

# RECYCLING & WASTE MANAGEMENT

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## **New possibilities of microbial enzyme cocktails in paper recycling**

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**P**aper is a composite consisting of cellulose, hemicellulose and lignin. The paper recycling process hence require the ligno-cellulosic enzymes like cellulase and xylanase for modification of paper pulp characteristics. A low molecular weight cellulase-xylanase complex (14 KDa) was co-produced using bacterial and fungal systems and compared for their efficiency in paper bleaching efficiency. Co-existence of these enzymes was found to be advantageous in paper pulp modification and in deinking applications. Defibrillations, crack formation and changes in functional groups was evident from the SEM and FT-IR analysis of paper pulp following the enzyme treatment. The enzyme facilitated a better reduction

of Kappa number and Hexenuronic acid (Hex A) compared to earlier studies. A  $\Delta$  brightness of approximately 10% was achieved in case of both cellulase and xylanase for different treatment time. The tear strength of recycled paper was also found to increase after the enzymatic treatment. The fungal enzymes were better in biobleaching applications compared to enzymes from bacterial systems. The enzyme mediated bio bleaching contributes to improved solid waste management efficiency and results in a eco-friendly and cleaner technology for paper and pulp industries.

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