# REACTION OF PAPER PULP AND ALKYL KETENE DIMER BY AGING TREATMENT DURING PAPERMAKING PROCESS

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Alkylketene dimer was known as a cellulose reactive or alkaline size because it does not require to fix to the fiber as do the traditional rosin sizes. A proposed sizing mechanism of AKD was the formation of $\beta$-ketoester bond between AKD and cellulose which provides the permanent attachment and the orientation of the hydrophobic alkyl chains outward. However, some questions about the reaction had arisen and thus, the sizing mechanism of AKD has been a subject of controversy for several decades. The major concern of the controversy is that AKD is really reactive with cellulose or not in the papermaking conditions.

In this study, reaction between AKD and pulp fiber was investigated, in order to find out whether AKD forms $\beta$-ketoester with pulp fiber during aging under no catalyzed neutral condition with obvious spectroscopic evidence. In addition, effect of aging treatment on the sizing development was studied.

It has been disclosed that, in absence of water, AKD reacted with cellulose to form $\beta$-ketoester linkage under no catalyzed neutral condition, while, in presence of water, most of AKD was hydrolyzed to a dialkyl ketone or $\beta$-ketoacid. In addition, during the aging treatment of AKD-sized paper, its typical IR spectra bands gradually were reduced, completely disappeared after 6hr aging, and formed new absorption bands at $1707cm^{-1}$ and shoulder peak at $1700cm^{-1}$ which refer to the typical dialkylketone absorption bands. Therefore, the formation of $\beta$-ketoester between AKD and pulp fiber is impossible in the practical papermaking process.

It could be suggested that the sizing development of AKD-sized paper is obtained by next two mechanism: 1) formation of a thin-layer of AKD on the fiber surface through melting and spreading of AKD emulsion particles by heat and 2) the hydrolysis of AKD to dialkyl ketone which has higher melting point, during drying and storage of AKD sized papers.