# Permanent gases and $CO_2$

## High resolution separation of permanent gases and $CO_2$ using tandem PLOT columns and FID

### Application Note

Environmental

**Authors**

Agilent Technologies, Inc.

## Introduction

A parallel setup of two PLOT columns is tuned for separation of permanent gases in a short time. The sample is injected via a normal injection port and is split into the parallel setup of two columns. In this application a short Agilent PoraBOND Q is used to separate the $CO_2$ (and methane) from the permanent gases (first peak composite) before the first peak (helium) elutes from the Agilent CP-Molsieve PLOT column. After helium, all other permanent gases will be separated which include helium, argon, oxygen, xenon, CO and methane. If water is present, it will appear on the PoraBond and will elute after the $CO_2$ peak.

This analysis is done isothermally and requires a long CP-Molsieve column to separate peakpairs argon-oxygen and helium-neon. The $CO_2$ and eventually water that enters the Molsieve column will be adsorbed. If the amount of $CO_2$ or water accumulated on the CP-Molsieve causes a shift of the retention time of the inert gases out of the integration window, the Agilent Select Permanent Gases/$CO_2$ and water adsorption has very little impact on the retention and many analysis can be done before regeneration is required. As methane elutes from both systems the split ratio between the columns can be calculated by the ratio of the methane peaks. If heavier compounds are present, for instance ethane, ethylene, propane, these components will elute later between the peaks that elute from the CP-Molsieve column. If such a component interferes with a compound that elutes from the Molsieve, the oven temperature must be changed by a few degrees.
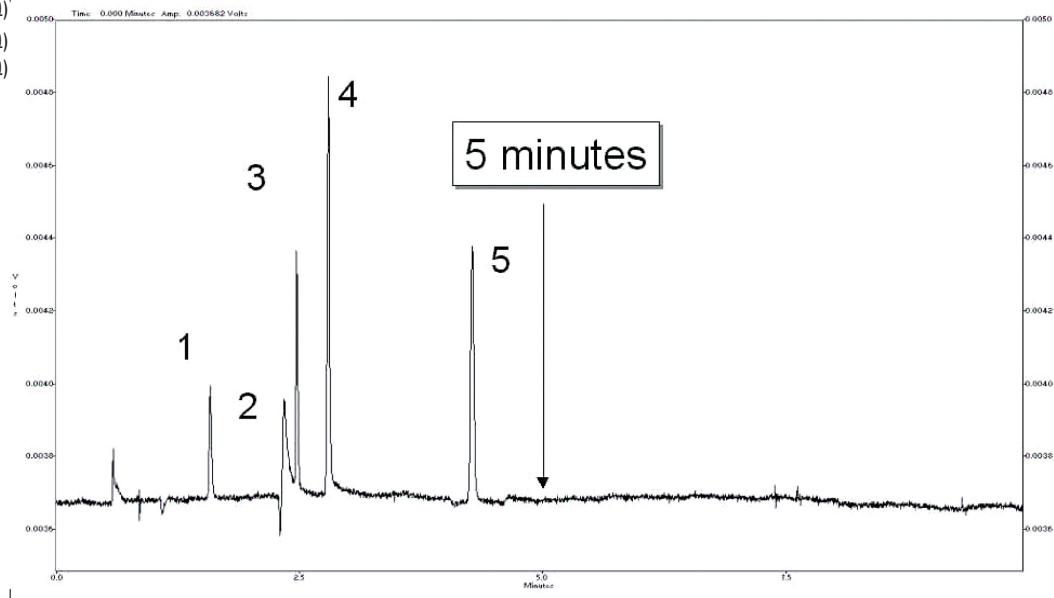
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## Conditions

| | | |
|---|---|---|
| Technique | : | GC |
| Column | : | Fused Silica, Agilent Select Permanent Gases/$CO_2$ <br> Part no. CP7429 |
| Temperature | : | 50 °C |
| Carrier Gas | : | $H_2$, 50 kPa |
| Injector | : | Split 50 mL/min |
| Detector | : | FID via Ni-catalyst methanizer |
| Sample Size | : | 10 µL |
| Concentration Range | : | $CO_2$ at ca. 50 ppm level |
| | | |
| Courtesy | : | C. Duvekot, Agilent Application Laboratory, <br> Middelburg, The Netherlands |

## Peak identification

1. methane (from ms-5A)
2. CO (from ms-5A)
3. methane/CO (from PBQ)
4. $CO_2$ (from PBQ)
5. ethane (from PBQ)

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