# Literature Reports

## Technology

**Th. W. Bither and J.F. Waterhouse: Strength development through refining and wet pressing.** Tappi J. *75* (1992): 11, 201–208.

An attempt was made to examine the tensile strength of paper within the framework of linear elastic fracture mechanics. An envelope for all of the properties examined (in-plane elastic constant, fracture resistance, pore size, tensile strength, "notched" tensile strength) was found, when paper was densified by different combinations of wet pressing and refining. A good correlation was observed between tensile strength and the product of fracture resistance and the modulus.

Treiber/1195

**B. Mao and N. Hartler: Improved modified kraft cooking. Part 2: Modified cooking using high initial sulfide concentration.** Nord. Pulp & Paper Res. J. *7* (1992): 4, 168–173.

In order to obtain a better selectivity, i. e. better viscosity and yield versus kappa-number, an improved modified kraft cooking process was developed. The process is characterized by an initial vapour-phase cooking stage followed by a second stage with a high liquor-to-wood ratio (6:1). The charge of NaOH is divided (approx. 60% in the beginning) between the two stages but with all the sulfide at the beginning of the first step. With a higher initial sulfide concentration and a lower final lignin concentration in the liquor, the process shows a significant improvment in selectivity, compared with a reference (modified) cooking process. The viscosity is about 50–150 units higher at a kappa-number of 25. The yield is about the same as for a conventional kraft cook.

Treiber/1196

**M. Laleg and I.I. Pikulik: Strengthening of mechanical pulp webs by chitosan.** Nord. Pulp & Paper Res. J. *7* (1992): 4, 174–180, 199.

Handsheets were made from stone groundwood pulps with several addition levels of chitosan and at several pH values. It was found that chitosan increased significantly the strength of never-dried webs, dry sheets and rewetted sheets, especially when introduced under neutral or alkaline conditions. It is proposed that chitosan crosslinks the fiber network by covalent bonds.

Treiber/1197

**K. Fischer, I. Schmidt, H. Lindig, K. Hübner, D. Mauler and P. Wiessner: Herstellung chlorfrei gebleichter Zellstoffe und deren Reaktivität.** (Production of non-chlorine bleached pulps and their reactivity.) Das Papier *46* (1992): 12, 703–709.

This article discusses the influence of oxygen containing bleaching agents on the bleachability of beech and spruce sulfite pulps in comparison with conventional bleaching methods. The pulps are dissolving pulps intended for further processing in the viscose industry. The oxygen containing bleaching agents cover oxygen itself, oxygen augmented by peroxyde as well as ozone and peroxide. The reactivity of the bleached pulps was assessed by conventional pulp parameters and also by the molecular mass distribution and by the filtration values after xanthation. Chlorine-free bleached pulp samples show a higher portion high DP cellulose compared to the chlorine bleached sample. During ageing of the AC this portion is drastically reduced and the polydispersity increases to a certain extent. The filterability of the pulps bleached according to the sequences EOP, P, P and EOP, Z, P was good.

Treiber/1199

**S. Murata, R. Kondo, K. Sakai, Y. Kashino, T. Nishida, and Y. Takahara: Chlorine-free bleaching process of kraft pulp using treatment with the fungus IZU-154.** Tappi J. *75* (1992): 12, 91–94.

Treatment with white-rot fungus IZU-154 was applied in bleaching of oxygen-bleached hardwood kraft pulp. This treatment brightened the pulp and decreased simultaneously its kappa-number. Brightness was increased by 17 and 22 points by three-day and five-day treatment respectively, and kappa-number was decreased from 10.1 to 6.4 by a five-day treatment. The combination of the three-day treatment with IZU-154, alkaline extraction with 2% NaOH (on pulp), and hydrogen peroxide bleaching with 5% gave a pulp of 86.3% ISO brightness.

Treiber/1200

**J.L. Yang, G. Lou and K-E. Eriksson: The impact of xylanase on bleaching of kraft pulps.** Tappi J. *75* (1992): 12, 95–101.

The application of xylanase from the fungus *Aureobasidium pullulans* as one bleaching stage yields better bleachability for both hardwood and softwood kraft pulps. Combinations of oxygen, xylanase treatment, hydrogen peroxide, enhanced alkaline extraction and chlorine dioxide have been tested in a variety of sequences. Pulp brightness of about 88% was achieved, about 4 points higher than without the xylanase.

Treiber/1201

**R.A. Blanchette, R.L. Farrell, T.A. Burnes, P.A. Wendler, W. Zimmerman, T.S. Brush and R.A. Snyder: Biological control of pitch in pulp and paper production by *Ophiostoma piliferum*.** Tappi J. *75* (1992): 12, 102–106.

The blue stain fungus *Ophiostoma piliferum*, which causes a blue discolor in sapwood of conifers, can substantially reduce the pitch content on chip surfaces and the pitch concentration in resin canals and within parenchyma ray cells. The colorless isolate CARTAPIP 58 from *Ophiostoma piliferum* extensively colonize chip surfaces and penetrate into the wood via ray parenchyma cells, and accumulate preferentially in wood areas containing a high concentration of pitch. Results from large-scale mill trials indicate that the fungus can be used successfully for pitch reduction.

Treiber/1202

**P. Axegård, B. Jacobson, S. Ljunggren and N-O. Nilvebrant: Bleaching of kraft pulps – a research perspective.** Das Papier *46* (1992): 10 A, V 16–V 25.

Today, there are two strong trends in process development of pulp bleaching. One is totally chlorine free bleaching; the second is the closed cycle mill concept. A lot of effort is made today in the development of totally chlorine-free (TCF) bleaching. Alternatives are here hydrogen peroxide, oxygen, ozone enzymes, reducing agents and – may be most important – modified extended kraft cooking processes. There is a great potential for improvements in TCF-bleaching Ozone is probably the most interesting chlorine-free bleaching chemical because of its very good bleaching effect. Unfortunately the attacks on carbohydrates are severe, mostly to the fact that the complex radical chemistry of the reaction is not fully understood. The closed cycle mill concept is still far away but is nevertheless more realistic than it was a few years ago. From a broader perspective such a mill can fit well into the idea of sustainable development. The kraft process has a number of natural bleeds for many elements that enter the mill with wood and raw water. One of the major challenges in the closed cycle mill is the handling of manganese.

Treiber/1207