



Standard Test Method for Total Olefins in Spark-ignition Engine Fuels by Multidimensional Gas Chromatography¹

This standard is issued under the fixed designation D 6296; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

^{ε1} NOTE—Warning notes were editorially moved into the standard text in August 2003.

1. Scope

1.1 This test method provides for the quantitative determination of total olefins in the C₄ to C₁₀ range in spark-ignition engine fuels or related hydrocarbon streams, such as naphthas and cracked naphthas. Olefin concentrations in the range from 0.2 to 5.0 liquid-volume % or mass %, or both, can be determined directly on the as-received sample whereas olefins in samples containing higher concentrations are determined after appropriate sample dilution prior to analysis.

1.2 This test method is applicable to samples containing alcohols and ethers; however, samples containing greater than 15 % alcohol must be diluted. Samples containing greater than 5.0 % ether must also be diluted to the 5.0 % or less level, prior to analysis. When ethyl-*tert*-butylether is present, only olefins in the C₄ to C₉ range can be determined.

1.3 This test method can not be used to determine individual olefin components.

1.4 This test method can not be used to determine olefins having higher carbon numbers than C₁₀.

NOTE 1—Precision was determined only on samples containing MTBE and ethanol.

1.5 The values stated in SI units are to be regarded as the standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption²
- D 4052 Test Method for Density and Relative Density of

Liquids by Digital Density Meter³

D 4307 Practice for Preparation of Liquid Blends for Use as Analytical Standards³

D 4815 Test Method for Determination of MTBE, ETBE, TAME, DIPE, *tertiary*-Amyl Alcohol and C₁ to C₄ Alcohols in Gasoline by Gas Chromatography³

D 5599 Test Method for Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *trap, n*—a device utilized to selectively retain specific portions (individual or groups of hydrocarbons or oxygenates) of the test sample and to release the retained components by increasing the trap temperature.

3.2 Acronyms:

3.2.1 *ETBE*—ethyl-*tert*-butylether.

3.2.2 *MTBE*—methyl-*tert*-butylether.

4. Summary of Test Method

4.1 A reproducible 0.2-μL volume of a representative sample, or a dilution thereof, is introduced into a computer controlled gas chromatographic system⁵ consisting of a series of columns, traps, and switching valves operating at various temperatures. The valves are actuated at predetermined times to direct portions of the sample to appropriate columns and traps. The sample first passes through a polar column that retains C₁₂⁺ hydrocarbons, all aromatics, C₁₁⁺ olefins, and some alcohols, all of which are subsequently backflushed to vent. The fraction eluting from the polar column, which contains C₁₁ and lower boiling saturated hydrocarbons as well as decene and lower boiling olefins, enters an ether/alcohol trap where the ethers and alcohols are selectively retained and also

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.04 on Hydrocarbon Analysis.

Current edition approved May 10, 2003. Published August 2003. Originally approved in 1998. Last previous edition approved in 1998 as D 6296–98.

² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 05.02.

⁴ *Annual Book of ASTM Standards*, Vol 05.03.

⁵ The sole source of supply of apparatus known to the committee at this time, the AC FTO Analyzer, is AC Analytical Controls, Inc., 3494 Progress Dr., Bensalem, PA 19020. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

