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# DISSOLUTION AND REGENERATION OF CELLULOSE FROM LIGNOCELLULOSIC RESIDUE WITH BICOMPOSED SOLVENT

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## INTRODUCTION

It is estimated that the lignocellulosic residue generated in wood processing comprehend 50% of the volume of the raw material. This material is predominantly composed of: cellulose, hemicellulose and lignin. Therefore, the duet Dissolution and Regeneration of the cellulose contained in this material can be applied for subsequent purposes as membranes and has been studied by several authors. However, the process is complex due to the hydrogen bonds present in the intra and intermolecular structure of cellulose. The present research has the objectives of a) to dissolve cellulosic material with the use of bicomposed solvents NaOH/Urea and subsequent regeneration, b) to quantify the influence of concentration variation of the bicomposed solventes and c) to identify the influence of the different physical parameters during the dissolution, such as temperature and the presence and absence of mechanical processing with ultrasonication.

## MATERIAL AND METHODS

Cellulose dissolution was performed with 2 grams of raw material in 50 ml of NaOH (3, 5 and 10 M), with aggregation of 3% wt Urea (10 M). The medium was kept under agoitation in a Dubnoff bath for 48 hours at 60° C; and ultrasonic bath for 2 hours at 25° C. Thereafter, the regenerated material was repeteadly washed (with water, or 5% m/v citric acid or 50% v/v etanol) for total removal of the dissolution media. The regenerated material was oven dried for 24 hours at 60° C and weighed. The dissolution efficiency was calculated directly by the mass loss of the material. The regenerated material was characterized by Thermogravimetric Analysis (TGA) and Differential Exploratory Calorimetry (DSC). Mass loss up to 35.8% were achieved with 5 M NaOH/10 M Urea. The temperature showed influence in the process, increasing the mass loss by 10.58%. Ultrasonic bath reached mass loss values of 23.58% in 2 hours of dissolution. Optical microscopes images showed changes in the structure of the material, such as fibrillation and fibrill formation at the end of the fibers. The thermal analyzes showed differences in the behavior between the material in natura and the regenerated materials. The TGA analysis showed an increase in the degradation temperature for regenerated materials corroborating that lignin and hemicellulose was removed during the chemical treatment, and the same is demonstrated in the DSC analysis with the displacement of the first endothermic peak in the 100°C region.

## RESULTS

## CONCLUSIONS

The proposed methodology for dissolution and regeneration of raw celulose with NaOH / Urea bicomponent solvent was effective, the ultrasonic bath implyed a decrease in dissolution time and thermal analysis revealed that part of the hemicellulose and lignin was removed during the process, providing a quasi-pure celulose.

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