

# Analyzing Oxygenates in Gasolines

## Using a Deactivated Sample Pathway and ASTM Method D-4815-99e1

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- Determine alcohols at 0.1-12 mass percent.
- Determine ethers at 0.1-20 mass percent.
- Separate all oxygenates in 11 minutes.

American Society for Testing and Materials Method D-4815-99 is optimized for determining oxygenated additives — ethers and alcohols — in gasolines. Concentrations of individual alcohols can be determined at between 0.1 and 12 mass percent; individual ethers can be determined between 0.1 and 20 mass percent. The chromatographic system consists of two columns, connected via a ten-port gas sampling valve (Figure 1). Column 1 is a Silcosteel® treated micropacked column containing highly polar 1,2,3-tri-2-cyanoethoxypropane (TCEP). Column 2 is a capillary column containing a non-polar polydimethylsiloxane (PDMS) polymer bonded in either fused silica tubing (Rtx®-1 column) or, for greater durability, but equivalent inertness, Silcosteel® treated stainless steel tubing (MXT®-1 column).

The sample is introduced onto the TCEP column. The lighter hydrocarbons quickly pass through this column and are vented, but the heavier hydrocarbons and oxygenates are retained. After methylcyclopentane is eluted, but before di-isopropyl ether (DIPE) and MTBE are eluted, the valve is actuated, backflushing the oxygenates and heavy hydrocarbons onto the PDMS column. From here, the alcohols and ethers elute in boiling point order (Figure 2). After benzene and TAME are eluted, the valve is actuated again, to backflush and vent the heavy hydrocarbons. To prevent adsorption of oxygenates in the sample pathway, and ensure symmetric peaks, we use Siltek®/Sulfinert® treated stainless steel transfer lines and a Sulfinert® treated sampling valve.

This procedure is a fast, reliable means of quantifying the oxygenated compounds currently added to gasolines. Sulfinert® treated system components help ensure accurate data and peak symmetry.

### Micropacked Column

Description	ID	OD	temp. range	length	cat. #
20% TCEP on 80/100 Chromosorb® PAW	0.75	1/16"	0–120°C	0.56-Meter	19040

### Rtx®-1 Column (fused silica) (Crossbond® 100% dimethyl polysiloxane)

ID	df (µm)	temp. limits	length	cat. #
0.53mm	3.00	-60 to 270/290°C	30-Meter	10185

### MXT®-1 Column (Silcosteel® treated stainless steel)

(Crossbond® 100% dimethyl polysiloxane)

ID	df (µm)	temp. limits	length	cat. #
0.53mm	3.00	-60 to 285°C	30-Meter	70185

### Sulfinert® Treated Ten-Port Gas Sampling Valve

Description	qty.	cat. #
Sulfinert® Gas Sampling Valve; 10-Port	ea.	20586

### Siltek®/Sulfinert® Treated Coiled 304 Grade Stainless Steel Tubing

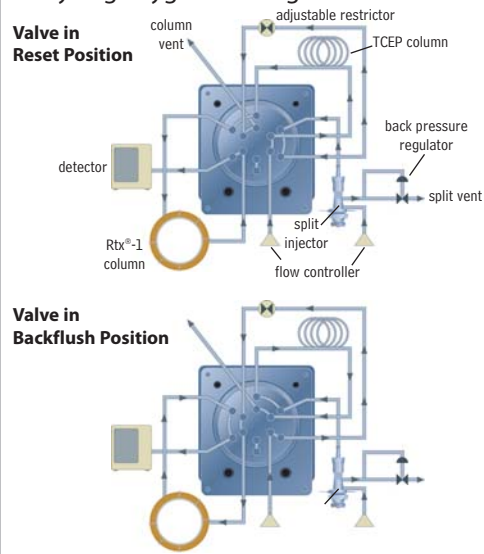
ID	OD	cat. #	5-24 ft.	25-199 ft.	200-399 ft.	> 400 ft.
0.020" (0.51mm)	1/16" (1.59mm)	22503				

### California Oxygenates Mix

diisopropyl ether	2,000	tert-amyl methyl ether	2,000	methyl tert-butyl ether	2,000
ethyl-tert-butyl ether	2,000	tert-butyl alcohol	10,000		

At indicated concentrations (µg/mL) in P&T methanol, 1mL/ampul  
cat. # 30465 (ea.)

**Figure 1** Inert two-column system for analyzing oxygenates in gasolines.



**Figure 2** A TCEP / Rtx®-1 column pair resolves oxygenates added to gasolines.

