

OXIDATION OF CELLULOSE FROM KRAFT PULP

J. A. Figueiredo,* Ana Paula Duarte, Suzana Martins, Carla Abrantes, M. Isabel Ismael, Rogério Simões

Research Unit of Textile and Paper Materials, University of Beira Interior,
P-6201-001 Covilhã, Portugal ; *albfig@ubi.pt

Cellulose fibers have several carboxylic groups that play an important role in paper production, since their changes affect the properties of the material. The presence of ionisable groups in the fiber has a significant effect on their swelling and on the strength properties of the paper produced. Most of the paper chemical additives are cationic polyelectrolytes which interact with these groups improving paper machine retention. Chemical modifications of cellulosic materials are usually carried out under conditions that destroy the inherent properties of the fibers, like their strength. Efforts have been made in order to achieve chemically modified cellulose fibers which could preserve their strength properties.

In this study, carboxylic groups were introduced to an industrial bleached kraft pulp of *Eucalyptus globulus* by a catalytic oxidation process using TEMPO (2,2,6,6-tetramethylpiperidine-1-oxy radical), sodium bromide and sodium hypochlorite (Fig. 1).¹ The oxidation conditions were optimized in order to increase the amount of carboxylic groups without a significant loss in pulp intrinsic viscosity. The determination of total carboxylic groups introduced in pulp fibers was performed using a conductometric titration method. The obtained results showed that an increase of 12% in the carboxyl groups content of pulp fibers gave rise to improvements of the swelling properties of the pulp, strength paper characteristics and cationic starch retention in paper formation. The oxidized pulp without refining exhibited an increase of 40% in its tensile strength and 50% in tear index and internal cohesion (Scott-bond test).

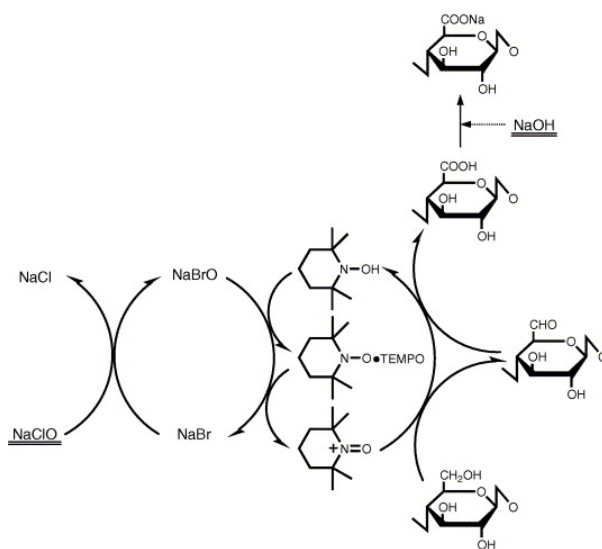


Figure 1 - Scheme of TEMPO-mediated oxidation of cellulose.¹

1. a) Saito, T., Okita, Y., Nge T. T., Sugiyama, J., Isogai, A. *Carbohydr. Polym.*, **2008**, *65*, 435-440; b) Saito, T.; Isogai, A. *Tappi J.*, **2005**, *4*, 3-8.