Simple Determination of Cellulose by Reactive Pyrolysis in Presence of Cobalt Sulfate ($CoSO_4$)

Cellulose is used in pharmaceutics, 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, 5µl of a cobalt sulfate solution (140µg/µl) was added to 0.2mg of sample. The resulting sample was dried, 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 $CoSO_4$ can favorably be applied to the determination of cellulose contained in various samples.

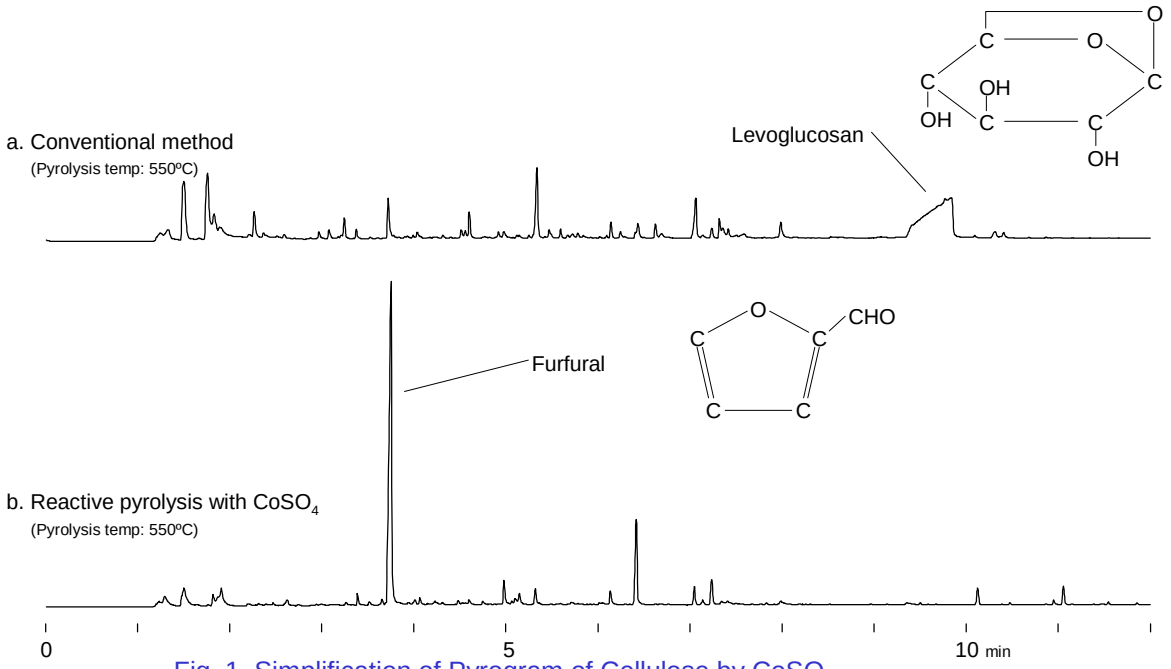

Fig. 1 Simplification of Pyrogram of Cellulose by $CoSO_4$

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

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

Application : Paper Industry, Pharmaceutics, Cosmetics, Foods, Chemical Industry

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