



Designation: D8098 – 23

Standard Test Method for Permanent Gases in C₂ and C₃ Hydrocarbon Products by Gas Chromatography and Pulse Discharge Helium Ionization Detector¹

This standard is issued under the fixed designation D8098; 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 This test method covers the determination of hydrogen, nitrogen, oxygen, methane, carbon monoxide, and carbon dioxide in the parts per billion mole (nmol/mol) to parts per million mole (μmol/mol) range in C₂ and C₃ hydrocarbons.

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

1.3 *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.* For some specific hazard statements, see [Annex A1](#).

1.3.1 *The user is advised to obtain LPG safety training for the safe operation of this test method procedure and related activities.*

1.4 *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

[D2505](#) Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by Gas Chromatography

[D4175](#) Terminology Relating to Petroleum Products, Liquid

Fuels, and Lubricants

[D6300](#) Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products, Liquid Fuels, and Lubricants

[D7915](#) Practice for Application of Generalized Extreme Studentized Deviate (GESD) Technique to Simultaneously Identify Multiple Outliers in a Data Set

[E260](#) Practice for Packed Column Gas Chromatography

[F307](#) Practice for Sampling Pressurized Gas for Gas Analysis

2.2 *Other Standards:*³

[G-4](#) and [G-4.1](#), Compressed Gas Association Booklet on the Use of Oxygen

3. Terminology

3.1 For definitions of terms used in this standard, see Terminology [D4175](#).

4. Summary of Test Method

4.1 The sample is separated in a gas chromatographic system using gas chromatography columns. Hydrogen, oxygen, nitrogen, methane, carbon monoxide, and carbon dioxide (also known as the permanent gases) are detected on a pulse discharge detector. The concentration of the gases to be determined is calculated from the peak areas relative to an external standard. Helium is the required carrier gas for this detector. Ultra-high purity carrier gases and leak-free gas chromatography (GC) systems with getters are essential due to the extreme sensitivity of the detector. Argon, if present in the sample, may interfere with oxygen determination.

5. Significance and Use

5.1 The presence of trace amounts of hydrogen, oxygen, carbon monoxide, and carbon dioxide can have deleterious effects in certain processes using hydrocarbon products as feed stock. This test method is suitable for setting specifications, for use as an internal quality control tool, and for use in development and research work.

¹ This test method is under the jurisdiction of ASTM Committee [D02](#) on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee [D02.D0.02](#) on Ethylene.

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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 this standard's Document Summary page on the ASTM website.

³ Available from Compressed Gas Association (CGA), 14501 George Carter Way, Suite 103, Chantilly, VA 20151, <http://www.cganet.com>.

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