



Designation: D6667 – 14 (Reapproved 2019)

Standard Test Method for Determination of Total Volatile Sulfur in Gaseous Hydrocarbons and Liquefied Petroleum Gases by Ultraviolet Fluorescence¹

This standard is issued under the fixed designation D6667; 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 total volatile sulfur in gaseous hydrocarbons and liquefied petroleum (LP) gases. It is applicable to analysis of natural, processed, and final product materials. Precision has been determined for sulfur in gaseous hydrocarbons in the range of 1 mg/kg to 100 mg/kg and for sulfur in LP gases in the range of 1 mg/kg to 196 mg/kg (**Note 1**).

NOTE 1—An estimate of pooled limit of quantification (PLOQ), information regarding sample stability and other general information derived from the interlaboratory studies on precision can be referenced in the ASTM research reports.^{2,3}

1.2 This test method may not detect sulfur compounds that do not vaporize under the conditions of the test.

1.3 This test method is applicable for total volatile sulfur determination in LP gases containing less than 0.35 % (mass/mass) halogen(s).

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. See 3.1 and Sections 6 and 7 for specific warning statements.*

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:⁴

D1070 Test Methods for Relative Density of Gaseous Fuels
D1265 Practice for Sampling Liquefied Petroleum (LP) Gases, Manual Method

D3700 Practice for Obtaining LPG Samples Using a Floating Piston Cylinder

D5287 Practice for Automatic Sampling of Gaseous Fuels

D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

F307 Practice for Sampling Pressurized Gas for Gas Analysis

2.2 Gas Processor Association (GPA) Standards:⁵

GPA 2166 Obtaining Natural Gas Samples for Analysis by Gas Chromatography

GPA 2174 Obtaining Liquid Hydrocarbon Samples for Analysis by Gas Chromatography

3. Summary of Test Method

3.1 A heated sample valve is used to inject gaseous samples. Liquefied petroleum gas (LPG) samples are injected by a sample valve connected to a heated expansion chamber. The gaseous sample then enters a high temperature combustion tube where sulfur is oxidized to sulfur dioxide (SO₂) in an oxygen rich atmosphere. Water produced during the sample combustion is removed and the sample combustion gases are next exposed to ultraviolet (UV) light. The SO₂ absorbs the energy from the UV light and is converted to an excited sulfur dioxide (SO₂^{*}). Fluorescence emitted from the excited SO₂^{*} as it returns to a stable state SO₂ is detected by a photomultiplier

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 D02.03 on Elemental Analysis.

Current edition approved May 1, 2019. Published July 2019. Originally approved in 2001. Last previous edition approved in 2014 as D6667 – 14. DOI: 10.1520/D6667-14R19.

² Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D02-1506. Contact ASTM Customer Service at service@astm.org.

³ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D02-1784. Contact ASTM Customer Service at service@astm.org.

⁴ 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.

⁵ Available from Gas Processors Association (GPA), 6526 E. 60th St., Tulsa, OK 74145.