De-Inking Process: Fungal vs. Bacterial

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Enzymes used in the de-inking process detach ink particles from the fibers by partially hydrolyzing the cellulose fibers on the fiber/ink inter-bonding regions. The purpose of this experiment was to determine which lipase, fungal or bacterial, was most effective in the removal of soy ink, using three different types of paper (25% cotton,100% cotton and recycled). The first hypothesis was that if two lipase were compared, then the fungal lipase would be more effective than the bacterial lipase because fungal enzymes are usually extracellular, facilitating extraction from fermentation media. The second hypothesis was that if three types of paper were compared, then the paper with the highest percent of cotton would be reused more times because of its high cellulose content. All papers were printed with soy based ink and submitted to fungal and bacterial lipase enzymatic action. The percentage of ink removal was calculated in terms of letters removed from each paper using a visual scale and compared to densitometry measurements. It was shown that the visual scale was an accurate measurement since it was validated with the densitometry. Standard deviation, coefficient of variability and a linear regression was calculated. The results confirmed that fungal enzymatic action was more effective than bacterial enzymatic action in the de-inking process of papers printed with soy based ink. Paper printed with soy based ink cannot be de-inked completely, therefore neither can be recycled nor reprinted using enzymatic activity.

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