

Application Note 164

The Analysis of Alcoholic Beverages on the 30m x 0.25mm ID, 1.0 μ m SPB™-20 Capillary Column

Traditional methods for monitoring aroma components in alcoholic beverages have employed packed column GC in fusel oil analyses. In this application, we used a 30m x 0.25mm ID, 1.0 μ m SPB-20 capillary column to separate 12 common components regularly monitored in alcoholic beverages.

Key Words:

• isoamyl alcohol • aroma • fusel oil

In addition to ethanol and water, alcoholic beverages contain a variety of compounds that are produced during fermentation and / or aging. These compounds impart many of the flavor and aroma characteristics familiar in certain beverages. To ensure consistency in finished product quality and flavor, many distilleries monitor the presence and relative levels of these compounds.

Isoamyl alcohol, for example, is an aroma component in rum. At very low levels, this compound has a fruity, pleasant odor. At high levels, the aroma of isoamyl alcohol is unpleasant. Its separation from active amyl alcohol is considered critical if monitoring because these two compounds are normally produced together. Compounds such as ethyl acetate, 1-propanol, isobutyl alcohol, and isoamyl alcohol are monitored as part of quality control in many beverages. Collectively, these compounds are referred to as fusel oils.

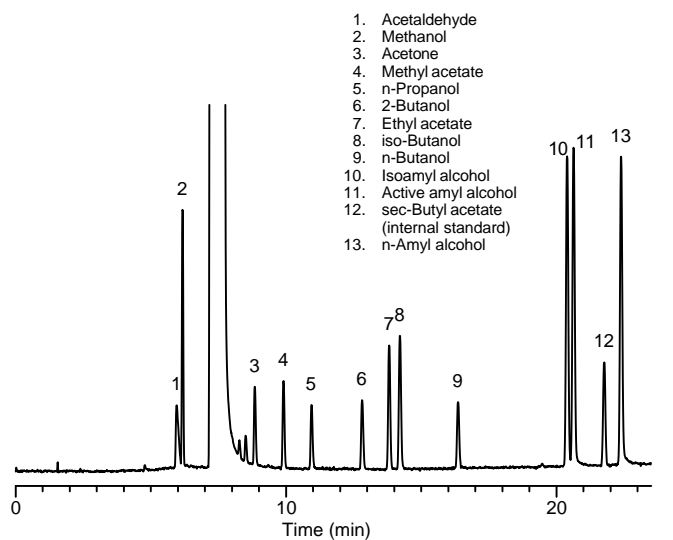
Traditional methods have employed packed column GC in fusel oil analysis. In this application, we used a 30m x 0.25mm ID, 1.0mm SPB-20 capillary column to separate 12 common components regularly monitored in alcoholic beverages. We also assayed several real world beverage samples.

Figure A illustrates the separation of the monitored compounds in a matrix of 40% ethanol in water. The ethanol matrix did not interfere, and all components were separated. The aroma compounds, isoamyl and active amyl alcohol, were separated almost to baseline. The inertness of the SPB-20 resulted in good peak shape for all compounds, including the alcohols. Many locations worldwide testing for these compounds have difficulty acquiring low cost helium. For this reason, we chose nitrogen as the carrier to show that it can be used with good results. If helium is used with the analysis, one can expect a decrease in the analysis time.

Figure B illustrates the use of the SPB-20 for the analysis of a variety of alcoholic beverage samples. This data shows that the SPB-20 capillary column is an excellent choice and a viable alternative to the use of packed columns for alcoholic beverage analysis.

Figure A. Alcoholic Beverage Analysis on the 30m x 0.25mm ID, 1.0 μ m SPB-20

Column: 30m x 0.25mm ID, 1.0 μ m SPB-20 capillary column
 Oven: 40°C / 5 min. hold, 4°C/min to 110°C / min. hold
 Injector: 150°C
 Detector: 210°C
 Flow: N₂, 11 cm/sec at 40°C
 Injection: 1 μ l, 25:1 split

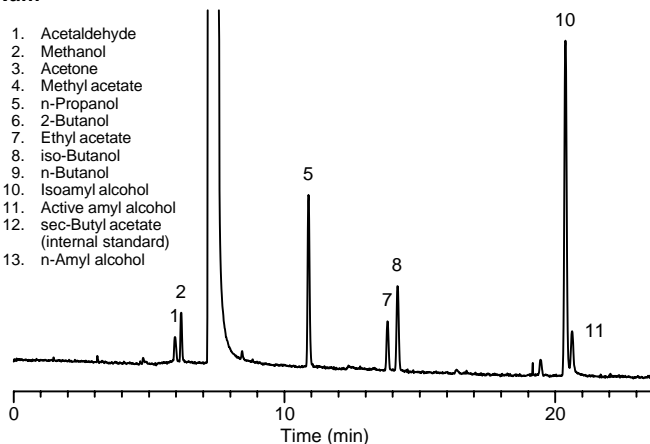


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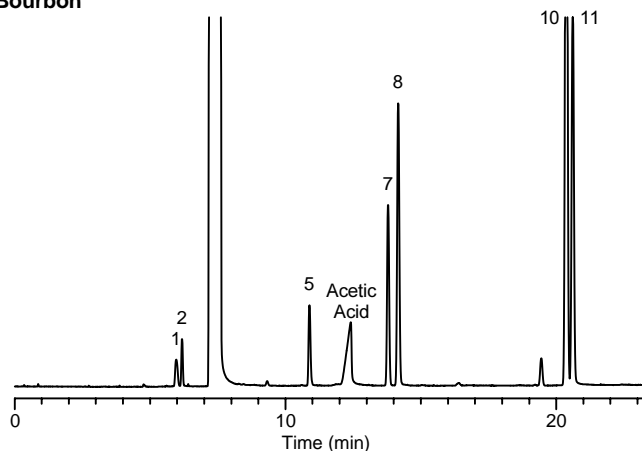
Figure B. Analysis of Various Alcoholic Beverages on the SPB-20

Rum

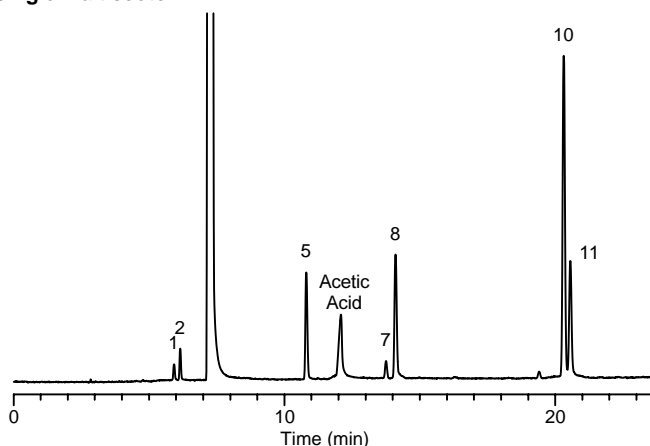
1. Acetaldehyde
2. Methanol
3. Acetone
4. Methyl acetate
5. n-Propanol
6. 2-Butanol
7. Ethyl acetate
8. iso-Butanol
9. n-Butanol
10. Isoamyl alcohol
11. Active amyl alcohol
12. sec-Butyl acetate (internal standard)
13. n-Amyl alcohol



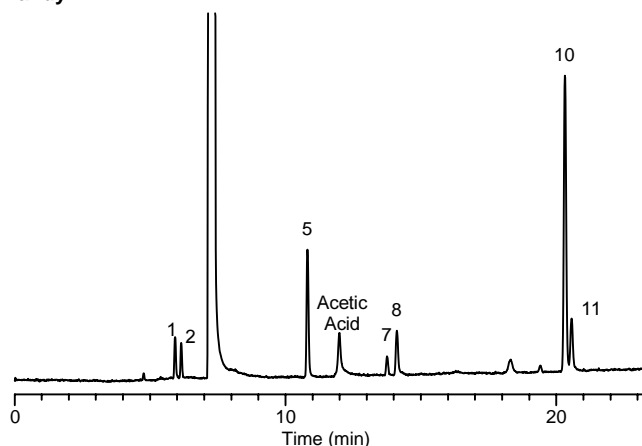
Bourbon



Single malt scotch



Brandy



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Ordering Information:

Description	Cat. No.
SPB-20 Fused Silica Capillary Column	
30m x 0.25mm ID x 1.0µm film	24196

Fused silica columns manufactured under HP US Pat. No. 4,293,415.

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