Industrial

Thermo Scientific Gas Chromatograph Analyzers

Oxygenates in Hydrocarbons (ASTM D4815, ASTM D7423, and ASTM D7754)

Overview

Oxygenates such as alcohols, ethers, ketones, and aldehydes are widely used in gasoline blending and petrochemical feedstocks. They improve octane number, reduce carbon monoxide emissions, and support compliance with clean fuel regulations. However, excessive or uncontrolled concentrations can reduce catalyst lifetime, affect process yields, and compromise product quality. To meet regulatory and quality control demands, standardized test methods—ASTM D4815, ASTM D7423, and ASTM D7754—have been established to quantify oxygenated compounds at concentrations ranging from sub-ppm to percent levels.

The Thermo Scientific™ GC Analyzers for Oxygenates in Light Hydrocarbons are pre-configured and factory-tested systems designed to meet these method requirements with high accuracy, reliability, and ease of use. These solutions enable refineries, petrochemical plants, and QA/QC laboratories to comply with international specifications while maintaining operational efficiency.

Key features and benefits

- **Regulatory compliance and method alignment:** GC analyzers are available to meet the requirements of ASTM D4815 for ethers and alcohols in gasoline, ASTM D7423 for low-level oxygenates in light hydrocarbons down to 0.1–0.4 ppm, and ASTM D7754 for oxygenates in fuels, ensuring laboratories comply with global standards.
- **Accurate detection across a broad range:** From trace-level impurities in feedstocks to percent-level ethanol in finished gasoline, the analyzers deliver precise quantification. This wide dynamic range helps QA/QC teams cover both environmental and process monitoring requirements with a single platform.
- **Maximized uptime and reproducibility:** Built on the modular Thermo Scientific™ TRACE™ 1610 GC platform combined with a spacious and easy-to-access auxiliary oven, the analyzers provide superior repeatability, maximized uptime, and fast serviceability to fulfill demand from high-throughput industrial labs.

- **Ease of use and streamlined operation:** The systems come with factory-installed columns, valves, and optimized methods, reducing installation and training requirements. Combined with the Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS), those solutions enable efficient data handling, compliance reporting, and straightforward adoption in QA/QC workflows.

The Thermo Scientific GC Analyzer for Oxygenates employs a dedicated hardware configuration tailored to each ASTM method:

- **For ASTM D4815,** the system uses a dual-column setup with a polar packed pre-column for hydrocarbon venting and a non-polar capillary column for separating oxygenates. A 10-port switching valve allows efficient backflushing, preventing heavier hydrocarbons from entering the analytical column. This ensures sharp peak resolution for MTBE, ETBE, TAME, DIPE, TAA, and C1–C4 alcohols. It is designed for gasoline with individual ethers content from 0.20 mass % to 20.0 mass % and individual alcohols 0.20 mass % to 12.0 mass %.
- **For ASTM D7423,** the configuration is suitable for oxygenates in C2–C5 matrices and includes a highly selective capillary column (Lowox type) to separate oxygenates from the hydrocarbon matrix at sub-ppm levels. A 6-port valve is installed in a compact auxiliary oven to backflush heavier fractions, ensuring accurate measurement of trace oxygenates such as methanol, ethanol, acetaldehyde, methyl ethyl ketone, and ethers. A liquid sampling valve is included for injection of liquefied light hydrocarbons.
- **For ASTM D7754,** a multi-dimensional GC configuration supports the determination of target oxygenates in automotive spark-ignition engine fuel. A robust single channel FID configuration ensures reliable quantification and repeatability, even in high-ethanol blends (1%–15% v/v).

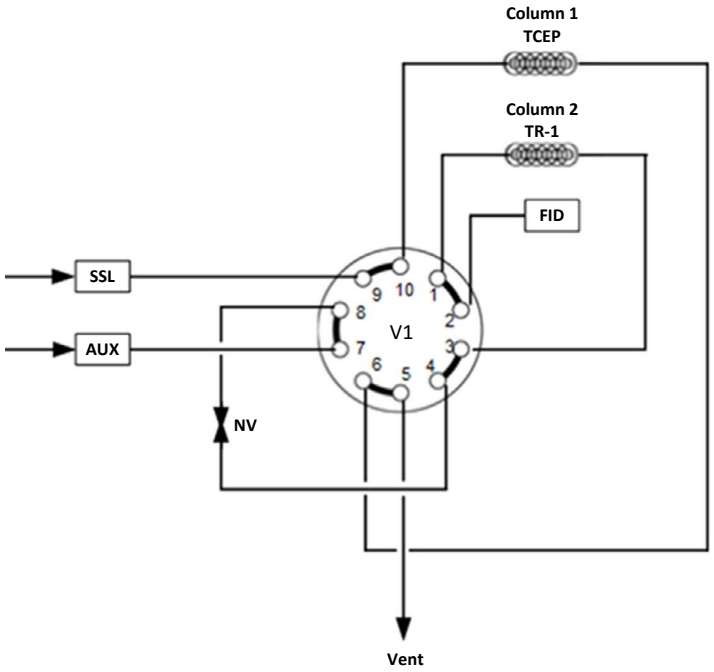

Figure 1. GC Analyzer for Oxygenates configuration for ASTM D4815.

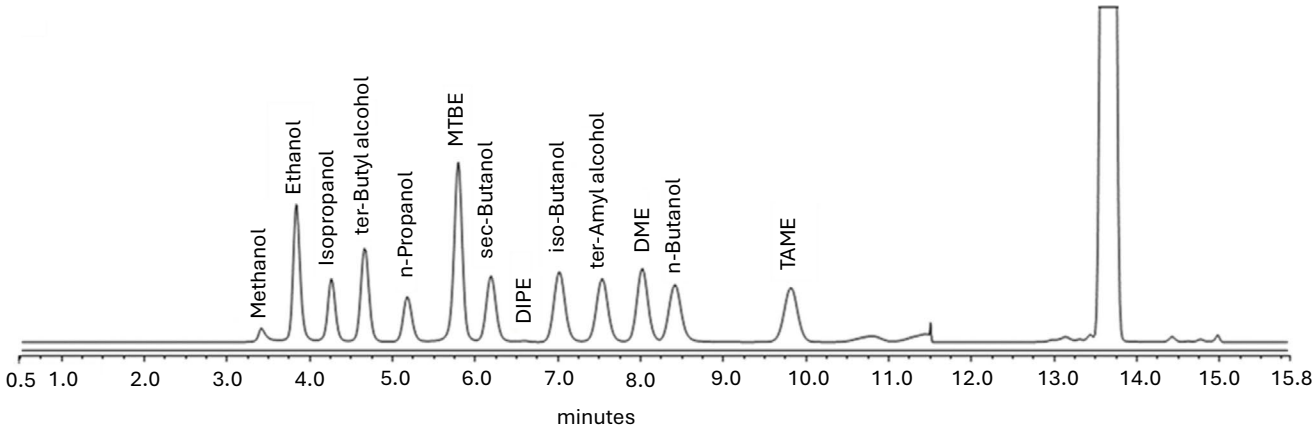

Figure 2. Example of oxygenates chromatogram according to method ASTM D4815.

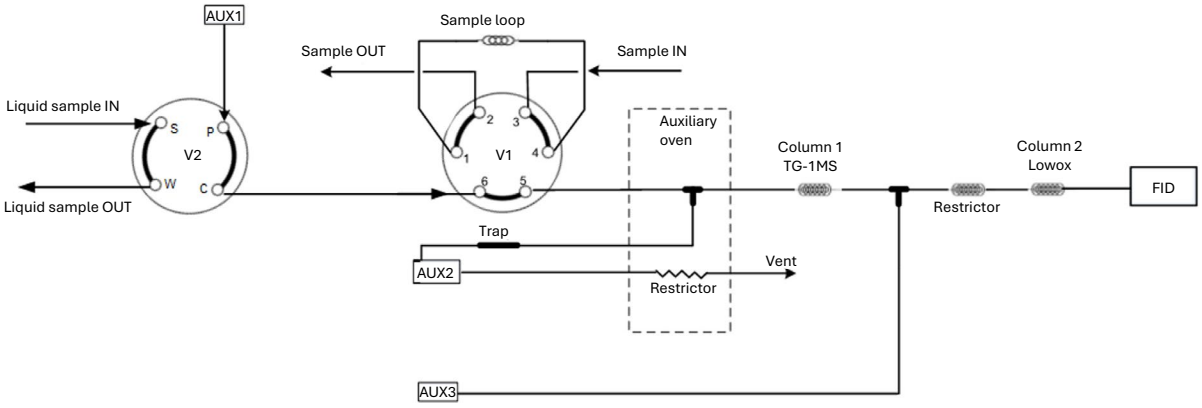

Figure 3. GC Analyzer for Oxygenates configuration for ASTM D7423.

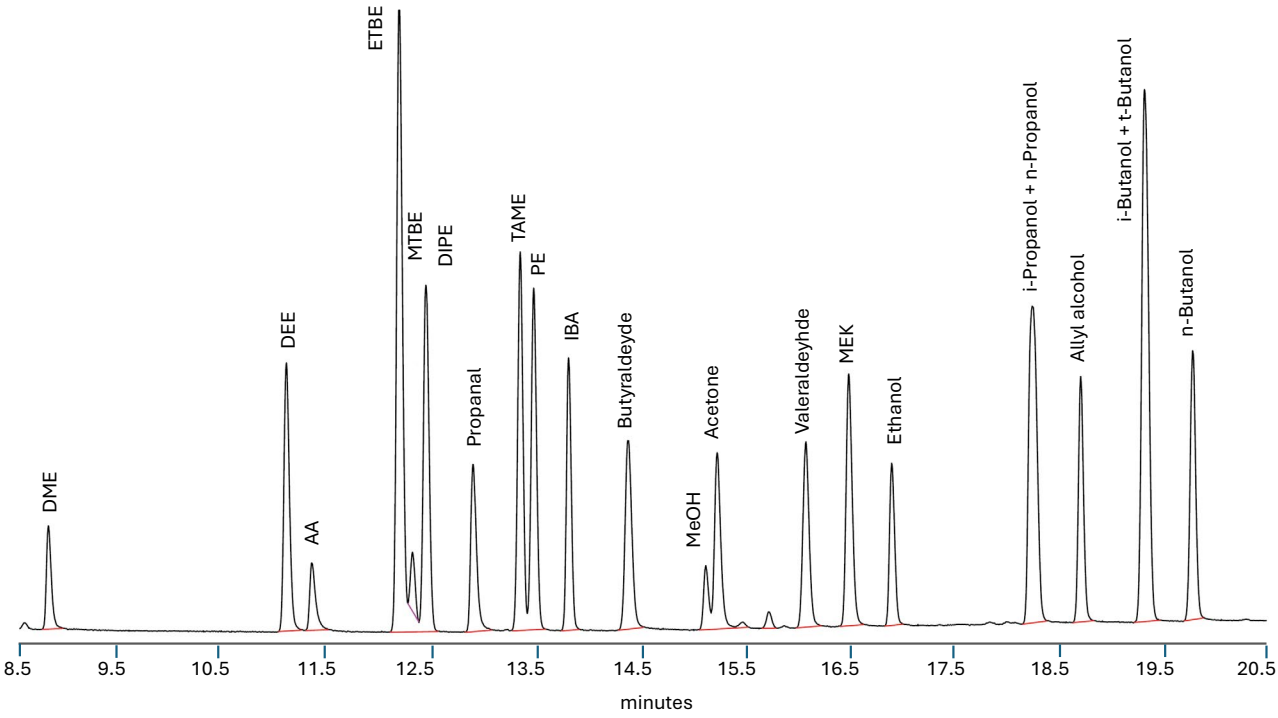

Figure 4. Example of oxygenates chromatogram according to method ASTM D7423.

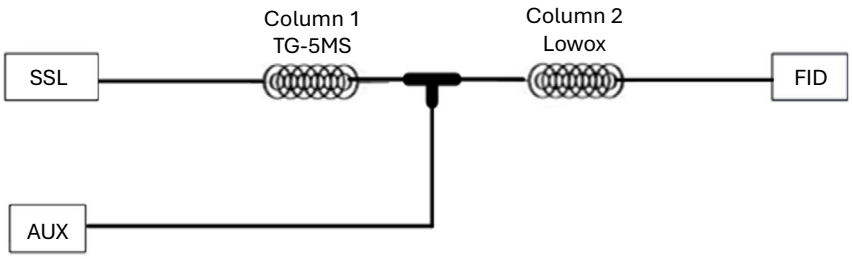

Figure 5. Multi-dimensional GC configuration for oxygenates according to ASTM D7754.

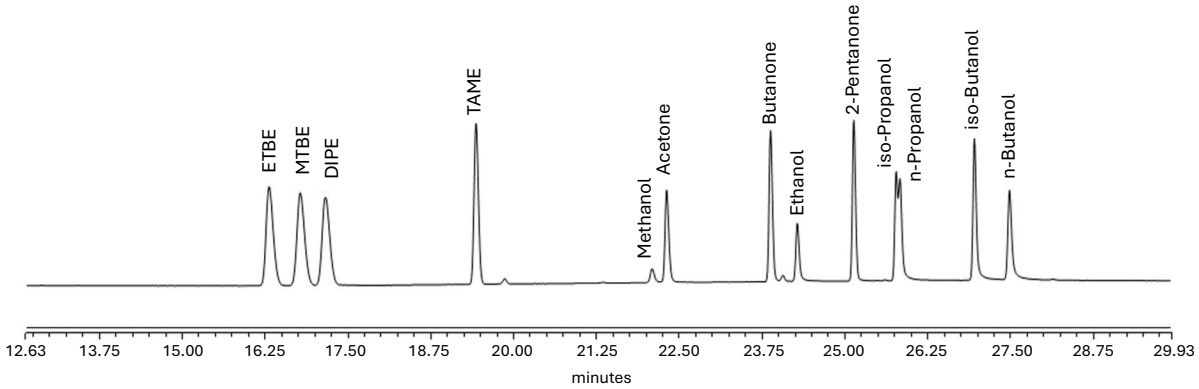

Figure 6. Example of oxygenates chromatogram according to method ASTM D7754.

Table 1. TRACE 1610 GC Analyzers for oxygenates in hydrocarbons.

Cat. No.	Description	Method	Channels	Sample type	Detection limit	Working range
OXY160010011	Oxygenates in gasoline	ASTM D4815	1 – FID	Liquid	0.2%	0.2%–20% ethers 0.2%–12% alcohols
LLVLOX1610111	Low levels oxygenates in LPG	ASTM D7423	1 – FID	Gas or Liquid (bp < 200°C)	0.4 ppm	0.4–20,000 ppm
LLVLOX1610112	Low levels oxygenates in fuels	ASTM D7754	1 – FID	Liquid	0.1 ppm	0.1–2,000 ppm

Conclusions

The Thermo Scientific GC Analyzer for Oxygenates in Light Hydrocarbons provides a reliable, compliant, and future-proof solution for QA/QC and process control laboratories in the oil and gas industry. By combining proven GC technology with pre-engineered configurations for ASTM D4815, D7423, and D7754, the system ensures accurate quantification of oxygenates across a wide concentration range.

Whether monitoring ethanol in gasoline blends, measuring low-level oxygenates that impact catalyst life, or characterizing oxygenate profiles in refinery streams, the Thermo Scientific GC Analyzers deliver dependable performance and actionable data that support both regulatory and business objectives.

Learn more at **thermofisher.com/oxygenates**