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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 periodiate oxidized starch. The starch conjugated *A. tenuissima* KM651985 laccase was active over a wide range of temperatures and pHs with the highest activity at 60ºC 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 70ºC, respectively, low K_d (denaturation rate constant)) $6.44x10^{-4}$, $18.13x10^{-4}$ and $36.25x10^{-4}min^{-1}$ 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 ΔH_d (enthalpy), high ΔG_d (free energy) and low ΔS_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± 19.17 mg from corn cops.

Keywords

Alternaria tenuissima KM651985 laccase; thermodynamics; applications.

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