



Designation: D5622 – 24

Standard Test Methods for Determination of Total Oxygen in Gasoline and Methanol Fuels by Reductive Pyrolysis¹

This standard is issued under the fixed designation D5622; 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.

1. Scope*

1.1 These test methods cover the quantitative determination of total oxygen in gasoline and methanol fuels by reductive pyrolysis.

1.2 Precision data are provided for 1.0 % to 5.0 % oxygen by mass in gasoline and for 40 % to 50 % oxygen by mass in methanol fuels.

1.3 Several types of instruments can be satisfactory for these test methods. Instruments can differ in the way that the oxygen-containing species is detected and quantitated. However, these test methods are similar in that the fuel is pyrolyzed in a carbon-rich environment.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D1298 Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

D4052 Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

D4815 Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C₁ to C₄ Alcohols in Gasoline by Gas Chromatography

2.2 Other Standards:

Clean Air Act (1992)³

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology **D4175**.

4. Summary of Test Method

4.1 A fuel specimen of 1 μ L to 10 μ L is injected by syringe into a 950 °C to 1300 °C high-temperature tube furnace that contains metallized carbon. Oxygen-containing compounds are pyrolyzed, and the oxygen is quantitatively converted into carbon monoxide.

4.2 A carrier gas, such as nitrogen, helium, or a helium/hydrogen mixture, sweeps the pyrolysis gases into any of the four downstream systems of reactors, scrubbers, separators, and detectors for the determination of the carbon monoxide content, hence of the oxygen in the original fuel sample. The result is reported as mass % oxygen in the fuel.

5. Significance and Use

5.1 These test methods cover the determination of total oxygen in gasoline and methanol fuels, and they complement Test Method **D4815**, which covers the determination of several specific oxygen-containing compounds in gasoline.

¹ These test methods are under the jurisdiction of Committee **D02** on Petroleum Products, Liquid Fuels, and Lubricants and are the direct responsibility of Subcommittee **D02.03** on Elemental Analysis.

Current edition approved May 1, 2024. Published May 2024. Originally approved in 1994. Last previous edition approved in 2017 as D5622 – 17. DOI: 10.1520/D5622-24.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ *Federal Register*, Vol 57, No. 24, Feb. 5, 1992, p. 4408.

*A Summary of Changes section appears at the end of this standard