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Standard Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)[1]

This standard is issued under the fixed designation D3227; 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 the determination of mercaptan sulfur in gasolines, kerosines, aviation turbine fuels, and distillate fuels containing from 0.0003 % to 0.01 % by mass of mercaptan sulfur. Organic sulfur compounds such as sulfides, disulfides, and thiophene, do not interfere. Elemental sulfur in amounts less than 0.0005 % by mass does not interfere. Hydrogen sulfide will interfere if not removed, as described in 9.2.

1.2 The values in acceptable SI units are to be regarded as the standard.

1.2.1 *Exception*—The values in parentheses are for information only.

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 Sections 6, 8, 9, and Appendix X1.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1193 Specification for Reagent Water

D1250 Guide for Use of the Petroleum Measurement Tables

D1298 Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

D4052 Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter

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

3. Summary of Test Method

3.1 The hydrogen sulfide-free sample is dissolved in an alcoholic sodium acetate titration solvent and titrated potentiometrically with silver nitrate solution, using as an indicator the potential between a glass reference electrode and a silver/silver-sulfide indicating electrode. Under these conditions, the mercaptan sulfur is precipitated as silver mercaptide and the end point of the titration is shown by a large change in cell potential.

4. Significance and Use

4.1 Mercaptan sulfur has an objectionable odor, an adverse effect on fuel system elastomers, and is corrosive to fuel system components.

5. Apparatus

5.1 As described in 5.2 – 5.5; alternatively, any automatic titration system may be used that, using the same electrode pair described in 5.3, is capable of performing the titration as described in Section 9 and selecting the endpoint specified in 11.1 with a precision that meets or is better than that given in Section 14.

5.2 *Meter*—An electronic voltmeter, operating on an input of less than 9×10^{-12} A and having a sensitivity of ±2 mV over a range of at least ±1 V. The meter shall be electrostatically shielded, and the shield shall be connected to the ground.[3]

5.3 *Cell System,* consisting of a reference and indicating electrode. The reference electrode should be a sturdy, pencil-type glass electrode, having a shielded lead connected to

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricantsand 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.

[3] Any apparatus that will give equal or better precision is acceptable.

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

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