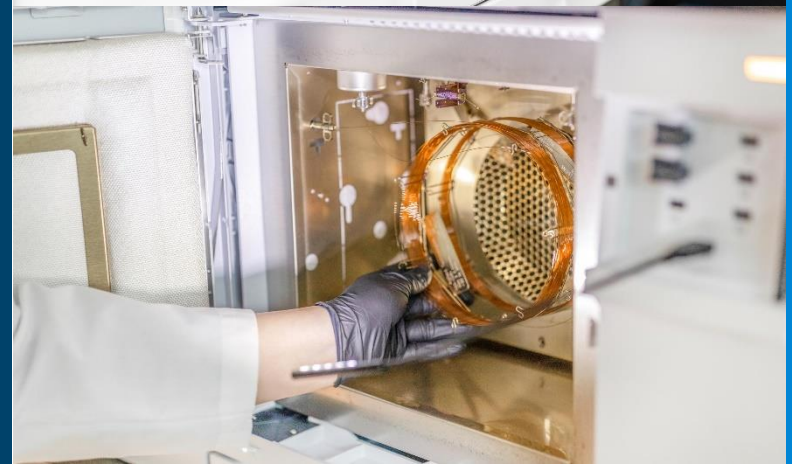
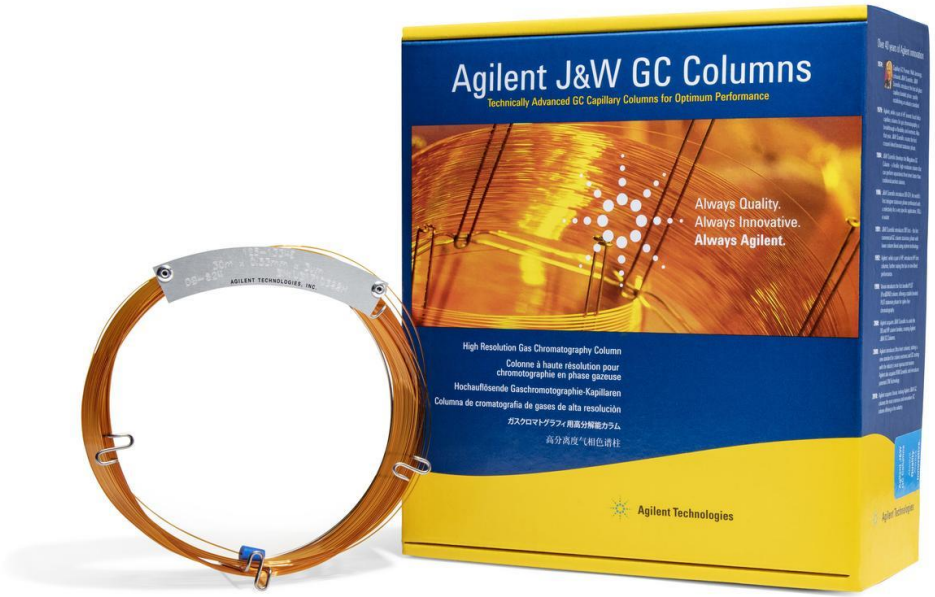
Chromatography Column Care 101: From Setup to Longevity

Ryan Birney and Alexander Ucci
Application Engineers
May 22, 2024

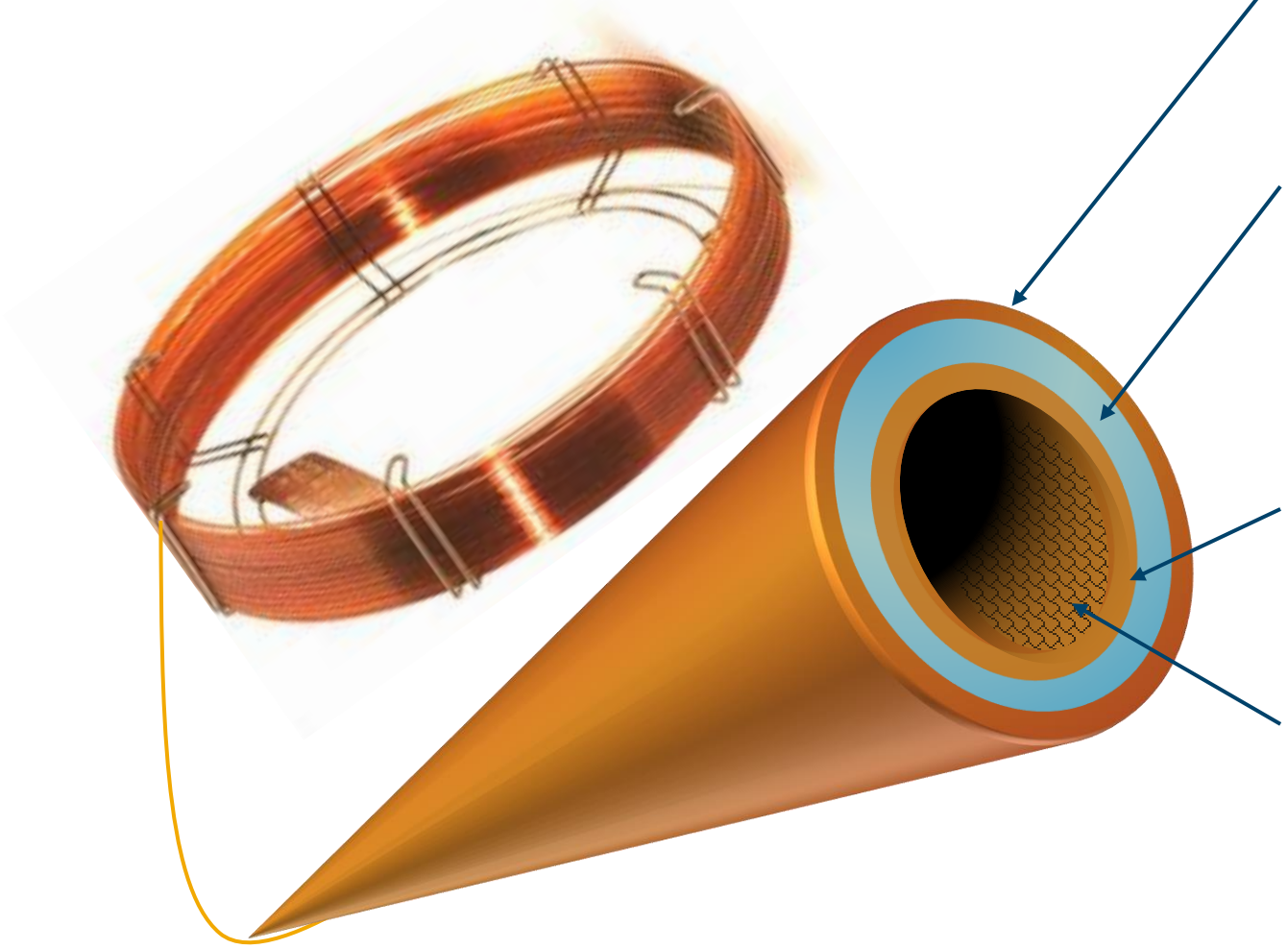


Agenda

- Unboxing / “getting to know your column”
- Install the column
- Preventive measures
- Corrective measures
- Latest instrument developments



Column Construction



Polyimide coating

Flexible polymeric coating; adds mechanical strength and temperature stability to fused silica

Fused silica

Amorphous glass-like tubing, comprised of silicon dioxide; high temperature resistance, low reactivity. May contain rough edges, creating active sites.

Deactivation

Chemical treatment layer; smooths fused silica surface to enhance inertness

Stationary phase

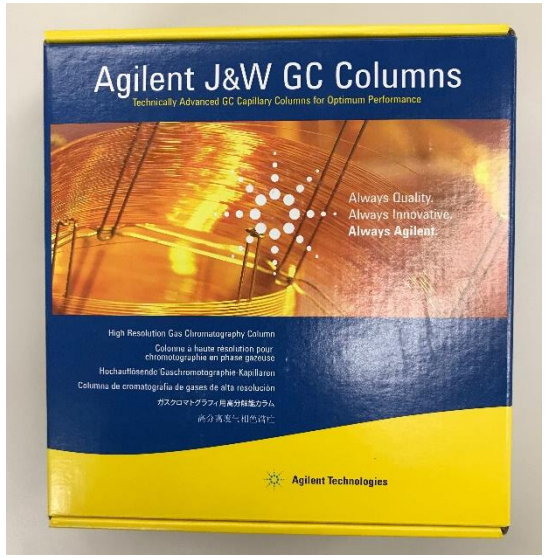
Polymeric coating atop deactivation layer; commonly comprised of polysiloxane- or polyethyleneglycol-based compounds

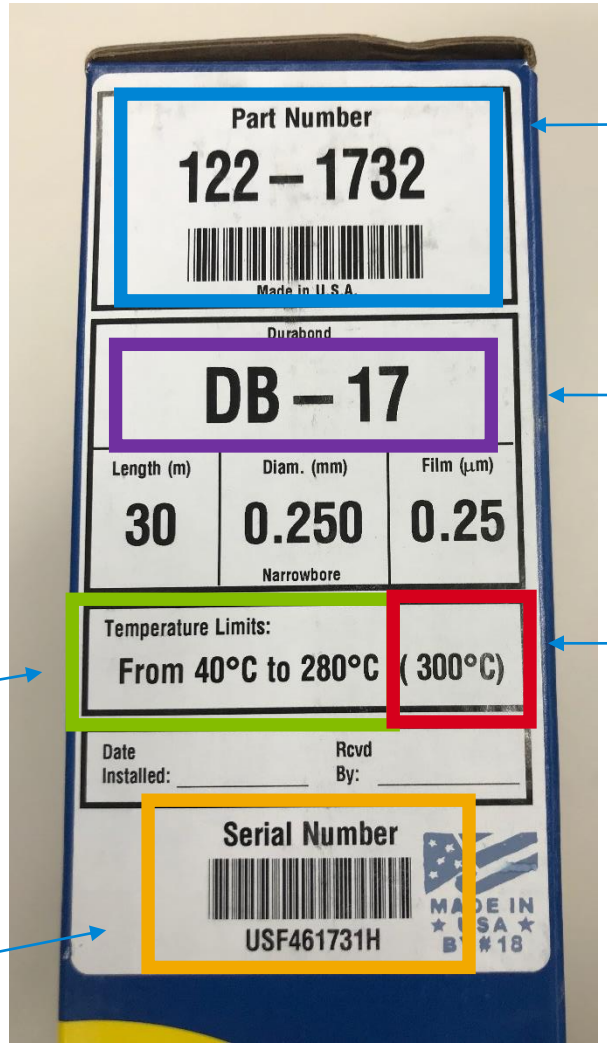
Agilent J&W Column Portfolio: DB, HP, CP, VF

Low Polarity			Mid Polarity			High Polarity		
CP-Sil 2	DB and HP-1ms UI	DB and HP-5ms UI	DB-XLB	DB-225ms	DB-ALC1	HP-88	DB-WAX	DB-WAX UI
DB-MTBE	DB and HP-1ms	DB and HP-5ms	VF-Xms	DB-225	DB-Dioxin	CP-Sil 88	DB-WAXetr	DB-HeavyWAX
CP-Select CB MTBE	VF-1ms	VF-5ms	DB-35ms UI	CP-Sil 43 CB	DB-200	DB-23	HP-INNOWax	DB-FATWAX UI
	DB and HP-1	DB and HP-5	DB and VF-35ms	VF-1701ms	VF-200ms	VF-23ms	VF-WAXms	
	CP-Sil 5 CB	CP-Sil 8 CB	DB and HP-35	DB-1701	DB-210		CP-Wax 57 CB	
	Ultra 1	Ultra 2	DB and VF-17ms	CP-Sil 19 CB	DX-4		DB and HP-FFAP	
	DB-1ht	VF-DA	DB-17	HP-Blood Alcohol			DB-WAX FF	
	DB-2887	DB-5.625	HP-50+	DB-ALC2			CP-FFAP CB	
	DB-Petro/PONA	DB and VF-5ht	DB-17ht	DX-1			CP-WAX 58 FFAP CB	
	CP-Sil PONA CB	CP-Sil PAH CB	DB-608				CP-Wax 52 CB	
	DB-HT SimDist	Select Biodiesel	DB-TPH				CP-WAX 51	
	CP-SimDis	SE-54	DB-502.2				CP-Carbowax 400	
	CP-Volamine		HP-VOC				Carbowax 20M	
	Select Mineral Oil		DB-VRX				HP-20M	
	HP-101		DB-624				CAM	
	SE-30		VF-624ms				CP-TCEP	
			CP-Select 624 CB					
			DB-1301					
			VF-1301ms					
			CP-Sil 13 CB					

Agilent J&W columns have over 50 different stationary phase offerings

The “Unboxing” of the GC Column





Important for identification and reordering

Column stationary phase

Programmed temperature limit (<10 min)

Isothermal temperature limits

Unique to each column (identification)

What's Inside?

The column tag contains useful information

The column plug holds the column ends together and protects against contamination. To put the column in storage, use this plug again or a piece of septa over the ends of the column.

Column Performance Summary

Catalog: 19091S-433UI

Serial: F 5 4 2 2 5 2 H

Stationary Phase: HP-5MS UI

Description: 30m x 0.250mm x 0.25µm

Temperature Limits: -60°C to 325°C (350°C Pgm)

Performance Results

Theoretical Plates/Meter:

n-DECANE	3208

Retention Index:

n-PROPYLBENZENE	953.110
1-HEPTANOL	967.660

Resolution:

1-OCTENE, n-OCTANE	2.97

Compound Identification	Retent. Time	Part. Ratio	1/2-Width
1. PROPIONIC ACID	1.543	0.30	0.027
2. 1-OCTENE	2.203	0.86	0.015
3. n-OCTANE	2.282	0.92	0.016
4. 1,3-PROPANEDIOL	2.552	1.15	0.020
5. 4-METHYLPYRIDINE	3.051	1.57	0.021
6. n-NONANE	3.738	2.15	0.027
7. TRIMETHYLPHOSPHATE	4.482	2.78	0.033
8. n-PROPYLBENZENE	5.193	3.38	0.038
9. 1-HEPTANOL	5.682	3.79	0.041
10. 3-OCTANONE	6.368	4.37	0.047
11. n-DECANE	6.940	4.85	0.053

Test Conditions

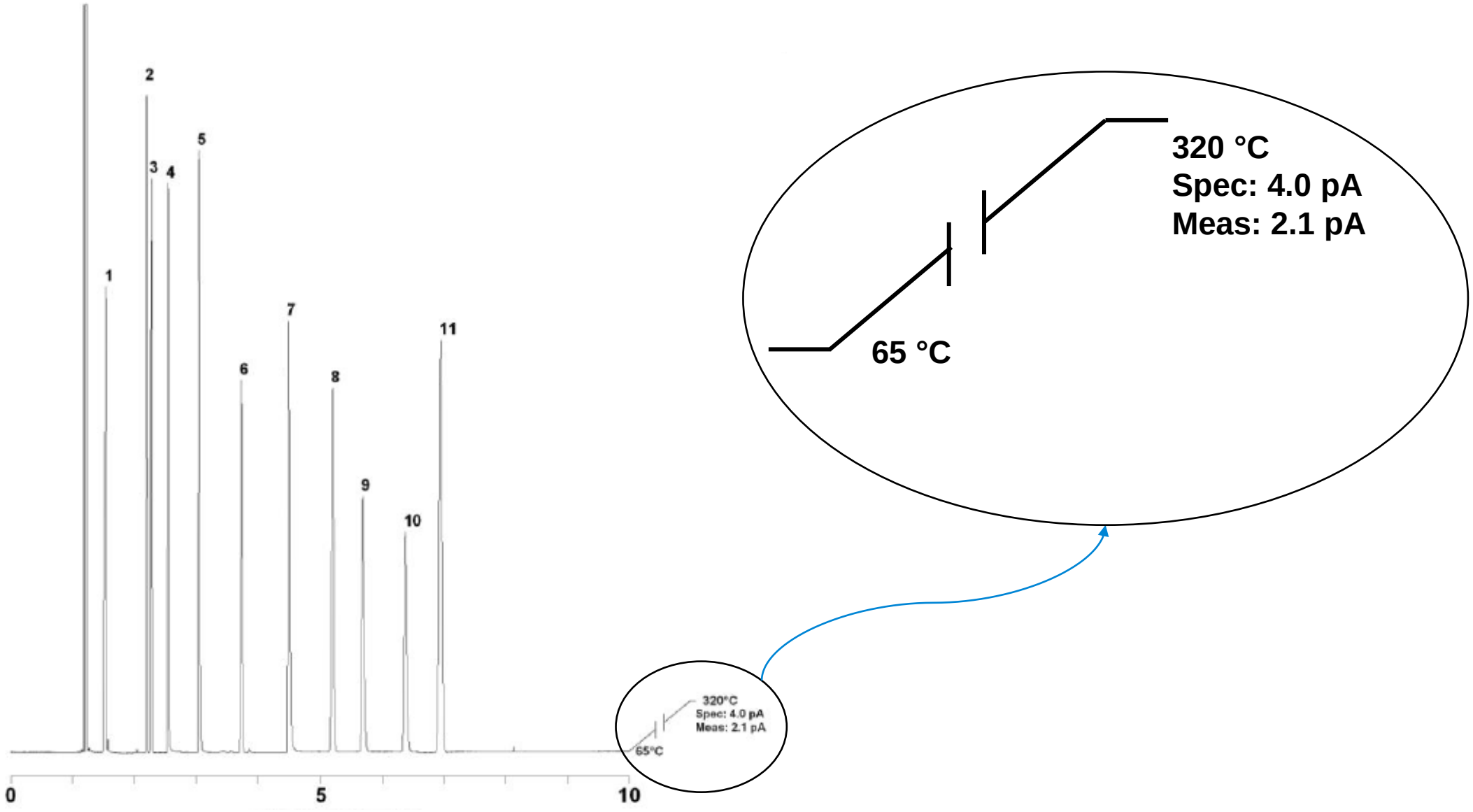
Inlet: **Split** (250°C) **Detector:** FID (325°C)

Carrier Gas: Hydrogen **Flow:** 42.1 cm/sec (1.2 ml/min)

Holdup Compound: Pentane (1.187-min)

Temperature Program: Isothermal at 65°C

Chromatographic Performance



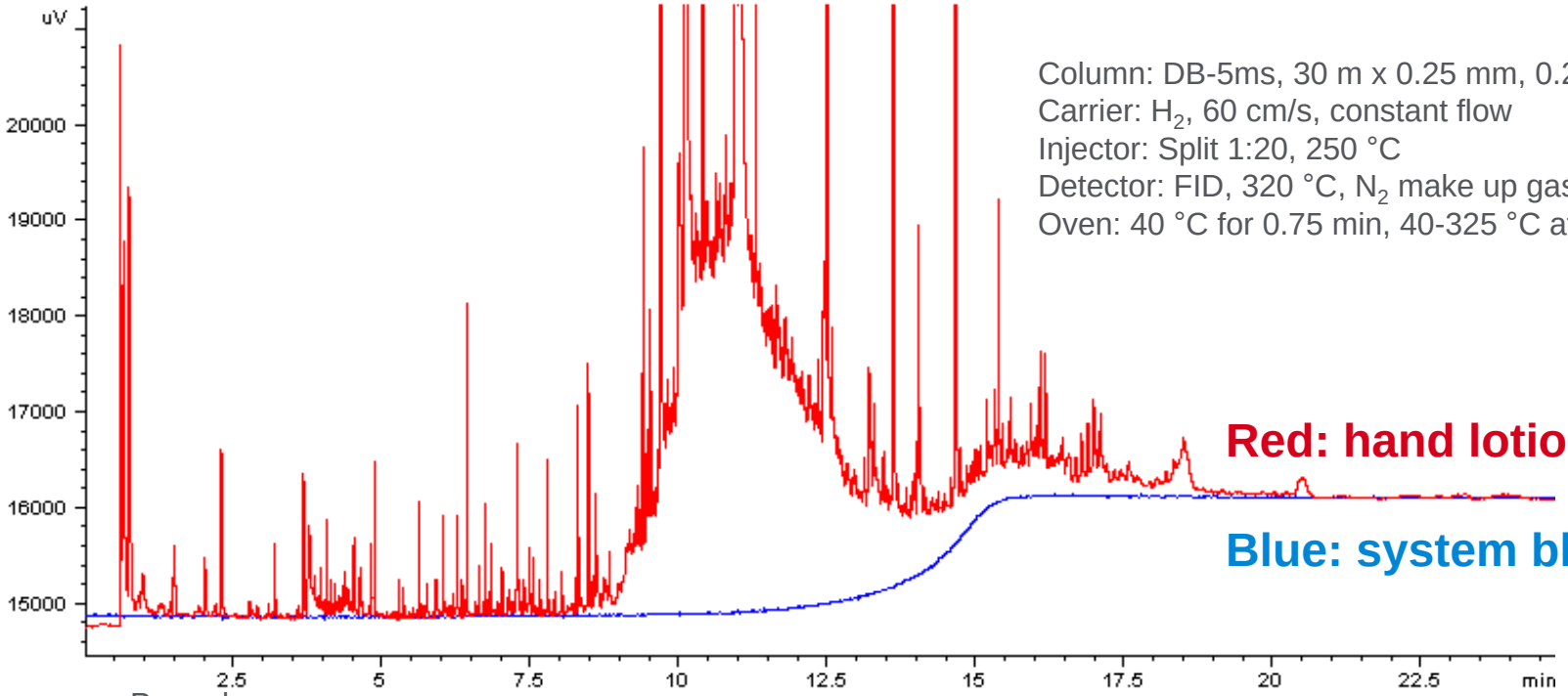
Test Mixture Components

Compounds	Purpose
Hydrocarbons	Efficiency
	Retention
FAMEs, PAHs	Retention
Alcohols	Activity
Acids	Acidic character
Bases	Basic character

Column Installation Procedure

- Install the column
- Leak and installation check
- Column conditioning
- Bleed profile
- Test mix

Contamination from Hand Lotion



Column: DB-5ms, 30 m x 0.25 mm, 0.25 µm
Carrier: H_2, 60 cm/s, constant flow
Injector: Split 1:20, 250 °C
Detector: FID, 320 °C, N_2 make up gas
Oven: 40 °C for 0.75 min, 40-325 °C at 20 °C/min, 325 °C for 30 min

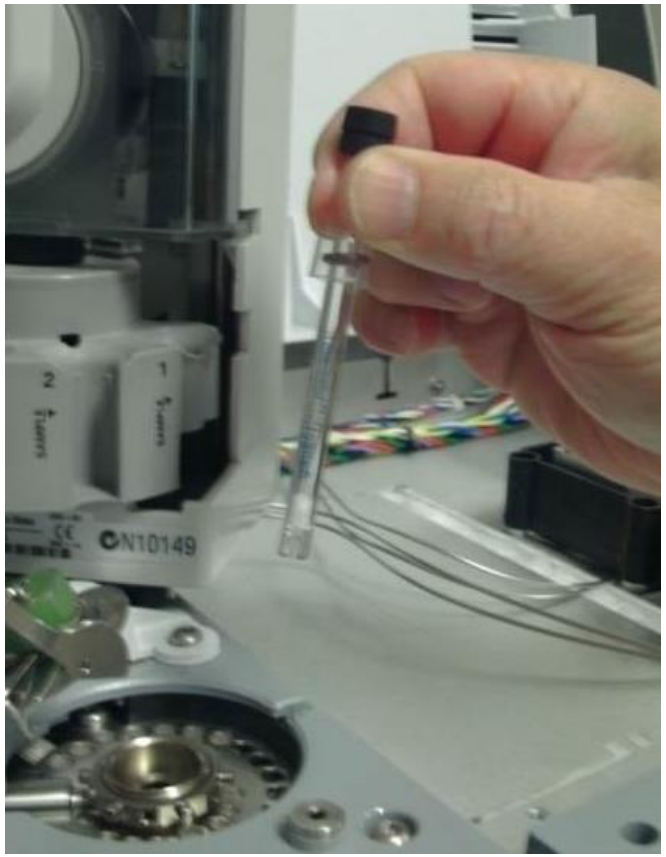
Red: hand lotion

Blue: system blank

Procedure:

(1) One small drop of liquid placed onto one fingertip.
(2) Wipe fingertip with paper towel to remove as much of the material as possible.
(3) Lightly touched the part of the column sticking up above the ferrule.
(4) Installed column into injector.
(5) Set oven temperature to 40 °C.
(6) Started oven temperature program as soon as the oven reached 40 °C.

“Touchless” Packaging



Column Installation

What type of ferrule should I use?

Polyimide

Graphite

Polyimide/ graphite

Flexible Metal

Composition	Re-use	Max Temperature (°C)	Use	Limitation
Polyimide (Vespel)	Yes	280	Easy seal	Shrinks after heating, causing leaks after thermal cycle; isothermal only
Graphite	Yes	450	FID, NPD, inlets	Contamination, permeable to air – not for oxygen-sensitive detectors
Polyimide/graphite (85% / 15%)	Limited	350	MS, ECD, inlets	Still shrinks after thermal cycles creating leaks; need to retighten regularly
Flexible Metal	No	450	Capillary flow technology (backflush, splitters, and so on)	May not seal well with damaged fittings or rough surfaces

"Short" ferrules for inlet and detector configurations on Agilent GCs

"Long" ferrules for MS transfer lines and MS interface nut

Agilent Gold-Plated Flexible Metal Ferrules (FMFs)

Agilent is excited to announce the release of our new gold-plated Flexible Metal ferrules

- These newly launched ferrules improve on the existing Flexible Metal ferrule (FMF) design by applying a gold coating to ensure a leak-free connection ***with Capillary Flow Technology (CFT) devices,*** while providing enhanced ease-of-use.

The Highlights

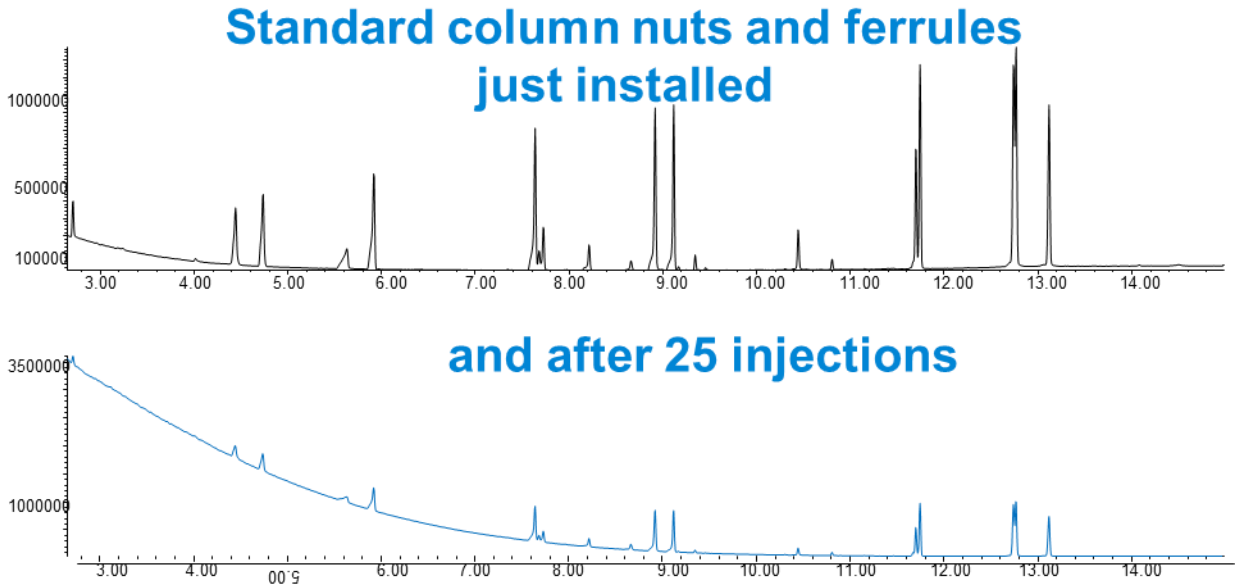
Review

- Flexible Metal ferrules are technologically advanced to provide ease-of-use and mechanically tight seals
- Gold-plating flows to fill scratches and striations on the surface of the CFT device
- Creates leak-free seals on first installation attempt
- Ideal for labs running backflush, Dean’s switch, or GC x GC analyses

Graphite/Polyimide Blend Capillary Ferrules

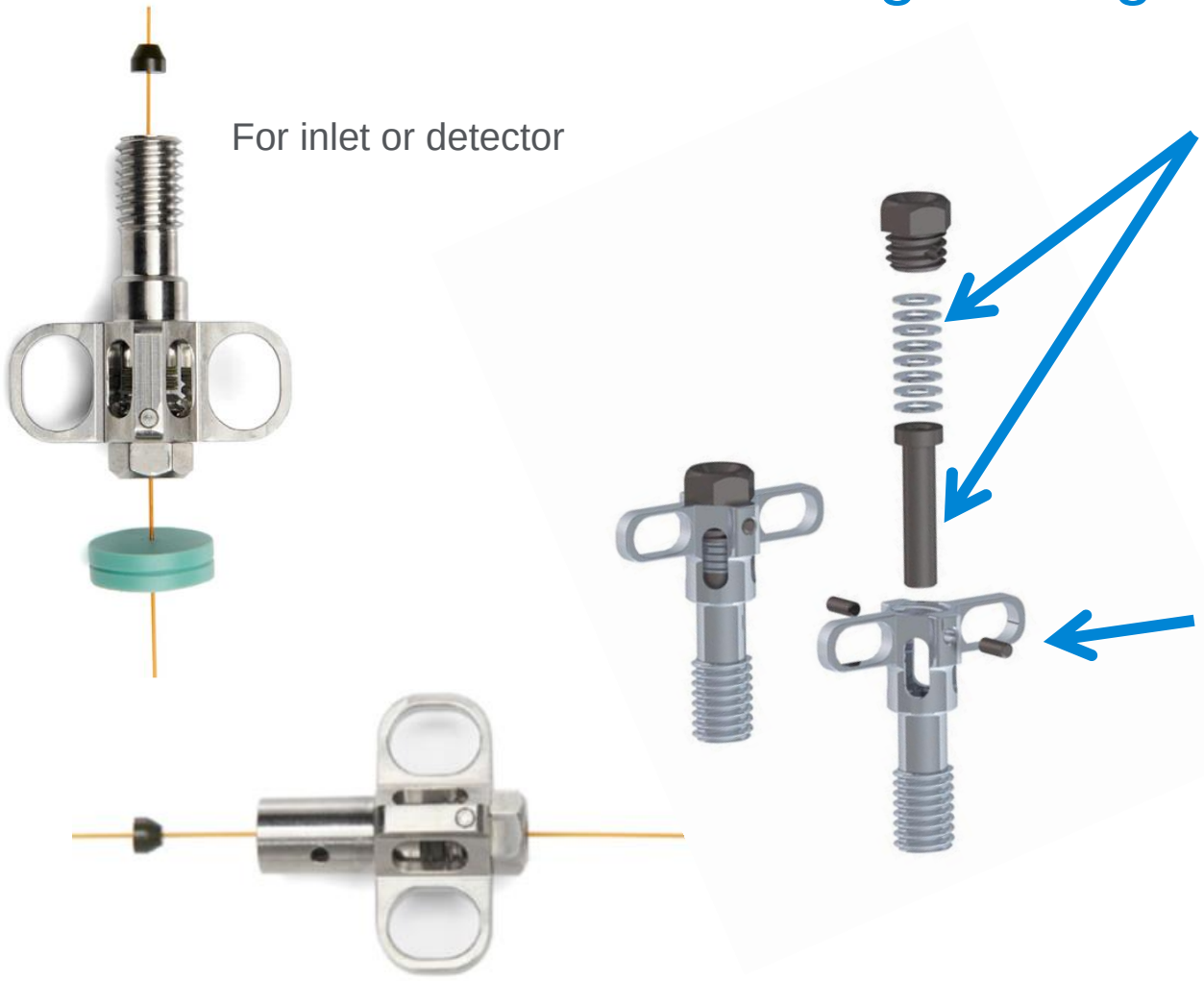
Unfortunately, a leak occurred following normal temperature program runs.

Studies show that the leaking continues with use of the ferrules (not just after the first one or two runs).



Frequent retightening of the fitting is needed to maintain a leak-free seal, as well as system performance and productivity.

Column Installation: Self Tightening Column Nut

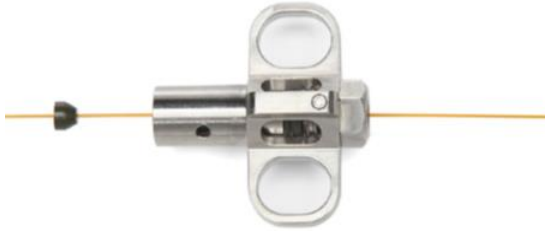


- Spring-driven piston continuously presses against ferrule
- Automatically retightens when the ferrule shrinks
- No leaks, no downtime, no frustration
- Wing design for finger tightening
- No tools needed
- No polymer materials for durability
- Compatible with **only** short graphite/vespel ferrules

Increasing Ease-of-Use Through Continued Innovation: Self Tightening Nuts

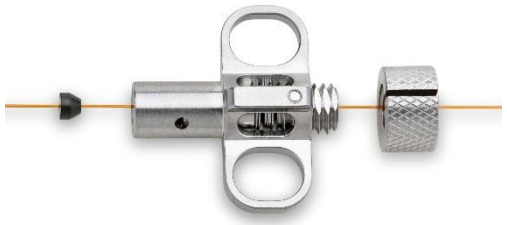
For GC inlet or detector

Innovating for the next generation



For mass spectrometry transfer line

Innovating for the next generation



- Easier and faster to install
- Collar holds column in place
- Single-hand installation into inlet
- No tools needed

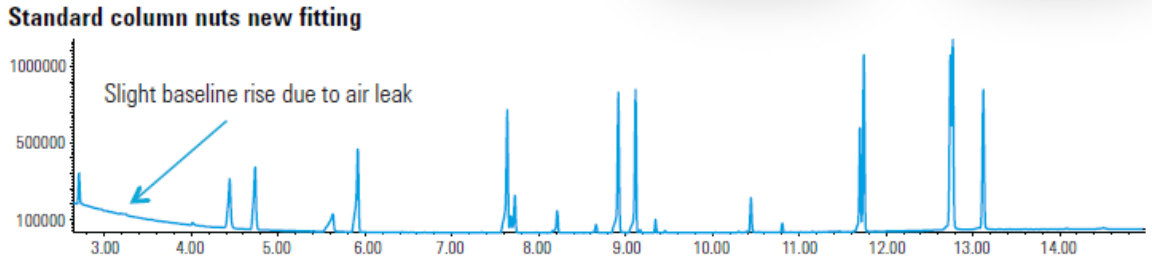
Self Tightening Nuts: No Leaks, No Downtime, No Frustration

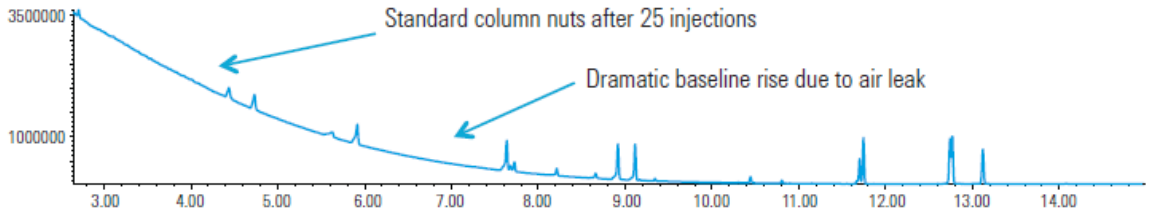
- Spring-driven piston continuously presses against ferrule
- Automatically retightens when the ferrule shrinks
- Wing design for finger tightening
- No tools needed

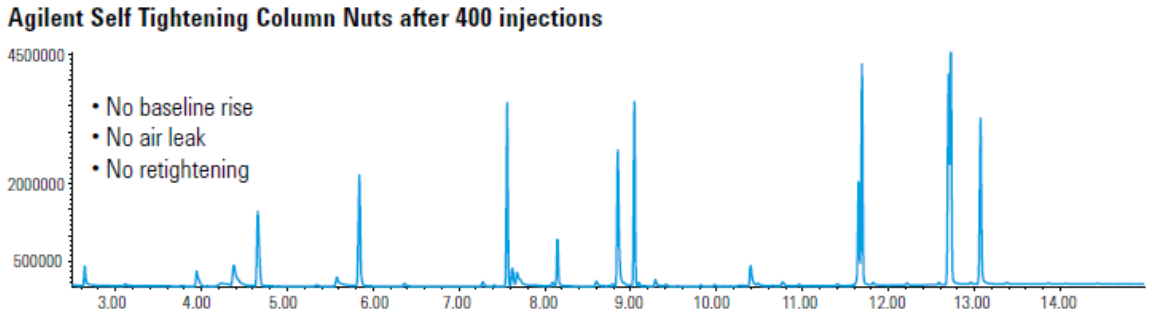
Part Number	Description
G3440-81013	Column Nut, Collared Self-Tightening MSD
G3440-81011	Column nut, Collared Self Tightening Inlet/Detect
G3440-81012	Collar for Self Tigthening Nut

https://www.agilent.com/en/video/gc-supplies-innovation

https://www.agilent.com/en/video/stcn-inlet-detector
https://www.agilent.com/en/video/stcn-mass-spec



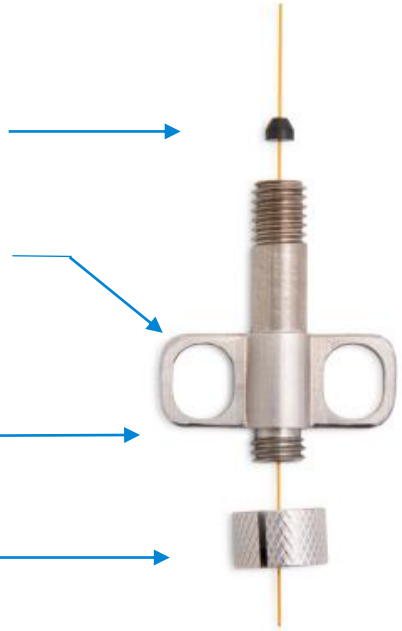




400 injections

New Agilent Standard Winged Nut and Depth Guide

- Compatible with Agilent/HP style compact ferrules, including graphite ferrules
- Winged fastener design for easy engagement and tool-free installation
- Hollow-body design with low thermal mass mitigates thermal lag during temperature cycling within the GC oven
- Removable locking-collar with soft-PTFE insert to secure column placement during install without damaging the analytical column



Don’t confuse them with the Self Tightening nuts

Inlet / Detector
G3440-81018

MSD
G3440-81019

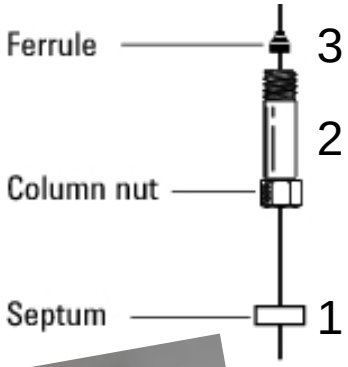
- Easy-to-use template provides critical capillary column installation for the most popular Agilent GC configurations
  - SSL, MMI, purge-packed inlets
  - FID, TCD, NPD detectors
  - EI MSD source
- Compatible with the Agilent Self Tightening and winged column nuts

Matching the Correct Nut with the Correct Ferrule

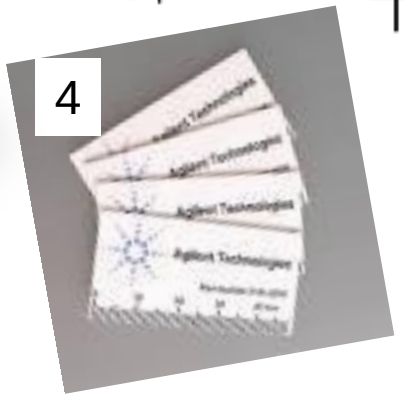
Nuts/Ferrules for Inlets and Non-MS Detectors (Male)			
Photo	Nut	Photo	Ferrule
	Traditional/ legacy nut		Short
	Wing nut		Short
	Self Tightening column nut		Short – G/V only

Nuts/Ferrules MSD (Female – G/V Only)			
Photo	Nut	Photo	Ferrule (G/V Only!)
	Traditional/ legacy nut		Long
	Wing nut		Long
	Self Tightening column nut		Short – G/V only

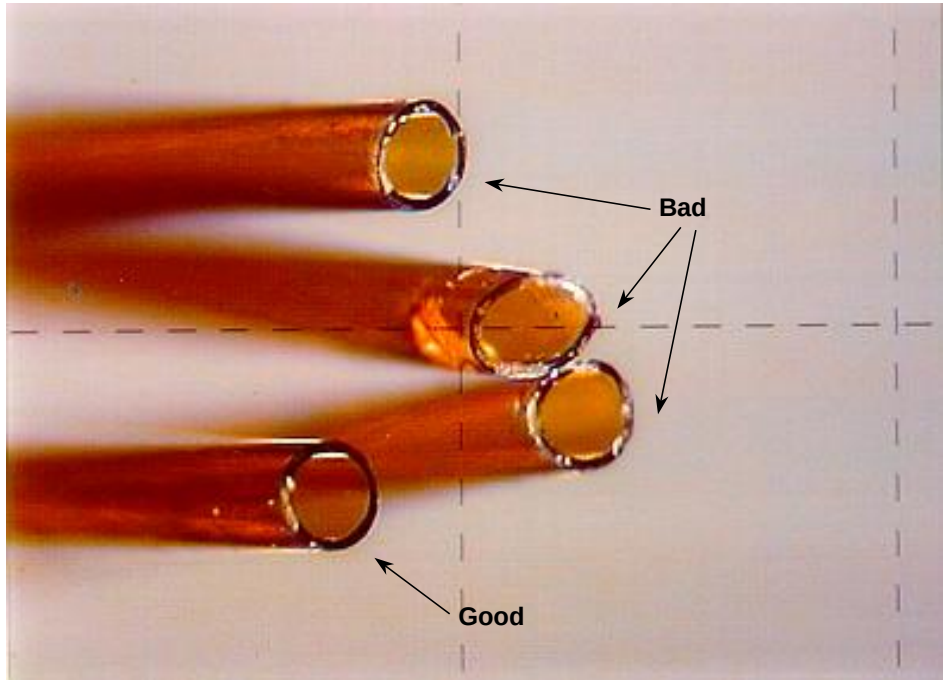
Column Installation Assembly Process



- Thread through an inlet septum (if traditional nut)
- Pass column through the column nut
- Install ferrule onto the column tubing
- **Then** make a fresh cut
- Inspect the cut; repeat the cut if there are any jagged or rough edges



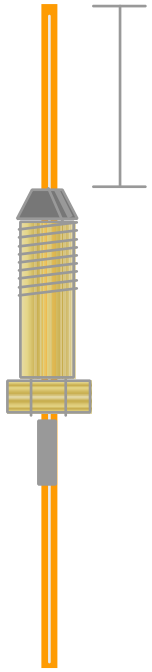
430-1020



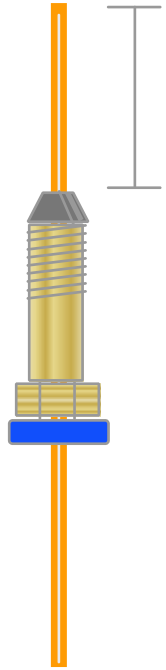
Column Installation

Measuring the right distance

White out



Septa



Self Tightening column nut collar or septa

Cutting the Column

Gently scribe through the polyimide coating

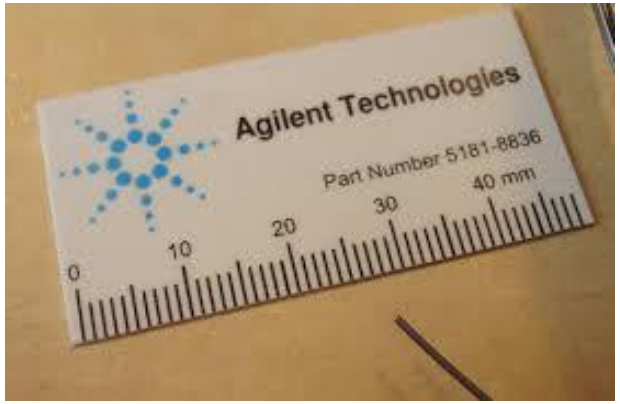
- Do not attempt to cut the glass

<u>Recommended tools</u>

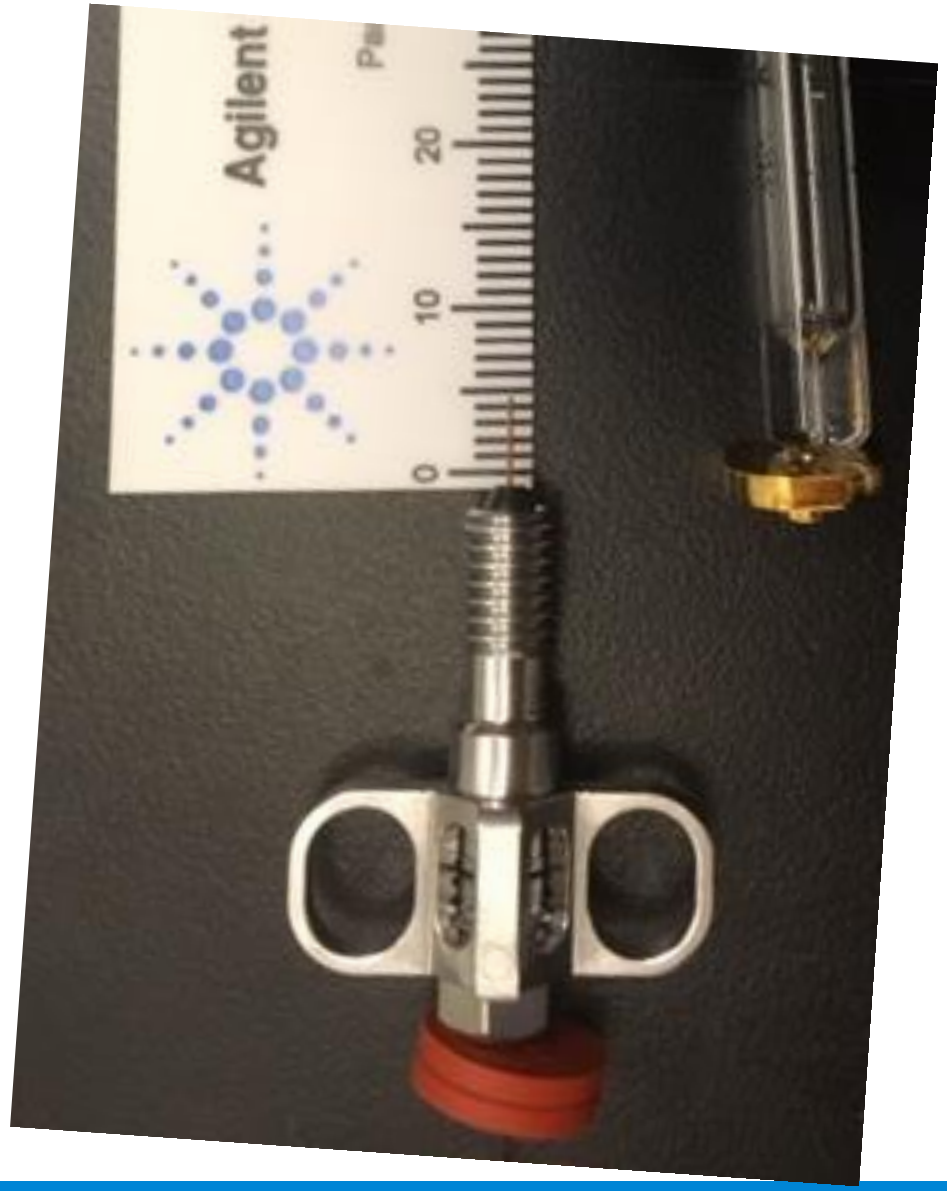
- Diamond or carbide-tipped pencil, or sapphire cleaving tool
- Ceramic wafer
- Ocular

<u>Do not use</u>

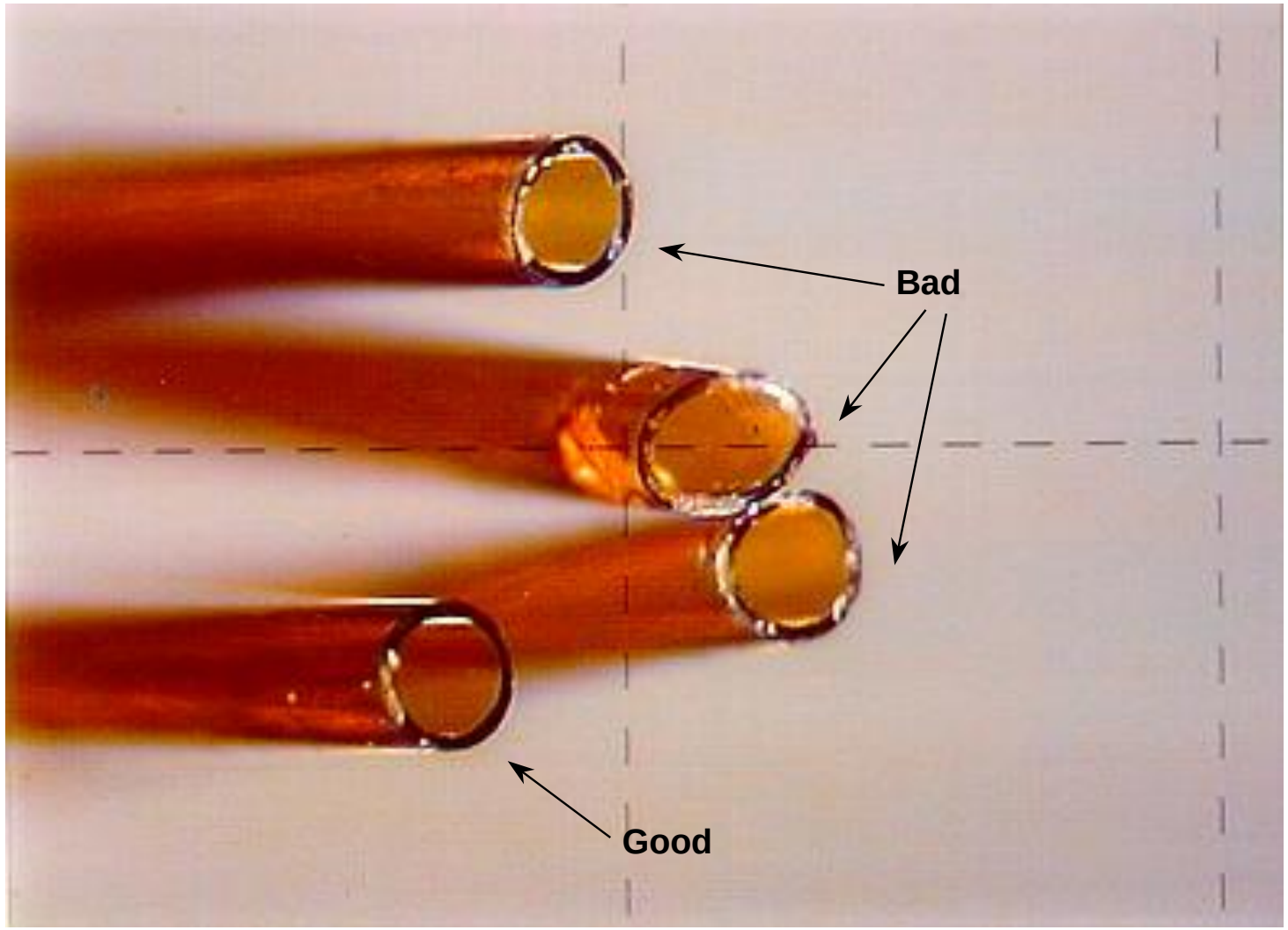
- Scissors, file, and so on



Why Does Distance Matter?

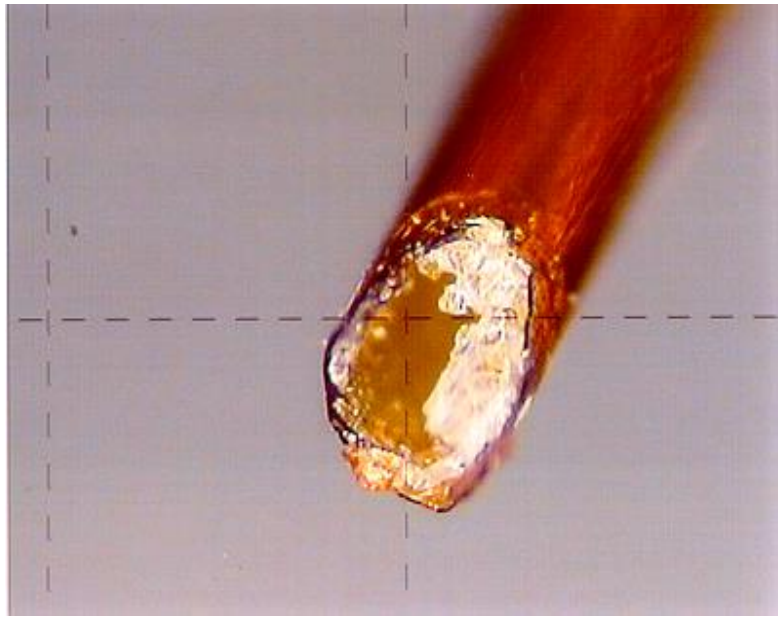


Examples of Column Cuts



Column Installation

How tight is tight?



Overtightened ferrule

Column Installation Videos

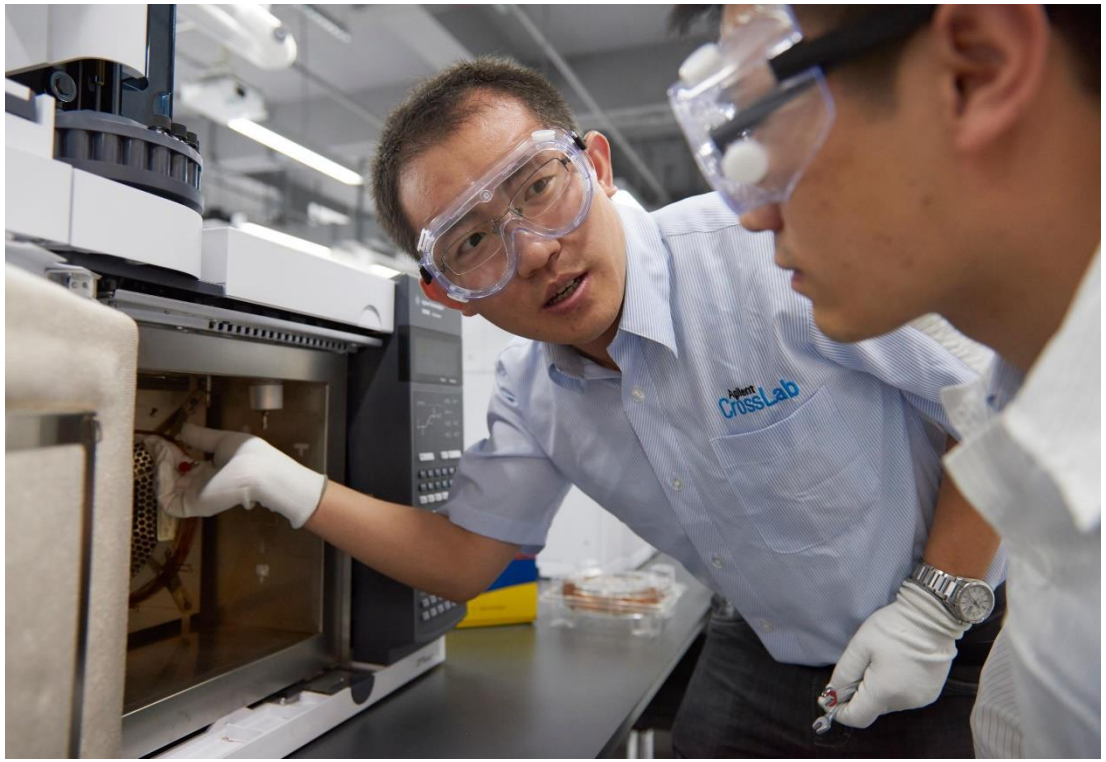
[Conditioning Your GC Column | Agilent]

[Front-End Maintenance for Your GC Column | Agilent]

[Installing a New GC Column into Your Inlet | Agilent]

[Installing New GC Column into Your Atmospheric Detector | Agilent]

[Installing a New GC Column into Your Mass Spec | Agilent]



New Agilent Universal Fit GC Detector Jets

- Easier column installation and jet replacement, reducing the risk of column damage
- Lubricant-free threads, reducing the risk of contamination
- Made of strong material, reducing the risk of deforming
- Universally fits in both capillary column and packed column (adaptable) FID detectors

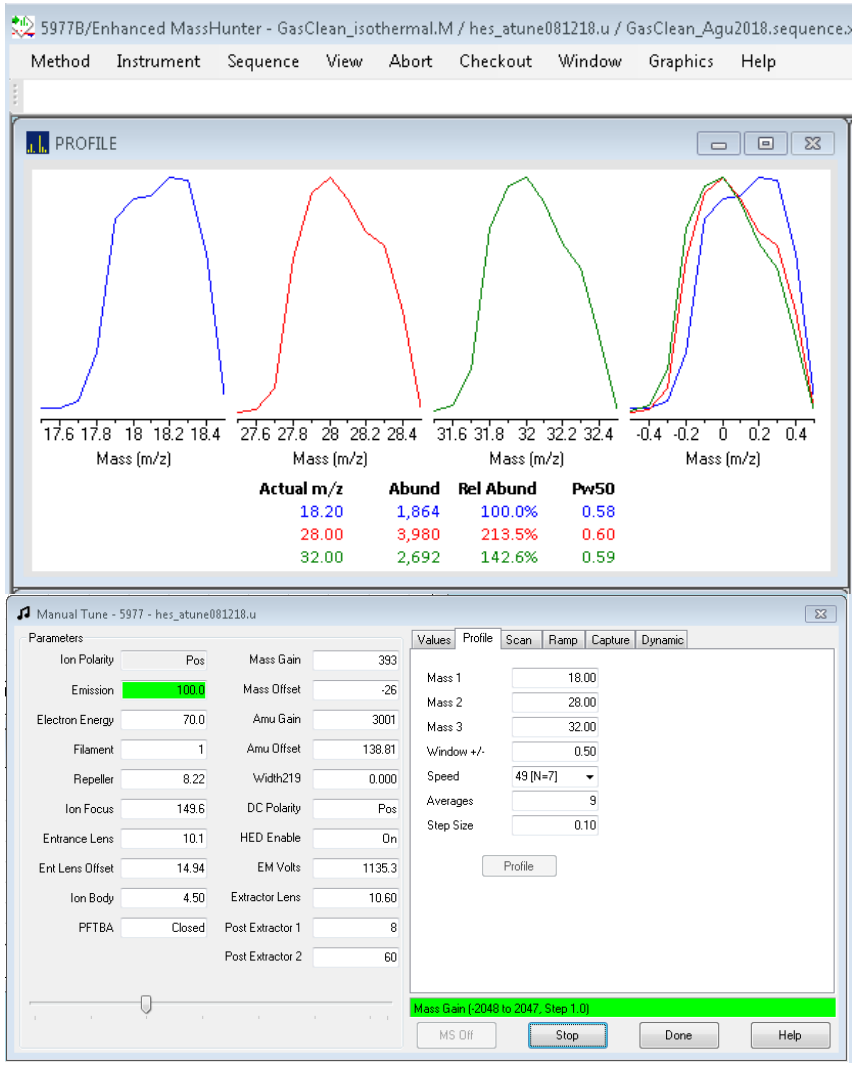
Previous Jets				New Universal Fit Jets			
Previous Jet PN	**Jet Orifice ID (inch/mm)**	**Jet Length (inch/mm)**	**Fit of Detector Fitting Type**	**New Jet PN (use for re-order)**	**Jet Orifice ID (inch/ mm)**	**Jet Length (inch / mm)**	**Fit of Detector Fitting Type**
19244-80560	***0.011 / 0.29***	***2.4 / 62***	***FID, Adaptable***	**5200-0176**	**0.011 / 0.29**	**1.2 / 31**	**FID, Capillary & Adaptable**
G1531-80560	***0.011 / 0.29***	***1.7 / 43***	***FID, Capillary***				
18710-20119	***0.018 / 0.47***	***2.5 / 64***	***FID, Adaptable***	**5200-0177**	**0.018 / 0.47**	**1.2 / 31**	**FID, Capillary & Adaptable**
19244-80620	***0.018 / 0.47***	***2.4 / 62***	***FID, Adaptable***				
G1531-80620	***0.018 / 0.47***	***1.7 / 43***	***FID, Capillary***				
18789-80070	***0.030 / 0.76***	***2.5 / 64***	***FID, Adaptable***	**5200-0178**	**0.030 / 0.76**	**1.2 / 31**	**FID, Capillary & Adaptable**
G1534-80580	***0.011 / 0.29***	***2.0 / 52***	***NPD, Capillary***	**5200-0179**	**0.011 / 0.29**	**1.6 / 40**	**NPD, Capillary & Adaptable**
G1534-80590	***0.011 / 0.29***	***2.8 / 71***	***NPD, Adaptable***				

Column Installation
Leak check

Do not use snoop

- Electronic leak detector
- IPA/water
- Inject a nonretained peak

If My System Is Leak-Free, What Should My Air Ion Abundances Be?



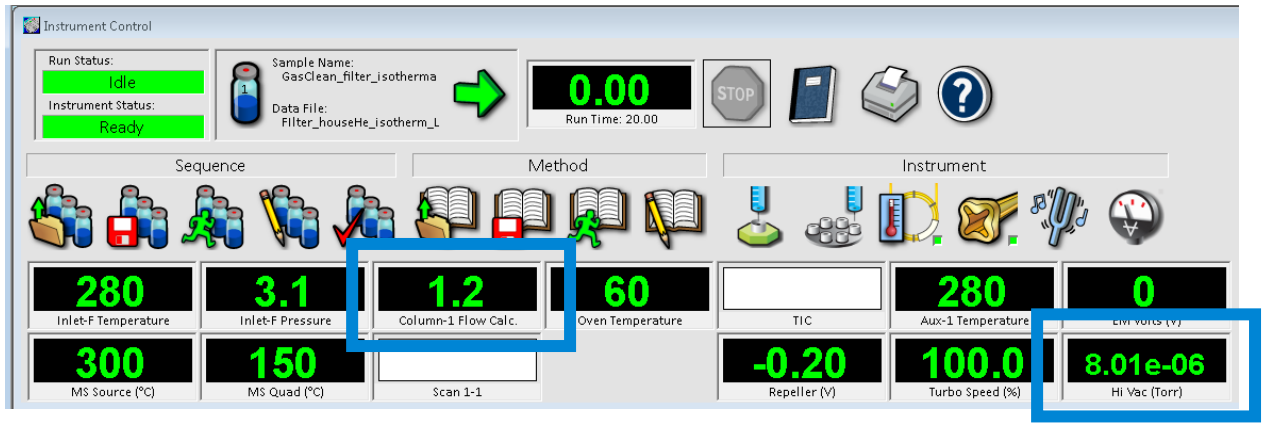
- These are just estimates
  - H_2O: ~2,000 counts (less is ok)
  - N_2: ~10,000 counts (less is ok)*
  - O_2: ~3,000 counts (less is ok)

*Make sure to purge your Gas Clean filter

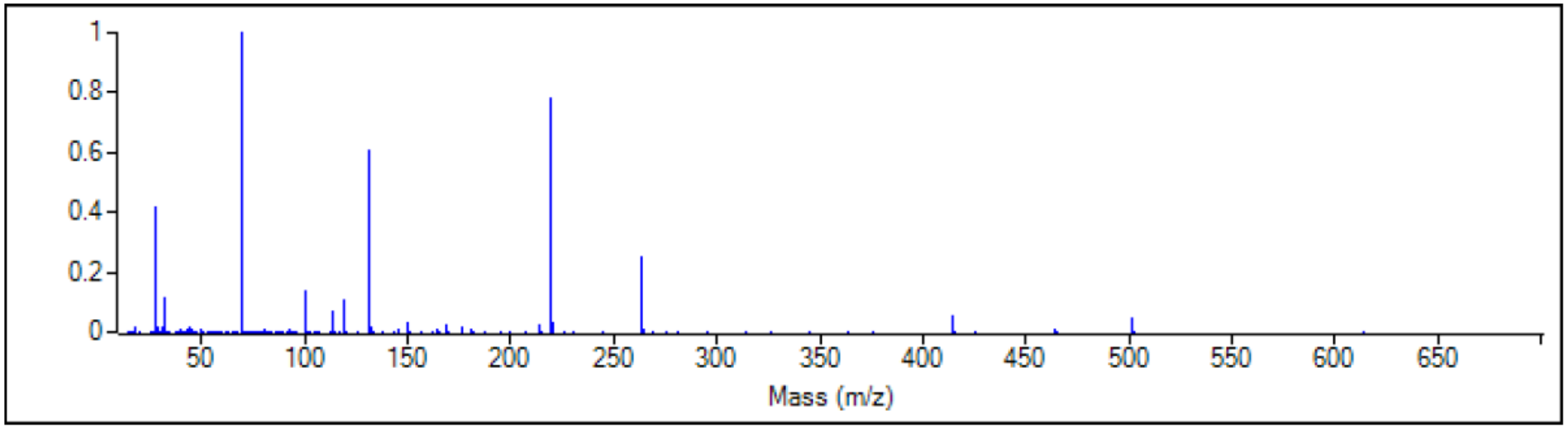
High vacuum gauge pressure (for SQ):

~1 x 10^{-5} Torr†

† Dependent on flow rate



Example Tune Report with Leak



Target m/z	Actual m/z	Abund	Rel Abund	Iso m/z	Iso Abund	Iso Ratio
69.00	69.00	498,432	100.0%	70.00	6,216	1.2%
219.00	219.00	391,232	78.5%	220.00	18,216	4.7%
502.00	502.00	23,680	4.8%	503.00	2,467	10.4%

Air/Water Check: H20 ~1.8% N2 ~42.1% O2 ~11.4% CO2 ~1.3% N2/H20 ~2325.0%

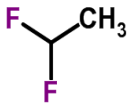
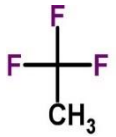
Column(1) Flow: 1.00 Column(2): 1.20 ml/min Interface Temp: 250

Use a Leak Detector or an Electronics Duster to Find Your Leaks

Why use a leak detector?

- High sensitivity
- Recommended for leak detection in gas plumbing and fittings

Typical Electronic Duster Components and Ions

	1,1-difluoroethane	*m/z* 51,65
	1,1,1-trifluoroethane	*m/z* 69
	1,1,1,2-tetrafluoroethane	*m/z* 69,83

Use electronics duster

- Hold can upright (don’t spray liquid)
- Spray short bursts around possible leak points
- “Live” tune profiling for ions to pinpoint the leak

Agilent CrossLab CS (Cartridge System)

No peaks from leaks

Features:

- Exchangeable cartridge with ADM Flow Meter
- Automatic notification of probe filter replacement
- Ergonomic and robust design
- Universal 3AA or USB power
- USB connects to web interface for added functionality and firmware updates
- Easy-to-view OLED screen
- Kickstand

Leak detector cartridge

Handheld

ADM Flow Meter cartridge

The Cost of Leaks

Cost of gases

Contamination from exposure

Reduced consumable lifetime

Reduced productivity from downtime

Detector noise and elevated baselines

Time in troubleshooting

It is critical that every customer checks for leaks. They should have the best tool for the job. Check valves, fittings, and traps for leaks after every maintenance period and after thermal cycling, as this can loosen some types of fittings.

Ordering Guide

G6693A – CrossLab CS Electronic Leak Detector

G6694A – Electronic Leak Detector Cartridge

G6699A - CrossLab CS Bundle: ADM Flow Meter and Electronic Leak Detector

- The bundle will include 1 handheld, 2 cartridges, and a free carrying case

G6694-60005 – Replacement probe filter

G6691-40500– Carrying case

Existing products:

G6691A – CrossLab CS ADM Flow Meter

G6692A – ADM Flow Meter Cartridge*

- Note that the ADM Flow Meter cartridge is ordered annually for calibration. The Electronic Leak Detector does not need to be recalibrated.

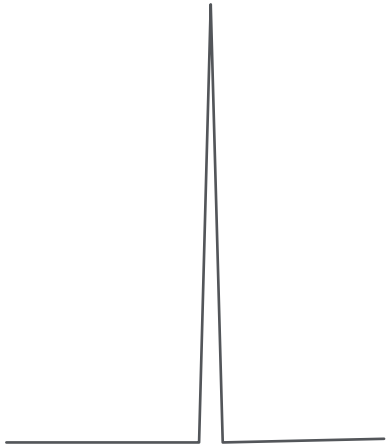
Leak and Installation Check

Inject a nonretained compound

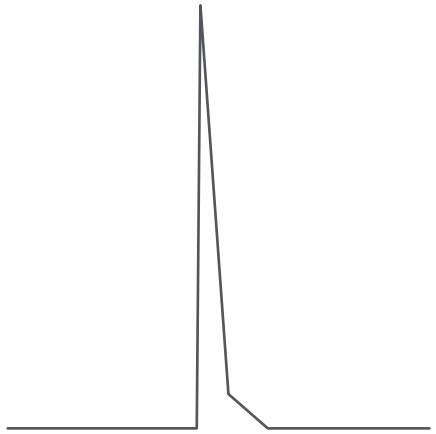
Detector	Compound
FID	Methane or butane
ECD	$MeCl_2$ (headspace or diluted)
NPD	CH_3CN-acetonitrile (headspace or diluted)
TCD	Air
MS	Air or butane

The peak should be sharp and symmetrical

Nonretained Peak Shapes



Good installation



Improper installation or injector leak

Check for:

- Too low of a split ratio
- Injector or septum leak
- Liner problem (broken, leaking, misplaced)
- Column position in injector and detector

Column Conditioning

System must be leak-free before conditioning the column.

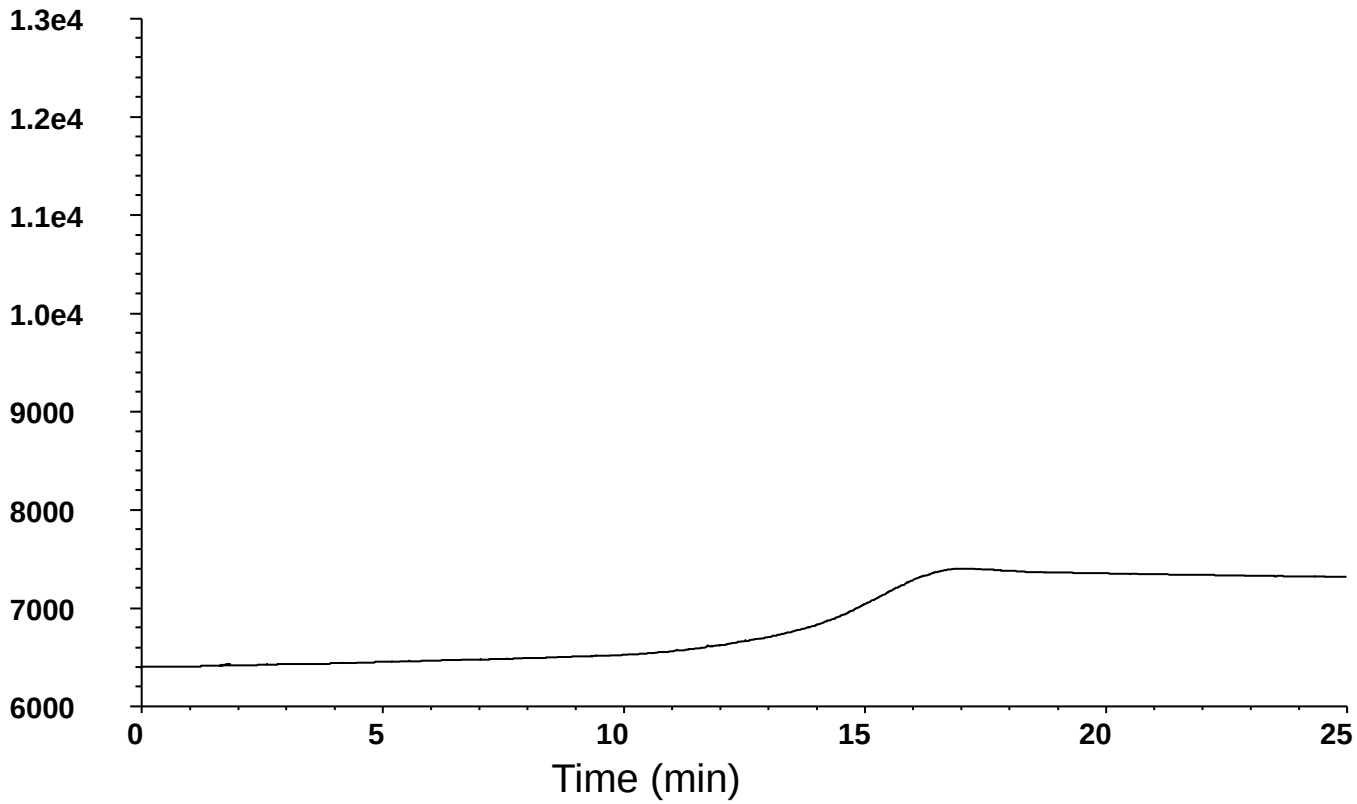
Heat the column to the lower of:

- Isothermal maximum temperature **or** 20 to 30 °C above the highest operation temperature.
- Temperature programming is not necessary.

Stop conditioning when a stable baseline is obtained:
1 to 2 hours, usually

Generating a Bleed Profile

Temperature program the column without an injection*



*Agilent J&W DB-1 30 m x 0.32 mm id, 0.25 µm
Temperature program // 40 °C, hold 1 min // 20 °C/min to 320 °C, hold 10 min

Own Test Mixture

- More specific to your application
- Selective detectors
- Use the same instrument conditions
- Easiest to simply inject a calibration standard
- Store for future measure of column performance

Standards Selection

Agilent ULTRA Chemical Standards have:

- Best in class online search, compare, and ordering capabilities
- Rapid shipping: 99.9% of orders are dispatched within 24 to 48 hours (continental U.S. only, as of now)
- Custom standard solutions, including our online custom quoting tool, enabling customers to upload recipe formulations and modify the recipe before submitting it
  - The tool allows customers to see the quote pricing instantly and lets them check the pricing based on quantity range
  - Discover more at www.agilent.com/en/product/chemical-standards

- Rigorously tested and manufactured under ISO 9001, ISO 17025, and ISO 17034 accreditation
- Sample preparation materials, columns, supplies, instrumentation, and reference materials from a single source

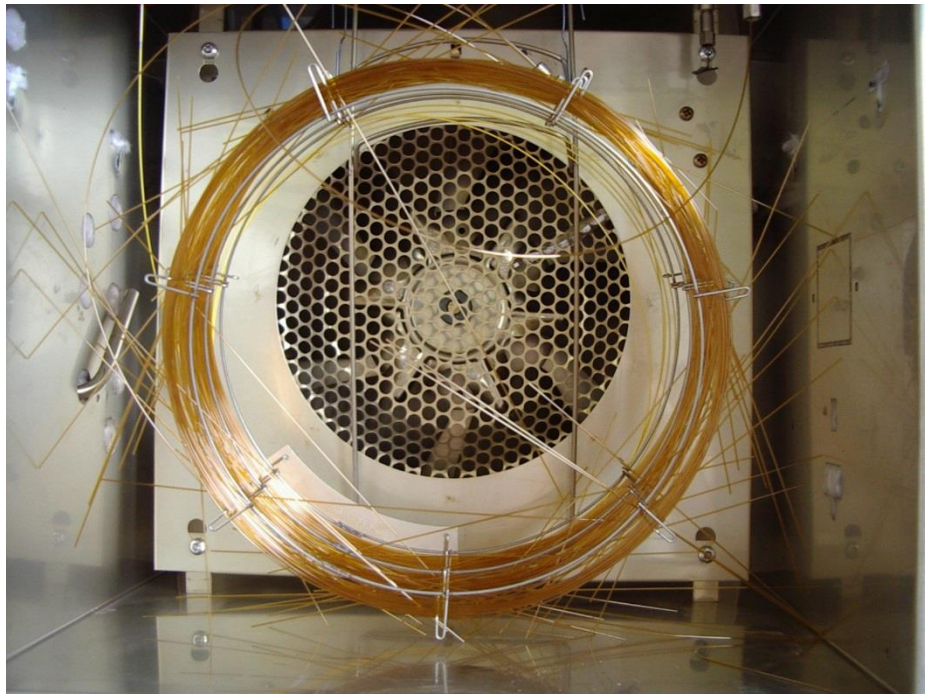
Proper Care of Your Column

Common Causes of Column Performance Degradation

- Physical damage to the polyimide coating
- Thermal damage
- Oxidation (O_2 damage)
- Chemical damage by samples
- Contamination

Physical Damage to the Polyimide Coating

- The smaller the tubing diameter, the more flexible it is
- Avoid scratches and abrasions
- Immediate breakage does not always occur upon physical damage



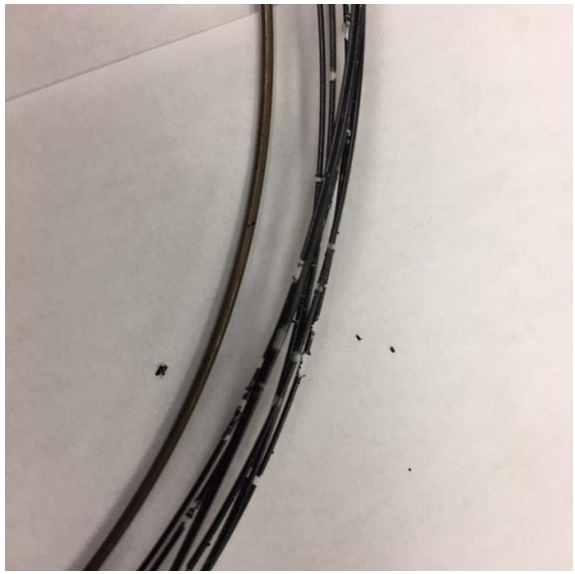
Thermal Damage

Degradation of the stationary phase is increased at higher temperatures.

- Rapid degradation of the stationary phase (breakage along the polymer backbone) caused by excessively high temperatures

  Isothermal limit = indefinite time
  Programmed limit = 5 to 10 minutes

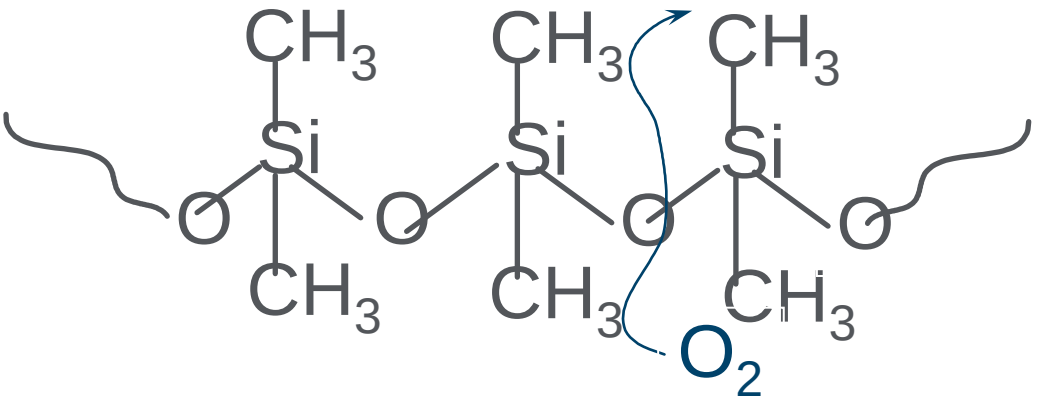
- Temporary "column failure" below lower temperature limit
- If this happens:
  - Disconnect the column from the detector
  - “Bake out” overnight at isothermal limit
  - Remove 10 to 15 cm from the end of the column



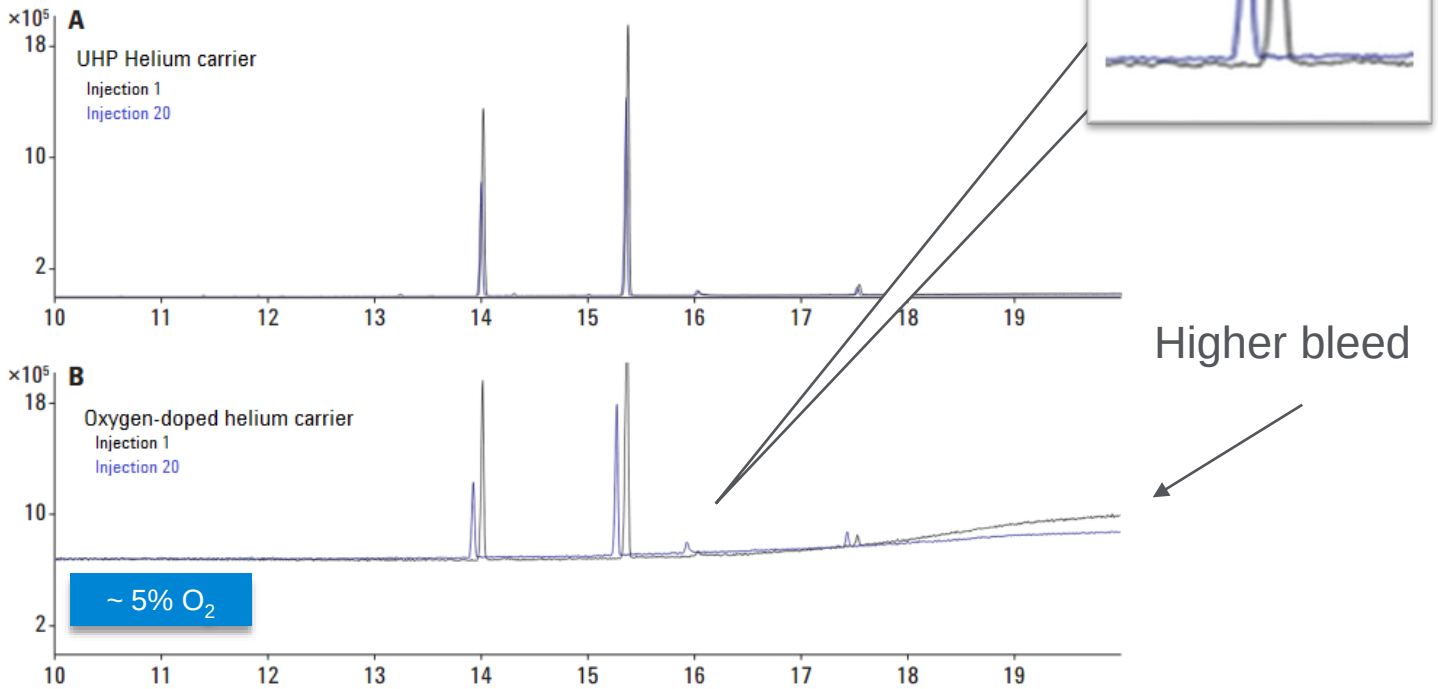
Column continuously exposed to temperatures above its temperature limit.

Oxidation (O_2 Damage)

Oxygen in the carrier gas rapidly degrades the stationary phase. The damage is accelerated at higher temperatures. Damage along the polymer backbone is irreversible. (Premature filament failure/excessive source maintenance.)

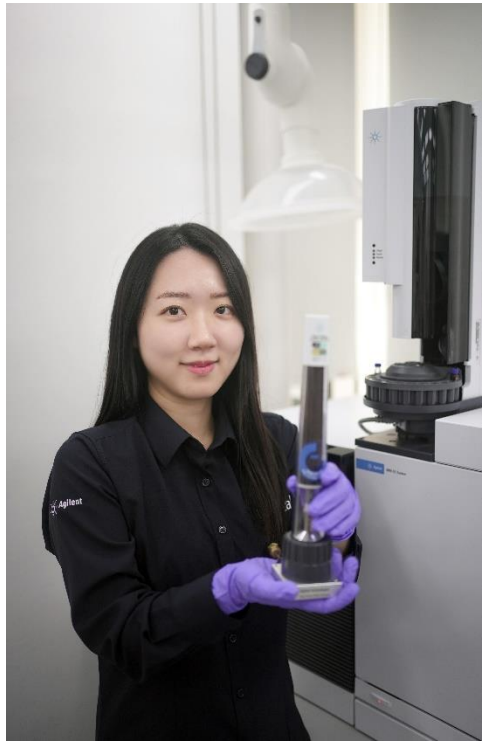


Dimethylpolysiloxane



How to Prevent Column Damage by Oxygen

- High-quality carrier gas (four 9s or greater)
- Leak-free injector and carrier lines
  - Change septa
  - Maintain gas regulator fittings
- Appropriate impurity traps



Efficient, fast, easy

Chemical Damage

Bonded and crosslinked columns have excellent chemical resistance, except for inorganic acids and bases.

HCl NH_3 KOH NaOH

H_2SO_4 H_3PO_4 HF

Chemical damage will be evident by excessive bleed, lack of inertness, or loss of resolution/retention.

Chemical Damage

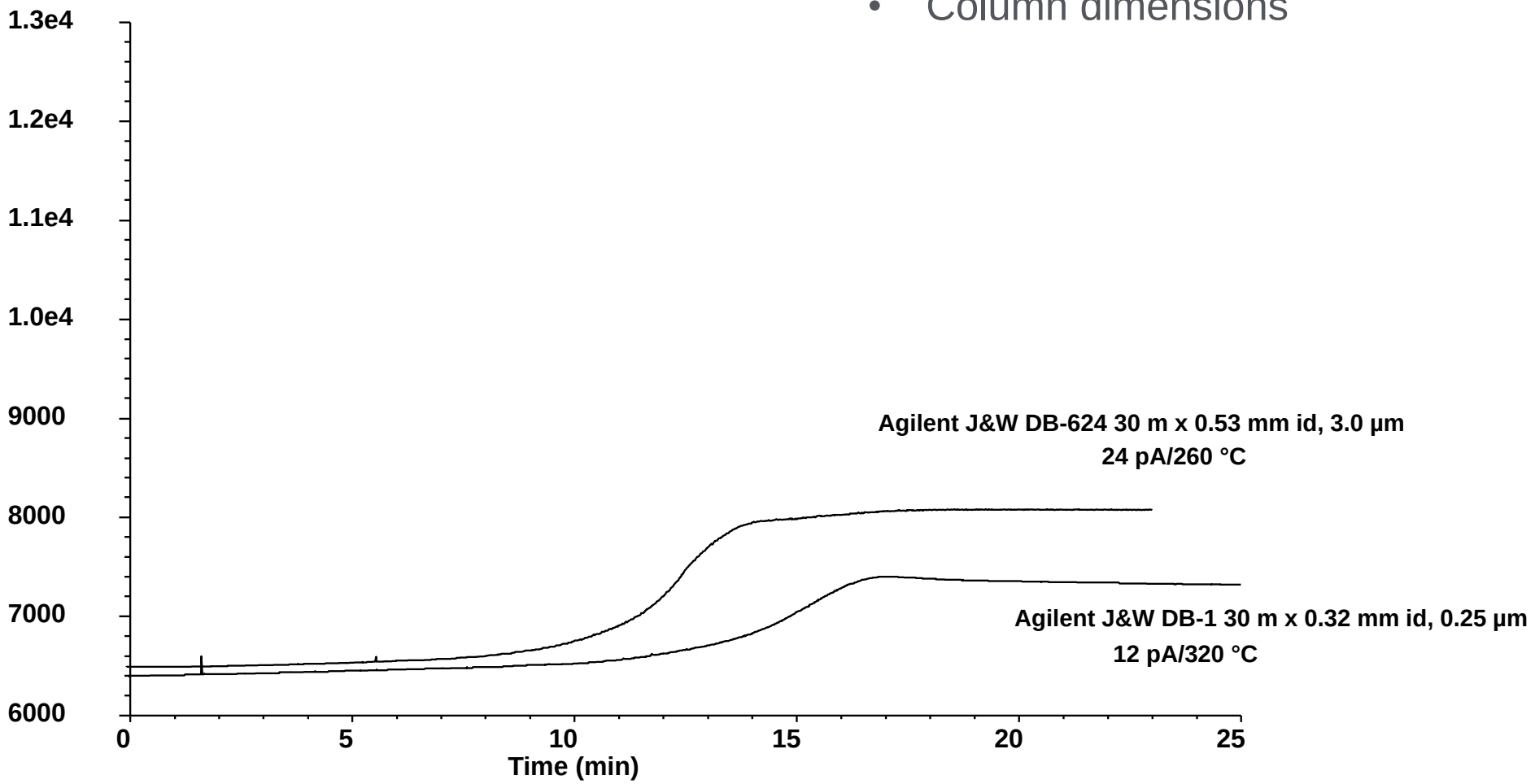
What to do if it happens

- Remove 0.5 to 1 m from the front of the columns
- Severe cases may require removal of up to 5 m

What Is Normal Column Bleed?

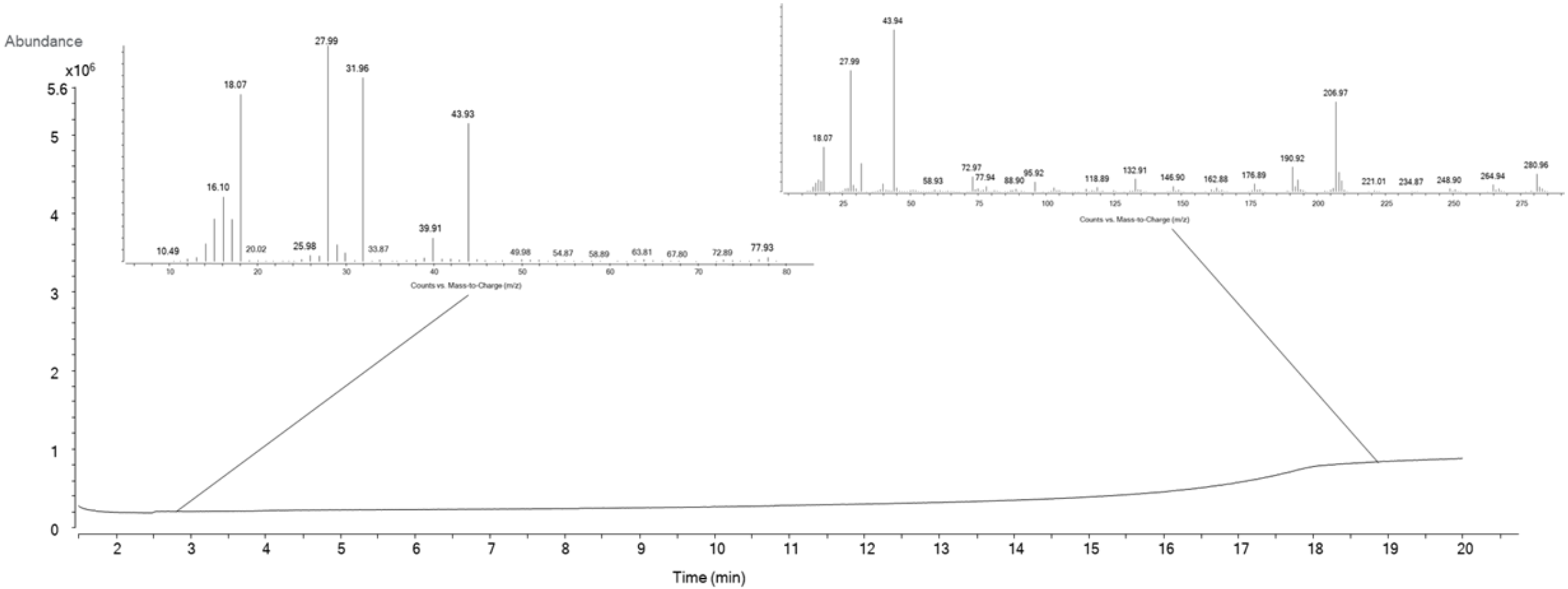
Normal background signal generated by the elution of normal degradation products of the column stationary phase. Column bleed is influenced by:

- Phase type
- Temperature
- Column dimensions



Mass Spectrum of Phenylmethylpolysiloxane Column Bleed

Normal background (HP-5ms UI)



What Is a Bleed Problem?

An abnormal elevated baseline at high temperature

It is not:

- A high baseline at low temperature
- Wandering or drifting baseline at any temperature
- Discrete peaks

Column Contamination and Symptoms

- Fouling of GC and column by contaminants
- Mimics nearly every chromatographic problem

- Poor peak shape
- Loss of separation (resolution)
- Changes in retention
- Reduced peak size
- Baseline disturbances (semivolatiles only)

Typical Samples That Contain a Large Amount of Residues

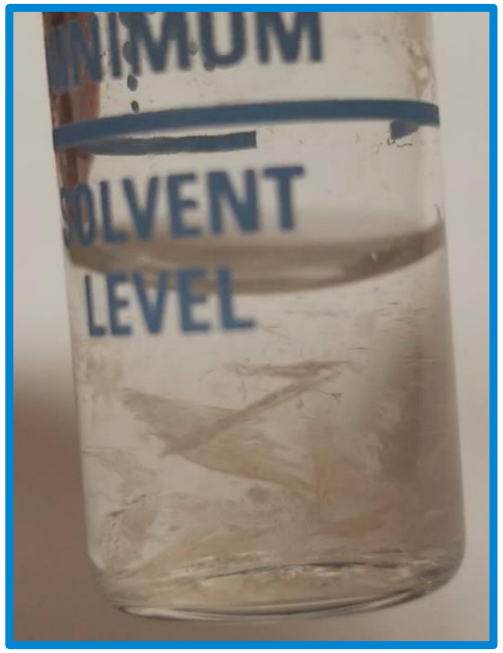
Soils Foods Plants

Wastewater Sludges

All samples contain residues (even standards)

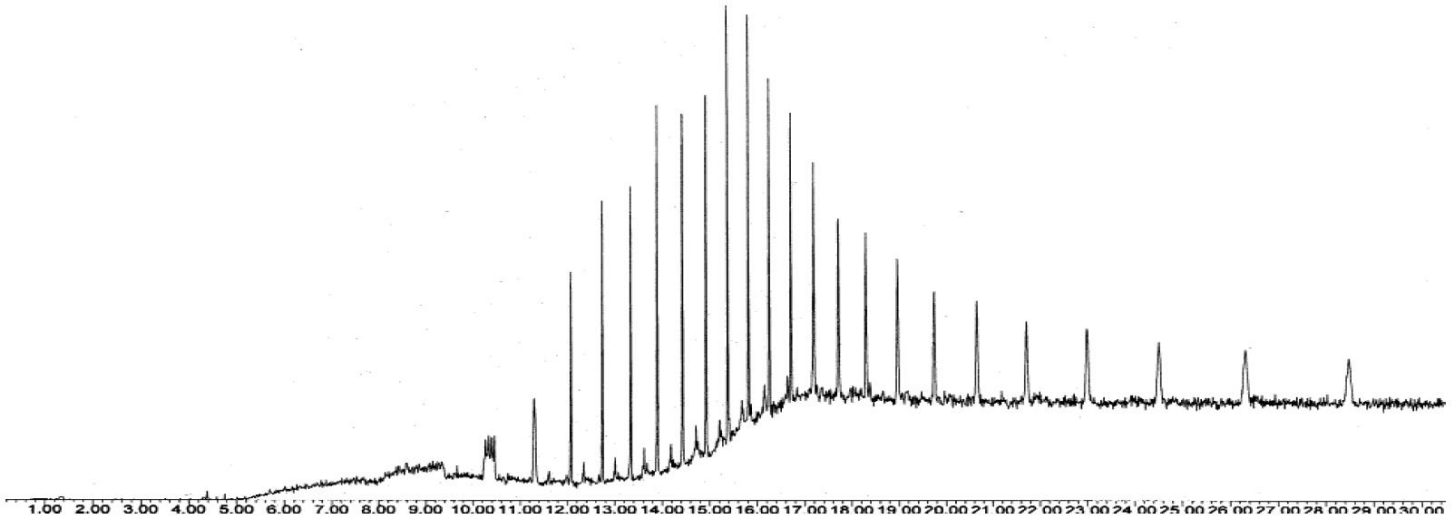
Other Sources of Contamination

- Septum and ferrule particles
- Gas and trap impurities
- Unknown sources (such as vials and syringes)



Contaminated wash solvent

Sample vial septum bleed profile:



Types of Residues

Nonvolatile residues

- Any portion of the sample that does not elute from the column or remains in the injector.

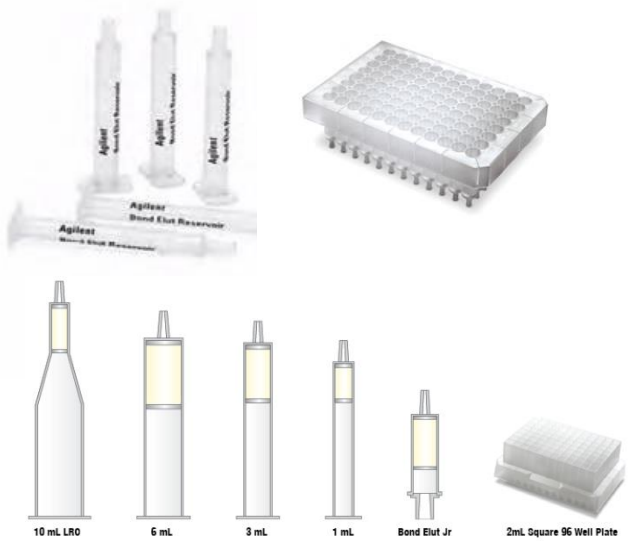
Semivolatile residues

- Any portion of the sample that elutes from the column after the current chromatographic run.

Methods to Minimize Nonvolatile Residue Problems

- Sample cleanup
- Packed injection port liners
- Guard columns

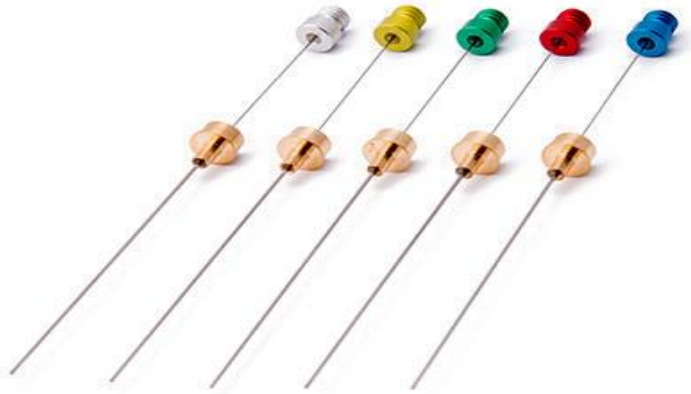
Offline Options for Sample Matrix Removal



Bond Elut solid phase extraction cartridges and plates

Filter vials

QuEChERS



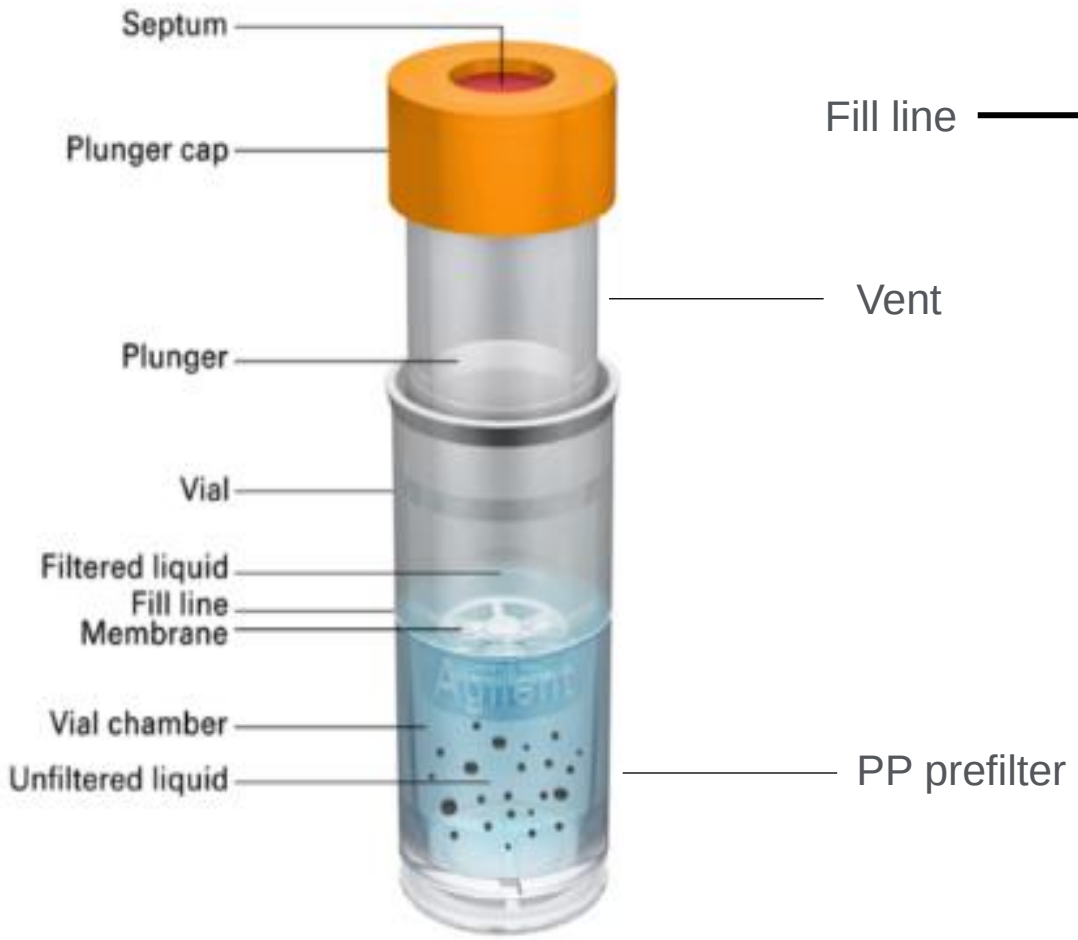
SPME

Captiva EMR-Lipid filtration cartridges and plates

Chem Elut S

Captiva syringe filters

Filtration – Captiva Filter Vials

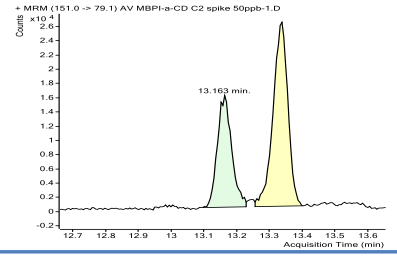
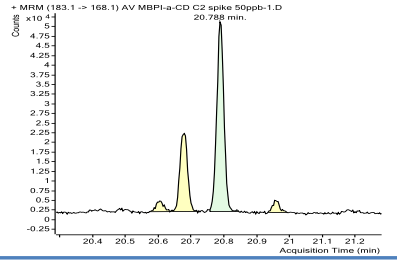
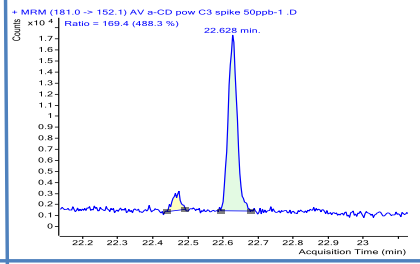
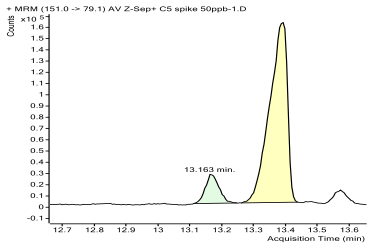
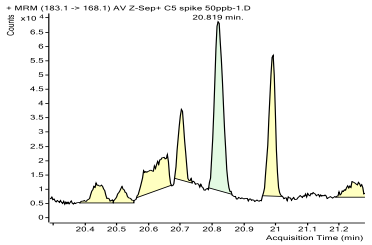
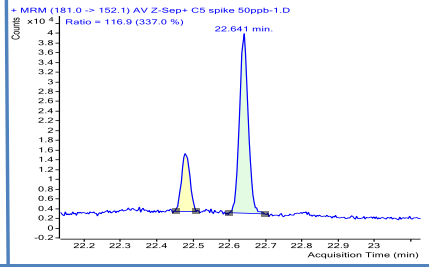
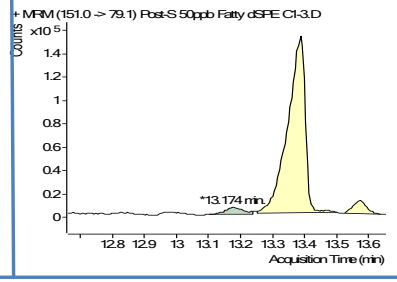
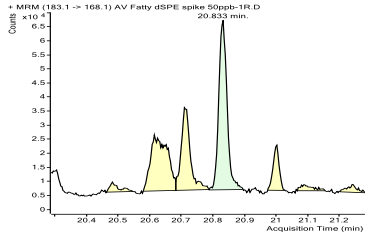
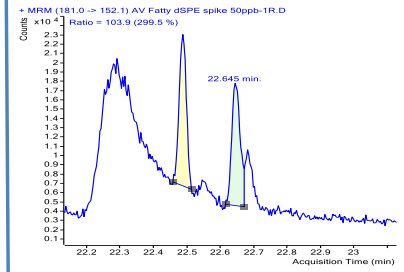


Part Number	Description
5191-5933	PTFE filter vial, 0.45 µm, 100/pk
5191-5934	PTFE filter vial, 0.20 µm, 100/pk
5191-5935	Nylon filter vial, 0.45 µm, 100/pk
5191-5936	Nylon filter vial, 0.20 µm, 100/pk
5191-5939	RC filter vial, 0.45 µm, 100/pk
5191-5940	RC filter vial, 0.20 µm, 100/pk
5191-5941	PES filter vial, 0.45 µm, 100/pk
5191-5942	PES filter vial, 0.20 µm, 100/pk
5191-5943	Vial closure tool

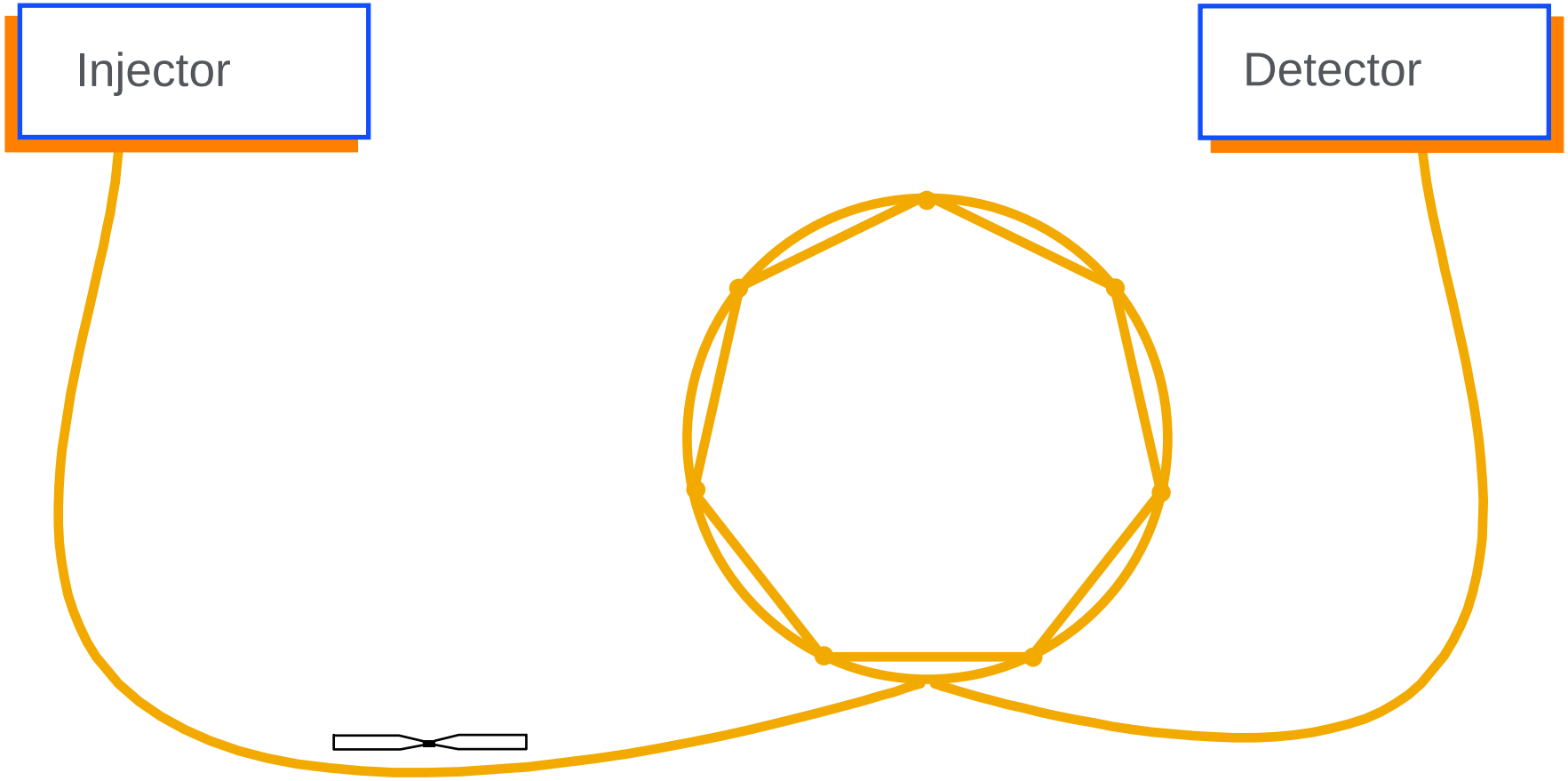
See appendix for solvent compatibility poster request

Agilent.com/chem/filtervials
Filter vials user guide: 5994-0814EN

Captiva EMR–Lipid Cleanup Improves Analytes S/N Ratio and Integration Accuracy on GC/MS(/MS) of Pesticides in Olive Oil

Pesticide	Captan	Permethrin	Deltamethrin
EMR-Lipid cleanup			
Zirconia sorbent cleanup			
C18/PSA cleanup			

Guard Column or Retention Gap



The guard column is 3 to 5 m of deactivated fused silica tubing with the same diameter as the analytical column. It is connected with a zero dead volume union.

Nonvolatile Contamination

What to do if it happens

- Do not “bake out” the column
- Front end maintenance
  - Clean or change the injector liner
  - Clean the injector
  - Cut off 0.5 to 1 m of the front of the column
- Turn the column around
- Cut the column in half

Semivolatile Contamination

What to do if it happens

- “Bake out” the column
  - Limit to 1 to 2 hours
  - Longer times may polymerize some contamination and reduce column life
- Solvent rinse the column

Instrumentation: Leveraging Intelligence Innovations

Introducing the Agilent 8890 GC System

Flexible and expandable to meet your needs today and tomorrow

Future-proof: Ready for anything

- Powerful next-generation electronic architecture
- Expanded smart-connected functionality
- Full suite of inlets, detectors, and accessories, CFT, Deans switch, backflush, GC x GC, dual simultaneous injection
- Six valves, eight heated zones, plus LVO
- Generation 6 precision EPC
- Smart keys
- 7-inch color touch display

Agilent 8890 GC System

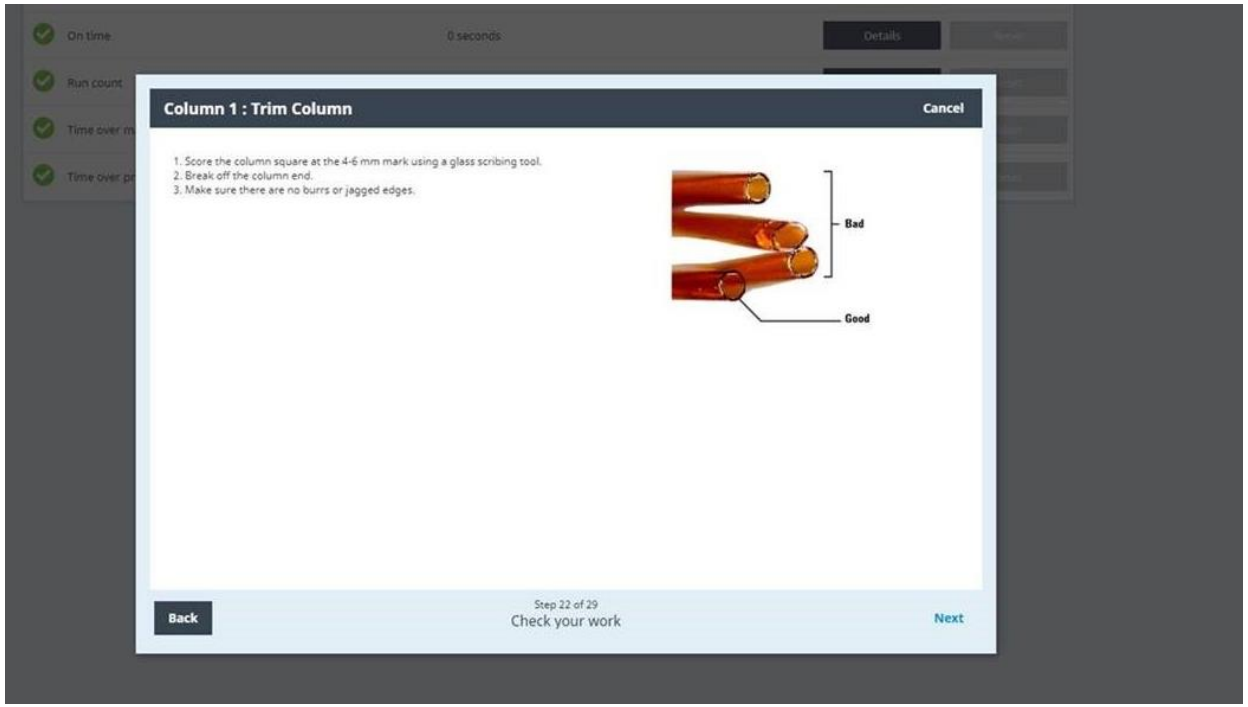
Smart-connected GC

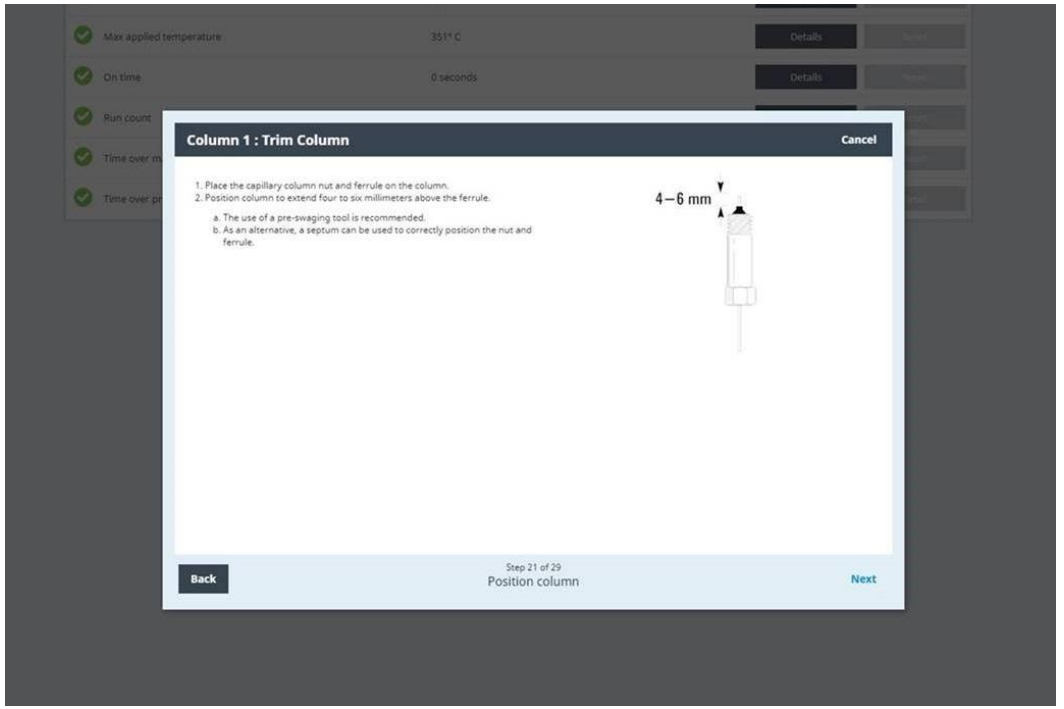
Modern intuitive interface

- 7-inch color touch screen
  - Configuration
  - Status
  - Methods
  - Sequence info
  - Troubleshooting, diagnostics, and help

- Real-time chromatographic evaluation
  - Blank evaluation
  - Detector evaluation

Some Examples of Guided Troubleshooting/Step-by-Step Guides on the Agilent 8890 GC System

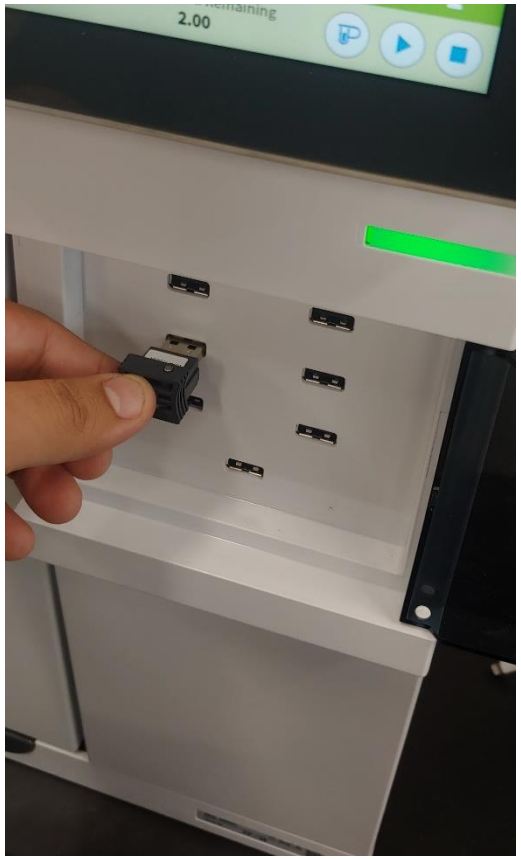




GC Columns with Smart Key (for the Agilent 8890 GC Only)

For immediate identification and use monitoring of your GC column

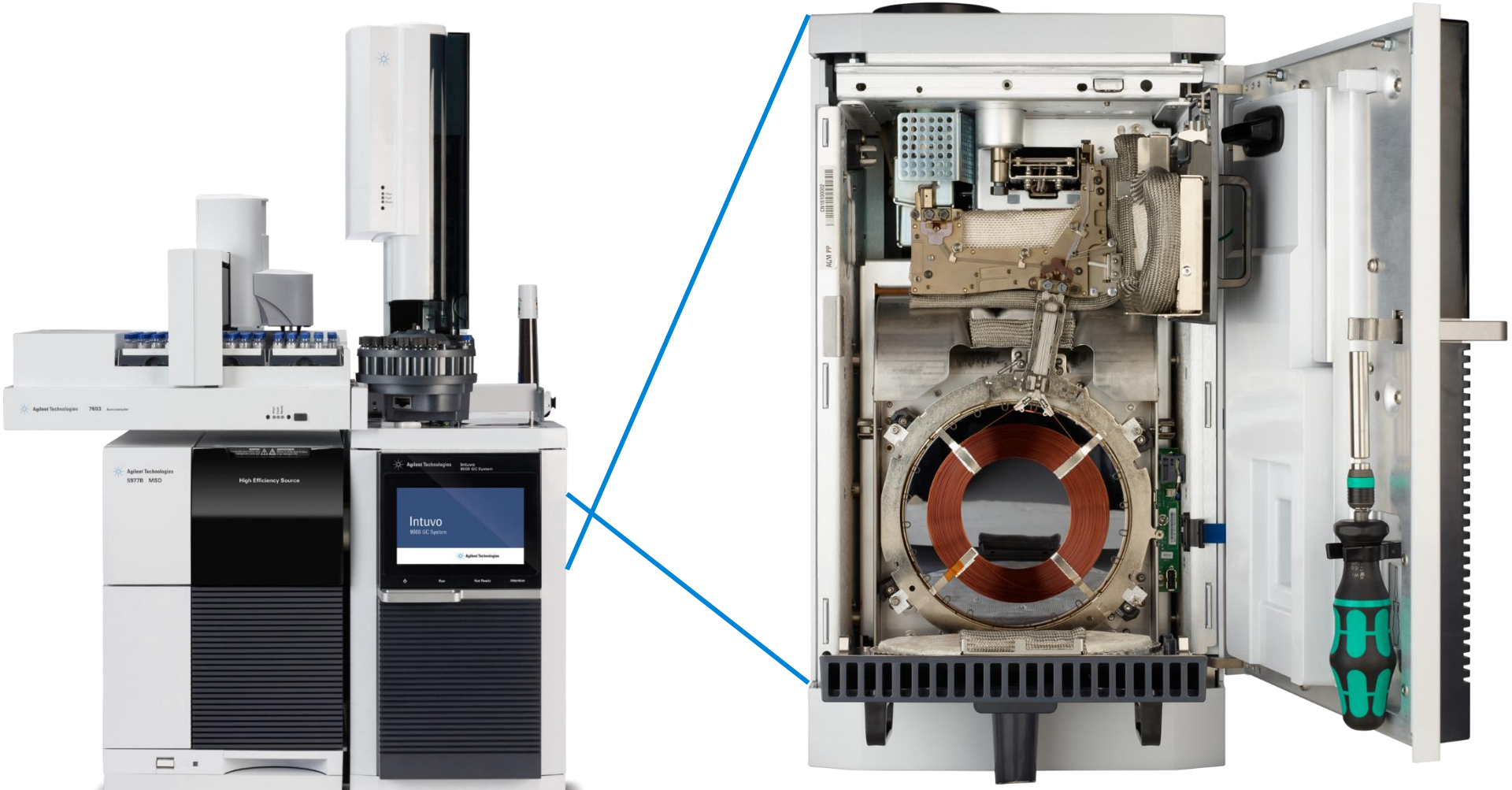
- Available with the Agilent 8890 GC model only
- Can track the use of a GC column
- The smart key contains GC column information, including:
  - Part and serial numbers
  - Number of injections/runs
  - Time at/above temperature limits
  - Date installed
  - Temperature limits – GC columns
    - If more than one column is installed, the temperature is determined by the lowest column smart key installed (DB-WAX vs DB-5)
  - Column length/trimming edited in “column maintenance mode” in the software and rewritten to the smart key
  - S/N of last instrument installed if it was in an Agilent 8890 GC



Other Resources

	Resources	Weblinks
1	Agilent 8890 GC brochure	URL: www.agilent.com/cs/library/brochures/brochure-gc-8890-5994-0476en-agilent.pdf
2	Smart key product page (not for ordering smart keys)	URL: www.agilent.com/chem/smartkey8890
3	Instruction sheet	URL: www.agilent.com/cs/library/instructionsheet/public/insert-smart%20key-8890-5994-0700en-agilent.pdf

Agilent Intuvo 9000 GC System



Common Frustrations with GC

- Measuring column length correctly
- Cutting your column correctly
- How tight is too tight?
- Clipping columns to deal with active sites, then updating retention times

Common Care and Maintenance Scheme for GC Columns

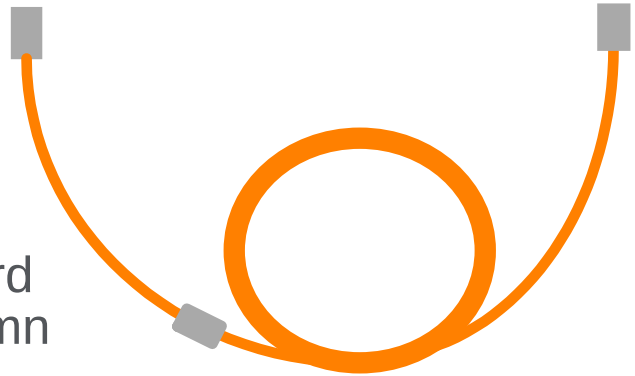
1. Cut off 6 inches to 1 foot from the inlet end of the column

2. Bake out the column for no more than 2 hours

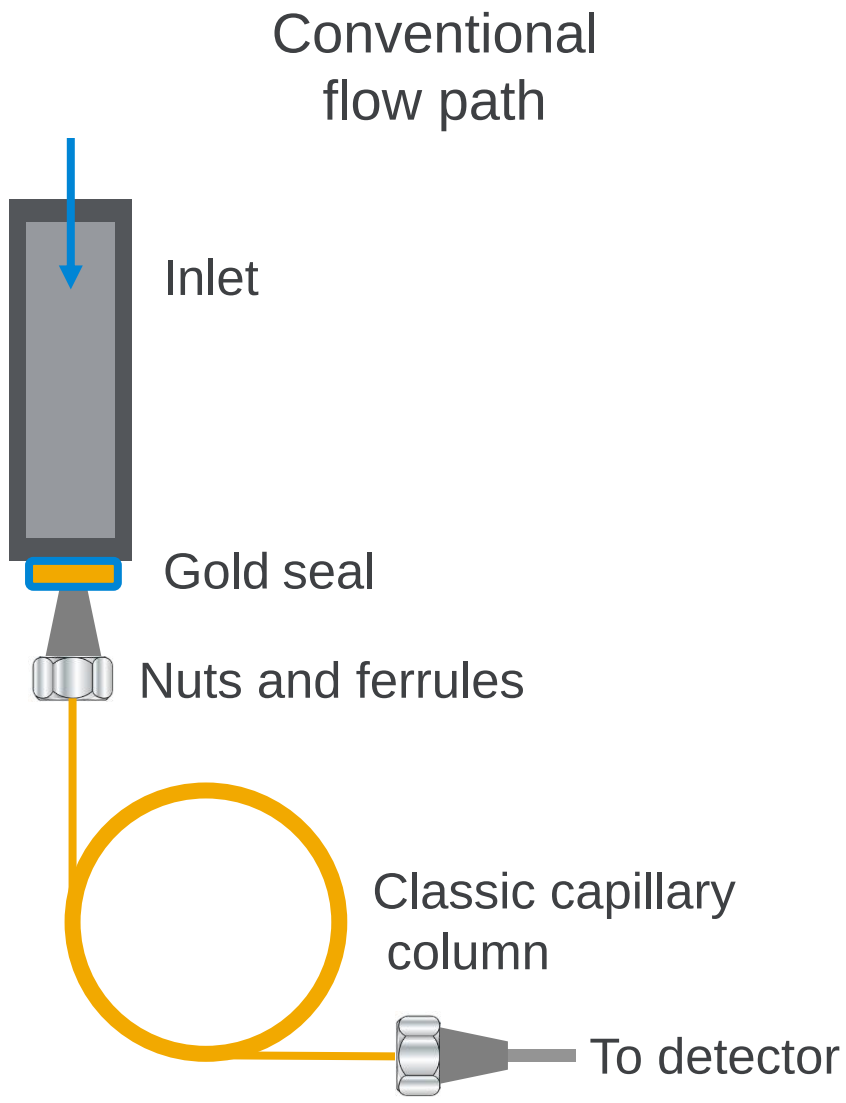
3. Cut off more of the column (repeat as necessary)

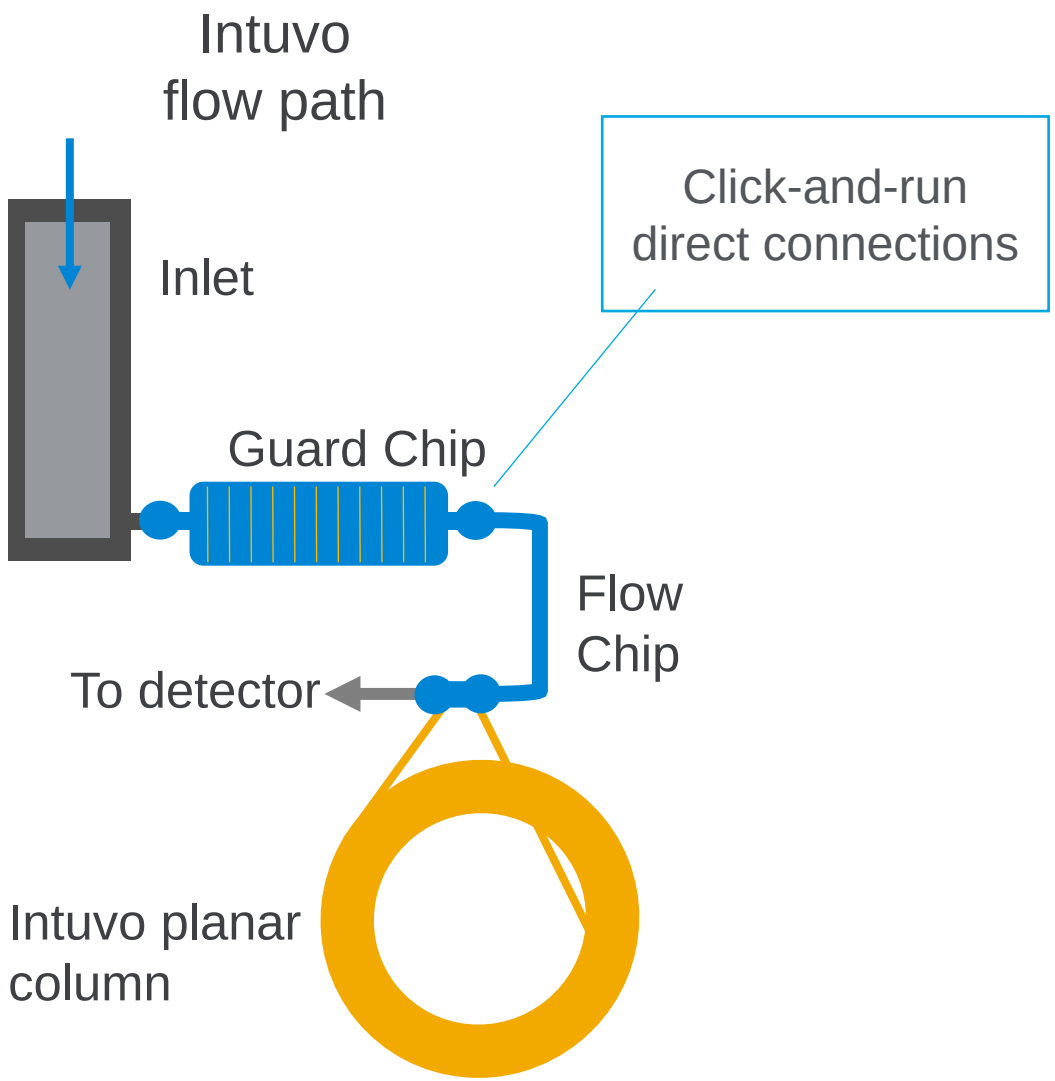
Intuvo…

Change the Guard Chip



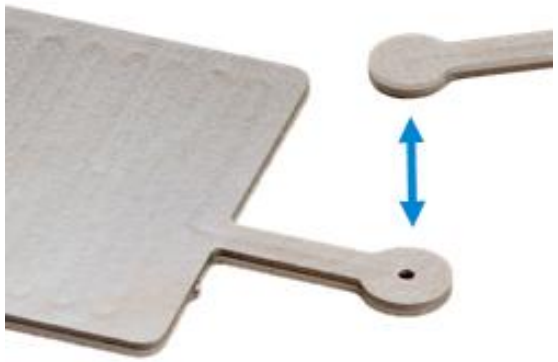
Innovating the GC Flow Path





Easier and Faster Maintenance with Intuvo

- No more ferrules
- Direct face seal connections
- Audible and tactile click lets you know connection is made
- Less unplanned downtime
- Fewer batch reruns, fewer samples lost

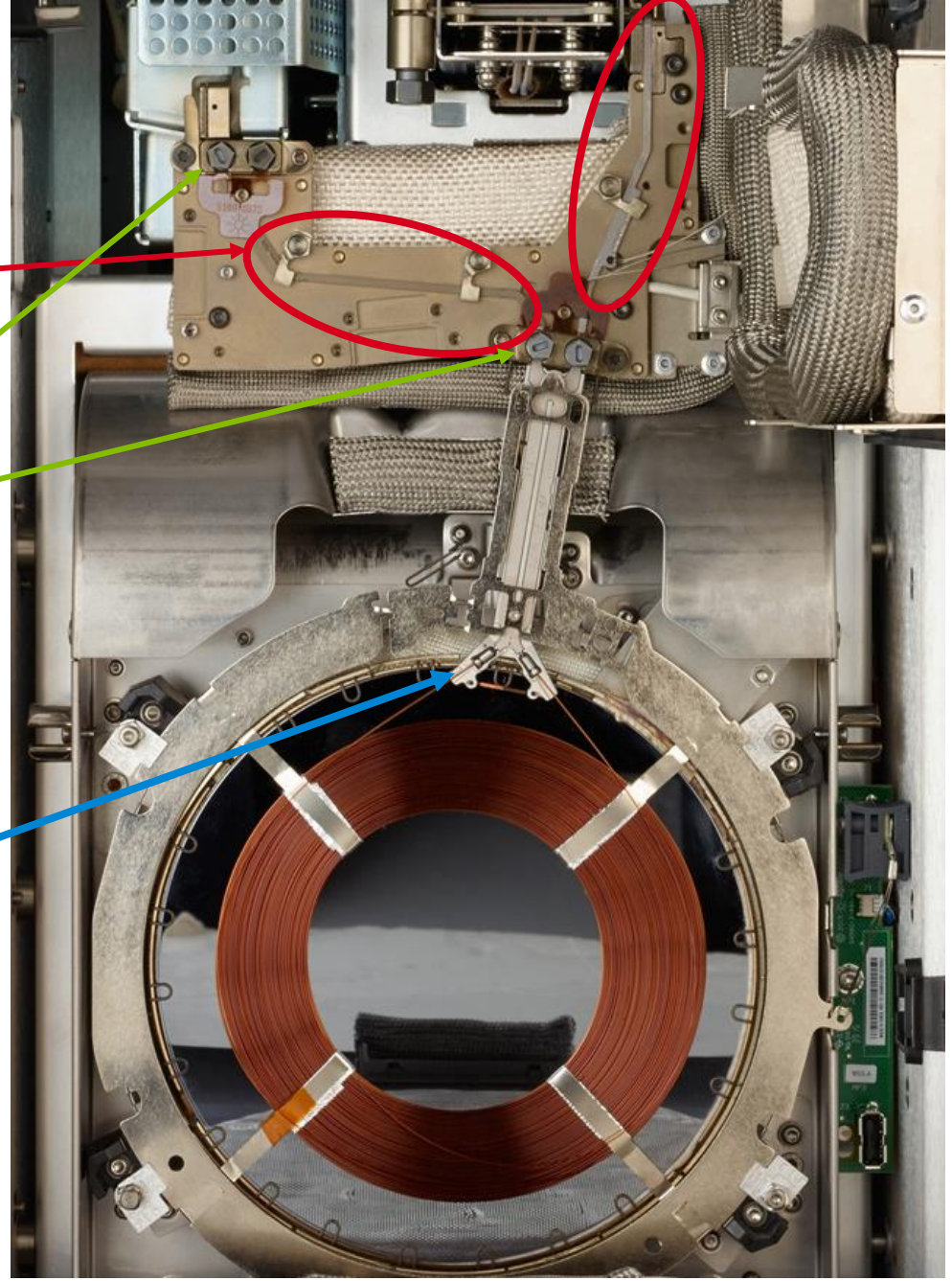


No More…

Measuring

Over-tightening

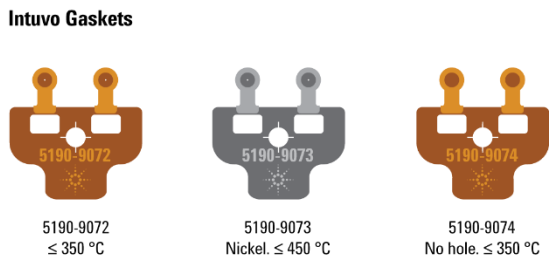
Trimming



A New Portfolio of GC Consumables

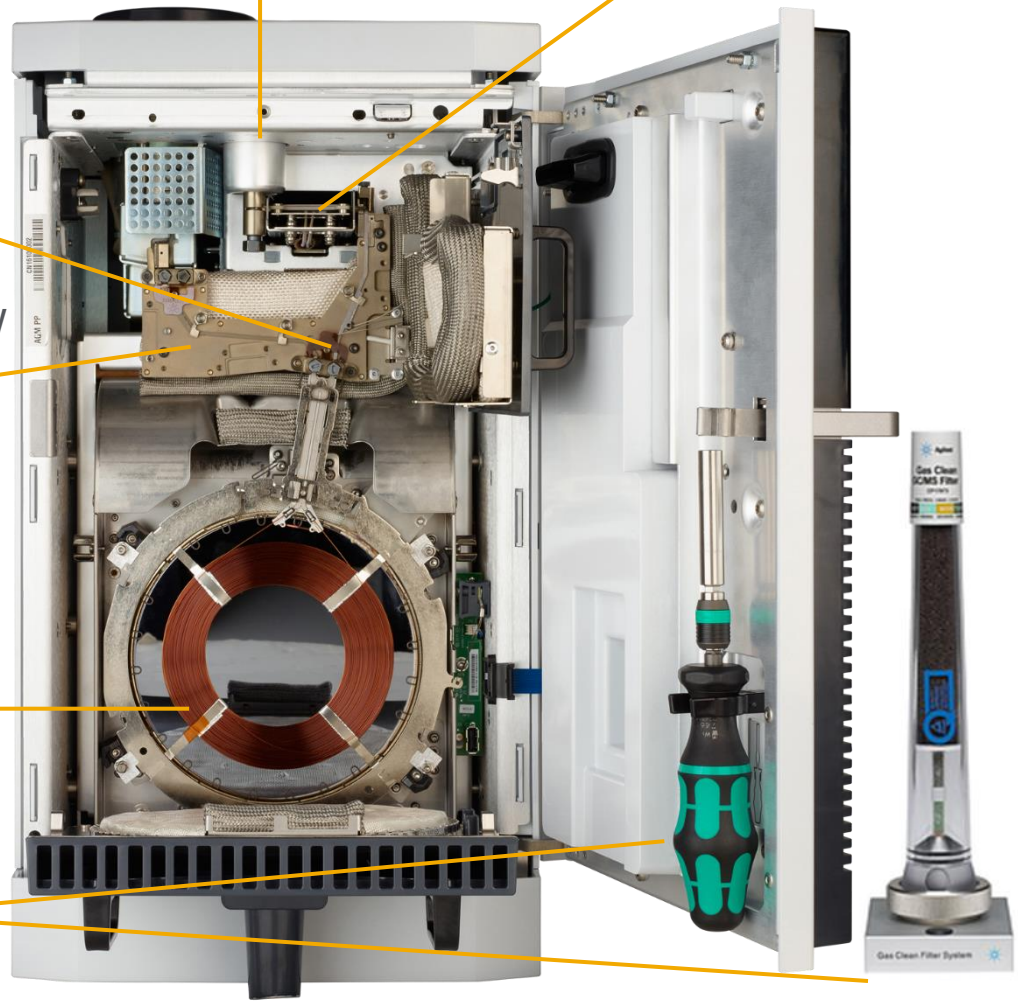
Guard Chip

UI inlet liners



Smart keys

Intuvo Flow Chips



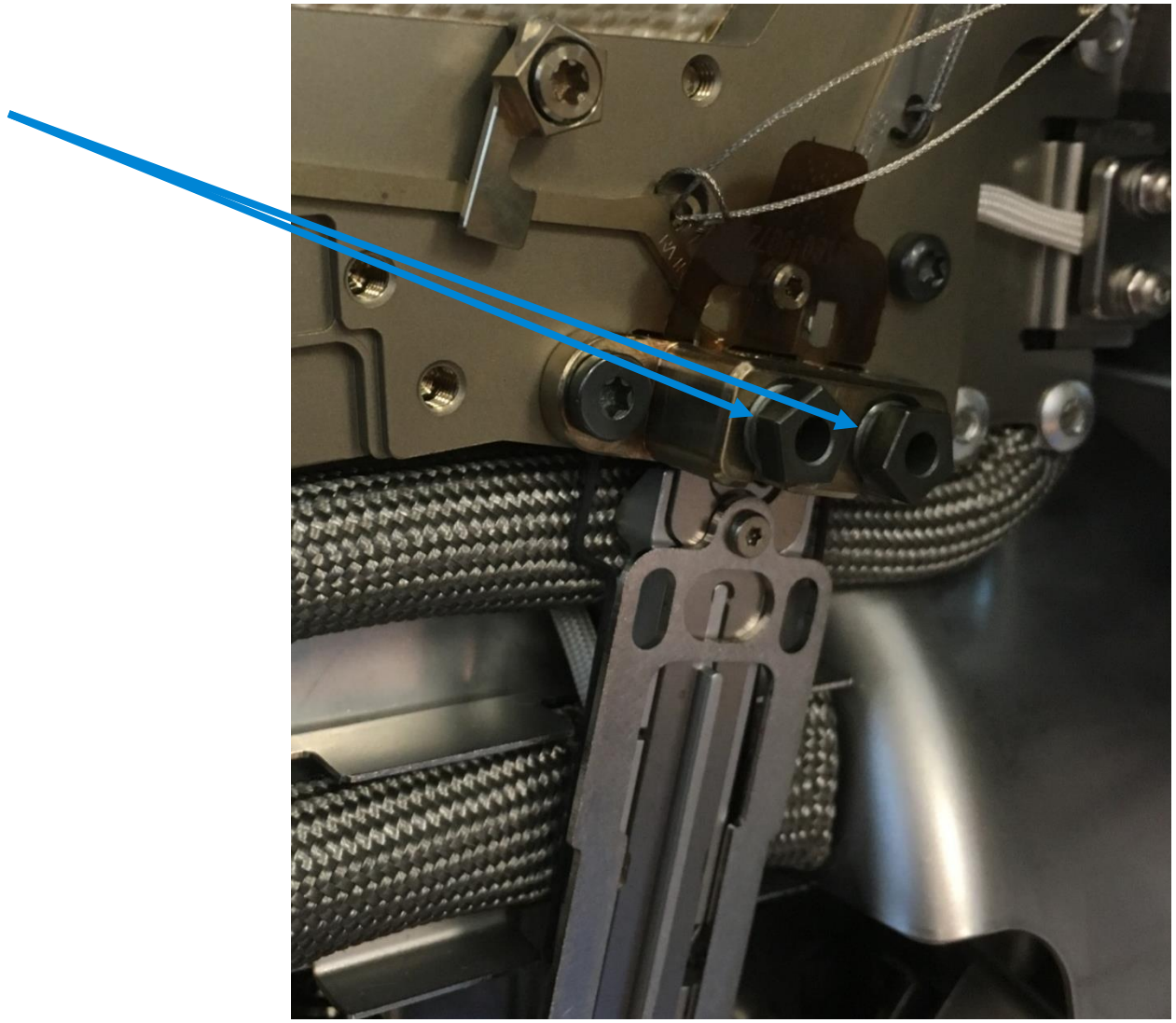
No-trim column

Tools and accessories

Tips to Ensure a Good Column Installation

Finger-tighten until only one thread on each of the two nuts is showing.

If more than one thread is showing, wiggle or reposition the column into place to further finger-tighten the nuts to one thread.



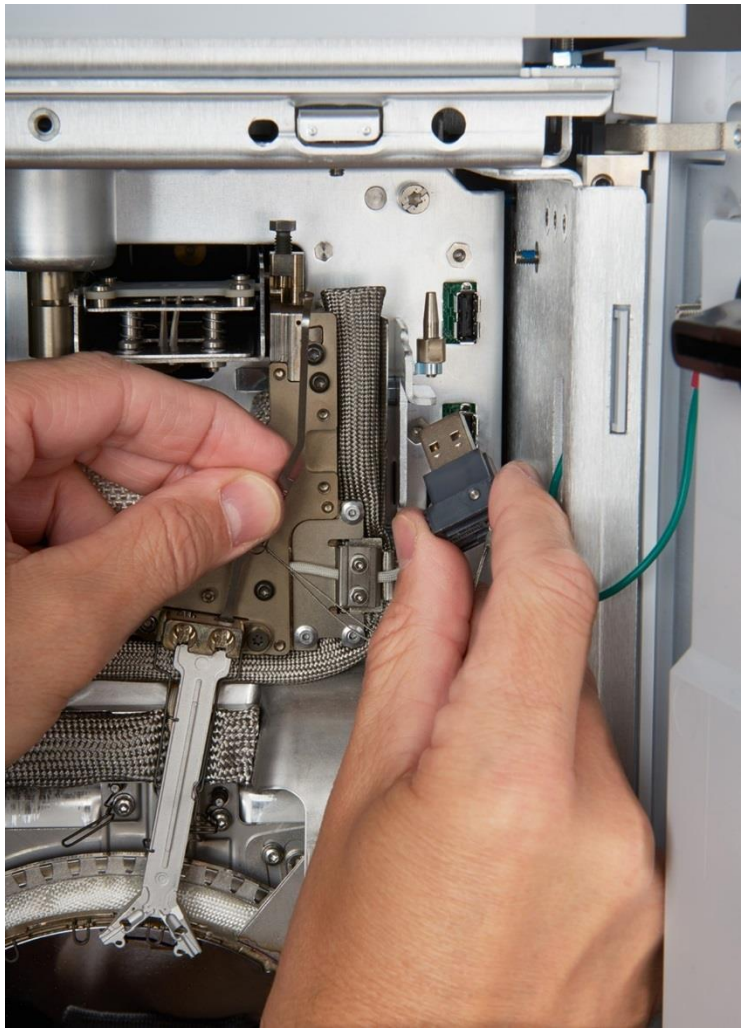
Tips to Ensure a Good Column Installation

Check that the small, integrated column nuts on the column are in their form fitted place on the heater, in the instrument.

Click and run.

Smart Key Technology

- The smart chip tells your Intuvo what you have
- It sets temperature limits for you
- Keep track of your performance with the read/writeable smart key



Agilent Intuvo 9000 Videos

The Agilent Intuvo 9000 GC System – Environmental Science Corporation (ESC)

Discover higher GC productivity with the Agilent Intuvo 9000 GC system

Playing time: 4:00

The Agilent Intuvo 9000 GC System Story

Learn more about the Agilent Intuvo 9000 GC System

Playing time: 2:21

The Agilent Intuvo 9000 GC System: Return on Investment. Return on Innovation

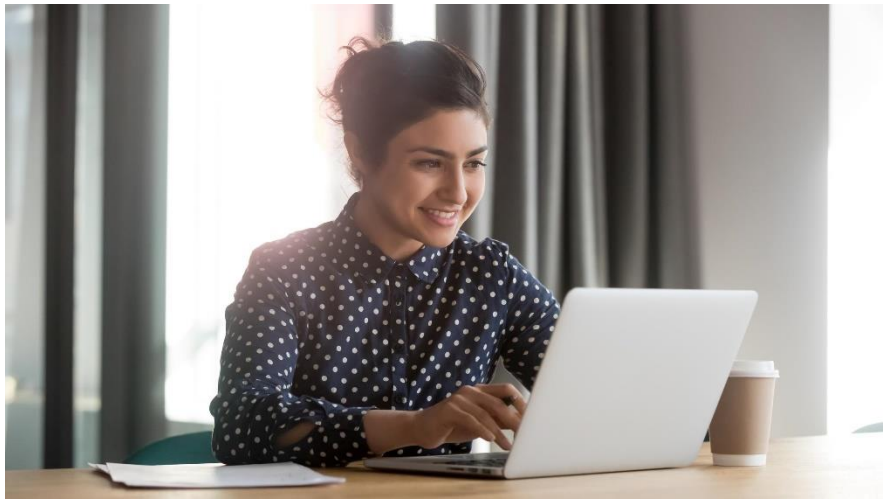
A testimonial about the return on investment on the Agilent Intuvo 9000 GC System

Playing time: 4:17

Always Remember

- Start with a good installation
- Maintain an oxygen-free system
- Avoid physical, thermal, and chemical damage
- Take steps to prevent contamination

Contact Agilent Chemistries and Supplies Technical Support



1-800-227-9770 option 3, option 3:

Option 1 for GC and GC/MS columns and supplies

Option 2 for LC and LC/MS columns and supplies

Option 3 for sample preparation, filtration, and QuEChERS

Option 4 for spectroscopy supplies

Option 5 for chemical standards

Available in the U.S. and Canada, 8–5, all time zones

gc-column-support@agilent.com

lc-column-support@agilent.com

spp-support@agilent.com

spectro-supplies-support@agilent.com

chem-standards-support@agilent.com