RESTEK Pure Chromatography

Separation of Neopentane in Hydrocarbon Mixture Using Helium and Hydrogen carrier gas – Facilitated by ProEZGC Chromatogram Modeling

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Abstract

Neopentane is an impurity in C4 hydrocarbons streams, such as 1,3-butadiene, *n*-butane, and butylene. It is used in a variety of applications from the production of adhesives, paints, and inks to the blowing agent in the production of polystyrene foam. While neopentane analysis is performed more frequently than in the past, chemists often have difficulty separating neopentane from other hydrocarbons due to column limitations. The unique stationary phase of Rt-Alumina BOND/MAPD columns is highly selective for C1-C5 hydrocarbons, offering excellent separation of neopentane and other impurities. The high loading capacity provides exceptionally symmetrical peaks, making these columns ideal for impurity analyses at ppm concentrations. Rt-Alumina BOND/MAPD columns are manufactured using an innovative bonding process that reduces particle generation and release, resulting in robust and reproducible retention and flow. Restek's ProEZGC platform has expanded to include PLOT functionality, allowing users to accurately model retention characteristics and optimize GC conditions without timely trial-and-error.

Featured products:

Rt-Alumina BOND/MAPD

- Highly selective stationary phase ideally suited for the analysis of C1-C5 hydrocarbons.
- Accurately resolves C4 hydrocarbons in fast, 24-minute run time.
- Achieve a faster, 21-minute run time with good separation when using hydrogen carrier gas.

ProEZGC Chromatogram modeler

- Model separations on PLOT columns without running any samples.
- Choose from a variety of PLOT columns and dimensions to optimize separations.
- Free! Available to anyone online.

Accuracy of ProEZGC models for PLOT columns

Empirical data was collected under the same conditions as modeled data. Predicted retention times were compared. Differences in retention time were acceptable if they fell within 30s or 10% of the empirical run time. Comparisons were made under varying conditions including inlet pressure, ramp rate, and carrier gas. Models were found to be accurate with modeled data varying <10% or <30s relative to empirical data.

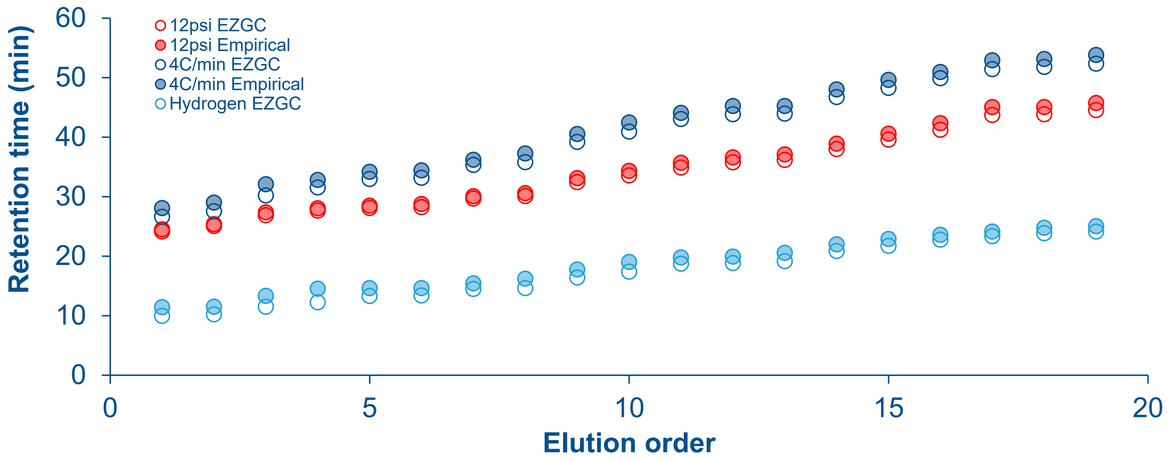

Figure 1: Retention time predictions by Pro *EZ*GC under varying instrument conditions, and difference from empirically obtained retention times, using the Rt-Q-BOND.

Separation of Neopentane and C4 Hydrocarbons

ProEZGC was used to model separation of neopentane on the Rt-Alumina BOND/MAPD. Empirical data demonstrates successful separation of neopentane using the recommended column, dimensions, inlet parameters, and oven parameters. While helium was capable of separating 21 of 23 compounds, hydrogen was able to separate all 23 compounds in the refinery gas mixture analyzed.

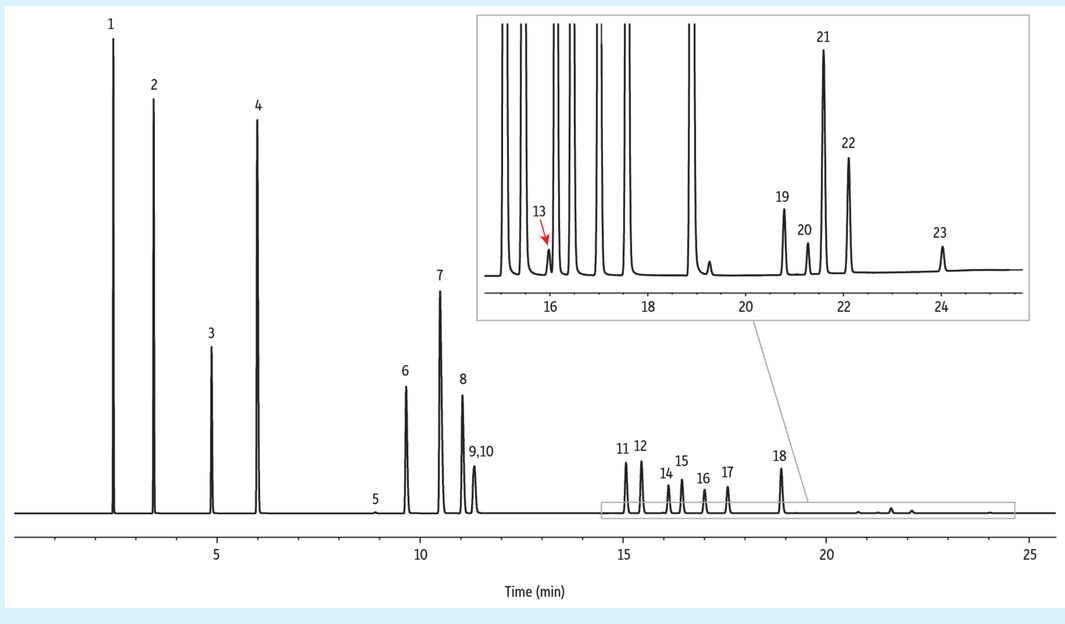

Figure 2: Separation of C4 hydrocarbons in a refinery gas standard using Helium carrier gas. Method was developed using ProEZGC.

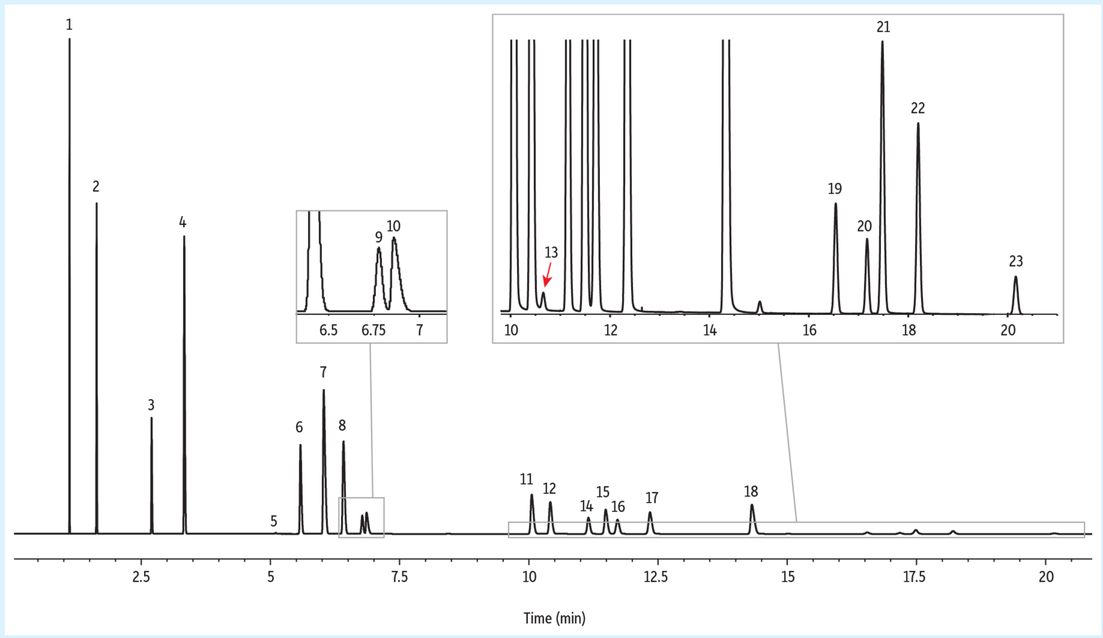

Figure 3: Separation of C4 hydrocarbons in a refinery gas standard using Hydrogen carrier gas. Method was developed using ProEZGC.

Summary of results:

- ProEZGC accurately models retention time and separation of compounds separated using PLOT columns
- Neopentane is separated from C4 hydrocarbons using helium carrier gas and the Rt-Alumina BOND/MAPD
- Neopentane is separated from C4 hydrocarbons with additional separation of refinery gases when using hydrogen carrier gas and the Rt-Alumina BOND/MAPD