



Deinking of noncontact-printed office waste paper with hemicellulase enzyme along with Tween-80 surfactant

Panitnad Chandranupap¹, Kanda Nakswan¹, and Pravitra Chandranupap^{2*}

¹*Department of Chemical Engineering, Faculty of Engineering,
King Mongkut's University of Technology North Bangkok, Thailand*

²*Department of Industrial Chemistry, Faculty of Applied Science,
King Mongkut's University of Technology North Bangkok, Thailand*

*e-mail: pravitra.c@sci.kmutnb.ac.th

The effect of polysorbate 80 or Tween-80 (nonionic) surfactant and hemicellulase enzyme on the efficiency of ink removal from laser-printed paper was investigated. Experimental conditions in this work were the dosages of hemicellulase enzyme from 0 wt% to 0.15 wt% (based on oven-dried weight of paper) and the concentration of nonionic surfactant from 1.0 wt% to 2.0 wt%. Pulp slurry was prepared for 5% consistency to use for enzyme treatment and the slurry was diluted to 0.5% consistency before flotation. The results showed that the enzymatic treatment along with flotation can remove ink particles from laser-printed paper better than flotation alone. This indicated by the significant decrease of freeness and the effective residual ink concentration (ERIC) in enzyme-treated pulp in comparing with non-enzyme-treated pulp. The increase in brightness and mechanical properties (tear and tensile index) of deinked paper pulp depended on proper dosage of hemicellulase enzyme and nonionic surfactant concentration in deinking process. The optimum condition for ink particles removal from laser-printed paper was 0.1 wt% hemicellulase enzyme in conjunction with 1.75 wt% Tween-80 surfactant. After flotation deinking, pulp has 598.4 ± 0.62 ppm freeness, 25.80 ± 0.62 ppm ERIC, 97.19 ± 0.69 % ISO brightness, 28.24 ± 0.33 mN.m²/g tear index, and 5.88 ± 0.62 Nm/g tensile index.

Keywords: Hemicellulase; Tween-80 surfactant; Flotation deinking