



Designation: D7994 – 17

Standard Test Method for Total Fluorine, Chlorine, and Sulfur in Liquid Petroleum Gas (LPG) by Oxidative Pyrohydrolytic Combustion Followed by Ion Chromatography Detection (Combustion Ion Chromatography-CIC)¹

This standard is issued under the fixed designation D7994; 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 individual determination of total fluorine, chlorine, and sulfur in liquid petroleum gas (LPG), low molecular weight hydrocarbons, their mixtures, and dimethyl ether (DME) in the range of 1 mg/kg to 300 mg/kg fluorine and sulfur and 5 mg/kg to 300 mg/kg for chlorine. This test method is applicable to products described in Specifications [D1835](#) and [D7901](#) and it can be applicable to process streams with similar properties to LPG and other materials such as butylene, propylene, and olefins.

1.2 This test method can also be applied to the measurement of the bromine and iodine in samples covered by the scope of this test method, but the precision and bias statement of this test method is not applicable to these halides.

1.3 This test method can be applied to sample concentrations outside the scope of this test method through adjustments of sample injection volume or number of injections combusted (or both), adjustment of injection volume to the ion chromatograph, and adjustment of the final dilution volume of the absorbing solution prior to injection to the ion chromatograph. The precision and scope of this test method is not applicable to samples that are outside the scope of the method.

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

1.4.1 *Exception*—Values given in parentheses are for information only.

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 and health practices and determine the applicability of regulatory limitations prior to use. See Section 9.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization 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

[D1193](#) Specification for Reagent Water

[D1265](#) Practice for Sampling Liquefied Petroleum (LP) Gases, Manual Method

[D1835](#) Specification for Liquefied Petroleum (LP) Gases

[D3700](#) Practice for Obtaining LPG Samples Using a Floating Piston Cylinder

[D6849](#) Practice for Storage and Use of Liquefied Petroleum Gases (LPG) in Sample Cylinders for LPG Test Methods

[D7901](#) Specification for Dimethyl Ether for Fuel Purposes

[E29](#) Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

[E288](#) Specification for Laboratory Glass Volumetric Flasks

[E969](#) Specification for Glass Volumetric (Transfer) Pipets

2.2 OSHA Standards:³

[29 CFR Part 1910.1000](#) Air Contaminants

[29 CFR Part 1910.1200](#) Hazard Communication

3. Terminology

3.1 Definitions:

3.1.1 *combustion ion chromatography (CIC)*, *n*—an analytical system consisting of oxidative pyrohydrolytic combustion followed by ion chromatographic detection.

3.1.2 *halogen (X)*, *n*—a generic term which includes the elements fluorine, chlorine, bromine, and iodine.

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.H0](#) on Liquefied Petroleum Gas.

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

³ Available from Occupational Safety and Health Administration (OSHA), 200 Constitution Ave., NW, Washington, DC 20210, <http://www.osha.gov>.