

DELIGNIFICATION OF PULP USING DEEP EUTECTIC SOLVENTS

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Abstract

Lot of works during the last decades have been focused on the new modes of pulp processing. One promising technology is the use of deep eutectic solvents. Deep eutectic solvents (DES) have opportunities to open new paths in the field of delignification methods.

This study was conducted to investigate the effects of deep eutectic solvent treatment on physical and chemical properties of delignified pulp. In the following experiment we used as an initial pulp the kraft pulp (Kappa No. 21.7; Degree of polymerization 1157). The pulp was treated with two different DES system based on choline chloride with lactic acid (1 : 9), and system alanine : lactic acid (1 : 9). The efficiency of delignification expressed as a decrease in kappa number on the unit change of the initial kappa number of pulp.

The order by the delignification efficiency growth is as follows: choline chloride : lactic acid (37.8%) > alanine : lactic acid (43.3%). During delignification by DESs, a degradation of pulp chain occurs, however a decrease in degree of polymerization was only 23 units versus kraft unbleached pulp, which represents maximum decrease by 2%. Delignified pulp with DESs has a brightness 34% and unbleached pulp achieved brightness 27%, therefore, it achieves the increase in brightness by 26%. The physical strength properties of DES delignified pulps were assessed in terms of tensile, tear and burst index and stiffness. Application of deep eutectic solvents were achieved to reduce tensile index by 13.2%, burst index by 14.3% and a tear index by 9.8%, and the pulp stiffness was increased by 4% again the unbleached pulp.

The results indicate that application of DESs might be an interesting alternative to oxygen delignification of pulp following kraft cooks.

Key words: *Delignification, Deep eutectic solvents, Green chemistry, Pulp.*