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Quantitative Determination of Alkyl Ketene Dimer (AKD) Retention in Paper  
Made on a Pilot Paper Machine

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**Abstract:** There have been some problems reported associated with the use of alkyl ketene dimer (AKD) in alkali papermaking. Excessive use of size emulsion, poor size performance when filler used, problems with back water contamination, poor retention, and formation of pitch deposits on machinery are some of the problems experienced during papermaking operations. In addition, paper containing AKD is reported to lose its resistance, over time against liquid penetration and tends to become slippery. Therefore, in this study, the retention and reaction mechanisms of AKD internal sizing agent in a paper matrix were investigated by capillary gas chromatography (GC) in an attempt to better understand paper sizing with AKD. Results are expressed as the mean value of at least three repetitive tests along with standard deviation (SD) and coefficient of variation (COV). A number of different paper samples were made on a pilot paper machine with different AKD addition levels. AKD levels in wet and machine dry paper were extracted and analysed in GC. Precipitated calcium carbonate (PCC) loading was observed to increase AKD retention. The amount of bound AKD in wet paper significantly increased as a result of drying. Nevertheless, in general the reacted AKD only constituted a very small portion of the total retained AKD. Paper sizing was found to be achieved by bound AKD. This means that an even lower additional level of AKD would be sufficient to ensure good paper sizing provided that it forms a chemical bond with furnish. This result is believed to be important in solving some problems associated with AKD sizing.

**Key Words:** Alkali paper, AKD sizing, retention, gas chromatography

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