°C and pH 8.0. Xylanase from CS₄ gave highest activity [92.1(±0.86) UmL⁻¹] at 60°C and pH 8.4. Michaelis constant of the crude enzymes from CS₁, CS₂, CS₃ and CS₄ to soluble birchwood xylan were 9.9, 15.5, 12.8, 9.2gL⁻¹ and the Vmax values were 132.4, 282.5, 180.0 and 9.24mgmL⁻¹ respectively at the respective optimum conditions of the enzymes. In the absences of additives xylanases produced by CS₂, CS₃ and CS₄ lost all their activities at 30 min at 60°C and pH 8.4 while xylanase from CS₁ retained 5(±0.92) % of its initial activity. Xylanase from CS₁ showed 38(±1.0) % of its initial activity at 55°C and pH 8.4, while xylanase from CS₂ retained 31(±0.86) % of its initial activity. Among the xylanases produced by CS₁, CS₂, CS₃ [retained 26(±0.83) % of its initial activity] and CS₄ [retained 29(±0.92) % of its initial activity] the enzyme from strain CS₁ is more stable at 55°C and pH 8.4.

Key words: Xylan, Xylanase, Thermostable, pH optimum and temperature optimum.