

Migration of Styrene from Packaging into Food

Migration of volatile compounds in packaged foods - whether from the food into the packaging or from the packaging into the food - is a concern in maintaining flavor quality. In this example of a snack food, peanut butter and crackers were packaged in a polystyrene tray. For testing, the samples were placed into a large dynamic headspace vessel which was purged with helium to the sorbent trap of the sample concentrator. After the sampling time, the trap was automatically placed on-line with the gas chromatograph and thermally desorbed to transfer the volatiles to the GC for analysis. Even at low temperatures, significant amounts of volatile organics may be seen in the dynamic headspace analysis of the packaging itself.

Figure 1 shows a chromatogram of the collected organics from the packaging at 40°C, in which aromatics such as ethyl benzene and benzaldehyde were identified, along with the principal compound, residual styrene from the polymer.

In Figure 2, the crackers from the packaging were sampled in the same way. For sensitivity, the mass spectrometer was operated in the Single Ion Monitoring mode, with ion 104 selected for styrene. The peak at about seven minutes shows the presence of styrene in the crackers. Additional testing also showed that styrene had migrated into the peanut butter as well.

The same techniques may be used to identify flavor compounds which are leaving the food and being absorbed by the packaging.

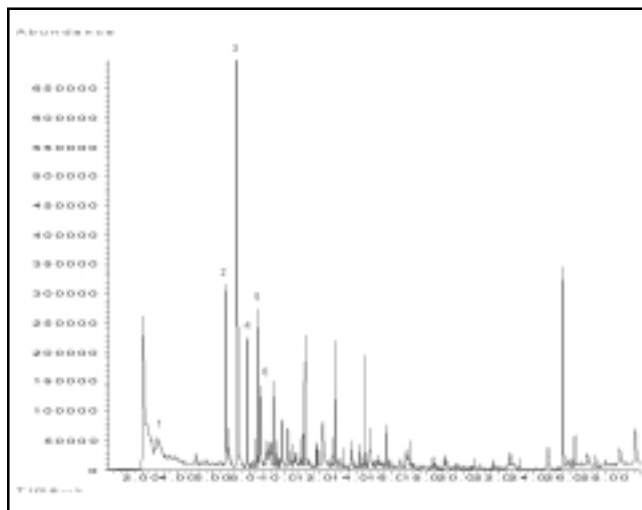


Figure 1. Dynamic headspace of polymer packing for snack.

Peak Identification

1. Acetic Acid
2. Ethyl benzene
3. Styrene
4. 1-methyl ethylbenzene
5. Propylbenzene
6. Benzaldehyde

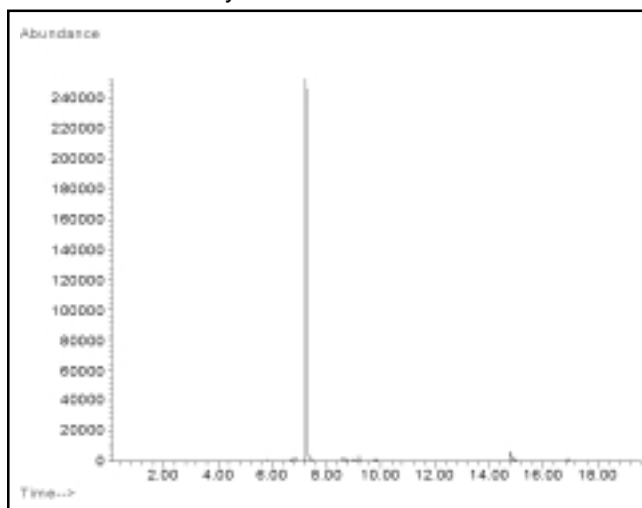


Figure 2. SIM (104) of cracker headspace.

Equipment

These samples were analyzed using a CDS Model 8000 Universal Sample Concentrator, interfaced to an Agilent Model 6890 gas chromatograph which was equipped with an 5973 MSD as the detector.

Model 8000 Conditions

Valve Oven: 250°C
Transfer Line: 300°C
Vessel: 95 mm
Temperature: 40°
Time: 45 minutes
Trap: Tenax
Trap Desorb: 275°C for 5 minutes

GC Conditions

Carrier: Helium
Column: HP-35 m (30m X 0.25)
Detector: MSD
GC Program:
Initial: 40°C for 2 minutes
Ramp: 6°C/min.
Final: 295°C

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

*Techniques for Analyzing Food
Aroma,*
R. Marsili, Ed., Marcel Dekker, Inc.,
New York.

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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