Designation: D1072 – 06 (Reapproved 2012)

Standard Test Method for Total Sulfur in Fuel Gases by Combustion and Barium Chloride Titration[1]

This standard is issued under the fixed designation D1072; 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 is for the determination of total sulfur in combustible fuel gases, when present in sulfur concentrations between approximately 25 and 700 mg/m^3 (1 to 30 grains per 100 cubic feet). It is applicable to natural gases, manufactured gases, mixed gases, and other miscellaneous gaseous fuels.

1.2 The values stated in inch-pound units are to be regarded as 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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1193 Specification for Reagent Water

3. Summary of Test Method

3.1 A metered sample of gas is burned in a closed system in an atmosphere of sulfur-free air. The oxides of sulfur produced are absorbed in sodium carbonate solution, where they are oxidized to sulfate. The sulfate in the absorbent solution is determined by titration with standardized barium chloride solution, using tetra-hydroxy-quinone (THQ) as an indicator.

4. Interferences

4.1 There are no known interferences for the determination of total sulfur in fuel gases when combustion is followed by barium chloride titration. However, users employing barium chloride titration following collection of sulfur dioxide by alternative procedures are cautioned that ammonia, amines, substances producing water soluble cations, and fluorides will interfere with the titration.

5. Apparatus

5.1 *Burner* (Fig. 1), as specified in the Appendix X1.

5.2 *Chimneys, Absorbers and Spray Traps,* (Fig. 2), as specified in the Appendix X1.

5.3 *Flow meter*—A calibrated capillary flow meter for predetermining and indicating the rate of flow of gas to the burner. The capillary selected should be of such size that at the required rate of flow the differential pressure is at least 20 cm of water. A scale divided into millimeters will then provide a reading precision of ± 0.5 %. Other metering devices, including but not limited to rotameters or dry displacement meters, are suitable provided the reading precision is ± 0.5 % or better. A flow controlling valve is attached to the inlet connection of the flow meter.

5.4 *Vacuum System*—A vacuum manifold equipped with a vacuum regulating device, valves, and other necessary accouterments. An example vacuum system capable of performing multiple test measurements is shown in Fig. 3. Other vacuum system configurations can be used to perform this test method. The vacuum system shall be connected to a vacuum pump capable of providing a steady gas flow of 3 L of air per minute through each absorber and capable of maintaining a constant manifold pressure of approximately 40 cm of water below atmospheric pressure.

5.5 *Air-Purifying System*—A device supplying purified air to the burner manifold at a constant pressure of approximately 200 mm of water and to the chimney manifold at a pressure of 1 to 2 cm of water. An example system configuration for multiple tests is illustrated in Fig. 4; however, other air-purifying system configurations can be used to perform this test method. The tubing that connects the chimneys to the manifold shall be of an internal diameter not smaller than 0.63 cm in order to prevent unnecessary restriction of airflow.

5.6 *Manometer*—A water manometer for indicating the gas pressure at the point of volume measurement. It is connected between the flowmeter and the burner, with one leg open to the atmosphere.

[1] This test method is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of D03.05 on Determination of Special Constituents of Gaseous Fuels.

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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.

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