A Comparison of Porous Layer Open Tubular (PLOT) Columns for the Separation of Refinery Gases

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Overview

This poster demonstrates the use of various Thermo Scientific TracePLOT Porous Layer Open Tubular columns for the analysis of low molecular weight hydrocarbons.

Introduction

Porous Layer Open Tubular (PLOT) columns are well suited for the analysis of light hydrocarbons such as those found in refinery gases. These highly selective columns are capable of separating low molecular weight hydrocarbons at above ambient temperatures and the columns can be programmed to higher temperatures to elute higher boiling compounds. An increasingly wide variety of PLOT column coatings are available, including alumina deactivated with Na\textsubscript{2}SO\textsubscript{4} and with KCl, as well as a range of porous polymers with varying degrees of polarity.

The differences in selectivity of numerous types of Thermo Scientific TracePLOT columns are demonstrated by the differences in the separation of light hydrocarbons in a refinery gas sample.

Results

TracePLOT Alumina Columns

Alumina is often used for the analysis of volatile hydrocarbons due to its selectivity which provides baseline resolution of most isomers at above ambient temperatures. The highly retentive nature of alumina requires that the surface be deactivated with inorganic salts such as sodium sulfate or potassium chloride to control retention.

This poster demonstrates the use of various Thermo Scientific TracePLOT Porous Layer Open Tubular columns for the analysis of low molecular weight hydrocarbons. The differences in selectivity of numerous types of Thermo Scientific TracePLOT columns are demonstrated by the differences in the separation of light hydrocarbons in a refinery gas sample.

TracePLOT Porous Polymer Columns

Three porous polymer PLOT columns were used for the analysis of a refinery gas sample. TracePLOT TG-BOND Q+ (Figure 3) is a porous divinyl benzene homopolymer of intermediate polarity incorporating a lower amount of 4-vinyl pyridine into the polymer. TracePLOT TG-BOND Alumina (Figure 2) is a midpolarity divinyl benzene incorporating higher Na\textsubscript{2}SO\textsubscript{4} elutes methyl acetylene before 1,3-butadiene. Not shown in these chromatograms, alumina Na\textsubscript{2}SO\textsubscript{4} elutes methyl acetylene (a.k.a. propyne) after 1,3-butadiene, while alumina KCl elutes methyl acetylene before 1,3-butadiene.

Conclusions

• Separation of saturated, unsaturated and branched chain light hydrocarbons such as those found in refinery gases is best accomplished on deactivated alumina PLOT columns.

• Porous polymers PLOT columns offer a different selectivity and elution order for refinery gas components versus alumina which may be useful for purity analysis of individual hydrocarbons.

For additional information, please visit our Chromatography Resource Centre which can be found at:

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