

Sub-ppb GC/MS Analysis of MTBE and TBA

Using an Rtx[®]-VMS Column and an OI 4660 Purge & Trap System

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- Optimized analysis for common oxygenates.
- Excellent reproducibility to 0.5ppb.
- Unique Rtx[®]-VMS phase fully resolves MTBE & TBA.

In an attempt to reduce automotive emissions in the US, the Clean Air Act Amendments of 1990 require that gasoline formulations contain at least 2% oxygen. Initially, addition of 15% methyl *tert*-butyl ether, MTBE, to gasoline was a common way of meeting this requirement. This became a concern, however, as MTBE has a relatively high solubility in water and, therefore, can easily contaminate groundwater sources. Subsequently, *tert*-butyl alcohol, TBA, has been included as a target compound on the oxygenates list, as it is both a contaminant in MTBE and a breakdown product of MTBE. Because of its appreciable affinity for water (greater than MTBE, and harder to detect than MTBE using purge and trap), and its potential health hazards, it also must be monitored.

To analyze for MTBE and TBA simultaneously, the two compounds must be resolved chromatographically, because the minor ion 59 of MTBE interferes with the quantification of TBA, whose primary ion is 59. The two tend to co-elute on many “624-type” columns (6% cyanopropylphenyl / 94% dimethyl polysiloxane stationary phases), making this separation a challenge.

The unique Rtx[®]-VMS phase provides the solution to this problem, resolving MTBE and TBA (Figure 1) and contributing to reliable quantification of both compounds. Using an OI 4660 Eclipse purge and trap system and an Rtx[®]-VMS column (cat.# 19915), optimizing purge and trap conditions (65°C sample temperature) to increase the concentrations of the low molecular weight oxygenates on the trap and allow the best responses at low levels, and operating the mass spectrometer in the SIM mode, we detected both compounds accurately at concentrations as low as 0.5ppb in 25mL water (Figure 1). Over a concentration range of 0.5ppb to 5ppb, we achieved relative standard deviations of 5.2% for MTBE and 8.7% for TBA. Based on these results, we highly recommend an Rtx[®]-VMS column for low level purge and trap analysis of MTBE and TBA, in conjunction with the standard Method 8260 analysis.

Rtx[®]-VMS Column (fused silica)

(proprietary Crossbond[®] phase)

ID	df (µm)	temp. limits	length	cat. #
0.25mm	1.40	-40 to 240/260°C	30-Meter	19915

Figure 1 An Rtx[®]-VMS column resolves MTBE and TBA, for reliable quantification of both compounds.

