Designation: D6021 – 12

Standard Test Method for Measurement of Total Hydrogen Sulfide in Residual Fuels by Multiple Headspace Extraction and Sulfur Specific Detection[1]

This standard is issued under the fixed designation D6021; 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 a method suitable for measuring the total amount of hydrogen sulfide (H_2S) in heavy distillates, heavy distillate/residual fuel blends, or residual fuels as defined in Specification D396 Grade 4, 5 (Light), 5 (Heavy), and 6, when the H_2S concentration in the fuel is in the 0.01 to 100 µg/g (ppmw) range.

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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific warning statements, see 7.5, 8.2, 9.2, 10.1.4, and 11.1.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D396 Specification for Fuel Oils
D1193 Specification for Reagent Water
D2420 Test Method for Hydrogen Sulfide in Liquefied Petroleum (LP) Gases (Lead Acetate Method)
D3609 Practice for Calibration Techniques Using Permeation Tubes
D4057 Practice for Manual Sampling of Petroleum and Petroleum Products
D4084 Test Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method)
D4323 Test Method for Hydrogen Sulfide in the Atmosphere by Rate of Change of Reflectance
D5504 Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence
D5705 Test Method for Measurement of Hydrogen Sulfide in the Vapor Phase Above Residual Fuel Oils
D7621 Test Method for Determination of Hydrogen Sulfide in Fuel Oils by Rapid Liquid Phase Extraction

3. Terminology

3.1 *Definitions:*

3.1.1 *heavy distillate, n*—a fuel produced from the distillation of crude oil which has a kinematic viscosity at 40°C between 5.5 and 24.0 mm^2/s, inclusive.

3.1.2 *heavy distillate/residual fuel blend, n*—a blend of heavy distillate and residual fuel oil having a viscosity at 40°C between 5.5 and 24.0 mm^2/s, inclusive.

3.1.3 *multiple headspace extraction, n*—a technique to determine the total concentration of a gas trapped in a liquid by analysis of successive gas extractions from the vapor space of a closed vessel containing a known amount of the sample.

3.1.4 *residual fuel oil, n*—any liquid or liquefiable petroleum product having a kinematic viscosity at 100°C between 5.0 and 50.0 mm^2/s, inclusive, burned for the generation of heat in a furnace or firebox or for the generation of power in an engine.

4. Summary of Test Method

4.1 A representative sample of residual fuel oil is obtained in sufficient quantity to completely fill the sample container. The sample is taken to the laboratory preferably within one to 4 h, within 24 h maximum and placed in a refrigerator until the hydrogen sulfide analysis can be run. At that time, the sample is removed from the refrigerator and allowed to sit at ambient temperature until it flows freely.

4.2 A 0.05 to 5.0 g test specimen (aliquot) is placed in a headspace vial and heated in an oven at 60°C for more than five but less than 15 min. The headspace gas is sampled and injected into either of two types of apparatus capable of measuring the hydrogen sulfide concentration in the gaseous

[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 D02.14 on Stability and Cleanliness of Liquid Fuels.

Current edition approved April 15, 2012. Published May 2012. Originally approved in 1996. Last previous edition approved in 2006 as D6021–06. DOI: 10.1520/D6021-12.

[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**

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