

Novel column heater for micro gas chromatography

Coralie BUISSON

Introduction

The Thermo Scientific C2V-200 Micro-GC is a small microchip based gas chromatograph for fast analysis of gaseous samples. It is built up around a replaceable cartridge which contains all core Micro-GC hardware (injector, column, detector, heaters, etc). Cartridges include a new heating technology. Contrary to conventional GC, the Micro-GC contains no oven but heating zones built just near the column.

The C2V-200 Micro-GC incorporates heating and temperature-sensing elements which are placed along the column. The cartridge consists of a capillary column (WCOT or PLOT) in fused silica or metal, and separate controlled heating zones for the microchip and the column. This method allows the use of temperature program and is especially useful to separate hydrocarbons from C2 to C6 on a single column.

Experimental conditions

A selection of eleven hydrocarbons (ethane, ethylene, propane, propylene, i-butane, n-butane, trans-2-butene, 1-butene, cis-2-butene, i-pentane, n-pentane) was injected on a 5m x 0.25mm ALOX-K BOND column. The carrier gas was Helium at a pressure of 100kPa. The detection system was a TCD detector. This separation (fig.1) was operated with two temperature ramps : 50 to 120°C and 120 to 140°C.

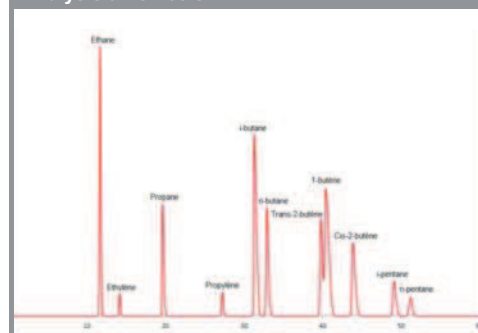
Results and discussion

With any other micro gas chromatograph, in order to separate hydrocarbons isomers C2 to C6, you must use two columns. When using C2V-200 temperature program, a single column can do it. Thus, It is possible to separate the 11 hydrocarbons (C2 through C6) in less than 60 sec. The column may be ramped as far as 240°C/min and is cooled down up to 60°C/min. The maximum heating rate is 4°C/s and the maximum temperature of the column is limited to 180°C. This column heating technique allows precise temperature control within 0.1°C range. With this heating method, the Micro-GC performs very fast analysis.

Conclusion

Direct heating of the column may be very convenient to control more precisely the temperature. Such heating technique is much faster than using conventional oven. This technology, applied to Micro-GC also allows the use of temperature ramping. It provides better control of temperature and reduces the cooling time. This technique, combined with a precise narrow injection bandwidth enables fast and highly repeatable analysis results, in seconds.

Figure 1 : Separation of eleven hydrocarbons
Column: ALOX-K BOND, 5m x 0.25mm
Carrier gas pressure : 100 kPa
Sample pressure : 50 kPa
Column temperature : 50/120/140 °C
Injector/detector temperature : 120°C
Analysis time : 60 s



ANTELIA

9 chemin de la Brocardière
69570 Dardilly
Tel: 04.72.17.82.10