

CDSolutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Pyrolysis of Soy Clothing Fiber

Today, you can buy clothing made from agricultural sources other than cotton; there's bamboo, corn, hemp and even soy. However, if you are think that soy fiber is made from 100% soy, or even is just 100% natural, this may be untrue. Pyrolysis GC/MS can be used to help determine fabric content, including the discovery of mislabeled consumer goods. It is a way of introducing nonvolatile materials to a gas chromatograph by using thermal energy to break molecular bonds, as a result, fragmenting solid material into volatile components which can be separated by the gas chromatograph.

We performed pyrolysis of tofu and texturized soy protein from the grocery store, and a fresh soybean to compare with soy fiber. Their pyrograms (not shown here) are almost identical. Figure 1 is a pyrogram of texturized soy protein. Soy clothing fiber, however, looks very different. Figure 2, contains a pyrogram of soy fiber. It has only very few similarities to soy protein, such as aromatics and phenols. However, aromatics and phenols would not indicate specifically soy protein; they are pyrolysis products of many polymers.

Because soy fiber looked so different from soy protein, we performed more research on how soy fiber is made, and discovered that it is made from soy fiber and polyvinyl alcohol. We pyrolyzed different grades of polyvinyl alcohol and discovered that soy fiber more closely resembles partially hydrolyzed (low grade) polyvinyl alcohol, (Figure 2), and we found very few pyrolysis products that are related to soy.

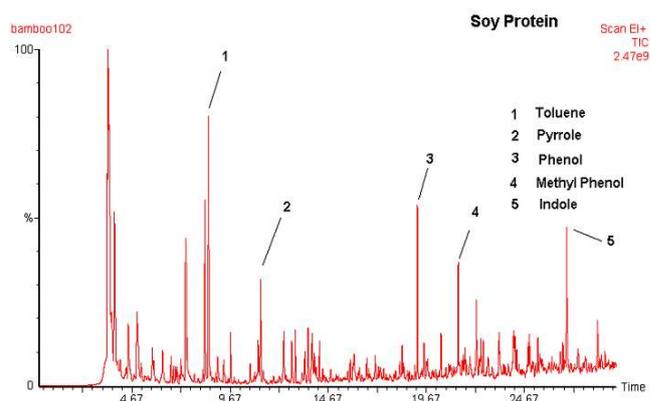


Figure 1. Pyrogram of texturized vegetable (soy) protein.

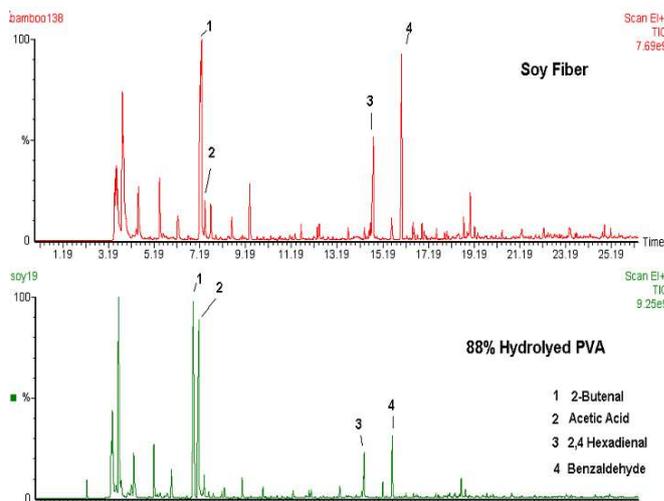


Figure 2. Soy clothing fiber and low grade polyvinyl alcohol.

Equipment

This sample was analyzed using a CDS Model 5200 Pyroprobe in direct pyrolysis mode, interfaced to a Perkin Elmer Clarus gas chromatograph/mass spectrometer.

Model 5200 Conditions

Pyroprobe:

Initial: 0°C .00 Seconds

Ramp: 0.00°C per mSec

Final: 600°C 30.00 Seconds

Interface:

Rest: 50°C

Initial: 50°C 0.00 Minutes

Ramp: 0.00°C per Minute

Final: 300°C 3.00 Minutes

Iso Zones:

Transfer Line: 310°C

Valve Oven: 350°C

GC Conditions

Carriers Parameters

Split Ratio: 50:1

Inj Port Temperature: 280°C

Column: 1701 60M 0.25mmID 0.25um df

Initial Temp: 40°C

Initial Hold: 2.00 min

Ramp: 6.0/min to 280°C, hold for 15.00 min

MS Scan, Time 0.00 to 39.50

Type: MS Scan

Ion Mode: EI+

Start Mass:25.00 End Mass: 620.00

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.

CDS Analytical, Inc. has been a leader in the design and manufacture of laboratory instruments for sample preparation and analysis since 1969. We are dedicated to providing the best possible instruments for both research and routine analysis. Well known in the field of pyrolysis, CDS manufactures the Pyroprobe® 5000, 5150, 5200 and 5250 autosampler for the introduction and analysis of solid materials by GC, MS and FT-IR. CDS offers a complete line of dynamic headspace instruments for the analysis of volatile organic compounds in environmental, pharmaceutical and food applications, including the model 8400 four-position autosampler. CDS also manufactures the Dynatherm line of thermal desorption instruments including the 9000 series for air monitoring and the 9300 TDA. Our customers, their requirements and applications are important to us. To help meet your needs, we offer a wide range of analytical information and the services of our applications laboratory. If you would like additional information, please contact us at the address below, call us at 1 800 541 6593, or log onto [www. cdsanalytical.com](http://www.cdsanalytical.com).