



The Use of Pyrolysis GC/MS to Characterize Indoor Dust

Application Note

Environmental Industry

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As indoor dust may contain toxic materials along with allergen causing natural polymers from spiders, insects and mites, the study of indoor dust can be used to determine potential environmental health risks in the environment. Using a CDS Pyroprobe as an injection strategy for gas chromatography/mass spectrometry, we are able to understand both the semi-volatile and polymer nature of dust.

We took dust from kitchens, bathrooms, and bedrooms in homes, and ran them on the GC/MS using a CDS Pyroprobe to introduce the samples. Small amounts of dust (<100µg) were desorbed at 300°C, and then pyrolyzed at 750°C. As expected, dust collected turned out to be a complex mixture. As shown in the figure on the following page, each location had pyrolysis products such as phenols from wool and hair, levoglucosan and furans from cellulose (cotton or paper), benzoic acid from polyester (clothing and carpeting), and styrene from polystyrene. Furthermore, not all locations were identical; each contained different types and relative amounts of products, relating to the items found in the area. For example, home "K", furnished with polyester carpeting, had more polyester; and home "T" had more cellulose from cotton clothing.

Semivolatiles present in the 300°C runs (not shown) included fatty acids and cholesterol from skin and cooking oils, and the plasticizer bis(2-ethylhexyl) phthalate.

By sampling dust, and items suspected of contributing to dust, thermal desorption and pyrolysis GC/MS can be used to help identify dust make-up.

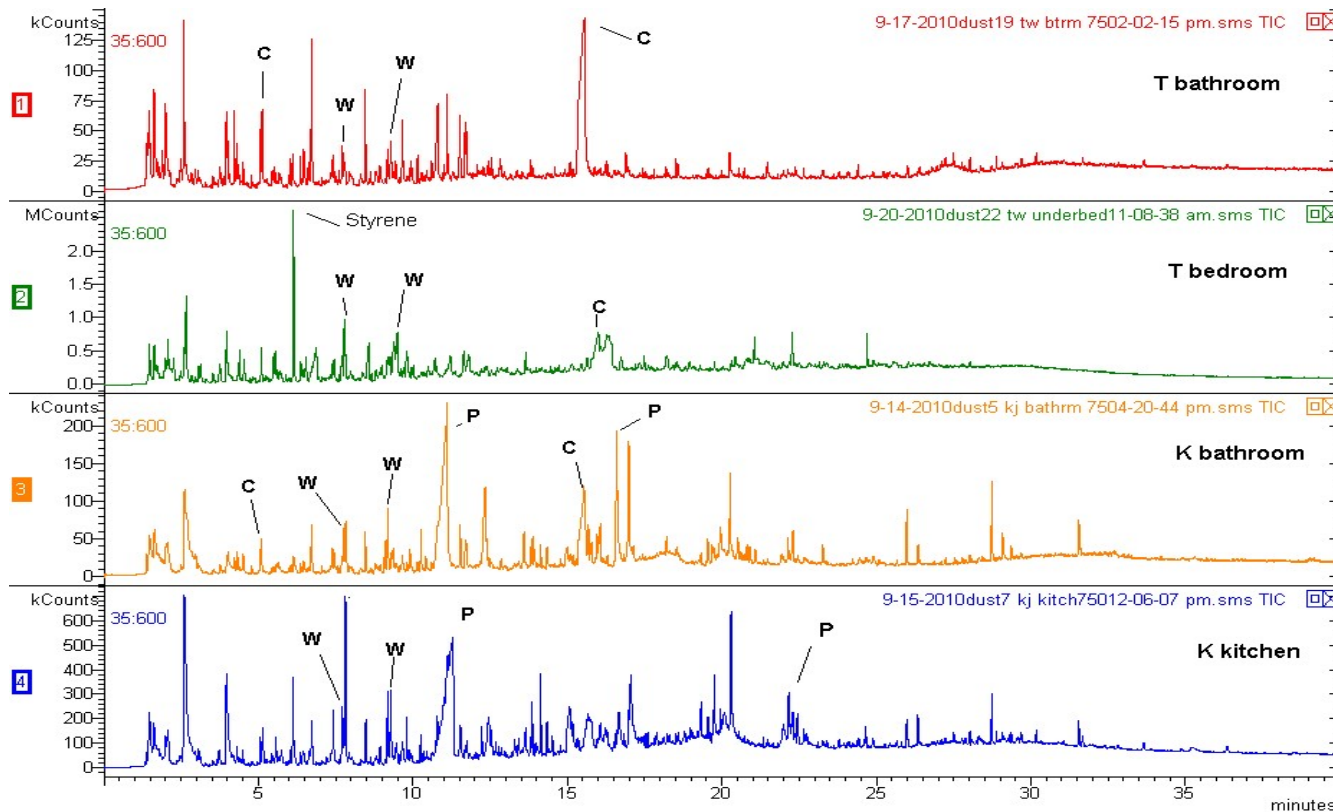
CDS Pyroprobe Conditions:

Interface: 300°C for 3 minutes
Platinum Coil: 300°C or 750°C 15 sec

Valve oven: 325° C
Transfer line: 325° C

GC/MS Conditions:

Column: 5 m x 0.25 mm 5% phenyl
Carrier: Helium, 50:1 split
Injector: 325°C
Program: 40°C for 2 min
10°C/min to 300°C(5min)
Mass range: 35 to 550



Peaks from Wool or Hair(W), Cotton (C), and Polyester (P) labeled in four dust samples.

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

K. Jansson et. al., Multistep thermal characterization of polymers using GC- MS, American Lab, 39 (6)
(2007) 16- 19.