

Improving Detailed Hydrocarbon Analysis

Using an Rtx®-1PONA Capillary GC Column

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- Column meets or exceeds all ASTM D-6730-01 and Canadian General Standards Board method requirements.
- 30% faster analysis (C13 retention = 97 minutes), using helium.
- Excellent responses and peak symmetry for polar oxygenates.
- Guaranteed column-to-column reproducibility for retention, efficiency, selectivity, peak skewness, resolution, low bleed.

Gasolines are complex mixtures of hundreds of compounds. Information about concentrations of the individual components is important for evaluating raw materials and controlling refinery processes. A high-resolution GC method for detailed hydrocarbon analysis (DHA) of gasolines is outlined in American Society of Testing and Materials (ASTM) Method D-6730-01—often referred to as the PONA (paraffins, olefins, naphthenes, aromatics) or PIANO (paraffins, isoparaffins, aromatics, naphthenes, olefins) analysis.* ASTM D-6730-01 is specific for the analysis of these hydrocarbon components, plus oxygenated additives such as methanol, ethanol, *tert*-butanol, methyl *tert*-butyl ether (MTBE), and *tert*-amyl methyl ether (TAME) in spark-ignition engine fuels.

To maximize resolution of these complex mixtures, the ASTM method recommends a 100-meter x 0.25mm ID capillary column coated with 0.5 μ m of 100% dimethyl polysiloxane stationary phase, and sets minimum resolution criteria for several critical pairs of closely eluting com-

pounds. To retain the aromatics, and accomplish the separations, a short tuning column, approximately 2-3 meters long, coated with 5% diphenyl/95% dimethyl polysiloxane polymer, is connected to the inlet of the 100-meter analytical column. Through a series of trial analyses, the length of the tuning column is adjusted to ensure the critical resolutions are achieved.

Analytical columns used for this application must exhibit high efficiency and exceptional inertness, especially for polar oxygenates in gasoline. Figure 1 illustrates a column efficiency of 613,596 total theoretical plates, measured on C5, and shows excellent peak symmetry for the oxygenated additives, including ethanol and *t*-butanol (*t*-butanol skewness = 1.25). We test every Rtx®-1PONA column for retention (*k*), efficiency (*n*), stationary phase selectivity (*RI*), and bleed, and guarantee reproducible column-to-column performance.

An Rtx®-1PONA column meets all ASTM D-6730-01 requirements for critical pair resolution, as

demonstrated by Figure 2. A 2.6-meter tuning column was used to achieve the highlighted resolutions, based on retention of the aromatics (e.g., resolution for 1-methylcyclopentene / benzene = 1.28).

In addition to qualifying for the ASTM D-6730-01 analysis, Rtx®-1PONA columns meet the similarly stringent requirements of Canadian General Standards Board (CGSB) methodology. For additional detailed hydrocarbon analysis chromatograms and more information about these high-performance columns, please request a free copy of Applications Note 59568, or review the applications note and chromatography on our website.

Rtx®-1 PONA Column (fused silica)

(Crossbond® 100% dimethyl polysiloxane phase optimized for hydrocarbon analysis) (temp. limits: -60 to 300/340°C) 100m, 0.25mm ID, 0.50 μ m df, cat.# 10195,

Rtx®-5 PONA Tuning Column

(Crossbond® 5% diphenyl/95% dimethyl polysiloxane phase) 5m, 0.25mm ID, 1.0 μ m df, cat.# 554206,

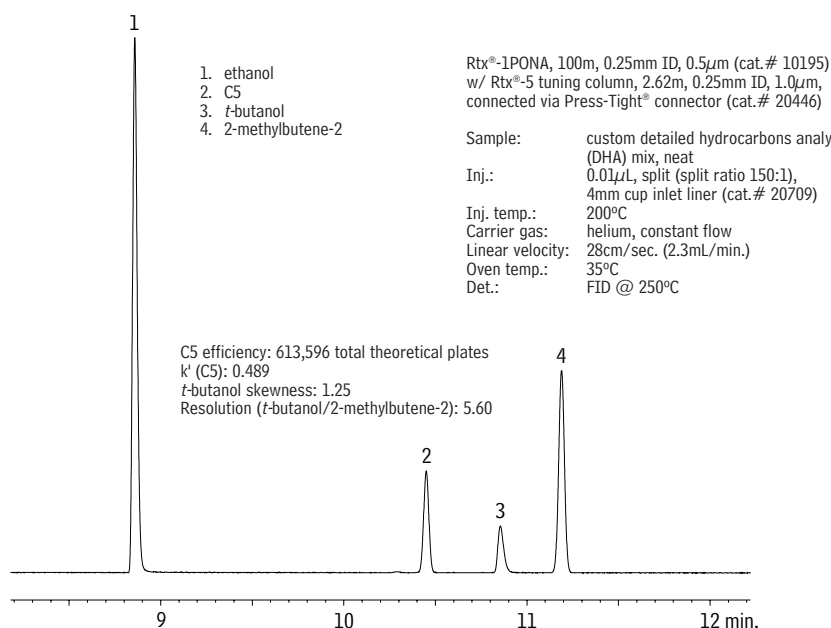
Press-Tight® Connectors

- Made from inert fused silica.
- Fit column ODs from 0.33–0.74mm (Restek 0.1mm–0.53mm ID).
- Angled connector reduces strain on connection.



Description	5-pk.
Universal Press-Tight® Connectors	20400
Siltek™-treated Universal Press-Tight® Connectors	20480
Universal Angled Press-Tight® Connectors	20446
Siltek™-treated Universal Angled Press-Tight® Connectors	20482

Figure 1 Sharp, symmetric peak for ethanol (gasoline oxygenate), using an Rtx®-1PONA column.



*In alternate terminology: paraffins & isoparaffins = alkanes; naphthenes = cyclic alkanes; olefins = alkenes.

Vu2 Union™ Connector

A Vu2 Union™ connector combines the simplicity of a Press-Tight® union with the strength of a metal union. The columns cannot unexpectedly disconnect, even at temperatures as high as 400°C.



**Secure, reliable
column-to-column
connections!**

Kits include: Vu2 Union™ body, 2 knurled nuts,
2 Press-Tight® unions, and 4 ferrules

Connector Kit (Ferrules Fit Restek Column ID)	cat.#
Vu2 Union™ Connector Kit (0.15–0.25mm)	21105
Vu2 Union™ Connector Kit (0.28/0.32mm)	21106
Vu2 Union™ Connector Kit (0.45/0.50 & 0.53mm)	21107

Figure 2 Critical pairs of gasoline components resolved per ASTM specifications, using an Rtx®-1PONA column.

