



Standard Test Method for Sulfur in Liquefied Petroleum Gases (Oxy-Hydrogen Burner or Lamp)¹

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1. Scope*

1.1 This test method covers the determination of total sulfur in liquefied petroleum gases containing more than 1 µg/g. Specimens should not contain more than 100 µg/g of halogens.

1.2 To attain the quantitative detectability that the test method is capable of, stringent techniques must be employed and all possible sources of sulfur contamination must be eliminated. In particular, cleaning agents, such as common household detergents which contain sulfates, should be avoided.

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.4 *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:²

D156 Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method)

D1193 Specification for Reagent Water

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

D1266 Test Method for Sulfur in Petroleum Products (Lamp Method)

D1657 Test Method for Density or Relative Density of Light Hydrocarbons by Pressure Hydrometer

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.03 on Elemental Analysis.

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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.

2.2 Energy Institute Standard:³

IP 181 Sampling Petroleum Gases, Including Liquefied Petroleum Gases

3. Summary of Test Method

3.1 The sample is burned in an oxy-hydrogen burner, or in a lamp in a closed system in a carbon dioxide-oxygen atmosphere. The latter is not recommended for trace quantities of sulfur due to the inordinately long combustion times needed. The oxides of sulfur are absorbed and oxidized to sulfuric acid in a hydrogen peroxide solution. The sulfate ions are then determined by either of the following finishes:

3.1.1 *Barium Perchlorate Titration*—The sulfate is titrated with barium perchlorate using a thorin-methylene blue mixed indicator.

3.1.2 *Turbidimetric*—The sulfate is precipitated as barium sulfate and the turbidity of a suspension of the precipitate is measured with a photometer.

4. Significance and Use

4.1 It is important to have the sulfur content of liquefied petroleum gases at low enough concentration to meet government regulations. The presence of sulfur can result in corrosion of metal surfaces. Sulfur can be poisonous to catalysts in subsequent processing.

5. Apparatus

5.1 *Oxy-Hydrogen Combustion Assembly*—The two types listed below are recommended. Any combustion apparatus giving equivalent results, however, is satisfactory.

5.1.1 *Wickbold-Type Combustion Apparatus*, as shown in Fig. 1.

5.1.2 *Modified Beckman Burner-Type Apparatus*,^{4,5} as shown in Fig. 2. Each of the above types of apparatus shall consist of three parts: atomizer-burner, combustion chamber,

³ Available from Energy Institute, 61 New Cavendish St., London, W1G 7AR, U.K., <http://www.energyinst.org.uk>.

⁴ The sole source of supply of the apparatus known to the committee at this time is Scientific Glassblowing Co., P.O. Box 18353, Houston, TX 77023.

⁵ If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

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