Analysis of Alkylketene Dimers (AKD) in Paper

In paper manufacturing, various additives are used, often at minute concentrations. While GC, LC, IR, and NMR are available for analyzing paper additives, these methods require a pretreatment to extract the additives. This can be a cumbersome and time-consuming process. However pyrolysis gas chromatography (Py-GC) is a simpler method, since an extraction step is not necessary.

The analysis of alkylketene dimers, AKD, used as a sizing agent in the paper industry, is described here. AKDs exist in three forms: unreacted, ketones resulting from hydrolysis, and AKDs bonded to cellulose by hydroxyl groups. Py-GC analysis revealed that in this sample all the AKDs were converted to dialkylketones by hydrolysis, as shown in Fig. 1. Fig. 2. is a pyrogram of paper with AKD added. Within 8 minutes, three dialkylketones originating from AKD were eluted. This example demonstrates the speed and ease with which Py-GC can analyze AKD without any pretreatment.

Reference : Yano, T., Ohotani, H., Tsuge, S., ANALYST., 1992, 5, 849.

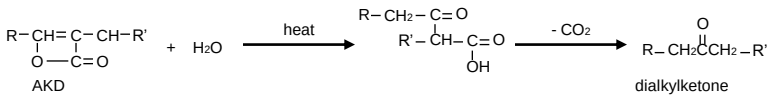
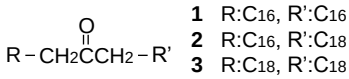


Fig. 1 Ketone Formation by Hydrolysis of AKD



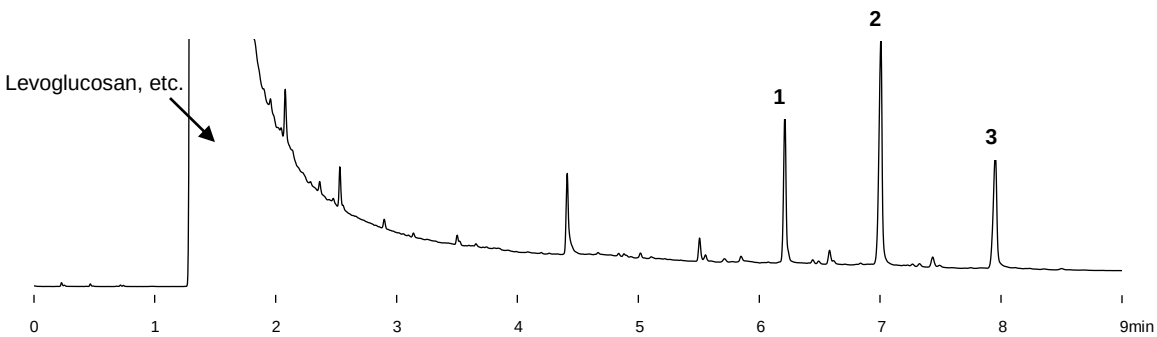


Fig. 2 Analysis of AKD in Paper by Pyrolysis-GC

Pyrolysis temp. : 600ºC, Carrier gas : He, Column head pressure : 140kPa, Split ratio : 1/50
Separation column : Ultra ALLOY^{+}-1 (dimethylpolysiloxane), Length 30m, 0.25mm id., Layer thickness 0.25µm
GC oven temp. : 225→20ºC/min→330ºC, GC injection port temp. : 320ºC, Sample : 2mg, Detector : FID

Keywords : Paper, Size, AKD, Flash Pyrolysis

Products used : Multi-functional pyrolyzer, UA-1

Applications : Paper Manufacturing

Related technical notes :

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