CDS olutions

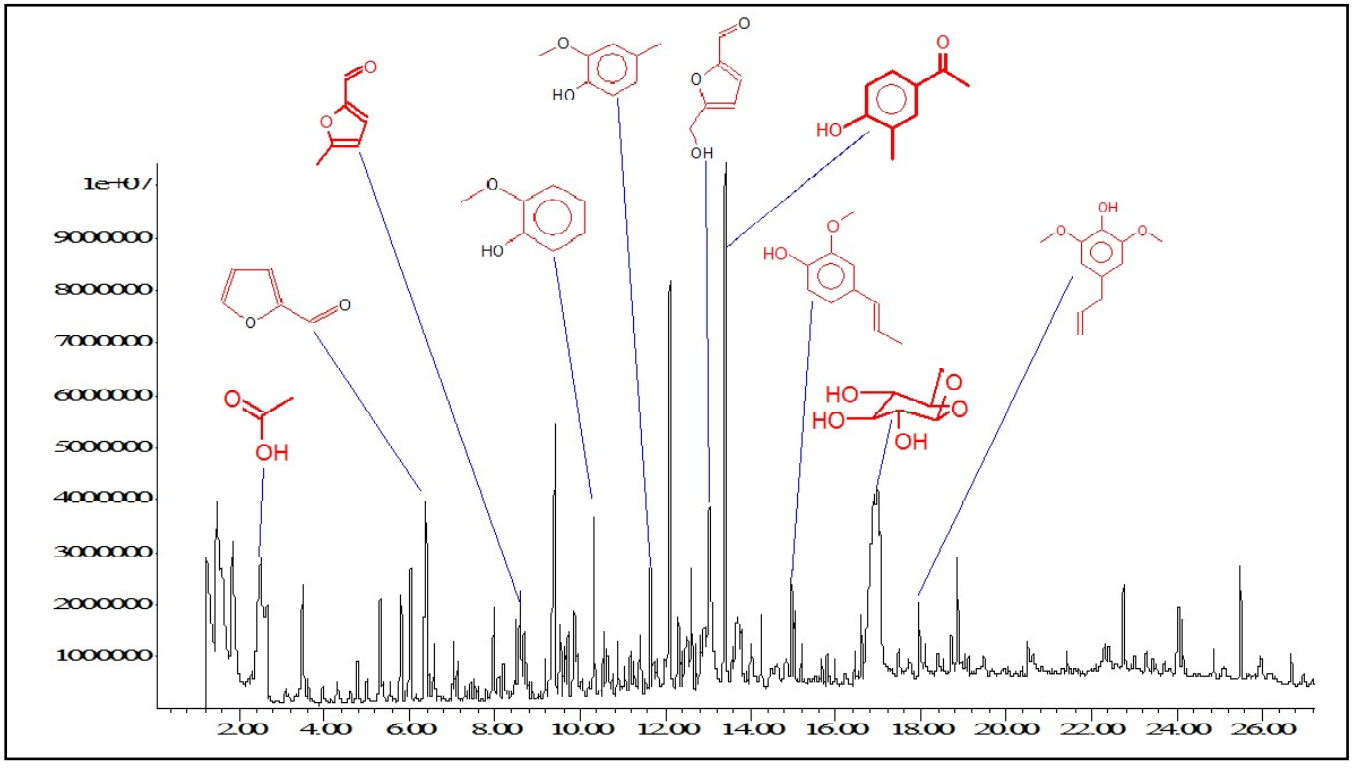
APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Pyrolysis-GC/MS of Switchgrass

Switchgrass, like many other plant materials, is comprised largely of cellulose and lignin. Cellulose is a glucose polymer, and when pyrolyzed produces considerable char, water, carbon dioxide and many polar organic compounds. Significant among these are levoglucosan and furans such as furanone, furancarboxaldehyde and hydroxymethyl furancarboxaldehyde. Acetic acid is also produced.

Lignin is a complex, crosslinked aromatic biopolymer which can make up to 30% of plant material. It is essentially insoluble, and is responsible for much of the heat produced when plant materials are burned. When pyrolyzed, it produces mostly subsituted phenolics, including a series of methoxyphenols and dimethoxyphenols. These compounds are seen in the pyrograms of many wood and paper products including fiberboard, kraft paper and cardboard.

The figure below shows a pyrogram of switchgrass at 650°C. Since both cellulose and lignin are present, pyrolysis products from both biopolymers are seen in the pyrogram. From the cellulose, acetic acid and levoglucosan (eluting at about 17 minutes) are prominent, along with the characteristic furans. Lignin contributes the aromatics, including the methoxyphenols and dimethoxyphenols.



Equipment

This sample was analyzed using a CDS Model 5250 Pyroprobe Autosampler, interfaced to an Agilent6890/5975B gas chromatograph/mass spectrometer.

Model 5250 Conditions

Valve Oven:	300°C
Transfer Line:	325°C
Temperature:	650°
Time:	15 seconds
Sample Purge:	0.1 min
Equilibration:	0.1 min
Post Pyro Delay	0.1 min

GC Conditions

Carrier:	Helium
Injector:	350°C
Split:	50:1
Column:	HP-5MS (30m X 0.25mm)
Detector:	5975B MS
Range:	35 - 550

GC Program:

Initial:	40°C for 2 minutes
Ramp:	10°C/min.
Final:	300°C

FOR MORE INFORMATION CONCERNING THIS APPLICATION, WE RECOMMEND THE FOLLOWING READING:

A. A. Boateng et al., Pyrolysis of switchgrass (Panicum virgatum) harvested at several stages of maturity, J. Anal. Appl. Pyrolysis 75 (2006) 55-64.

Additional literature on this and related applications may be obtained by contacting your local CDS Analytical representative, or directly from CDS at the address below.

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