

Convenient Calibration, Faster GC/MS Analysis for Volatile Organics in Water

Using a New Restek Calibration Mix and an Rtx®-VMS Column

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- 60-component MegaMix™ includes six target gases—eliminates mixing errors.
- 0.18mm Rtx®-VMS column offers fast cycles, excellent resolution of gases.
- Monitor drinking water - wastewater - hazardous waste.

Volatile organic analytes (VOAs) are a common source of environmental pollution, and are among the most difficult and expensive contaminants to monitor in water. Analysis and quantification of VOAs in drinking water are detailed in US EPA methods 502 and 524, and in many other methods worldwide.

Until now, Restek has offered two complex calibration mixes of volatile compounds for drinking water analysis: a mix containing 54 target compounds (502.2 MegaMix™, cat.# 30432), and one containing 73 compounds (Drinking Water VOA MegaMix™ 524.2 Rev. 4.2, cat.# 30601). The only target compounds in the EPA methods that we do not include in these mixes are the highly volatile gases, and, for Method 524.2, the reactive ketones. To prevent acetal formation, we offer the five ketones as a separate mix (cat.# 30602). We also offer the six gases separately, as 502.2 Calibration Mix #1 (cat.# 30042 or cat.# 30439). Analysts monitoring samples for the gases combine the gases mix with either the 54-component mix or the 73-component mix—this takes time and can introduce variation or mixing errors.

For the convenience of our customers, we have developed a new 60-component calibration mix (Volatiles MegaMix™ with Gases, cat.# 30603) that contains the 54 target compounds in 502.2 MegaMix™ mix, plus the six gases in 502.2 Calibration Mix #1, at 200 ppm each in purge and trap methanol. The new mix is suitable for Method 502, Method 524, or other methods followed in monitoring these compounds. The new mix brings a choice. The 60-component mix is very convenient to use, and eliminates both variation and the potential for errors (associated with measuring and mixing from multiple ampuls). An unopened ampul of this mix has a 24-month shelf life, but once the ampul is opened, the gases can begin to escape from the solution, and opened ampuls of the new mix should be replaced more frequently than ampuls of the 54-component mix. (This also is true of the 6-component gas mix.) Analysts choosing to work with the 54-component mix and the six gases mix must contend with the potential for mixing errors, but can see longer lifetimes from ampuls of the opened 54-component mix—if they are stored properly. We recommend storing

all VOAs reference mixes in a freezer, especially those containing the gases.

Chemists monitoring VOAs in water require fast and accurate analyses. A chromatography column with a cyanopropylphenyl/dimethyl polysiloxane stationary phase (e.g., a “624” column) or a diphenyl/dimethyl polysiloxane phase (e.g., a “502.2” column) can provide a fast analysis, but some compounds are likely to coelute, creating quantification problems. In contrast, Rtx®-VMS columns are designed specifically for

Rtx®-VMS Columns (fused silica)

(temp. limits -40°C to 240/260°C)

0.18mm ID, 1.00µm df
20-Meter, cat.# 49914,
40-Meter, cat.# 49915,



Volatiles MegaMix™ with Gases (60 Components)

benzene	2,2-dichloropropane
bromobenzene	1,1-dichloropropene
bromochloromethane	<i>trans</i> -1,3-dichloropropene
bromodichloromethane	<i>cis</i> -1,3-dichloropropylene
bromoform	ethylbenzene
bromomethane (methyl bromide)	hexachloro-1,3-butadiene
<i>n</i> -butylbenzene	(hexachlorobutadiene)
<i>sec</i> -butylbenzene	isopropylbenzene (cumene)
<i>tert</i> -butylbenzene	4-isopropyltoluene (<i>p</i> -cymene)
carbon tetrachloride	methylene chloride
chlorobenzene	(dichloromethane)
chloroethane (ethyl chloride)	naphthalene
chloroform	<i>n</i> -propylbenzene
chloromethane (methyl chloride)	styrene
2-chlorotoluene	toluene
4-chlorotoluene	1,1,1,2-tetrachloroethane
dibromochloromethane	1,1,2,2-tetrachloroethane
1,2-dibromo-3-chloropropane	tetrachloroethylene
1,2-dibromoethane (EDB)	1,2,4-trichlorobenzene
dibromomethane	1,2,3-trichlorobenzene
1,2-dichlorobenzene	1,1,1-trichloroethane
1,3-dichlorobenzene	1,1,2-trichloroethane
1,4-dichlorobenzene	trichloroethylene
dichlorodifluoromethane (CFC-12)	trichlorofluoromethane (CFC-11)
1,1-dichloroethane	1,2,3-trichloropropane
1,2-dichloroethane	1,3,5-trimethylbenzene
1,1-dichloroethylene	1,2,4-trimethylbenzene
<i>cis</i> -1,2-dichloroethylene	vinyl chloride
<i>trans</i> -1,2-dichloroethylene	<i>m</i> -xylene
1,2-dichloropropane	<i>o</i> -xylene
1,3-dichloropropane	<i>p</i> -xylene

Each	5-pk.	10-pk.
200µg/mL each in P&T methanol, 1mL/ampul		
30603	30603-510	—
w/data pack		
30603-500	30603-520	30703

analyses of volatiles by GC/MS, and circumvent such problems. Analysis on a 20m, 0.18mm ID, 1.0µm Rtx®-VMS column (cat.# 49914), using a 45°C initial oven temperature, will provide good resolution of the early eluting gases and ensure faster oven cycles. Under optimized analytical conditions and using a dual purge and trap system, as shown in Reference 1, Figure 47, the narrow bore column can reduce the analysis time to approximately 10 minutes, without sacrificing resolution.

If you are testing for volatiles in drinking water, wastewater, or hazardous waste, an Rtx®-VMS column and our new 60-component volatiles MegaMix™ with gases will help you meet the requirements for most analytical methods.

Reference

1. *Optimizing the Analysis of Volatile Organic Compounds*
Restek technical guide,
lit. cat.# 59887A,
free on request.
Also available on our website.



502.2 MegaMix™ (54 Components)

benzene	2,2-dichloropropane
bromobenzene	1,1-dichloropropene
bromochloromethane	<i>cis</i> -1,3-dichloropropene
bromodichloromethane	<i>trans</i> -1,3-dichloropropene
bromoform	ethylbenzene
<i>n</i> -butylbenzene	hexachlorobutadiene
<i>sec</i> -butylbenzene	isopropylbenzene
<i>tert</i> -butylbenzene	<i>p</i> -isopropyltoluene
carbon tetrachloride	methylene chloride
chlorobenzene	naphthalene
chloroform	<i>n</i> -propylbenzene
2-chlorotoluene	styrene
4-chlorotoluene	1,1,1,2-tetrachloroethane
dibromochloromethane	1,1,2,2-tetrachloroethane
1,2-dibromo-3-chloropropane	tetrachloroethene
1,2-dibromoethane	toluene
dibromomethane	1,2,3-trichlorobenzene
1,2-dichlorobenzene	1,2,4-trichlorobenzene
1,3-dichlorobenzene	1,1,1-trichloroethane
1,4-dichlorobenzene	1,1,2-trichloroethane
methylene chloride	trichloroethene
(dichloromethane)	1,2,3-trichloropropane
naphthalene	1,2,4-trimethylbenzene
<i>n</i> -propylbenzene	1,3,5-trimethylbenzene
styrene	<i>m</i> -xylene
toluene	<i>o</i> -xylene
1,1,1,2-tetrachloroethane	<i>p</i> -xylene
1,1,2,2-tetrachloroethane	
tetrachloroethylene	
1,2,4-trichlorobenzene	
1,2,3-trichlorobenzene	
1,1,1-trichloroethane	
1,1,2-trichloroethane	
trichloroethylene	
trichlorofluoromethane (CFC-11)	
1,2,3-trichloropropane	
1,3,5-trimethylbenzene	
1,2,4-trimethylbenzene	
vinyl chloride	
<i>m</i> -xylene	
<i>o</i> -xylene	
<i>p</i> -xylene	

Each	5-pk.	10-pk.
200µg/mL each in P&T methanol, 1mL/ampul		
30432	30432-510	—
w/data pack		
30432-500	30432-520	30532
2,000µg/mL each in P&T methanol, 1mL/ampul		
30431	30431-510	—
w/data pack		
30431-500	30431-520	30531

502.2 Calibration Mix #1 (gases)

bromomethane	dichlorodifluoromethane
chloroethane	trichlorofluoromethane
chloromethane	vinyl chloride

Each	5-pk.	10-pk.
200µg/mL each in P&T methanol, 1mL/ampul		
30439	30439-510	—
w/data pack		
30439-500	30439-520	30539
2,000µg/mL each in P&T methanol, 1mL/ampul		
30042	30042-510	—
w/data pack		
30042-500	30042-520	30142

Additional Reference Materials for GC/MS Analysis of Volatile Organics in Water

Drinking Water VOA MegaMix™, 524.2 Rev. 4.1 (73 Components)

acrylonitrile	<i>trans</i> -1,3-dichloropropene
allyl chloride	diethyl ether (ethyl ether)
benzene	ethylbenzene
bromobenzene	ethyl methacrylate
bromochloromethane	hexachlorobutadiene
bromodichloromethane	hexachloroethane
bromoform	iodomethane (methyl iodide)
<i>n</i> -butylbenzene	isopropylbenzene (cumene)
<i>sec</i> -butylbenzene	4-isopropyltoluene (<i>p</i> -cymene)
<i>tert</i> -butylbenzene	methacrylonitrile
carbon disulfide	methyl acrylate
carbon tetrachloride	methylene chloride
chloroacetonitrile	(dichloromethane)
chlorobenzene	methyl methacrylate
1-chlorobutane	methyl <i>tert</i> -butyl ether
chlorodibromomethane	(MTBE)
(dibromochloromethane)	naphthalene
chloroform	nitrobenzene
2-chlorotoluene	2-nitropropane
4-chlorotoluene	pentachloroethane
1,2-dibromo-3-chloropropane	propionitrile (ethylcyanide)
(DBCP)	<i>n</i> -propylbenzene
1,2-dibromoethane	styrene
(ethylene dibromide)	1,1,1,2-tetrachloroethane
dibromomethane	1,1,2,2-tetrachloroethane
1,2-dichlorobenzene	tetrachloroethene
1,3-dichlorobenzene	tetrahydrofuran
1,4-dichlorobenzene	1,2,3-trichlorobenzene
<i>trans</i> -1,4-dichloro-2-butene	1,2,4-trichlorobenzene
1,1-dichloroethane	1,1,1-trichloroethane
1,2-dichloroethane	1,1,2-trichloroethane
1,1-dichloroethene	trichloroethene
<i>cis</i> -1,2-dichloroethene	1,2,3-trichloropropane
<i>trans</i> -1,2-dichloroethene	1,2,4-trimethylbenzene
1,2-dichloropropane	1,3,5-trimethylbenzene
1,3-dichloropropane	toluene
2,2-dichloropropane	<i>m</i> -xylene
1,1-dichloropropene	<i>o</i> -xylene
<i>cis</i> -1,3-dichloropropene	<i>p</i> -xylene

Each	5-pk.	10-pk.
2,000µg/mL each in P&T methanol, 1mL/ampul		
30601	30601-510	—
	w/data pack	
30601-500	30601-520	30701

Ketones Mix, 524.2 Rev. 4.1

acetone	2-hexanone
2-butanone (MEK)	4-methyl-2-pentanone (MIBK)
1,1-dichloro-2-propanone	

Each	5-pk.	10-pk.
5,000µg/mL each in 90% P&T methanol:10% water, 1mL/ampul		
30602	30602-510	—
	w/data pack	
30602-500	30602-520	30702

Antifoam Agent for Purge & Trap Samples

- Efficiently controls foam over a wide pH range.
- Effective at less than 0.1% of sample volume.
- Will not conflict with chromatography of target analytes.

Foam generated when purge gas passes through a sample can enter the analytical trap, and possibly into the GC column. Our non-hazardous silica-containing antifoam agent is of great help in volatile organics analyses.

Each	5-pk.
Neat, 1mL/ampul	
31822	31822-510