



Reference
Standards

Analyze a Full 82-Component EPA List Using Just Three Ampuls

With EPA 524.3 Certified
Reference Materials!



RESTEK

Pure Chromatography

www.restek.com



Analyze a Full 82-Component EPA List Using Just Three Ampuls with EPA 524.3 Certified Reference Materials!

In support of the U.S. Safe Drinking Water Act (SDWA), Restek has formulated a complete set of EPA 524.3 reference standards for the monitoring of purgeable organic compounds in drinking water—using as few as three ampuls! This collection of certified reference materials (CRMs) also covers the seven volatile organic compounds (VOCs) included in the Unregulated Contaminant Monitoring Rule 3 (UCMR3), which requires monitoring of all public drinking water systems with 10,000 or more customers.

- Full 82-component EPA 524.3 list using as few as three ampuls—reduce prep time and chances for error or contamination. (See Figure 1 on page 3!)
- EPA 524.3 VOA MegaMix ampul includes oxygenates group—no need to order separately.
- Volatile gases prepared separately—replace shorter-life components without wasting money on full list.
- Two options for internal and surrogate standards—separate or combined mix.
- Certified reference materials (CRMs) manufactured and QC-tested in Restek's ISO-accredited labs—satisfy your ISO requirements.
- Also ideal for surface water and groundwater testing.

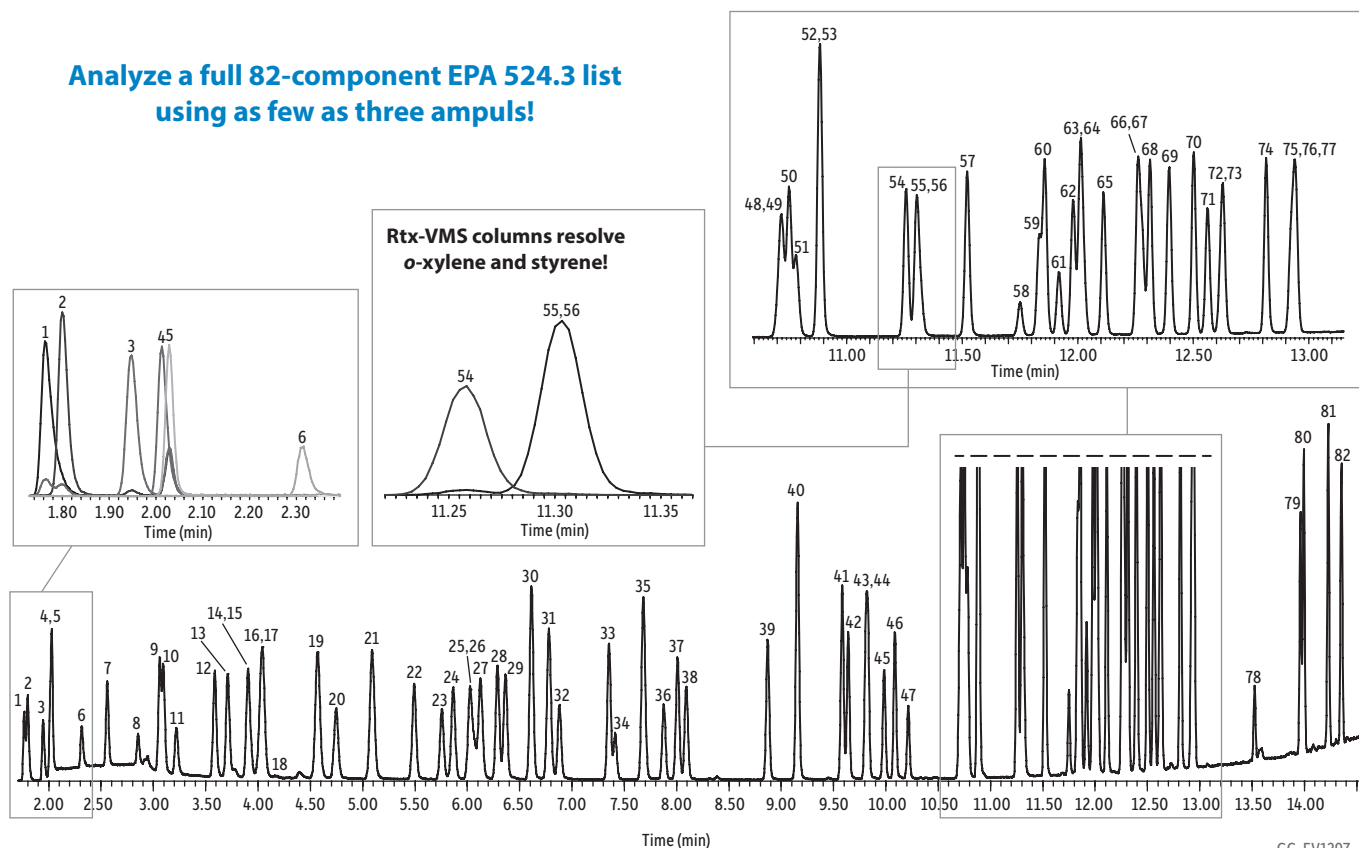
Simplify your analyses and start saving with our EPA 524.3 reference standards — visit www.restek.com/524.3-standards today!

Figure 1: 5 ppb Volatiles in Drinking Water on Rtx-VMS by EPA 524.3

Peaks

- | | | | |
|---|---|-------------------------------|---------------------------------|
| 1. Dichlorodifluoromethane | 22. <i>cis</i> -1,2-Dichloroethene | 43. 1,1,2-Trichloroethane | 64. 1,2,3-Trichloropropane |
| 2. Chlorodifluoromethane | 23. Bromochloromethane | 44. Ethyl methacrylate | 65. 4-Chlorotoluene |
| 3. Chloromethane | 24. Chloroform | 45. Dibromochloromethane | 66. <i>tert</i> -Butylbenzene |
| 4. Vinyl chloride | 25. Carbon tetrachloride | 46. 1,3-Dichloropropane | 67. Pentachloroethane |
| 5. 1,3-Butadiene | 26. Tetrahydrofuran | 47. 1,2-Dibromoethane | 68. 1,2,4-Trimethylbenzene |
| 6. Bromomethane | 27. 1,1,1-Trichloroethane | 48. Chlorobenzene-d5 | 69. <i>sec</i> -Butylbenzene |
| 7. Trichlorofluoromethane | 28. 1,1-Dichloropropene | 49. Chlorobenzene | 70. 4-Isopropyltoluene |
| 8. Diethyl ether | 29. 1-Chlorobutane | 50. Ethylbenzene | 71. 1,3-Dichlorobenzene |
| 9. 1,1-Dichloroethene | 30. Benzene | 51. 1,1,1,2-Tetrachloroethane | 72. 1,4-Dichlorobenzene-D4 |
| 10. Carbon disulfide | 31. <i>tert</i> -Amyl methyl ether (TAME) | 52. <i>m</i> -Xylene | 73. 1,4-Dichlorobenzene |
| 11. Methyl iodide | 32. 1,2-Dichloroethane | 53. <i>p</i> -Xylene | 74. <i>n</i> -Butylbenzene |
| 12. Allyl chloride | 33. Trichloroethene | 54. <i>o</i> -Xylene | 75. Hexachloroethane |
| 13. Methylene chloride | 34. 1,4-Difluorobenzene | 55. Styrene | 76. 1,2-Dichlorobenzene-D4 (SS) |
| 14. <i>trans</i> -1,2-Dichloroethene | 35. <i>tert</i> -Amyl ethyl ether (TAE) | 56. Bromoform | 77. 1,2-Dichlorobenzene |
| 15. Methyl acetate | 36. Dibromomethane | 57. Isopropylbenzene | 78. 1,2-Dibromo-3-chloropropane |
| 16. MTBE-d3 (SS) | 37. 1,2-Dichloropropane | 58. 4-Bromofluorobenzene (SS) | 79. Hexachlorobutadiene |
| 17. MTBE | 38. Bromodichloromethane | 59. Bromobenzene | 80. 1,2,4-Trichlorobenzene |
| 18. <i>tert</i> -Butyl alcohol (TBA) | 39. <i>cis</i> -1,3-Dichloropropene | 60. <i>n</i> -Propylbenzene | 81. Naphthalene |
| 19. Diisopropyl ether (DIPE) | 40. Toluene | 61. 1,1,2,2-Tetrachloroethane | 82. 1,2,3-Trichlorobenzene |
| 20. 1,1-Dichloroethane | 41. Tetrachloroethene | 62. 2-Chlorotoluene | |
| 21. <i>tert</i> -Butyl ethyl ether (ETBE) | 42. <i>trans</i> -1,3-Dichloropropene | 63. 1,3,5-Trimethylbenzene | |

Analyze a full 82-component EPA 524.3 list using as few as three ampuls!



Column Rtx-VMS, 30 m, 0.25 mm ID, 1.40 μ m (cat.# 19915)
Sample 524.3 internal standard/surrogate mix (cat.# 30017)
 524.3 gas calibration mix (cat.# 30014)
 524.3 VOA MegaMix standard (cat.# 30013)
Diluent: RO water
Conc.: 5 ng/mL (5 mL sample)
Injection purge and trap split (split ratio 30:1)
Liner: Restek Premium 1.0 mm ID straight inlet liner (cat.# 23333.1)
Inj. Temp.: 200 °C
Purge and Trap
Instrument: EST Encon Evolution
Trap Type: Vocarb 3000
Purge: 11 min, flow 40 mL/min
Dry Purge: 1 min, flow 50 mL/min
Desorb: 1 min @ 260 °C, flow 30.9 mL/min
Bake: 8 min @ 265 °C
Interface Connection: injection port
Transfer Line Temp.: 150 °C
Oven
Oven Temp: 45 °C (hold 4.5 min) to 100 °C at 12 °C/min to 240 °C at 25 °C/min (hold 1.32 min)

Carrier Gas He, constant flow
Flow Rate: 0.9 mL/min
Detector MS
Mode: Scan
Scan Program:

Group	Start Time (min)	Scan Range (amu)	Scan Rate (scans/sec)
1	1.5	47-300	5.4
2	2.9	35-300	5.19

Transfer Line Temp.: 240 °C
Analyzer Type: Quadrupole
Source Temp.: 230 °C
Quad Temp.: 150 °C
Electron Energy: 70 eV
Solvent Delay Time: 1.5 min
Tune Type: BFB
Ionization Mode: EI
Instrument Agilent 7890A GC & 5975C MSD
Acknowledgement EST Analytical provided the Centurion robotic autosampler and Encon Evolution P&T concentrator.

GC_EV1297

For EPA 524.3 analysis, Restek recommends...



EPA 524.3 Reference Standards

(5 separate mixes, including a MegaMix standard)

Each ampul sold separately.

Cat.# 30013: 524.3 VOA MegaMix (69 components)

Allyl chloride (3-chloropropene) (107-05-1)
tert-Amyl ethyl ether (TAE) (919-94-8)
tert-Amyl methyl ether (TAME) (994-05-8)
 Benzene (71-43-2)
 Bromobenzene (108-86-1)
 Bromochloromethane (74-97-5)
 Bromodichloromethane (75-27-4)
 Bromoform (75-25-2)
tert-Butanol (TBA) (75-65-0)
n-Butylbenzene (104-51-8)
sec-Butylbenzene (135-98-8)
tert-Butylbenzene (98-06-6)
 Carbon disulfide (75-15-0)
 Carbon tetrachloride (56-23-5)
 Chlorobenzene (108-90-7)
 Chloroform (67-66-3)
 1-Chlorobutane (butyl chloride) (109-69-3)
 2-Chlorotoluene (95-49-8)
 4-Chlorotoluene (106-43-4)
 Dibromochloromethane (124-48-1)
 1,2-Dibromo-3-chloropropane (96-12-8)
 Dibromomethane (74-95-3)
 1,2-Dibromoethane (EDB) (106-93-4)
 1,2-Dichlorobenzene (95-50-1)
 1,3-Dichlorobenzene (541-73-1)
 1,4-Dichlorobenzene (106-46-7)
 1,1-Dichloroethane (75-34-3)
 1,2-Dichloroethane (107-06-2)
 1,1-Dichloroethene (75-35-4)
cis-1,2-Dichloroethene (156-59-2)
trans-1,2-Dichloroethene (156-60-5)
 1,2-Dichloropropane (78-87-5)
 1,3-Dichloropropane (142-28-9)
 1,1-Dichloropropene (563-58-6)
cis-1,3-Dichloropropene (10061-01-5)
trans-1,3-Dichloropropene (10061-02-6)
 Diethyl ether (ethyl ether) (60-29-7)
 Diisopropyl ether (DIPE) (108-20-3)
 Ethylbenzene (100-41-4)
 Ethyl-*tert*-butyl ether (ETBE) (637-92-3)
 Ethyl methacrylate (97-63-2)
 Hexachlorobutadiene (87-68-3)
 Hexachloroethane (67-72-1)
 Iodomethane (methyl iodide) (74-88-4)
 Isopropylbenzene (cumene) (98-82-8)
 4-Isopropyltoluene (*p*-cymene) (99-87-6)
 Methyl acetate (79-20-9)
 Methyl-*tert*-butyl ether (MTBE) (1634-04-4)

Methylene chloride (dichloromethane) (75-09-2)
 Naphthalene (91-20-3)
 Pentachloroethane (76-01-7)
n-Propylbenzene (103-65-1)
 Styrene (100-42-5)
 Tetrachloroethene (127-18-4)
 1,1,1,2-Tetrachloroethane (630-20-6)
 1,1,2,2-Tetrachloroethane (79-34-5)
 Tetrahydrofuran (109-99-9)
 Toluene (108-88-3)
 1,2,3-Trichlorobenzene (87-61-6)
 1,2,4-Trichlorobenzene (120-82-1)
 1,1,1-Trichloroethane (71-55-6)
 1,1,2-Trichloroethane (79-00-5)
 Trichloroethene (79-01-6)
 1,2,3-Trichloropropane (96-18-4)
 1,2,4-Trimethylbenzene (95-63-6)
 1,3,5-Trimethylbenzene (108-67-8)
m-Xylene (108-38-3)
o-Xylene (95-47-6)
p-Xylene (106-42-3)

Cat.# 30014: 524.3 Gas Calibration Mix (7 components)

Bromomethane (methyl bromide) (74-83-9)
 1,3-Butadiene (106-99-0)
 Chlorodifluoromethane (CFC-22) (75-45-6)
 Chloromethane (methyl chloride) (74-87-3)
 Dichlorodifluoromethane (CFC-12) (75-71-8)
 Trichlorofluoromethane (CFC-11) (75-69-4)
 Vinyl chloride (75-01-4)

Cat.# 30015: 524.3 Internal Standard Mix (3 components)

Chlorobenzene-*d*5 (3114-55-4)
 1,4-Dichlorobenzene-*d*4 (3855-82-1)
 1,4-Difluorobenzene (540-36-3)

Cat.# 30016: 524.3 Surrogate Standard (3 components)

1-Bromo-4-fluorobenzene (BFB) (460-00-4)
 Methyl-*d*3-*tert*-butyl ether (29366-08-3)
 1,2-Dichlorobenzene-*d*4 (2199-69-1)

Cat.# 30017: 524.3 Internal Standard/Surrogate Mix (6 components)

1-Bromo-4-fluorobenzene (BFB) (460-00-4)
 Methyl-*d*3-*tert*-butyl ether (29366-08-3)
 Chlorobenzene-*d*5 (3114-55-4)
 1,2-Dichlorobenzene-*d*4 (2199-69-1)
 1,4-Dichlorobenzene-*d*4 (3855-82-1)
 1,4-Difluorobenzene (540-36-3)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
524.3 VOA MegaMix							
2000 µg/mL each in P&T methanol, 1 mL/ampul	Yes	6 months	36 months	Ambient	0 °C or colder	ea.	30013
524.3 Gas Calibration Mix							
2000 µg/mL each in P&T methanol, 1 mL/ampul	Yes	6 months	36 months	Ambient	0 °C or colder	ea.	30014
524.3 Internal Standard Mix							
2000 µg/mL each in P&T methanol, 1 mL/ampul	Yes	6 months	60 months	Ambient	0 °C or colder	ea.	30015
524.3 Internal Standard/Surrogate Mix							
2000 µg/mL each in P&T methanol, 1 mL/ampul	Yes	6 months	60 months	Ambient	0 °C or colder	ea.	30017
524.3 Surrogate Standard							
2000 µg/mL each in P&T methanol, 1 mL/ampul	Yes	6 months	60 months	Ambient	0 °C or colder	ea.	30016

Rtx-VMS Columns (fused silica)

proprietary Crossbond phase

- Application-specific columns for analyzing volatile organic pollutants by GC-MS including Methods TO-15, TMS, and EPA 8260.
- Complete separation of U.S. EPA Method 8260 compounds in less than 10 minutes.
- Stable to 260 °C.
- No known equivalent phases.

Description	Temp. Limits	qty.	cat. #
30 m, 0.25 mm ID, 1.40 µm	-40 to 240/260 °C	ea.	19915



Topaz 1.0 mm ID Straight Inlet Liner

for Agilent GCs Equipped with Split/Splitless Inlets

ID x OD x Length	Similar to Part #	qty.	cat. #
1.0 mm x 6.3 mm x 78.5 mm	18740-80200 (ea.), 5190-4047 (ea.)	5-pk.	23333



Manual Microliter Syringe, SGE

- Economical.
- Available with cemented needles (N/F) or removable needles (RN/R).
- Each syringe plunger and barrel assembly is manufactured as one working unit; components are not interchangeable or individually replaceable.

Note: Syringes and needles sold by Restek are intended for scientific research and laboratory use only and are not intended for human in vivo or animal use.



Needle Gauge	Needle Length	Needle Point Style	Needle Termination	Volume	SGE		Restek	
					Model	cat. #	Units	cat. #
26	50 mm	2	R	5 µL	5R	001050	ea.	24701*
26	50 mm	2	R	10 µL	10R	002050	ea.	24703*
25	50 mm	2	R	25 µL	25R	003050	ea.	24705
25	50 mm	2	R	50 µL	50R	004050	ea.	24707
25	50 mm	2	R	100 µL	100R	005050	ea.	24709
25	50 mm	2	R	250 µL	250R	006050	ea.	24711
25	50 mm	2	R	500 µL	500R	007050	ea.	24713

* With plunger protection.



PTFE Tip, Gas-Tight Syringes

- Suitable for gases or liquids, for maximum inertness.
- High accuracy of dispensed volumes.
- Interchangeable barrels, plungers, and tips extend performance and increase cost-effectiveness.

Volume	Needle Term	Needle Gauge	SGE		Restek	
			Model	cat.#	qty.	cat.#
5 mL	LL	†	5MDR-LL-GT	008760	ea.	24757
50 mL	LL	†	50MR-LL-GT	009660	ea.	24761

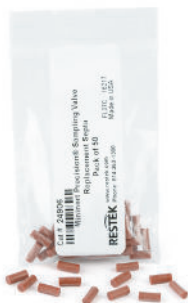
†Syringes are equipped with a luer-lock fitting instead of a needle; if needed, needles sold separately at www.restek.com



Mininert Precision Sampling Valve

Mininert valves are very convenient for repetitive sampling and limit content exposure to the silicon septum. Models are available for screw-cap and crimp-top vials. The crimp-top valve for 13 mm ID glassware slides into the neck of the vial. Turn the threaded flange to secure a tight fit.

Product Name	Cap Size	Type	Units	cat.#
Mininert Precision Sampling Valve, 13 mm	13-425	Screw-Thread	12-pk.	24900



Accessories for Mininert Precision Sampling Valves

Product Name	Units	cat.#
Replacement Septa for Mininert Precision Sampling Valves	50-pk.	24906
Septum Insertion Tool for Mininert Precision Sampling Valves	ea.	24907



4.0 mL WISP 48 Screw-Thread Step Vials, 15 x 45 mm, 13-425 (vials only)

Description	Type	Volume	Color	Size	qty.	cat.#
WISP 48 Step Vial w/White Graduated Marking Spot	13-425 Screw-Thread	4.0 mL	Amber	15 x 45 mm	1000-pk.	24657

Precleaned Volatile Organic Analyte (VOA) Sampling Vials

- Container, liner, and closure cleaned, assembled, and lot traceable.
- Open-top caps.
- PTFE faced 0.125" silicone septa.
- Cleaned to U.S. EPA Protocol B specifications.

Description	Type	Volume	Cap Size	Color	Material	qty.	cat.#
Precleaned Volatile Organic Analyte (VOA) Sampling Vials	24-400 Screw-Thread	40 mL	24-400	Clear	Glass	72-pk.	21796
	24-400 Screw-Thread	40 mL	24-400	Amber	Glass	72-pk.	21797



Replacement Septa, PTFE-Lined Silicone

for 20, 40 & 60 mL Vials and 250 mL Bottles

Description	qty.	cat.#
Replacement Septa, PTFE-lined silicone, 22 mm x 0.125"	100-pk.	24694



Welded/Drawn 304 Stainless-Steel Tubing, Sulfinert Treated

Our most popular grade of tubing. Recommended for the following:

- Chromatography applications.
- Gas delivery systems.
- Lower pressures.
- Inert applications.
- Maximum temperature of 450 °C in an inert atmosphere.

Sulfinert—A required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds.

Description	Internal Diameter (ID)	Outer Diameter (OD)	qty.	cat.#
Welded/Drawn 304 Stainless-Steel Tubing, Sulfinert Treated	0.040" (1.02 mm)	1/16" (1.59 mm)	10-ft Roll	29235



Learn more at www.restek.com/524.3-standards



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