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Short Communication

An ecofriendly cost effective enzymatic methodology for deinking of school waste paper

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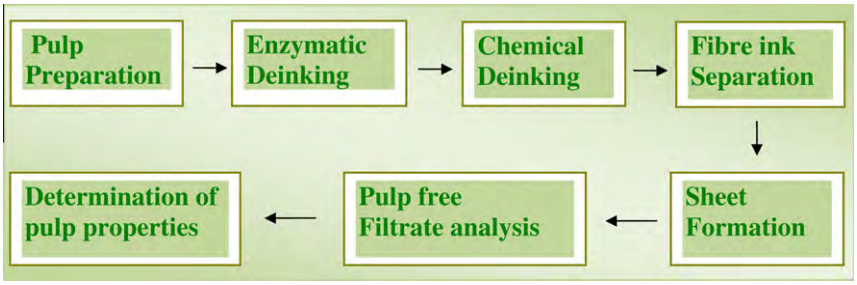
HIGHLIGHTS

- Enzyme dose of 15.0 IU xylanase and 3.0 IU pectinase per gram of pulp was sufficient for ink removal.
- Peformance of enzymes at alkaline conditions showed their suitability for paper industries.
- Enzymatic plus chemical deinking approach decreased the requirement of chemicals to nearly 50%.
- This combined methodology resulted in decrease of 20.15% and 22.64% in BOD and COD of effluents.
- This deinking approach also improved the various physical properties of handsheets.

GRAPHICAL ABSTRACT



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ABSTRACT

Efficiency of xylano-pectinolytic enzymes in deinking of school waste paper for its reuse has been investigated in the present study. Enzymatic deinked pulp decreased the requirement of chemicals to nearly 50% and gave same optical properties of pulp as obtained by conventional deinking process. This biodeinking plus chemical deinking approach resulted in a decrease of 20.15% and 22.64% in BOD and COD values of effluents and a gain of 10.71% in viscosity, 7.49% in breaking length, 10.52% in burst factor and 6.25% in tear factor as compared to conventional chemical deinking. This is the first report mentioning the use of xylanase and pectinase produced from a cellulase free alkalo-thermotolerant bacterial strain in the same cost effective agricultural residues based production medium for deinking and will help in making the process ecofriendly with 50% reduction in chemicals, commercially viable with better paper quality.

1. Introduction

Recycling of waste paper is an alternative process which can preserve the green plants and saves the environment in terms of pollution, water and energy (Imamoglu, 2006). Recycling of waste paper requires the removal of printing ink from the paper by a process called deinking. Deinking which involves the removal of printing ink, mainly consists of two steps *i.e.* the detachment of ink particles from the fibre surface followed by the removal of detached ink from the pulp slurry by washing or floatation.

Current deinking processes depend upon the use of large amount of environment damaging chemicals such as NaOH, Na_2SiO_3, Na_2CO_3, H_2O_2, chelating agent and surfactants (Zhang et al., 2008; Pathak et al., 2010). Use of these chemical based deinking methods produce toxic effluents which increase the COD values of water and hence resulting in costly waste water treatment (Zhang et al., 2008). Deinking using enzymes is less polluting, energy saving and also results in lower disposal problems. Enzymes which are being used in deinking are pectinases, hemicellulases, cellulases

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