Application Report

Sedimentation and dispersibility

Application report:	AR209e
Industry section:	Paper, polymer, chemical
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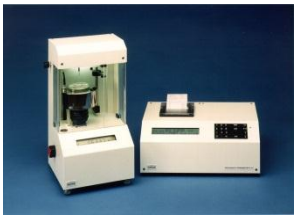
Method:	(Sedimentation)
Keywords:	Lignin, sedimentation, dispersibility, clay



Force Tensiometer – K12

Evaluating the Efficacy of Lignosulphonates as Dispersing Agents

Abstract

During the extraction of cellulose from wood pulp in the paper producing industry, lignosulphonates are generated as a by-product. They are most commonly used as dispersing or deflocculating agents in various products such as aqueous carbon black and pigment dispersions, wettable pesticides, industrial cleaning formulations and ore flotation; just to mention a few.

The following application note sets out to demonstrate how sedimentation measurements with a Krüss K12 tensiometer, can be used to evaluate the dispersing power of such lignosulphonates.

Lignosulphonates

The raw material for the cellulose industry – wood – consists mainly of cellulose, hemicellulose and lignin. The latter is a polymer containing phenyl propane units as shown in figure 1.

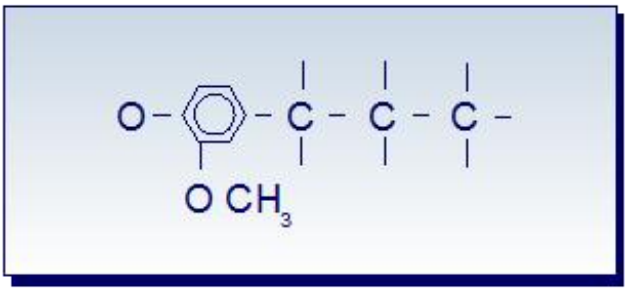


Figure 1

As lignin in its natural form is insoluble in neutral liquids and organic solvents, a common way of seperating the cellulose from lignin and other compounds is to treat the wood chips with a hot acid aqueous solution of calcium bisulphite. During this "digesting" process, parts of the lignin are sulphonated according to the simplified reaction shown in figure 2.

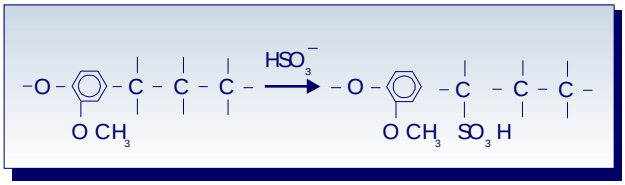


Figure 2

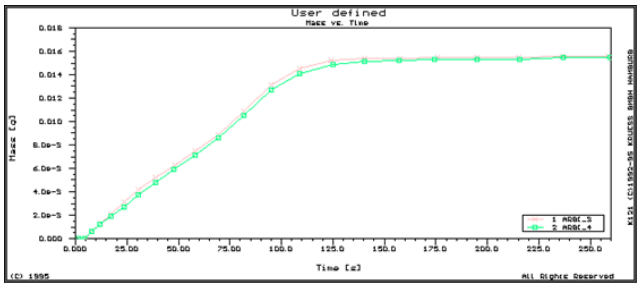
During this treatment some of the linkages in the lignin network structure and lignin carbohydrate attachment are hydrolyzed rendering them more soluble. These soluble lignosulphonates vary in nature of cation, degree of sulphonation and in their average molecular weight. Chemically they are known as water soluble anionic surface active derivatives of lignin.

Experimental method

All data was measured using a Krüss K12 tensiometer equipped with a sedimentation measuring kit. In order to measure dispersing efficacy, the rate of sedimentation of a standard clay, Argirec B24 (20 g/l) was measured first alone and then in the presence of different lignosulphonates (1 g/l).
As a starting point, reproducibility was checked with Argirec B24 in the absence of lignosulphonates. Similar measurements were then made in the presence of two lignosulphonates in order to evaluate their dispersion efficacy.

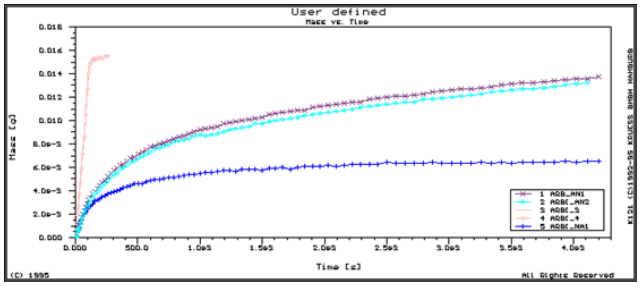
Results

Measurements on dispersions of Argirec B24 alone demonstrate good reproducibility as shown in Graph 1.



Graph 1

In the presence of lignosulphonates, the sedimentation profiles are as expected quite different. Moreover, the two lignosulphonates investigated can be easily and reproducibly differentiated by their sedimentation profiles as illustrated in Graph 2.



Graph 2

Conclusions

Sedimentation measurements on Argirec clays can be made successfully using a Krüss K12 tensiometer. The modified sedimentation profiles resulting from addition of lignosulphonate dispersing agents make it possible to identify those most likely to be effective dispersing agents.
For improved sensitivity, both sample vessel and measuring probe size could be increased.