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## Thermodynamics enhancement of *Alternaria tenuissima* KM651985 laccase by covalent coupling to polysaccharides and its applications

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### ABSTRACT

This study full filed in enhancement of catalytic, thermodynamics and storage stability of *Alternaria tenuissima* KM651985 laccase by conjugation to sodium periodate oxidized starch. The starch conjugated *A. tenuissima* KM651985 laccase was active over a wide range of temperatures and pHs with the highest activity at 60°C and 4, respectively. The thermal stability of conjugated *A. tenuissima* KM651985 laccase was indicated by, high  $T_{1/2}$  values (half life) 1076.16, 382.42 and 191.23 min. at 50, 60 and 70°C, respectively, low  $K_d$  (denaturation rate constant))  $6.44 \times 10^{-4}$ ,  $18.13 \times 10^{-4}$  and  $36.25 \times 10^{-4} \text{min}^{-1}$  at the same temperatures, high D-values (decimal reduction time) 3575.56, 1270.61 and 635.38 min at the same temperatures. Also, the thermal stability of conjugated *A. tenuissima* KM651985 laccase was emphasized by high  $\Delta H_d$  (enthalpy), high  $\Delta G_d$  (free energy) and low  $\Delta S_d$  (entropy). The conjugated *A. tenuissima* KM651985 laccase showed high effectiveness in dyes decolourization of Remazol Brilliant Blue R (RBBR) and Malachite Green (MG). Moreover, the addition of conjugated *A. tenuissima* KM651985 laccase with hemicellulolytic enzymes cocktail improved the saccharification of corn cobs, rice straw, corn cobs leaves and water hyacinth with the highest reducing sugar production  $847.44 \pm 19.17$  mg from corn cobs.

### Keywords

*Alternaria tenuissima* KM651985 laccase; thermodynamics; applications.

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