



## Qualitative Rum Profiles using Thermal Desorption with the Monotrap®

### Application Note

Food and Flavor

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Distilled alcoholic beverages such as rum are complex mixtures of compounds in an ethanol/water mixture. These compounds can be grouped into a number of categories. The first group consists of compounds produced by the fermentation process along with the ethanol. This includes aliphatic alcohols, esters, aldehydes, and lactones. The other categories consist of phenolic volatiles produced from the breakdown of lignin products from smoke (for a characteristic flavor) and cask extractives (non volatiles).

The characterization of alcoholic beverages is frequently done using GC/MS. This usually consists of either a direct injection or a preparatory extraction pretreatment before injection. A new technology called the Monotrap® has been developed to enable characterization of alcoholic beverages with no initial sample preparation. The Monotrap® consists of highly porous rods of silica impregnated with graphite carbon.

For the analysis, a 2 ml aliquot of commercial rum was placed in a 3 ml vial to which a Monotrap® had been added. The sample was capped with a PTFE lined cap and agitated periodically for one hour. The Monotrap® was then removed (gently, using forceps) and placed into a dynamic headspace vessel of a Sample Concentrator, which was interfaced to a GC/MS. The sample was thermally desorbed at 325°C for 20 minutes. Figure 1 shows the chromatogram of a "light" rum profile. This rum has a pale yellow color and contains five aliphatic esters (peaks 1,2,3,4,6).

The chromatogram in Figure 2 contains furfural and a number of its derivatives, as well as levoglucosan. This compound profile, along with the observed deep amber color, indicates a rum aged in charred wooden casks. The chromatogram in Figure 3 shows the profile of a rum which has a number of additives, including cymene, limonene, and citral.

### Instrument Conditions

CDS Sample Concentrator		GC/MS	
Valve Oven:	300°C	Column:	30m x 0.25 mm 5% phenyl
Transfer Line:	275°C	Carrier:	Helium, 50:1 split
Vessel Idle:	40°C	Injector:	350°C
Vessel Heat:	325°C/20min	Program:	40°C for 2 minutes, 10°/min to 295°C
Trap Heat:	250°C/5min	Solvent Delay	8 minutes

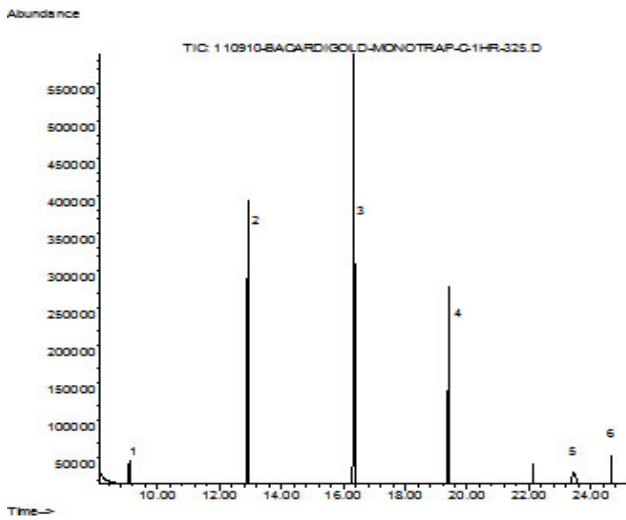


Figure 1. Light rum.

1. Ethyl Hexanoate
2. Ethyl Octanoate
3. Ethyl Decanoate
4. Ethyl Dodecanoate
5. Hexadecanol
6. Ethyl Hexadecanoate

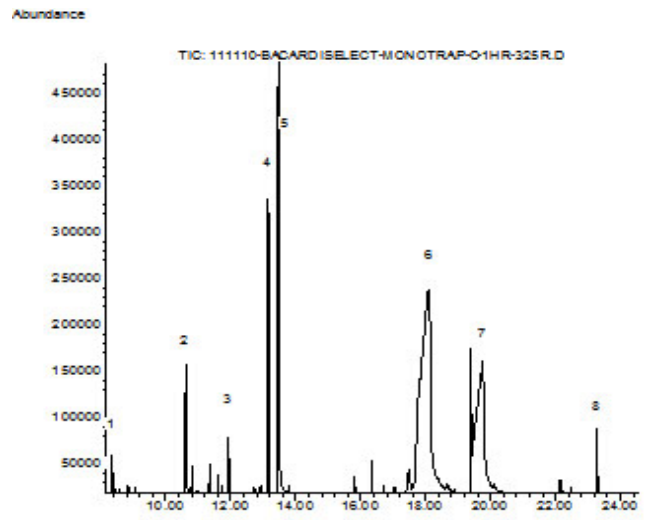


Figure 2. Aged rum.

1. 5-Methyl Furfural
2. 2,5-Furandicarbaldehyde
3. 3,5-Dihydroxypyranone
4. 1,4 Dianhydroglucopyranose
5. 5-Hydroxymethylfurfural
6. Levoglucosan
7. 1,6-anhydro- $\alpha$ -d-Galactofuranose
8. n-Hexadecanol

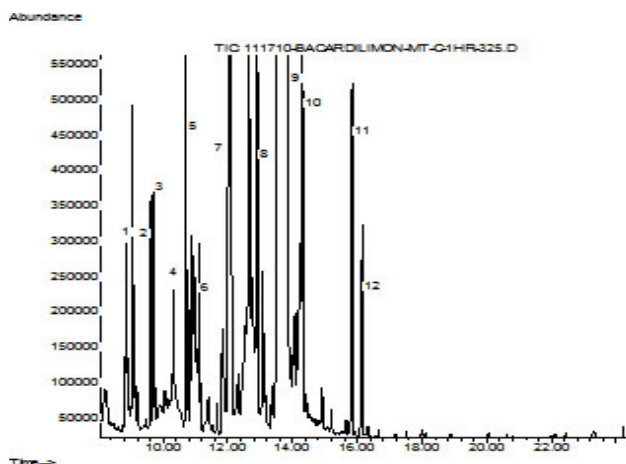


Figure 3. Flavored rum.

1. 2,4-Dihydroxy-2,5-Dimethyl-3-Furanone
2. m-Cymene
3. Limonene
4. Terpinene
5. 2,5-Furandicarbaldehyde
6. Linalool
7. 3,5-Dihydroxy-6-methyl-2,3-Dihydroxy-2,5-Dimethyl-3-Furanone
8.  $\alpha$ -Terpineol
9. 5-Hydroxymethylfurfural
- 10 Citral