

Effective biotransformation of Reactive Black 5 Dye Using Crude Protease from *Bacillus Cereus* Strain KM201428

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Abstract

Effective effluent treatment is a paramount step towards conserving the dwindling clean water resources. The present study describes the use of crude protease extract from *Bacillus Cereus* Strain KM201428 biotransformation of azo dye Reactive Black 5 (RB5). Batch experimental results displayed over 97% decolorization efficiency with initial dye concentration of $1.0 \times 10^{-4}M$. The decolorization process was highly dependent on contact time, dye concentration and pH. The optimum contact time and pH for decolorization were 120 hours and pH 9 respectively at 25°C. Biotransformation of RB5 dye was monitored using UV-Vis spectrophotometer and formed metabolites characterized by LC-QTOF-MS. Comparison of resultant LC-QTOF-MS chromatograms after decolorization confirmed complete cleavage of RB5 dye. First order kinetic fitted well with experimental data for different RB5 dye concentrations. Lineweaver-Burk plot was used to describe the apparent relationship between the decolorization rate and the dye concentration at optimized condition with the coefficient of determination $R^2 = 1$. This study comprehensively illustrates the potential of crude protease from *Bacillus Cereus* Strain KM201428 as an effective and environmentally friendly bacterial isolate in biodegradation of RB5 and opens a new approach in the treatment of wastewaters contaminated with high load of azo dyes.

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