

Thermal Extraction of Coffee, Tea, and Cocoa

Application Note

Food & Flavor

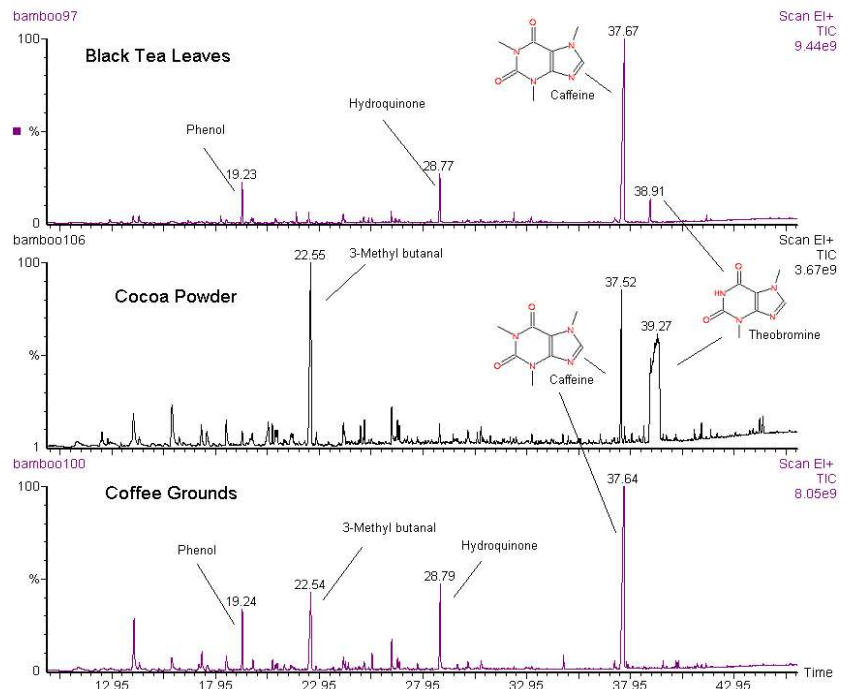
Author:

K. Sam

Although the Pyroprobe is most often used for analytical pyrolysis, it also can be used for thermal sampling at sub-pyrolysis temperatures for semi-volatiles. To compare the thermally labile compounds present in coffee, tea, and cocoa, we placed about 50 micrograms of each into a quartz sample tubes for analysis. The tube was inserted into the Pyroprobe coil. Both the coil and interface were heated to 300°C for 3 minutes. The resulting volatiles were swept to the GC/MS via a heated transfer line.

Coffee grounds, cocoa powder and black tea leaves all shared compounds. Like compounds include caffeine, phenol, and hydroquinone, but the relative amounts of these components differ. Cocoa has much more 3-methyl butanal than either coffee or tea. Present in large amounts in cocoa, lesser amounts in tea leaves, but notably absent in coffee grounds is theobromine, a stimulant that provides alertness.

The Pyroprobe is a versatile thermal sampling instrument, enabling the analyst to extract and analyze compounds thermally in one step. Caffeine and theobromine were detected in coffee grounds, cocoa powder, and tea leaves without the use of hazardous chemicals, and without the time required for solvent extraction.



Instrument Conditions

Pyroprobe

Valve Oven: 300°C
Transfer Line: 300°C
Coil: 300°C for 3 minutes
Interface: 300°C for 3 minutes

GC/MS

Column: 30m x 0.25 mm 5% phenyl
Carrier: Helium, 50:1 split
Injector: 350°C
Program: 40°C for 2 minutes,
10°/min to 300°C