

The electro-oxidation of lignin in Sappi Saiccor dissolving pulp mill effluent

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Abstract

Electro-oxidation reactions using a nickel anode were carried out on the calcium-spent liquor effluent obtained from Sappi Saiccor (formerly South African Industrial Cellulose Corporation) dissolving pulp mill as well as on lignin- and lignan-type compounds previously identified in the effluent. Voltammograms were obtained for each solution in order to identify the oxidation potentials of the compounds to be electro-oxidised. Value-added products such as vanillin and syringaldehyde were identified in the electro-oxidised reaction mixtures using gas chromatography-mass spectrometry (GC-MS) and high performance liquid chromatography (HPLC). Profiles of the changes in concentration of these compounds were determined as a function of time with maximum concentrations reached within the first half hour. These findings are significant in that few electro-oxidation reactions have been carried out on the effluent of a pulp mill which uses the acid bisulphite pulping process and no results have previously been reported on the electro-oxidation of syringaldehyde. This study contributes to a further understanding of the electro-oxidation of lignin and is of value to the paper and pulp industry at large. Reduction of the organic content of the effluent by electro-oxidation was shown to be possible.

Keywords: electro-oxidation, lignin, effluent, vanillin, syringaldehyde