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Application of enzymes in the pulp and paper industry**Mija Sežun**

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At Pulp and Paper Institute, enzymatic applications for the main processes in pulp and paper industry i.e. deinking, fibrillation, bleaching and papermaking was investigated in the last years. In our study, we were focusing on improvement of fibrillation and deinking process. During the fibrillation process, objective was to reduce energy consumption while in the deinking process we tried to replace environmentally unfriendly chemicals with enzymes. The deinking is a process for the removal of contaminants from reusable paper fibers. Basically, deinking is carried out in two major phases: The disintegration of printed paper and the separation of ink particles and contaminants from the fibrous suspension by washing or flotation. The enzymatic/neutral deinking is an alternative to counteract the intensive use of chemicals in the conventional process, a process that reduces the environmental impact, efficient and fast, and with which similar results to what has been achieved in deinking using chemical substances are obtained. Paper production is extremely energy-intensive process as 18 to 25% of all the energy needed for the cellulose fibrillation. Cellulose fibrillation is one of the most important processes in the papermaking. This has a major impact on the mechanical properties and, consequently, the mechanical properties of the paper products. The effect of enzymatic treatment (cellulase) on the degree of refining and on the basic, mechanical and optical properties of produced laboratory sheets (thickness, grammage, density, breaking length, tear index, stretch, tensile index, burst index and ISO brightness) was investigated. Enzymatic treatment performed before the refining reduced the refining time for 10%, while treatment after the refining has proven to be ineffective. Enzyme had a positive effect on virtually all measured properties of laboratory sheets made of short eucalyptus' s fibers and slightly inferior effect on sheets produced from long fibers of coniferous. According to results of deinking process efficiency, we can conclude that enzymatic treatment had a positive effect on ISO brightness of all treated samples. Highest ISO brightness was determined after using a mix of enzymes (cellulase, laccase and lipase). Enzymatic treatment had a slightly inferior effect on tensile index of all samples and even the other measured properties were better with using enzymes.

Biography

Mija Sežun has completed her PhD in Biological and Biotechnological Sciences. Her Doctoral thesis included Environmental Biotechnology area. Currently, she is working at Pulp and Paper Institute and mainly deals with Biotechnology in the paper industry through the use of enzymes in the process of paper production. Currently, her research focuses on the production of enzymes by using fungi and by applying paper mill sludge, as the substrate for the cultivation of fungi. In addition to the fungal enzyme production, she also deals with the use of commercial enzymes to improve the efficiency of processes in the paper industry.

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