

Simple Determination of Cellulose by Reactive Pyrolysis in Presence of Cobalt Sulfate (CoSO₄)

Cellulose is used in pharmaceuticals, cosmetics, foods, paints, etc. in addition to paper products. Infrared spectrometer or pyrolysis gas chromatography (Py-GC) has been used for quantification of cellulose; however, results are not always satisfactory. Fig. 1a shows a pyrogram obtained by conventional Py-GC technique. Pyrolyzates of cellulose shows up as complicated peak pattern consisting of over 50 peaks with levoglucosan as the major component, and it therefore results in poor reproducibility of about 30 % relative standard deviation (RSD). Hence, 10 µL of a cobalt sulfate solution (140 µg/µL) was added to 0.2 mg of sample. The resulting sample was dried at 90 °C for 10 min in an oven, then was subjected to reactive pyrolysis. Fig. 1b shows simplified pyrogram thus obtained, showing furfural as the major component. Quantitative analysis of cellulose using the peak area of furfural gave a satisfactory reproducibility of 2.7 % RSD. This demonstrates that Py-GC utilizing reactive pyrolysis in the presence of CoSO₄ can favorably be applied to the determination of cellulose contained in various samples.

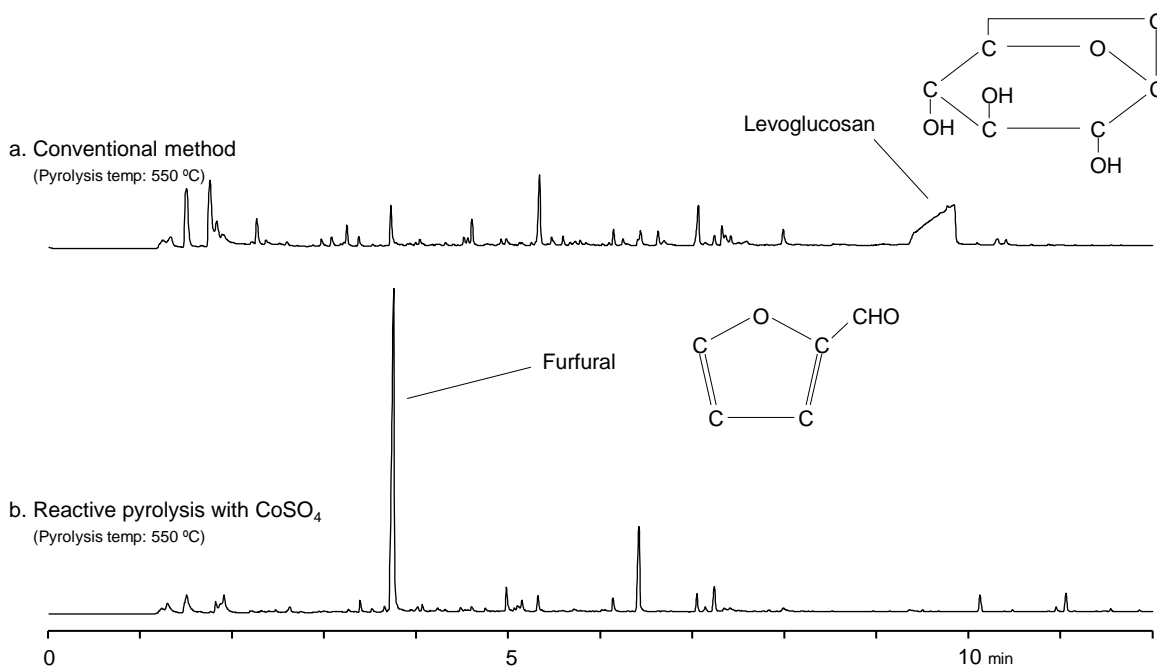


Fig. 1 Simplification of Pyrogram of Cellulose by CoSO₄

PY : Double-Shot Pyrolyzer (PY-2020D), Detector : Flame ionization detector (FID)
 Carrier gas : He, Flow rate : 1.2 mL/min, Split ratio : 1/80
 Separation column : Ultra ALLOY⁺-5 (5 % diphenyl 95 % dimethylpolysiloxane), Length : 30 m, Id : 0.25 mm, Film thickness : 0.5 µm
 GC oven temp. : 40 ~ 320 °C (2 min) at 20 °C/min, GC injection port temp. : 320 °C, Sample : ca. 0.2 mg, Amt. of CoSO₄ added : 1.4 mg

Keywords : Reactive Pyrolysis, Cobalt Sulfate, Cellulose, Quantitative Analysis

Products used : Multi-functional pyrolyzer, UA⁺-5

Applications : Paper Industry, Pharmaceuticals, Cosmetics, Foods, Chemical Industry

Related technical notes :

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