



Trace Level Gases via GC/MS and a Unique Valve Switching Concept

Application Note

Environmental

Authors

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Abstract

A unique GC/MS switching arrangement, with an Agilent J&W PoraPLOT Q and an Agilent J&W Molsieve 5 Å column, was used to separate five permanent gases and carbon dioxide in 16 minutes.

Introduction

Permanent gases and CO₂ are analyzed and quantified at sub-ppm levels by using a 0.53 mm PoraPLOT Q and a 0.53 mm Agilent Molsieve 5Å PLOT column, which are switched in a special way, as shown in the figure. Using this switching concept, there is no flow reversal in the system and there is only one transfer line from the valve to the mass spectrometer. Injection (position 1) is done on the PoraPLOT Q column where the permanent gases will elute as one peak and the CO₂ is retained. The permanent gases are sent to the Molsieve column. This peak includes: neon, nitrogen, oxygen, carbon monoxide, argon and methane. The valve is switched into position 2: the CO₂ elutes from the PoraPLOT Q column into the transfer line and is detected by the MS. The permanent gases are separated by the Molsieve column, travel through the PoraPLOT column and elute after the CO₂. The extra transport through the PoraPLOT Q column will only result in a small decrease in sensitivity.

To set up the method, the timing of the valve switching is important: CO₂ should not enter the Molsieve column because it will be adsorbed. To prevent any disturbance by leaks, all fittings in the system are located in a purged plastic housing on top of the GC, which is kept under a stream of ultrapure helium.



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Conditions

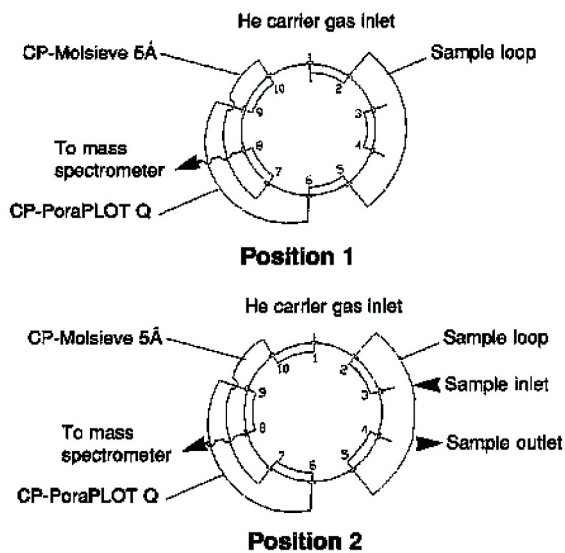
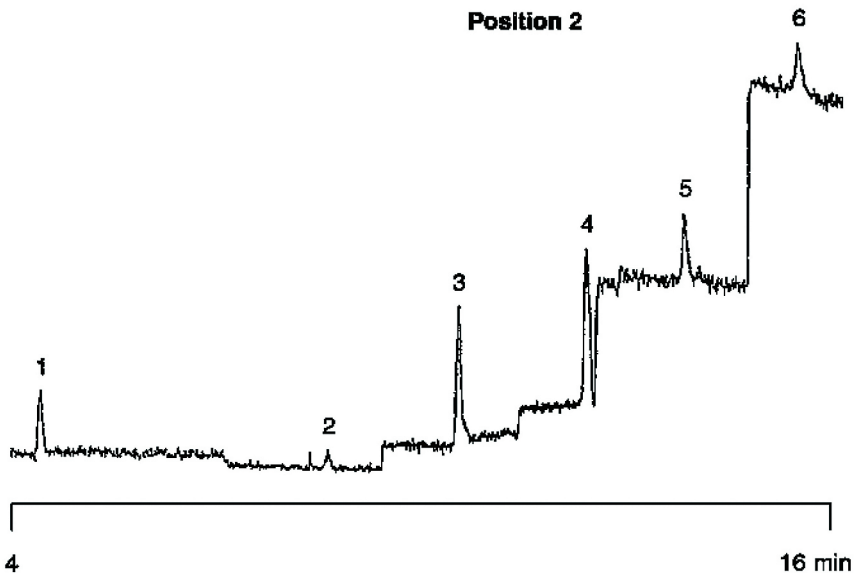
Technique : CG-wide-bore
Column 1 : Agilent PoraPLOT Q, 0.53 mm x 25 m fused silica
WCOT PoraPLOT Q (df = 20 μ m)
(Part no. CP7554)
Column 2 : Agilent CP-Molsieve 5Å, 25m x 0.53 mm fused silica
PLOT (df = 50 μ m) (Part no. 7538)
Temperature : 30 °C
Carrier Gas : He, 30 kPa (0.3 bar, 4.4 psi)
Injector : Valco 10-port injection valve, T = 30 °C
Detector : MS
Sample Size : 250 μ L
Concentration Range : 100 ppb in helium

Courtesy : Jeremiah D. Hogan,
Texas Instruments Inc. Dallas

Transferline from valve to detector:
0.25 mm x 10 m fused silica, methyl deactivated
(Part no. CP4074, 10 pc)

Peak identification

1. carbon dioxide
2. neon
3. argon
4. nitrogen
5. methane
6. carbon monoxide



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This information is subject to change without notice.

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