

## Polysulphide Pulp on Softwood Polysaccharides

With wood chips becoming harder than ever to obtain, any development to increase the 45-50% kraft pulping yield is important. Just a 1% yield *increase* can save a 1000 ton/day mill up to \$1,000,000 per year. A pulp yield increase of 1-2% is possible with the addition of polysulphide (PS) in the kraft process. However, the current information on the effects of PS pulping on polysaccharides is limited to monosaccharide analysis and pulp viscosity determination (estimation of the average cellulose chain length). Our objective here was to determine the PS effect on the complete polysaccharides degree of polymerization (DP) distribution.

Kraft pulps were produced from white spruce chips with the addition of 0, 2, 5 and 10% PS and further bleached to 85% ISO brightness.

Carbanilated pulp solutions were injected in a size exclusion chromatography system, connected to a DAWN.

A 1% yield gain per 1% PS application was obtained. With up to 5% PS addition, glucomannan retention accounted for almost all the yield gain; at 10% PS charge, cellulose retention contributed also. The DP analysis showed a consistent shift of the distribution toward *higher* DP as the PS concentration was *increased*. Thus, PS addition not only caused *more* hemicelluloses to be retained within the fibres, but also protected the cellulose and hemicelluloses against degradation during pulping. Furthermore, most of the DP increment occurred with a low PS charge (2%). A decrease in the alkaline hydrolysis rate was the most likely cause of a decrease in random chain scission. Glucomannan—normally dissolved and now retained within the fibres—might have acted as radical scavengers.

Polysulphide must be considered as both a yield *enhancer* and, shown for the first time, a carbohydrate molecular weight *protector*, which could result in stronger pulp.

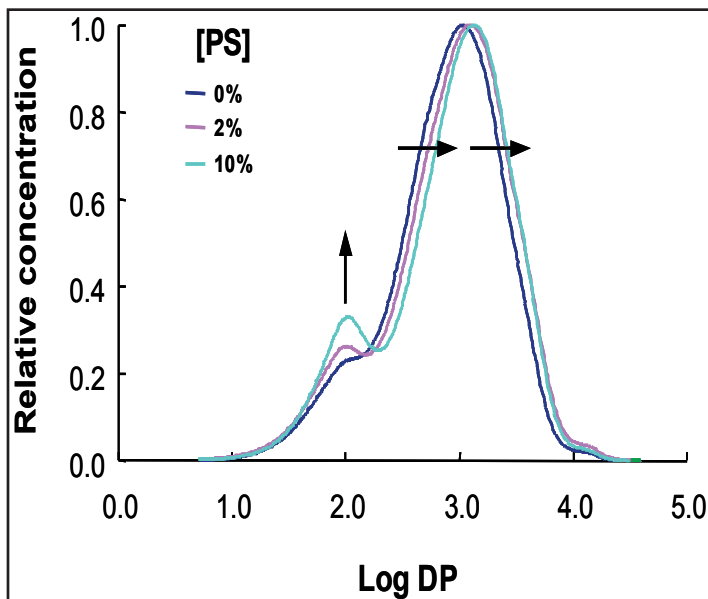


Figure 1. Distribution of the degree of polymerization of the polysaccharides of the bleached white spruce pulps cooked using 0-10% polysulphide.

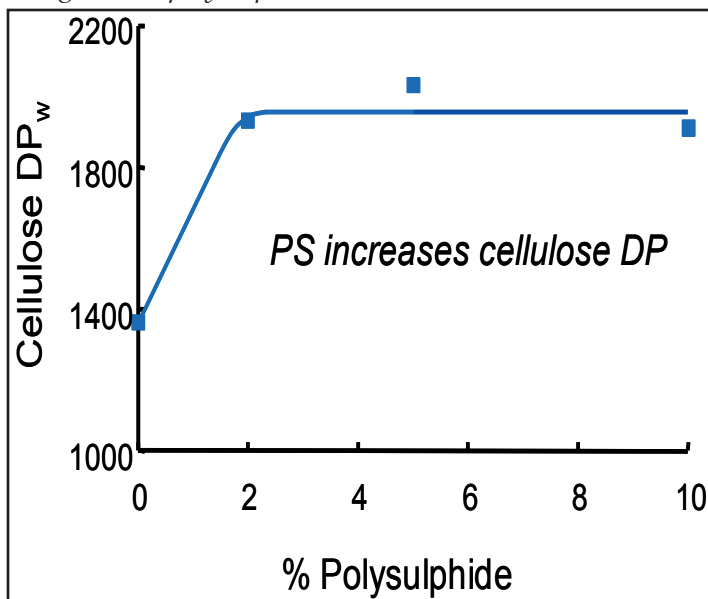


Figure 2. Weight-average degree of polymerization (DP<sub>w</sub>) of the cellulose fraction as a function of the polysulphide concentration in the cooking liquor.

