



Designation: D1552 – 23

Standard Test Method for Sulfur in Petroleum Products by High Temperature Combustion and Infrared (IR) Detection or Thermal Conductivity Detection (TCD)¹

This standard is issued under the fixed designation D1552; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method covers procedures for the determination of total sulfur in petroleum products including lubricating oils containing additives, and in additive concentrates. This test method is applicable to samples boiling above 177 °C (350 °F). Other sulfur concentrations outside of those listed in 1.1.1 and 1.1.2 may be analyzed, but the precision stated may or may not apply. These procedures use IR detection or TCD following combustion in a furnace.

1.1.1 Procedure A, IR Detection:

1.1.1.1 This procedure is applicable to samples containing a mass fraction of sulfur between 0.22 % and 24.2 %.

1.1.1.2 Petroleum coke containing a mass fraction of sulfur between 2.53 % to 3.79 % sulfur may be analyzed.

1.1.2 Procedure B, TCD Detection:

1.1.2.1 This procedure is applicable to samples containing a mass fraction of sulfur between 0.071 % and 25.8 %.

1.1.2.2 Petroleum coke containing a mass fraction of sulfur between 0.19 % to 6.38 % sulfur may be analyzed.

1.2 Petroleum coke containing a mass fraction of sulfur between 2.53 % to 3.79 % sulfur may be analyzed. Other sulfur concentrations may be analyzed, but the precision stated may or may not apply.

NOTE 1—The D1552 – 08 (2014) version of this standard contained two other procedures using iodate titrations. Since these procedures are no longer being used in the industry laboratories based on a survey of D02.SC 3 laboratories conducted in September 2014, they are being deleted. For earlier information on the deleted procedures, D1552 – 08 (2014) may be perused.

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

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.

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

1.5 *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

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

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

D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products, Liquid Fuels, and Lubricants

D6792 Practice for Quality Management Systems in Petroleum Products, Liquid Fuels, and Lubricants Testing Laboratories

3. Summary of Test Method

3.1 The sample is weighed and placed into a furnace having an oxygen atmosphere sufficient to combust the entire sample and a temperature between 1150 °C and 1450 °C for Procedure A or 1150 °C for Procedure B. Most sulfur present is combusted to SO₂, which is then measured with a detector after moisture and dust are removed by traps. The instrument

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.

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