

Detailed Hydrocarbon Analysis

Featuring Rtx[®]-1 PONA Columns

- Compatible with hydrogen, for **50% faster run times**.
- Improved resolution between oxygenates and hydrocarbons, for more accurate reporting.
- Individually tested to meet DHA method criteria; guaranteed column-to-column reproducibility.

**BEST COLUMN
AVAILABLE**

See page 5 for competitor
comparison.

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Detailed Hydrocarbon Analysis

Featuring Rtx®-1PONA Capillary GC Columns

- Columns meet or exceed all ASTM D6730-01 and Canadian General Standards Board method guidelines.
- Excellent responses and peak symmetry for polar oxygenates.
- Guaranteed column-to-column reproducibility for retention, efficiency, selectivity, peak skewness, resolution, and low bleed.

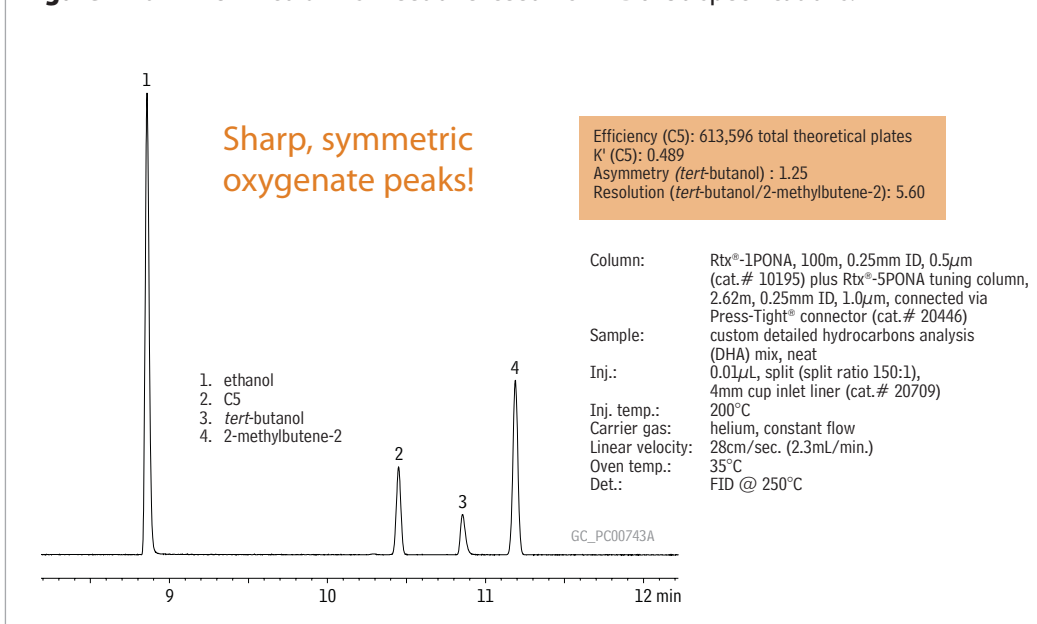
Gasolines are complex mixtures of hundreds of compounds. Information about concentrations of the individual components is important for evaluating raw materials and for controlling refinery processes. A high-resolution GC method for detailed hydrocarbon analysis (DHA) of gasolines is outlined in American Society of Testing and Materials (ASTM) Method D6730-01—often referred to as the PONA (paraffins, olefins, naphthenes, aromatics) or PIANO (paraffins, isoparaffins, aromatics, naphthenes, olefins) analysis. ASTM D6730-01 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 100m 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 compounds. To retain the aromatics, and accomplish the separations, a short tuning column, approximately 2-3m long, coated with 5% diphenyl/95% dimethyl polysiloxane polymer, is connected to the inlet of the 100m analytical column. Through a series of trial analyses, the length of the tuning column is adjusted to ensure the critical resolutions are achieved. Rtx®-1PONA columns are ideal for DHA methods and easily meet or exceed performance requirements.

Quality & Consistency

Analytical columns used for DHA applications 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 *tert*-butanol (*tert*-butanol skewness = 1.25). We test every Rtx®-1PONA column for retention (k), efficiency (n), stationary phase selectivity (RI), and bleed, guaranteeing reproducible column-to-column performance.

Figure 1 Rtx®-1PONA columns meet or exceed ASTM D6730 specifications.

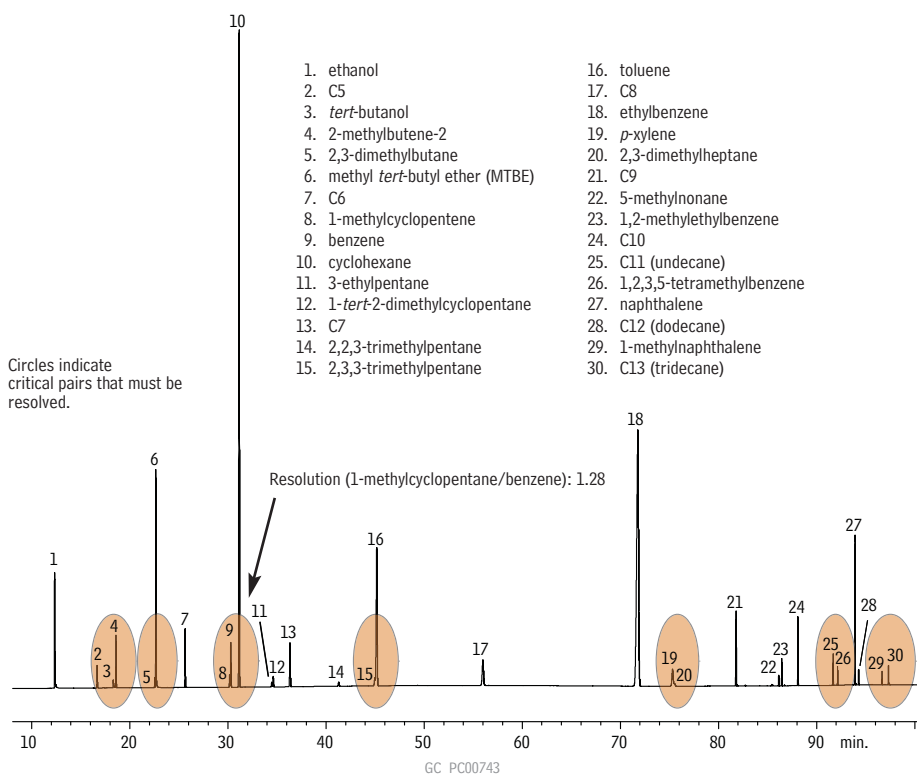


Resolution of Critical Pairs

There are a number of critical compound pairs that must be resolved as measured by an oxy set-up blend mix. An Rtx®-1PONA column meets all ASTM D6730-01 requirements for critical pair resolution, as demonstrated in Figure 2. A 2.6m tuning column was used to achieve the highlighted resolutions based on retention of the aromatics (e.g., resolution for 1-methylcyclopentane/benzene = 1.28). In addition to qualifying for the ASTM D6730-01 analysis, Rtx®-1PONA columns meet the similarly stringent requirements of Canadian General Standards Board (CGSB) methodology.

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

Resolve all critical pairs—including
2,3,3-trimethylpentane and toluene!



Column: Rtx®-1PONA, 100m, 0.25mm ID, 0.5 μ m (cat.# 10195) w/ Rtx®-5 tuning column, 2.62m, 0.25mm ID, 1.0 μ m, connected via Press-Tight® connector (cat.# 20446)

Sample: custom detailed hydrocarbons analysis (DHA) mix, neat

Inj.: 0.01 μ L, split (split ratio 150:1), 4mm cup inlet liner (cat.# 20709)

Inj. temp.: 200°C

Carrier gas: helium, constant flow

Linear velocity: 28cm/sec. (2.3mL/min.)

Oven temp.: 5°C (hold 15 min.) to 50°C @ 5°C/min. (hold 50 min.) to 200°C @ 8°C/min. (hold 10 min.)

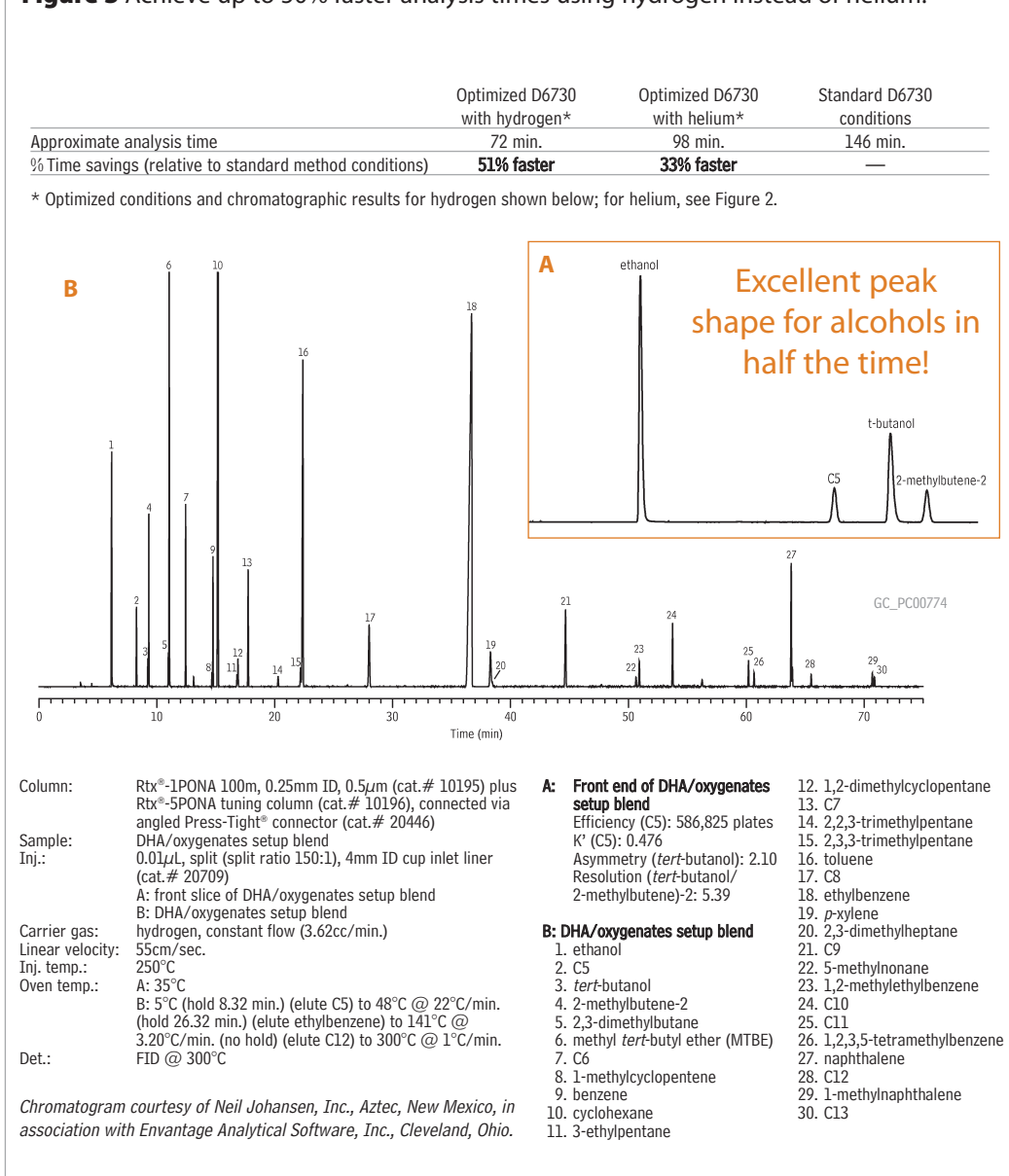
Det.: FID @ 250°C

Cooling gas.: liquid nitrogen

Speed Up Analysis Time Using Hydrogen

Rtx®-1PONA columns easily meet all ASTM and CGSB method requirements when using helium as the carrier gas. However analysis times can be improved significantly—with no loss in chromatographic performance—by switching to hydrogen as the carrier gas. Rtx®-1PONA columns meet or exceed all criteria in these standardized methods in up to 50% less time when using hydrogen (Figure 3).

Figure 3 Achieve up to 50% faster analysis times using hydrogen instead of helium.



Best Column Available

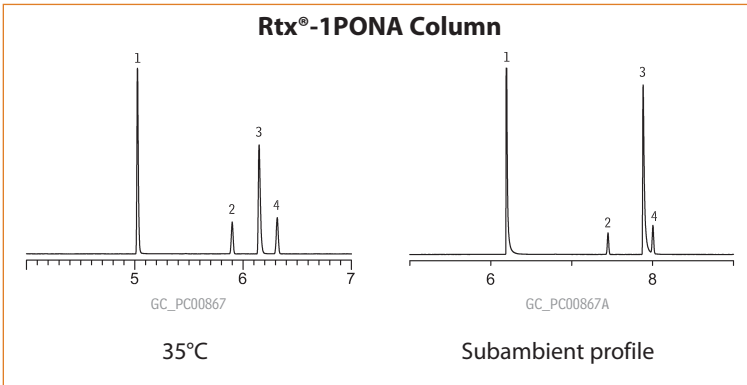
A comparison of PONA columns offered by other manufacturers shows that the Rtx®-1PONA column is the best overall column for peak shape, theoretical plates, and required resolution. Figure 4 shows that, at 35°C, the Vendor A and Vendor B PONA columns did not meet ASTM D6730 method specifications. The Vendor C and Vendor D PONA columns performed within specifications, but column efficiency was less than ideal. In contrast, the performance of the Rtx®-1PONA column at 35°C was well within ASTM D6730 method specifications, and column efficiency exceeded the specification. The column also performed well at subambient temperature using hydrogen as the carrier gas.

Figure 4 Rtx®-1PONA columns outperform competitor columns for detailed hydrocarbon analysis.

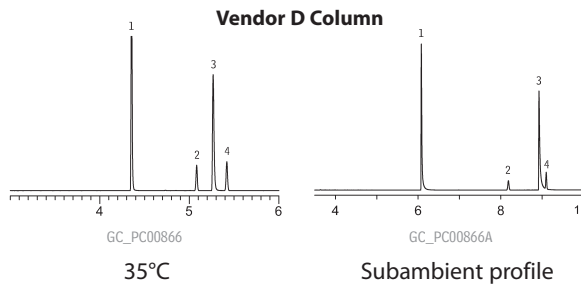
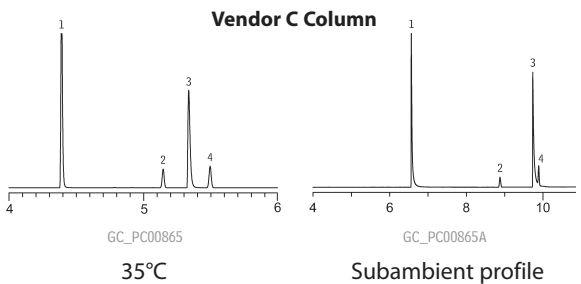
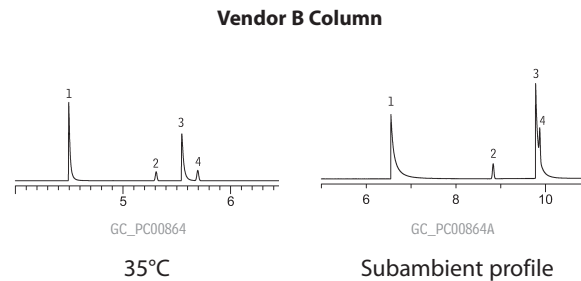
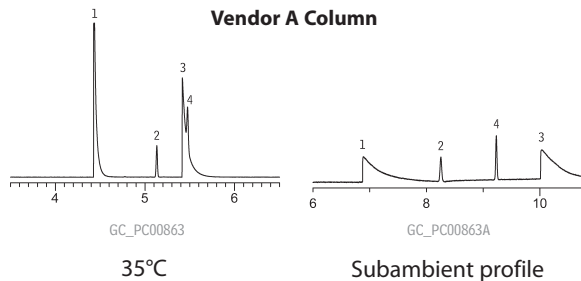
	ASTM D6730 guidelines	Rtx-1 PONA	Vendor A	Vendor B	Vendor C	Vendor D
Efficiency (C5)*	400,000-550,000 plates	551,294	522,974	466,089	489,991	483,449
K' (C5)	0.45-0.50	0.48	0.46	0.51**	0.47	0.46
Asymmetry (t-butanol)	>1.00-<5.00	1.31	>5.00**	3.6	1.71	1.59
Resolution (t-butanol/2-methylbutene-2)*	3.25-5.25	4.84	1.00**	4.32	5.01	5.07

* Minimum values; criteria may be exceeded for these parameters.

** Fails method criteria (results based on analyses at 35°C).



Superior performance for ASTM D6730 method specifications!



Column: 100m, 0.25mm ID, 0.50µm
 Sample: DHA Oxy-Setup mix (Transition Labs #94100)
 Inj.: 0.01µL split (split ratio 150:1)
 Inj. temp.: 275°C
 Carrier gas: hydrogen
 Linear velocity: 48cm/sec.
 Det.: FID
 Det. temp.: 300°C

Oven temp.: 35°C and Method D 6730 temperature profile
 Temperature Profile
 Column A: 5°C > 8.23 min. > 22°C/min. > 48 min.
 Column B: 5°C > 8.84 min. > 22°C/min. > 48 min.
 Column C: 5°C > 8.87 min. > 22°C/min. > 48 min.
 Column D: 5°C > 8.19 min. > 22°C/min. > 48 min.
 Rtx®-1PONA: 5°C > 8.20 min. > 22°C/min. > 48 min.

1. ethanol
 2. pentane (C5)
 3. t-butanol
 4. 2-methylbutene-2

Conclusion

Rtx®-1PONA columns offer the best overall value and performance for detailed hydrocarbon analysis. These columns meet or exceed all ASTM D6730-01 and Canadian General Standards Board method requirements and outperform other commercially available columns. Make your next PONA column an Rtx®-1PONA column—individually tested to meet DHA method criteria, assuring outstanding performance and column-to-column reproducibility.

Product Listing

Rtx®-1PONA (nonpolar phase; Crossbond® 100% dimethyl polysiloxane)

- Application-specific columns meet ASTM and CGSB requirements for detailed hydrocarbon analysis.
- Stable to 340°C.

similar phases

Petrocol DH, DB-Petro,
HP-PONA

The Rtx®-1PONA polymer was designed to offer the exact polarity necessary to resolve hydrocarbons in the specific order requested by petrochemical companies. In order to meet the demanding resolution and retention criteria of the American Society for Testing and Materials (ASTM) and the Canadian General Standards Board (CGSB), Restek has developed unique quality control tests and specifications for the Rtx®-1PONA column. The measured values for retention (k), efficiency (n), and stationary phase selectivity (RI) are controlled so that each column exceeds the requirements of the ASTM and CGSB methods.

ID	df (μm)	temp. limits	50-Meter	100-Meter	150-Meter
0.25mm	0.50	-60 to 300/340°C	10186	10195	10197

Rtx®-5PONA Tuning Column (Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

ID	df (μm)	temp. limits	5-Meter
0.25mm	1.0	-60 to 325°C	10196

Universal Press-Tight® Connectors

- Connect a guard column to an analytical column.
- Angle approximates the curvature of a capillary column, reduces strain on column-end connections (Universal Angled Press-Tight® connectors only).
- Repair a broken column.
- Deactivated Press-Tight® connectors assure better recovery of polar and nonpolar compounds.
- Siltek® treated connectors are ideal for low-level analyses and active compounds.
- Fit column ODs from 0.33–0.74mm (Restek 0.1mm–0.53mm ID).



Description	5-pk.	25-pk.	100-pk.
Deactivated, Universal Press-Tight® Connectors	20429	20430	20431
Siltek® Treated Universal Press-Tight® Connectors	20480	20449	20481

Description	5-pk.	25-pk.	100-pk.
Deactivated Universal Angled Press-Tight Connectors	20446-261	20447-261	20448-261

Vu2 Union™ Connectors

- Connect a guard column to an analytical column, a column to a transfer line, two columns in series, or repair a broken column.
- Combines the simplicity of a Press-Tight® union with the strength of a metal union.
- Will not unexpectedly disconnect, even at temperatures as high as 360°C.


NOTE: This product is not recommended for GC column-to-MS connections—use the Vacuum Vu-Union. Visit www.restek.com.


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


Description	Ferrules Fit Column ID	qty.	cat.#
Vu2 Union Connector Kit	0.10/0.15mm	kit	22220
Vu2 Union Connector Kit	0.18/0.28mm	kit	21105
Knurled nut		2-pk.	21108


Use Universal Press-Tight® Connectors (cat.# 20429) as replacement connectors.

Split Liners for Agilent GCs


ID* x OD & Length (mm)	qty.	cat.#
		
4.0 ID x 6.3 OD x 78.5	ea.	20781
4.0 ID x 6.3 OD x 78.5	5-pk.	20782
4.0 ID x 6.3 OD x 78.5	25-pk.	20783


		
Siltek 4mm Split w/ Wool		
4.0 ID x 6.3 OD x 78.5	ea.	20781-213.1
4.0 ID x 6.3 OD x 78.5	5-pk.	20782-213.5

		
Cup Splitter		
4.0 ID x 6.3 OD x 78.5	ea.	20709
4.0 ID x 6.3 OD x 78.5	5-pk.	20710

		
Siltek Cup Splitter		
4.0 ID x 6.3 OD x 78.5	ea.	20709-214.1
4.0 ID x 6.3 OD x 78.5	5-pk.	20710-214.5

Split Liners for Varian GCs

ID* x OD & Length (mm)	qty.	cat.#
		
Splitter w/ Wool		
4.0 ID x 6.3 OD x 72	ea.	20792
4.0 ID x 6.3 OD x 72	5-pk.	20793
4.0 ID x 6.3 OD x 72	25-pk.	20794

		
Cup Splitter		
4.0 ID x 6.3 OD x 72	ea.	20724
4.0 ID x 6.3 OD x 72	5-pk.	20725

*Nominal ID at syringe needle expulsion point.


Thermolite® Septa


- Precision molding assures consistent, accurate fit.
- Usable to 340°C inlet temperature.
- Excellent puncturability.
- Preconditioned and ready to use.
- Do not adhere to hot metal surfaces.
- Packaged in precleaned glass jars.




Septum Diameter	25-pk.	50-pk.	100-pk.
5mm (1/8")	27120	27121	27122
6mm (1/4")	27123	27124	27125
7mm	27126	27127	27128
8mm	27129	27130	27131
9mm	27132	27133	27134
9.5mm (3/8")	27135	27136	27137
10mm	27138	27139	27140
11mm (7/16")	27141	27142	27143
11.5mm	27144	27145	27146
12.5mm (1/2")	27147	27148	27149
17mm	27150	27151	27152
Shimadzu Plug	27153	27154	27155


Split/Splitless Liners for Shimadzu 17A, 2010, and 2014 GCs

ID* x OD & Length (mm)	qty.	cat.#
		
Split/Splitless w/ Wool		
3.5 ID x 5.0 OD x 95	ea.	20955
3.5 ID x 5.0 OD x 95	5-pk.	20956
3.5 ID x 5.0 OD x 95	25-pk.	20957


		
Siltek Split/Splitless w/ Wool		
3.5 ID x 5.0 OD x 95	ea.	20955-213.1
3.5 ID x 5.0 OD x 95	5-pk.	20956-213.5
3.5 ID x 5.0 OD x 95	25-pk.	20957-213.25

Split Liners for Thermo Scientific TRACE & Focus SSL

ID* x OD & Length (mm)	qty.	cat.#
		
5mm Split		
5.0 ID x 8.0 OD x 105	ea.	20939
5.0 ID x 8.0 OD x 105	5-pk.	20940
5.0 ID x 8.0 OD x 105	25-pk.	20941

		
Cup Splitter		
4.0 ID x 8.0 OD x 105	ea.	20950
4.0 ID x 8.0 OD x 105	5-pk.	20951

Split Liners for PerkinElmer GCs

ID* x OD & Length (mm)	qty.	cat.#
		
Auto SYS Cup Splitter		
4.0 ID x 6.2 OD x 92.1	ea.	20835
4.0 ID x 6.2 OD x 92.1	5-pk.	20836

did you know?

Whether you have an Agilent, Varian, Shimadzu, PerkinElmer, or Thermo Scientific gas chromatograph, Restek has the consumables and parts to help you maintain optimum system performance.



Gas purifiers also available! Visit www.restek.com for a complete list.

Product Listing

Widest variety of standards available!

Oxy Set-Up Blend

ASTM method D6730-01 is specifically designed for the determination of the individual hydrocarbons present in spark ignition fuels, as well as fuel blends containing oxygenates such as methyl *tert*-butyl ether, ethyl *tert*-butyl ether, *tert*-butanol, ethanol, etc.

Gravimetrically prepared and NIST-traceable.

benzene	1.00%	1-methyl-2-ethylbenzene	0.50%
<i>tert</i> -butanol	0.50%	1-methylnaphthalene	0.25%
cyclohexane	28.9%	5-methylnonane	0.20%
<i>n</i> -decane	1.00%	naphthalene	0.50%
2,3-dimethylbutane	0.50%	<i>n</i> -nonane	2.00%
<i>trans</i> -1,2-dimethylcyclopentane	0.50%	<i>n</i> -octane	2.00%
2,3-dimethylheptane	0.20%	<i>n</i> -pentane	2.00%
dodecane	0.25%	1,2,3,5-tetramethyl	0.52%
ethanol	8.00%	benzene	0.25%
ethylbenzene	25.0%	toluene	7.00%
3-ethylpentane	0.20%	tridecane	0.25%
<i>n</i> -heptane	2.00%	2,2,3-trimethylpentane	0.52%
<i>n</i> -hexane	2.00%	2,3,3-trimethylpentane	0.50%
2-methyl-2-butene	2.50%	undecane	0.50%
methyl <i>tert</i> -butyl ether	10.0%	<i>p</i> -xylene	1.00%
1-methylcyclopentene	0.50%		

2mL prescored ampul

cat. # 33034 (ea.)

DHA Oxy Setup Blend (30 components)

Neat, 0.1mL in Autosampler Vial	cat. # 30710 (ea.)
Neat, 0.1mL in Vial with Miniert Valve	cat. # 30711 (ea.)

PIANO Standards

The PIANO blends are standards used for calibrating complex hydrocarbon analyses and provide the greatest number of gravimetrically determined values for quantitative calibration.

DHA PIANO Blend (136 components)

Neat, 0.1mL in Autosampler Vial	cat. # 30712 (ea.)
Neat, 0.1mL in Vial with Miniert Valve	cat. # 30709 (ea.)

DHA Paraffins Mix (11 components)

Neat, 0.1mL in Autosampler Vial	cat. # 30713 (ea.)
Neat, 0.1mL in Vial with Miniert Valve	cat. # 30714 (ea.)

DHA Isoparaffins Mix (34 components)

Neat, 0.1mL in Autosampler Vial	cat. # 30715 (ea.)
Neat, 0.1mL in Vial with Miniert Valve	cat. # 30716 (ea.)

DHA Naphthenes Mix (27 components)

Neat, 0.1mL in Autosampler Vial	cat. # 30719 (ea.)
Neat, 0.1mL in Vial with Miniert Valve	cat. # 30720 (ea.)

DHA Aromatics Mix (38 components)

Neat, 0.1mL in Autosampler Vial	cat. # 30717 (ea.)
Neat, 0.1mL in Vial with Miniert Valve	cat. # 30718 (ea.)

DHA Olefins Mix (26 components)

Neat, 0.1mL in Autosampler Vial	cat. # 30721 (ea.)
Neat, 0.1mL in Vial with Miniert Valve	cat. # 30722 (ea.)

DHA PONA VI Mix (426 components)

PONA-VI (PONA 6) is a qualitative mixture of various gasoline and refinery materials prepared to provide nearly every component that may be encountered in feedstock and finished gasolines. Some oxygenates have been added to allow this blend to be used for DHA method setup.

Contact us for component listing.

Neat, 0.1mL in Autosampler Vial	cat. # 30723 (ea.)
Neat, 0.1mL in Vial with Miniert Valve	cat. # 30724 (ea.)

Quantity discounts not available.

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Lit. Cat.# PCFL1007-INT

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