

TO-Can™ Air Monitoring Canisters

Long-Term Stability of TO-14/TO-15 Compounds

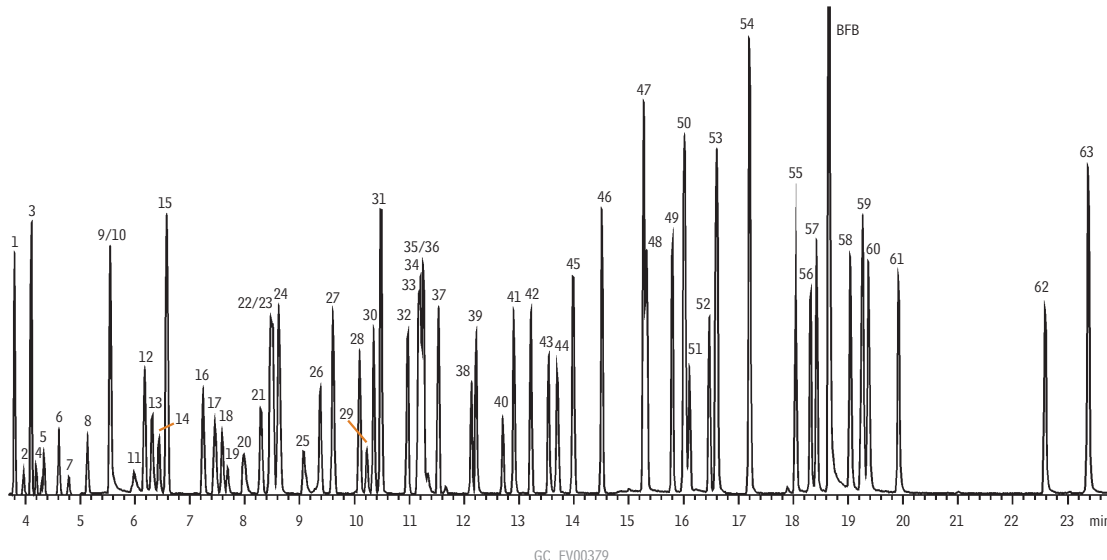
US Environmental Protection Agency (EPA) Compendium of Air Methods TO-14/TO-15 are designed to regulate the collection, storage, and analysis of atmospheric volatile organic compounds (VOCs) using treated air sampling canisters. Restek TO-Can™ canisters are electropolished using a proprietary process and extensively cleaned using an ultrasonic method—treatments that ensure a high-quality, passivated surface to maintain stability of the TO-14/TO-15 compounds during storage. The design of the frame surrounding the electropolished canister eliminates the need for weld marks on the sphere, which can be focal points for VOC breakdown or adsorption. A Parker Hannifin metal-to-metal diaphragm valve further ensures the reliable performance of the canister.

To collect VOCs in ambient air, TO-Can™ canisters should be cleaned and evacuated prior to being sent to the field. In the field, the sample is drawn through a sampling train that will regulate the rate and duration of sampling. The TO-Can™ canister is then sent to an analytical laboratory, where a known amount is drawn from the canister, concentrated on a concentrating trap, and analyzed according to Methods TO-14/TO-15, typically using a 60m, 0.32mm ID, 1.0µm Rtx®-1 capillary column in a GC/MS system.

TO-Can™ canisters meet the holding time criteria for Methods TO-14/TO-15

A 62-component TO-15 standard (10ppbv) was injected into a TO-Can™ canister and humidified to 70% relative humidity. The standard was analyzed on day 0, day 7, and day 14 of storage. Table I (page 2) shows the results of the study. The TO-Can™ canister ensured excellent stability for these polar and non-polar compounds. The analysis on an Rtx®-1 column shows excellent resolution and peak shapes (Figure 1).

Figure 1 TO-Can™ canister maintains excellent stability for TO-14/TO-15 compounds at 10ppbv after 14 days.



Rtx®-1 60m, 0.32mm ID, 1.0µm (cat.# 10157).

Sample: 200mL of 10ppbv TO-15 standard, injected into TO-Can™ canister, humidified to 70% RH, stored 14 days.

Concentrator: Nutech 3550 Preconcentrator, 200mL of sample concentrated at -160°C, thermally desorbed at 150°C, and cryofocused at -185°C.

Oven temp.: 30°C (hold 4 min.) to 175°C @ 9°C/min. to 220°C @ 40°C/min.

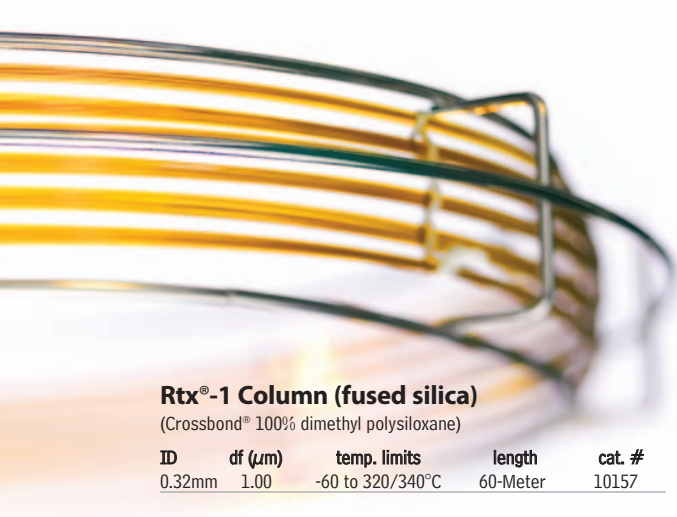
Carrier gas: helium @ 1.2mL/min.

Det.: Agilent 5971 MS

Scan range: 35-265amu

(see Table I on page 2 for peak identifications)

Chromatogram courtesy of Gina Maio, Severn Trent Laboratories, Inc., Burlington, VT.



Rtx[®]-1 Column (fused silica)

(Crossbond[®] 100% dimethyl polysiloxane)

ID	df (μm)	temp. limits	length	cat. #
0.32mm	1.00	-60 to 320/340°C	60-Meter	10157



The ultimate in controlled heating, for reliably cleaning your air canisters!

Air Canister Heating Jacket

- Heats entire canister, and valve.
- Two temperature settings, 75°C and 150°C.*
- Prevents sample condensation, for accurate sub-sampling.
- Easily fits canister up to 6 liters.
- Lightweight; comfortable to the touch when heated.
- Connect up to five Canister Heating Jackets to one 15 amp circuit.

Description	qty.	cat.#
Air Canister Heating Jacket (110 volt)	ea.	24123

*Not CE certified.

TO-14A Internal Standard/Tuning Mix

bromochloromethane
1-bromo-4-fluorobenzene (4-bromofluorobenzene)
chlorobenzene-d5
1,4-difluorobenzene

In nitrogen, 104 liters @ 1800psig

1ppm	cat. # 34408 (ea.)
100ppb	cat. # 34425 (ea.)

Table I Holding time criteria for Methods TO-14/TO-15 are easily achieved using a TO-Can[™] canister.

Compounds	RTs	Day 1 ppbv	Day 7 ppbv	Day 14 ppbv
1. dichlorodifluoromethane (Freon [®] 12)	3.794	10.0	10.0	11.0
2. chloromethane	3.952	9.2	9.0	10.0
3. dichlorotetrafluoroethane (Freon [®] 114)	4.096	9.7	9.7	11.0
4. vinyl chloride	4.193	10.0	9.8	11.0
5. 1,3-butadiene	4.327	10.0	9.9	12.0
6. bromomethane	4.601	9.3	8.5	9.7
7. chloroethane	4.774	9.4	8.2	10.0
8. bromoethene	5.117	9.8	8.8	9.7
9. acetone	5.436	9.1	9.4	9.9
10. trichlorofluoromethane (Freon [®] 11)	5.527	9.8	10.0	10.0
11. isopropyl alcohol	5.709	10.0	8.8	7.8
12. 1,1-dichloroethene	6.149	9.6	9.6	11.0
13. methylene chloride	6.271	9.1	9.5	9.8
14. 3-chloropropene	6.392	9.1	8.3	8.4
15. carbon disulfide	6.544	8.0	8.9	9.6
16. trichlorotrifluoroethane (Freon [®] 113)	6.544	9.3	10.0	11.0
17. <i>trans</i> -1,2-dichloroethene	7.196	9.5	10.0	10.0
18. 1,1-dichloroethane	7.394	9.3	9.9	10.0
19. methyl <i>tert</i> -butyl ether	7.500	12.0	8.3	8.2
20. methyl ethyl ketone	7.834	9.2	9.1	10.0
21. <i>cis</i> -1,2-dichloroethene	8.228	9.6	9.8	10.0
22. bromochloromethane (IS)	8.395	10.0	10.0	10.0
23. <i>n</i> -hexane	8.471	9.0	9.4	9.9
24. chloroform	8.532	9.3	10.0	10.0
25. tetrahydrofuran	8.972	8.2	7.2	7.3
26. 1,2-dichloroethane	9.291	9.0	8.1	8.9
27. 1,1,1-trichloroethane	9.549	8.5	7.8	8.6
28. benzene	10.019	9.1	8.7	9.8
29. carbon tetrachloride	10.171	7.3	7.4	7.5
30. cyclohexane	10.307	9.2	9.2	10.0
31. 1,4-difluorobenzene (IS)	10.399	10.0	10.0	10.0
32. 1,2-dichloropropane	10.884	9.8	8.3	8.9
33. bromodichloromethane	11.081	7.2	8.0	8.6
34. trichloroethene	11.127	8.0	8.5	9.3
35. 1,4-dioxane	11.157	7.4	7.9	9.9
36. 2,2,4-trimethylpentane	11.188	7.7	7.9	8.7
37. <i>n</i> -heptane	11.461	7.9	8.0	9.0
38. <i>cis</i> -1,3-dichloropropene	12.068	7.7	8.3	9.5
39. methyl isobutyl ketone	12.129	8.5	8.6	10.0
40. <i>trans</i> -1,3-dichloropropene	12.644	7.5	7.9	8.2
41. 1,1,2-trichloroethane	12.842	8.8	11.0	9.9
42. toluene	13.160	9.0	12.0	11.0
43. methyl butyl ketone	13.464	9.3	9.7	10.0
44. dibromochloromethane	13.631	8.5	8.6	9.2
45. 1,2-dibromoethane	13.919	9.3	9.0	11.0
46. tetrachloroethene	14.481	9.7	8.5	12.0
47. chlorobenzene-d5 (IS)	15.224	10.0	10.0	10.0
48. chlorobenzene	15.285	10.0	9.4	11.0
49. ethylbenzene	15.755	11.0	11.0	12.0
50. xylene (<i>m,p</i>)	15.983	20.0	19.0	23.0
51. bromoform	16.059	9.6	8.4	8.5
52. styrene	16.438	11.0	8.3	8.5
53. 1,1,2,2-tetrachloroethane	16.545	11.0	9.1	8.0
54. xylene (<i>o</i>)	16.575	12.0	8.9	7.8
55. 2-chlorotoluene	18.017	11.0	10.0	7.8
56. 4-ethyltoluene	18.290	11.0	9.7	7.7
57. 1,3,5-trimethylbenzene	18.396	11.0	10.0	8.4
58. 1,2,4-trimethylbenzene	19.018	11.0	11.0	10.0
59. 1,3-dichlorobenzene	19.246	10.0	10.0	9.9
60. 1,4-dichlorobenzene	19.352	10.0	9.9	10.0
61. 1,2-dichlorobenzene	19.898	10.0	10.0	10.0
62. 1,2,4-trichlorobenzene	22.569	12.0	11.0	10.0
63. hexachlorobutadiene	23.358	12.0	11.0	10.0

TO-15 62 Component Mix

acetone	<i>trans</i> -1,2-dichloroethene	4-methyl-2-pentanone (MIBK)
benzene	1,2-dichloropropane	methylene chloride
benzyl chloride*	<i>cis</i> -1,3-dichloropropene	methyl <i>tert</i> -butyl ether (MTBE)
bromodichloromethane	<i>trans</i> -1,3-dichloropropene	2-propanol
bromoform	1,4-dioxane	propylene
bromomethane	ethanol*	styrene
1,3-butadiene	ethyl acetate	1,1,2,2-tetrachloroethane
2-butanone (MEK)	ethyl benzene	tetrachloroethene
carbon disulfide*	ethyl dibromide	tetrahydrofuran
carbon tetrachloride	(1,1-dibromoethane)	toluene
chlorobenzene	4-ethyltoluene	1,2,4-trichlorobenzene
chloroethane	trichlorofluoromethane	1,1,1-trichloroethane
chloroform	(Freon® 11)	1,1,2-trichloroethane
chloromethane	dichlorodifluoromethane	trichloroethene
cyclohexane	(Freon® 12)	1,2,4-trimethylbenzene
dibromochloromethane	1,1,2-trichloro-1,2,2-trifluoroethane (Freon® 113)	1,3,5-trimethylbenzene
1,2-dichlorobenzene	1,2-dichlorotetrafluoroethane (Freon® 114)	vinyl acetate
1,3-dichlorobenzene	heptane	vinyl chloride
1,4-dichlorobenzene	hexachloro-1,3-butadiene	<i>m</i> -xylene
1,1-dichloroethane	hexane	<i>o</i> -xylene
1,2-dichloroethane	2-hexanone (MBK)	<i>p</i> -xylene
1,1-dichloroethene		
<i>cis</i> -1,2-dichloroethene		

In nitrogen, 104 liters @ 1800psig

1ppm cat. # 34436 (ea.)

100ppb cat. # 34437 (ea.)

*Stability of this compound cannot be guaranteed.



cylinder design

Aluminum construction.

Size: 8 x 24 cm.

Volume/Pressure:

104 liters of gas @ 1800psig.

Outlet Fitting: CGA-180.

Weight: 1.5 lbs.

TO-Can™ Air Monitoring Canisters

Optimized for US EPA Methods TO-14/TO-15

- High quality, metal-to-metal seal, 2/3-turn valve with metal diaphragms.
- Sizes from 1 to 15 liters.
- Optional 30" Hg/60psig vacuum/pressure gauge (other gauges available).

Description	qty.	cat.#
1L Volume		
TO-Can™ Canister, 1/4" Valve	ea.	24172
TO-Can™ Canister with Gauge, 1/4" Valve	ea.	24176
3L Volume		
TO-Can™ Canister, 1/4" Valve	ea.	24173
TO-Can™ Canister with Gauge, 1/4" Valve	ea.	24177
6L Volume		
TO-Can™ Canister, 1/4" Valve	ea.	24174
TO-Can™ Canister with Gauge, 1/4" Valve	ea.	24178
15L Volume		
TO-Can™ Canister, 1/4" Valve	ea.	24175
TO-Can™ Canister with Gauge, 1/4" Valve	ea.	24179



Miniature Air Sampling Canisters

These 1000cc canisters are suitable for sampling volatile organic compounds in air according to US EPA Methods TO-14/TO-15.

Description	Volume	qty.	cat.#
With Quick-Connect Stem Fittings			
Electro-Polished Miniature Canister with Quick-Connect Stem Fitting	1000cc	ea.	24194
Sulfinert®-Treated Miniature Canister with Quick-Connect Stem Fitting	1000cc	ea.	24195
Sulfinert®-Treated Miniature Canister with Sulfinert®-Treated Quick-Connect Stem Fitting	1000cc	ea.	24196
With Metal-Seated Diaphragm Valve			
Electro-Polished Miniature Canister with Metal-Seated Diaphragm Valve	1000cc	ea.	24197
Sulfinert®-Treated Miniature Canister with Metal-Seated Diaphragm Valve	1000cc	ea.	24198
Sulfinert®-Treated Miniature Canister with Sulfinert®-Treated Diaphragm Valve	1000cc	ea.	24199
With Nut & Ferrule			
Electro-Polished Miniature Canister with Nut & Ferrule	1000cc	ea.	24206
Sulfinert®-Treated Miniature Canister with Nut & Ferrule	1000cc	ea.	24208

Also available: 400cc canisters. See our catalog or website.



Dimensions:
2.75" diameter, 11.92" long
(7 x 30.3cm)

free literature

For detailed information about using, cleaning, and certifying passive sampling trains in air sampling applications, request our technical guide *A Guide to Passive Air Sampling*.

Call Restek at 800-356-1688 or 814-353-1300, ext. 5, or contact your Restek representative, to request your free copy!

lit. cat.# 59977B

Passive Air Sampling Kits

- Improved design eliminates leaks at the filter.
- Excellent for sampling times from 1 hour to 125 hours, or grab sampling.

Available in six sampling flow ranges, Restek's passive air sampling kit incorporates all hardware necessary to collect air samples, and is easy to assemble for field sampling.* The stainless steel kit is ideal to partner with the Restek TO-Can™ air sampling canister for methods TO-14A/TO-15. Use the Siltek®-treated version with the Restek SilcoCan® air sampling canister when collecting low-level volatile sulfur compounds, or other active compounds.

Air Sampling Kits

Canister Volume					Flow (sccm)	Orifice size	Siltek®-Treated Complete Sampling Kits	Stainless Steel Complete Sampling Kits
400cc	1 Liter	3 Liter	6 Liter	15 Liter				
8 hour	24 hour	48 hour	125 hour	—	0.5–2	0.0008"	24217	24216
2 hour	4 hour	12 hour	24 hour	60 hour	2–4	0.0012"	24160	24165
1 hour	2 hour	6 hour	12 hour	30 hour	4–8	0.0016"	24161	24166
—	1 hour	4 hour	8 hour	20 hour	8–20	0.0020"	24162	24167
—	—	2 hour	3 hour	8 hour	20–40	0.0030"	24163	24168
—	—	—	1 hour	3 hour	40–80	0.0060"	24164	24169

*Air sampling canisters sold separately.

did you know?

We also offer sampling bags, thermal desorption tubes, and a range of gas reference standards to meet your environmental air sampling requirements.

1. Veriflo™ SC423XL flow controller

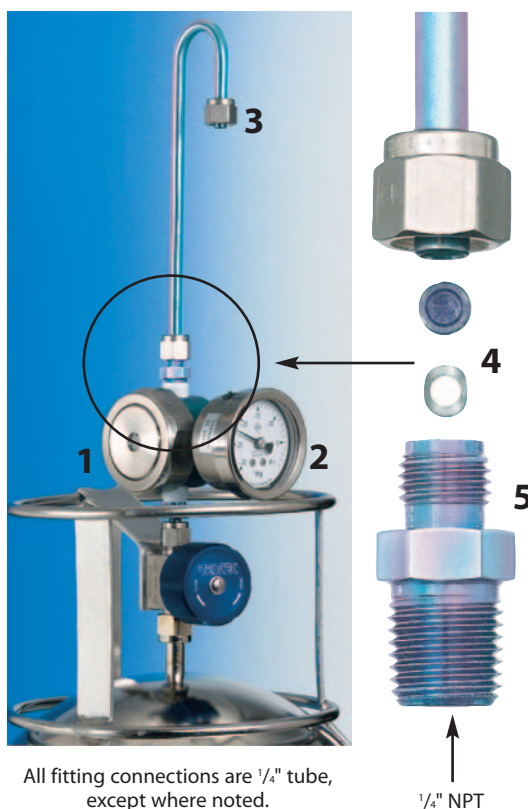
Designed to maintain a constant mass flow as the pressure changes from 30" Hg to 5" Hg. All wetted parts of the flow controller can be Siltek®-treated.

2. Stainless steel vacuum gauge

Monitors canister pressure change during sampling.

3. 1/4-inch Siltek® sample inlet

Stainless steel nut prevents water droplets from accumulating at the edge of the tubing, where they could be pulled into the sampling train.



All fitting connections are 1/4" tube, except where noted.

1/4" NPT

4. 2-micron frit filter and washer

Replaceable. Available in stainless steel, or Siltek®-treated for optimum inertness.

5. Interchangeable critical orifice

Sapphire critical orifice controls the flow with very high precision. Available in stainless steel, or Siltek®-treated for optimum inertness.

Restek Trademarks:
Rtx, SilcoCan, Sulfinert, Siltek, TO-Can, Turning Visions into Reality, Restek logo.

Other Trademarks:
Freon (E. I. du Pont de Nemours & Co., Inc.), Veriflo (Veriflo Corp.)

For individual components, see our catalog or website.



Lit. Cat.# 59189A

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