

Preliminary studies on enzymatic deinking

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Wastepaper recycling is nowadays mandatory, because of the world-wide lack of virgin fibre, and in order to reduce the cellulosic residues produced in developed societies. The incorporation of secondary fibres in paper production became an accepted reality, and research on recycling technologies, namely for effective removal of pulp contaminants (deinking) is necessary.

Traditional processes use expensive, potentially environment damaging chemicals. An alternative to these methods are biological treatments, which use enzymes to peel away cellulosic fibrils, thus removing attached ink particles which are then removed by flotation [1]. Enzymatic technology is also known as specially advantageous to deink mixed office waste (MOW), the best quality wastepaper. The reuse of MOW is usually limited by its high content of noncontact inks, which are very difficult to remove by application of current methodologies [2].

The current work aims to study the potential of enzymes in the deinking of three different wastepaper samples: (i) photocopy printed paper; (ii) MOW (a chemically treated pulp); (iii) newspaper (a mechanical pulp). The enzymatic cocktail used was a commercial preparation kindly supplied by Buckman Laboratories, which presents mainly cellulase and xylanase activities.

Enzymatic action on pulp was conveniently evaluated by determining physical, mechanical and optical properties of pulp and paper, according to the standard TAPPI procedures. Parameters as drainage rate, burst, tensile, tear and brightness were measured. Image analysis techniques were also used, allowing the study of the enzyme treatment on ink particles size distribution.

The obtained results revealed the effectiveness of the assayed enzyme preparation on ink removal trials, with the three tested pulp samples. However, enzymatic deinking requires special conditions such as pH value, pulping consistency, soaking and reaction times, mechanical shear forces and refining mixed effects (with the enzymes), which will be analysed in further work.

[1] Jeffries, T., Klungness, J.H., Sykes, M., Rutledge-Cropey, K., TAPPI 1993 Recycling Symposium, 183 - 188, 1993

[2] Prasad, D.Y., Appita, 46 (4), 289 - 292, 1993