SRI GC Innovations

MGA #1 uTCD Upgrade 2010 by Chromalytic

Keep your gas products in spec! Monitor gas product purity, natural gas, and ambient air quality.

Sounds expensive and complicated to operate? Not from SRI! The SRI Multiple Gas Analyzer #1 uses just ONE gas sampling valve and TWO analytical columns to perform the same separations that require multiple valves and columns in other systems. Best of all, the Multiple Gas Analyzer #1 can achieve ppm to 100% concentrations with a single injection!

- ☆ Separates multiple gases with a single injection
- ☆ Very tolerant of user adjustments and timing variations
- ☆ Simpler than other multi-gas capable GC systems
- ☆ Multiple gas analysis in a compact unit

MUCH more !

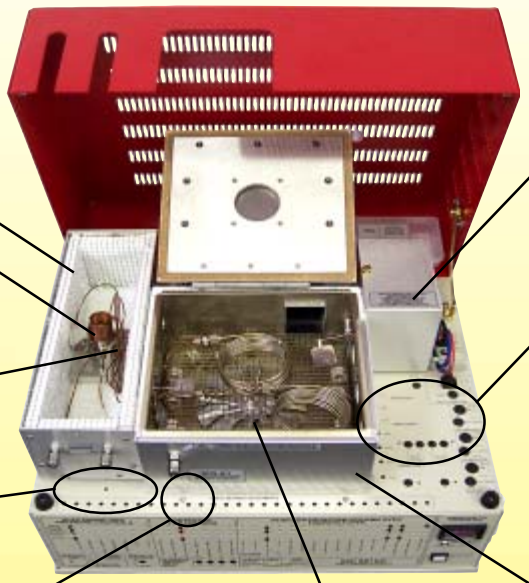
Substitute VICI u-TCD (for SRI TCD) for Capillary Column use;

~10ppM Sensitivity

Restek PLOT MS5A, ShinCarbon ST for Permanent Gases AND CO2

Optional Vacuum Pump Interface for continuous sampling or from gas bags multple injections

19.5"W x 14.5" D x 12.5" H footprint



Heated Valve Oven

original SRI dual column

1m (3') Molecular Sieve packed column separates H_2, O_2, N_2, CH_4 & CO

10 Port Gas Sampling Valve and 1mL Sample Loop

Sample In and Out for Valve Injection

On-column Injector

original SRI dual packed columns

2m (6') Silica Gel packed column separates CO_2 & C_2-C_6

XXX

TCD Detector - universal response, 250ppm to 100% detection range

Optional

FID Detector - Hydrocarbon selectivity, 5ppm detection limits Methanizer in FID body- converts CO and CO_2 to Methane for FID detection

Temperature Programmable Column Oven

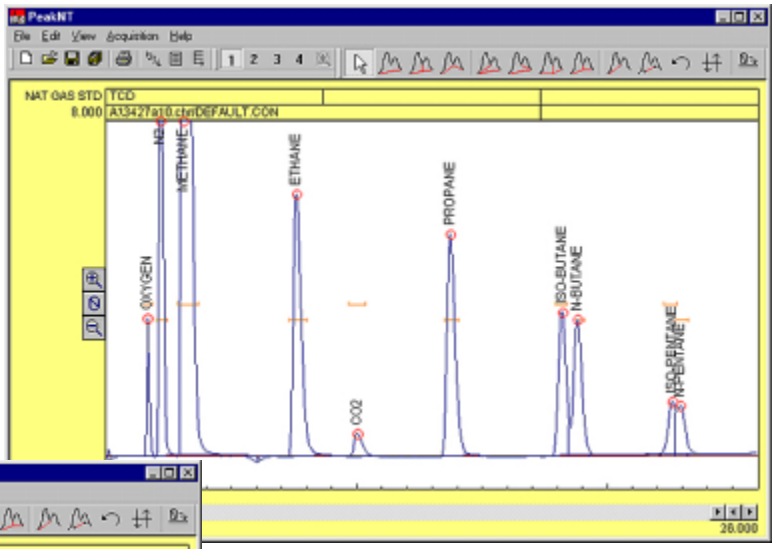
ALSO add VICI Mass Flow Controller

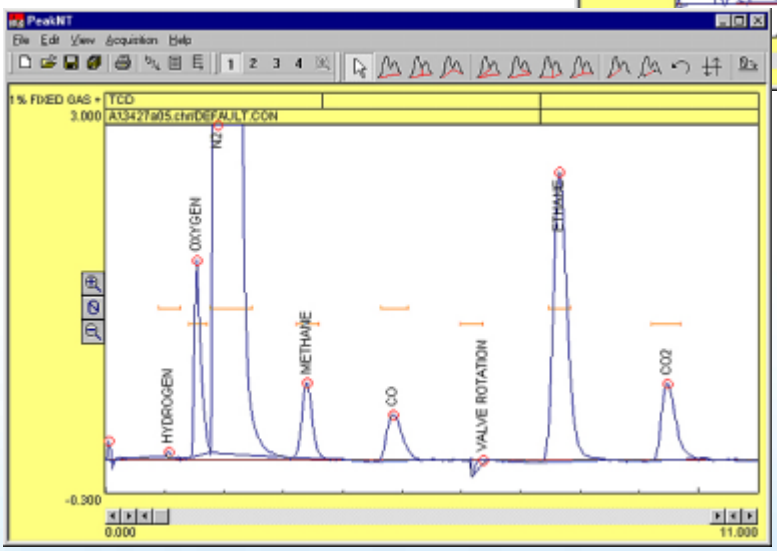
replace packed columns with microPacked/PLOT column

Specifically Designed for
Separation of Whole Gas Components and Natural Gas Samples

Multiple Gas Analyzer #1

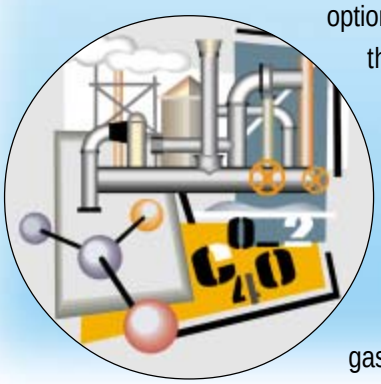
Separating out the hydrocarbon components of natural gas facilitates accurate BTU quantification. This compositional analysis of a natural gas standard by an SRI Multiple Gas Analyzer #1 shows good separation up to the pentanes. Performing compositional analyses of natural gas product before and after refining helps to maximize process efficiency and profit.

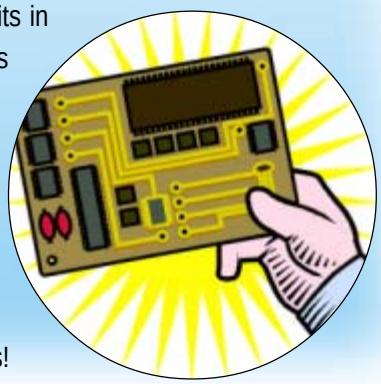




The same instrument produced this chromatogram, separating a sample mix of 1% fixed gas standard and ethane. With the built-in PeakSimple data system, the gas sampling valve was programmed to inject the sample loop contents into the carrier gas stream at 5 seconds, then rotate back at 6 minutes, after CO elution.

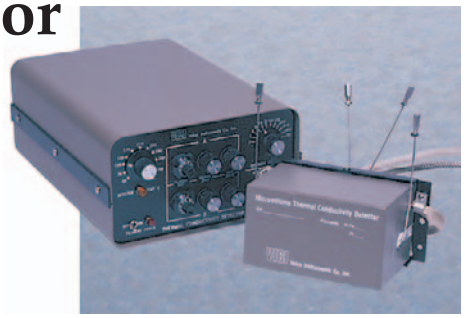
The basic Multiple Gas Analyzer #1 has a TCD detector only; this model provides analyses in the 250ppm to 100% range for fixed and natural gases. A second option is a TCD, Methanizer, and FID detector combination which adds 5ppm detection limits for CO, CO_2, and all hydrocarbon peaks; this model is useful for air quality monitoring and other applications. A third option is a TCD-HID detector combination, for detection limits in the 10ppm range for all analytes...the HID even sees hydrogen! Since we build each GC from the boards up, the Multiple Gas Analyzer #1 may be further customized to suit your application needs. With the optional built-in "whisper-quiet" air compressor, the Multiple Gas Analyzer #1 can be used with the SRI H_2-50 hydrogen generator to separate multiple gases anywhere, without using compressed gas cylinders!





8610-0070	Multiple Gas Analyzer #1 GC with TCD detector
8610-0071	Multiple Gas Analyzer #1 GC with TCD, Methanizer, FID & built-in Air Compressor
8610-0072	Multiple Gas Analyzer #1 GC with TCD & HID detectors
8690-0070	Built-in Air Compressor, 120 VAC
8690-2270	Built-in Air Compressor, 220 VAC

Dual Cell Microvolume Thermal Conductivity Detector



- Stand-alone unit
- Optimized for capillary chromatography
- Thermal stability to ±0.02°C
- Dual filaments capable of independent or referenced (differential) operation

The Valco Microvolume Thermal Conductivity Detector (TCD) is useful in a wide variety of capillary and packed column applications. Constant filament temperature control provides a linear dynamic range permitting measurement of a wide range of concentrations without the need for multiple standards or sample dilution.

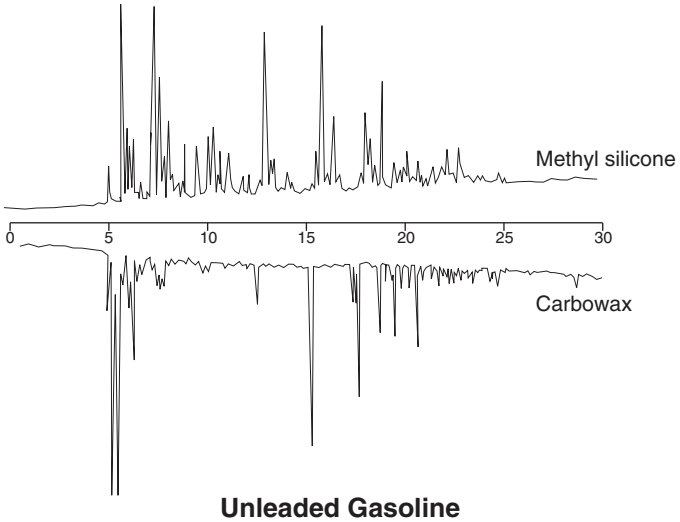
Since the detector is non-destructive of the sample and contributes virtually no band spreading, it can be used in series with other detectors without affecting the performance characteristics of either.

Description

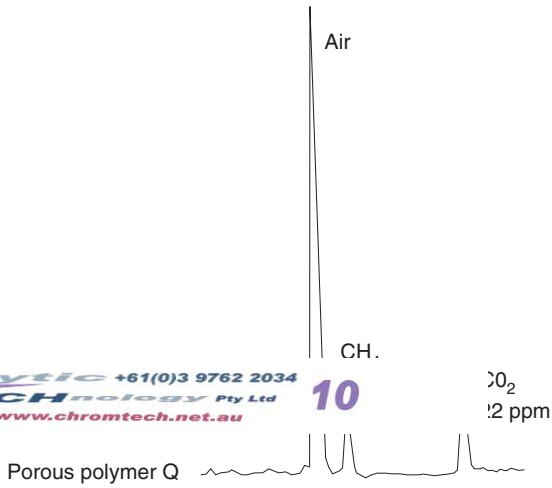
The detector consists of the cell housing and the electronics controller. The cell design permits mounting in virtually any orientation with no effect on performance. It can be installed easily on virtually any gas chromatograph, comprising a stand-alone unit requiring nothing else for operation but carrier gas flow.

Each of the two cell chambers is independent of the other, except for block temperature. Filaments can be replaced individually. Front panel controls set the temperature for the cell and for each filament. Since each detector cell can be operated separately or simultaneously, two analyses can be run using a single Valco TCD.

To insure compatibility with any system, two outputs are provided: 0-1 m[illegible] and 0-10 V full [illegible] and data acquis[illegible]

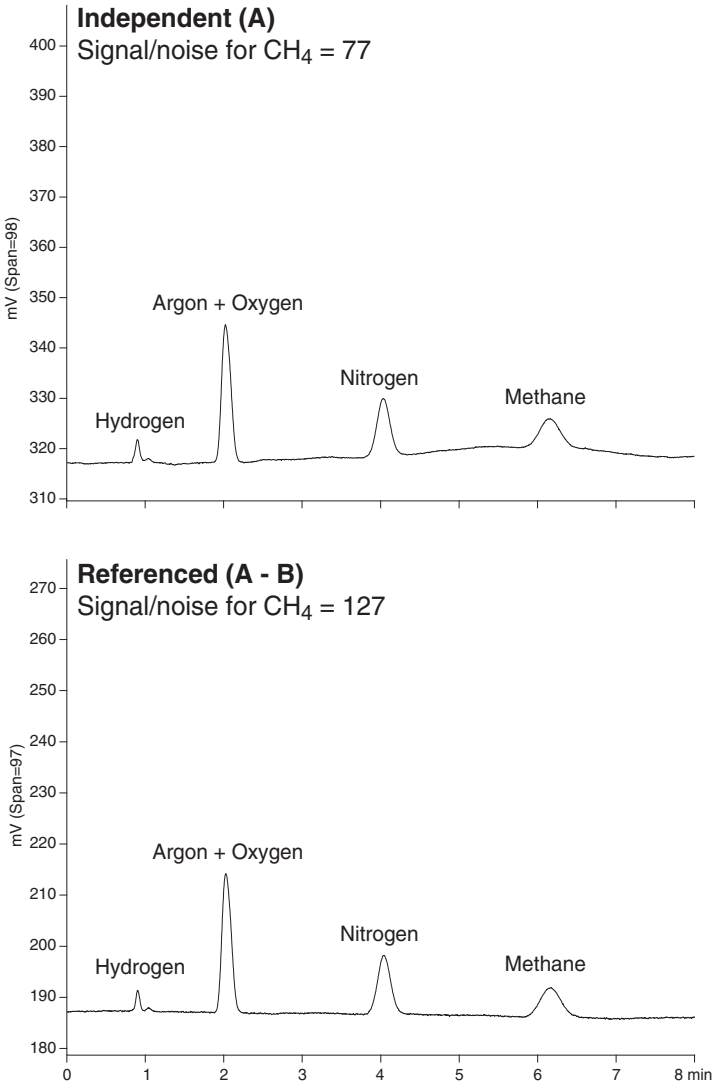


Unleaded Gasoline
50 m x 320 micron columns, 0.06 µl valve injection



Gas Standard
30 m x 530 micron PLOT column, 100 µl valve injection

Independent vs. referenced operation



Helium Blend

Sample size: 250 µl
Sample concentration: 100 ppm each
Column: 10' x 1/16" OD x 0.040" ID
Molesieve 5Å, micropacked
Column temp: 65°C
Detector temp: 100°C
Filament temp setting: 5.0
Flow rate
Channel A: 5.5 ml/min
Channel B: 5.42 ml/min

Specifications

Overall

Linear range	1 nanogram to 3 micrograms nC_4
Minimum detectable quantity	approx. 50 picograms n-butane
Time constant	< 150 milliseconds
Cell temperature control	Automatic proportional control with ±0.02°C stability
Maximum cell temperature	300°C

Detector assembly

Dimensions	3.12" x 6" x 3.75" high (8 cm x 15 cm x 9 cm)
Gas connections	Valco 1/16" zero dead volume fittings
Single multi-pin connector	5 foot cable supplied

Control unit

Dimensions	12" x 8" x 5" high (30 cm x 20 cm x 13 cm)
Electrical connections	Single multi-pin connector
Operator controls	Cell temperature control (40-400°C) 10-turn filament temperature potentiometers (A & B) 10-turn coarse and fine baseline adjustment potentiometers (A & B) 12 position recorder attenuator output switch (A, B, or A-B) Filament power on/off switch
Indicator LEDs	Detector heater "on" Filament power "on"
Power requirements	Universal 100-250 VAC 50/60 Hz, 100W maximum

Product numbers

	110 VAC	230 VAC
Dual cell microvolume TCD with:		
nickel/iron filaments	TCD2-NIFE	TCD2-NIFE-220
tungsten/rhenium filaments	TCD2-WRE	TCD2-WRE-220

North America, South America, and Australia/Oceania contact:
VICI® Valco Instruments Co. Inc.

Europe, Asia, and Africa contact:
VICI® VICI AG International

Built-in "Whisper Quiet" Air Compressor

- ***Built into the GC Chassis***
- ***Powerful enough to supply FID air (300mL/minute)***
- ***Convenient—Recommended for Field Work***

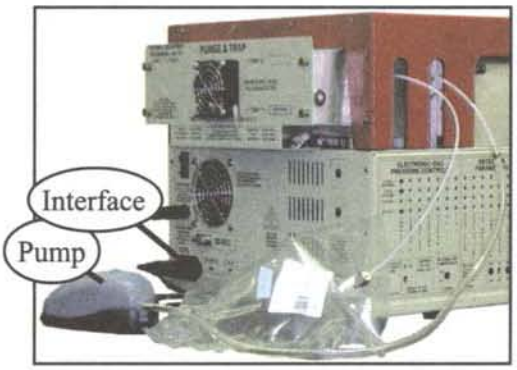
The Built-in "Whisper Quiet" Air Compressor provides an infinite and nearly silent supply of air for the FID, FID/DELCD, NPD, FPD, TID, or CCD detector. It mounts unobtrusively inside the 8610 or 310 GC chassis, and delivers unfiltered air to the detector.

With the built-in air compressor, no air cylinders are required. This simplifies field operations, and saves the expense of regularly replacing air cylinders.

8690-0070	**Built-in "Whisper Quiet" Air Compressor**
8690-2270	**Same as above but 220 VAC**

Vacuum Pump Interface

- ***Draw air samples through traps or load the loop of a gas sampling valve***
- ***Enables Data System Control of an external vacuum pump (included)***
- ***Extremely reproducible flow through traps***



The Vacuum Pump Interface is a data system controlled main power outlet (120 or 220 VAC) on the side of an 8610 or 310 GC for an external vacuum pump. The PeakSimple data system can turn the power to this receptacle ON/OFF, thus controlling the vacuum pump.

Typically, the vacuum pump is used to draw gaseous samples through the traps for ambient air monitoring applications, or to load the loop of a gas sampling valve by pulling sample gas from a remote location.

Because the vacuum pump can be turned ON for a precise length of time, the gas flow through the traps is very reproducible (approximately 100mL/minute).

8690-0073	**Vacuum Pump Interface and Pump**

Molecular Sieve 5A PLOT Columns

Restek's molecular sieve 5A PLOT columns are designed for efficient separation of Ar/O_2 and other permanent gases, including CH_4, C_2H_6, and CO. Special coating and deactivation procedures ensure chromatographic efficiency and the integrity of the porous layer coating. Molecular sieves have very high retention, allowing separations of permanent gases at temperatures above ambient. Additionally, our unique immobilization process guarantees that the uniform particles remain adhered to the tubing—even after continuous valve-cycling.

Our revolutionary molecular sieve 5A PLOT columns separate Ar/O_2 and H_2/He at ambient temperature or above (see figure). These columns also are an excellent choice for rapid separation of permanent gases in refinery or natural gas.

NEW! advanced technology
Details on **pages 106-107**.

Rt®-Msieve 5A Columns (fused silica PLOT)

ID	df	temp. limits	15-Meter	30-Meter
0.25mm	20µm	to 300°C	19773	
0.32mm	30µm	to 300°C	19720	19722
0.53mm	50µm	to 300°C	19721	19723

MXT®-Msieve 5A Columns (Siltek®-treated stainless steel PLOT)

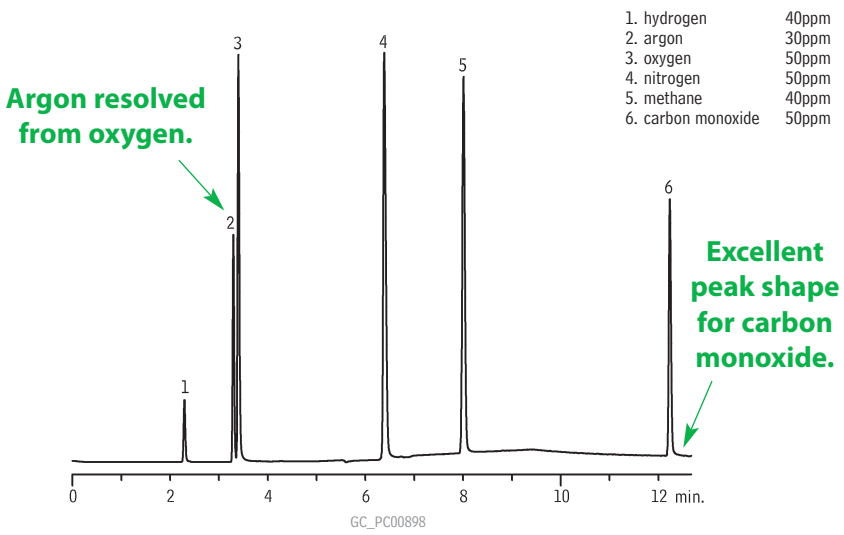
NEW!

Advantages of metal MXT® PLOT columns include:

- Can be made in small coil diameters—perfect for tight spaces.
- Will not spontaneously break, making them ideal for rugged environments.
- Designed for robust performance in process GCs and field instruments.
- Available in 3.5" coil diameter or 7" diameter 11-pin cage.

ID	df	temp. limits	15-Meter	3.5" coil 30-Meter	7" diameter 11-pin cage 30-Meter
0.25mm	20µm	to 300°C	79717		
0.53mm	50µm	to 300°C		79723-273	79723

Permanent gases on an Rt®-Msieve 5A PLOT column.



Column:	Rt®-Msieve 5A, 30m, 0.53mm ID, 50µm (cat.# 19723)
Sample:	permanent gases (ppm)
Inj.:	5µL sample loop, 6-port Valco® valve, valve temp.: ambient
Inj. temp.:	200°C
Carrier gas:	helium, constant flow
Flow:	5mL/min.
Oven temp.:	27°C (hold 5 min.) to 100°C @ 10°C/min. (hold 5 min.)
Det.:	Valco® helium ionization detector @ 150°C

did you know?

Rt®-Msieve 5A PLOT columns are designed for efficient separation of Ar/O_2 and other permanent gases, including CH_4, C_2H_6, and CO.

tech tip

Because molecular sieve materials are very hydrophilic, they will adsorb water from the sample or carrier gas. Water contamination can have a detrimental effect on peak symmetry and can reduce the resolution of all compounds. If water contamination occurs, reactivate your Rt®-Msieve 5A PLOT column by conditioning at 300 °C with dry carrier gas flow for 3 hours.

tech tip

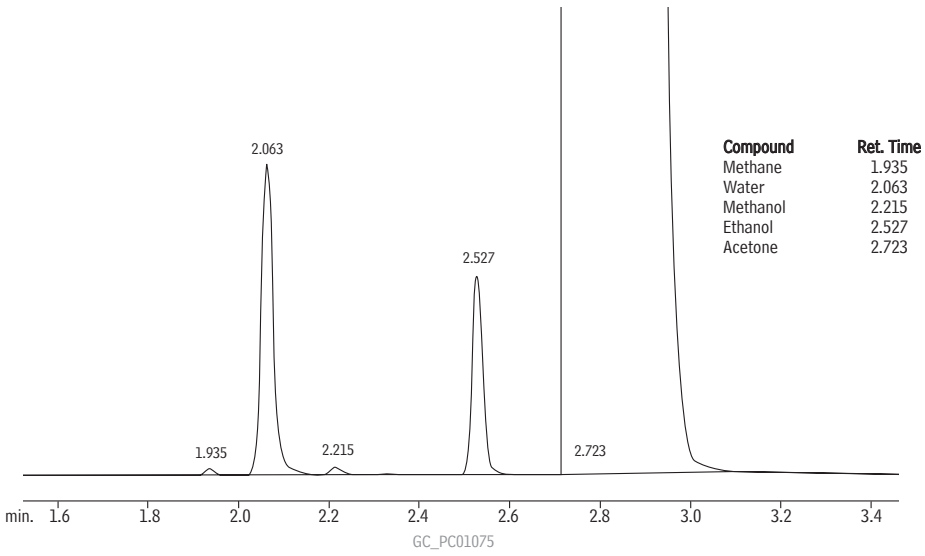
Carbon dioxide will not elute from molecular sieve columns. Rt®-Q-BOND is a good choice for this analysis.

did you know?

ShinCarbon ST micropacked columns are another alternative for analyzing permanent gases.

See **page 130** for information.

Water and ethanol in acetone on an Rt®-Q-BOND PLOT column.



Compound	Ret. Time
Methane	1.935
Water	2.063
Methanol	2.215
Ethanol	2.527
Acetone	2.723

Column:	Rt®-Q-BOND, 30m, 0.53mm ID, 20µm (cat.# 19742)
Sample:	0.5% water and ethanol in acetone
Inj.:	3µL split (split ratio 11:1), 4mm single gooseneck liner w/ wool (cat.# 22405)
Inj. temp.:	250°C
Carrier gas:	helium, constant flow
Linear velocity:	28.7cm/sec. @ 200°C
Oven temp.:	200°C, isothermal
Det.:	TCD @ 260°C

PLOT Column Particle Trap

- Includes two Press-Tight® connectors and a 2.5 m column.
- Protects detector and valves; connects between column and detector or valve.
- Eliminates detector spikes and scratches in valve rotors.

The technology used to adhere particles in PLOT columns is excellent; however, there is still a possibility for particles to dislodge when extreme pressure shocks and gas flow changes are anticipated. This sometimes happens when valve backflush or MS detection is used. In those extreme cases, using particle traps is recommended.

Particle Trap

Description	qty.	cat.#	price
PLOT Column Particle Trap, 2.5m, 0.32mm ID with 2 Press-Tight Connectors	ea.	19753	
PLOT Column Particle Trap, 2.5m, 0.53mm ID with 2 Press-Tight Connectors	ea.	19754	

Restek Customer Service

In the U.S.

Call: 800-356-1688 (ext. 3) or 814-353-1300 (ext. 3)

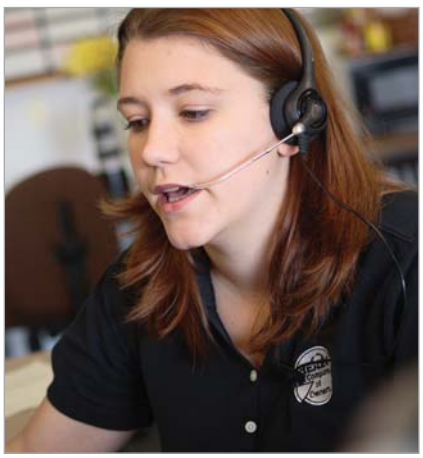
Monday–Friday 8:00 a.m.–6:00 p.m. ET

Fax: 814-353-1309—24-hours a day

Online: www.restek.com—24-hours a day

Outside the U.S.

Contact your Restek representative:
Refer to our list on pages 4-5 or visit our website at www.restek.com



Melissa Decker, Customer Service

Permanent Gases & Hydrocarbon Analysis

ShinCarbon ST Packed/Micropacked Columns

- Separate permanent gases, including CO/CO_2, without cryogenic cooling.
- Rapid separations of permanent gas/light hydrocarbon mixtures.
- Excellent compatibility with most GC detectors—minimal bleed, minimal baseline rise.
- Preconditioned, less than 30 minutes to stabilize.

Analyze oxygen, nitrogen, methane, carbon monoxide, and carbon dioxide with one column and at room temperature. ShinCarbon ST material, a high surface area carbon molecular sieve (~1,500 m^2/g), is the ideal medium for separating gases and highly volatile compounds by gas solid chromatography (GSC). The rapid, above-ambient analyses these columns provide will be a great convenience. Excellent thermal stability of the high surface area carbon, combined with careful conditioning during column manufacturing, ensures low-bleed operation and rapid stabilization when installing a new column. Custom-made ShinCarbon ST columns are available on request.

ShinCarbon ST is a highly stable material. Its 330 °C upper temperature limit minimizes bleed and baseline rise during temperature programming, making the material compatible with most detection systems used for gas analysis, including TCD or HID. All ShinCarbon ST columns are fully conditioned in an oxygen/moisture free environment to prevent contamination. This minimizes stabilization time (less than 30 minutes) when installing a new column which, in turn, minimizes downtime.

it's a **fact**

ShinCarbon ST is an ideal packing material for permanent gases, low molecular weight hydrocarbons, sulfur dioxide, and Freon® gases.

also **available**

For adapter kits for installing packed/micropacked columns, see **page 133.**

ShinCarbon ST 80/100 Columns (packed)
(SilcoSmooth® Stainless Steel)*

OD	ID	2-Meter
1/8" Silcosmooth	2.0mm	80486-

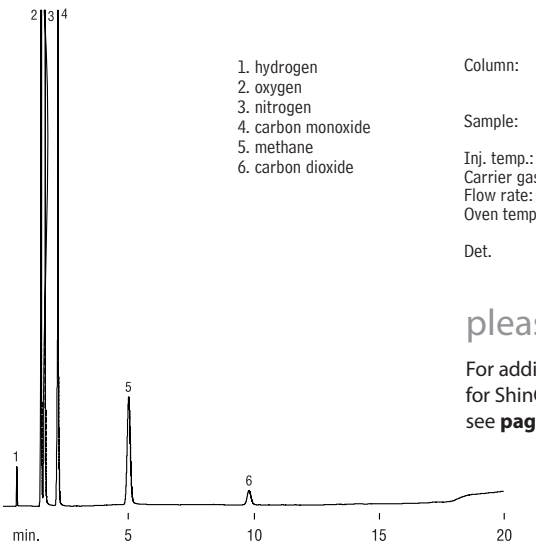
ShinCarbon ST 100/120 Columns (micropacked)
(SilcoSmooth® Stainless Steel)**

OD	ID	1-Meter		2-Meter
1/16"	1.0mm	19809	$245	19808
0.95mm	0.75mm	19810	$245	

*Please add column instrument configuration suffix number to cat.# when ordering. See chart on the next page.

**Does not include column nuts and ferrules. Optional installation kits can be ordered separately—see page 133.

Separate permanent gases in 10 minutes, without cryogenics.



1. hydrogen
2. oxygen
3. nitrogen
4. carbon monoxide
5. methane
6. carbon dioxide

Column:	ShinCarbon ST, 100/120 mesh, 2m, 1mm ID micropacked (cat.# 19808)
Sample:	5µL permanent gases mix, approx. 5 mole % each
Inj. temp.:	100°C
Carrier gas:	helium
Flow rate:	10mL/min.
Oven temp.:	40°C (hold 3 min.) to 250° @ 8°/min. (hold 10 min.)
Det.	HID @ 200°C

GC_PC00666

please **note**

For additional chromatograms for ShinCarbon ST columns, see **pages 647, 649, and 652**.