



Standard Test Method for Acidity of Sulfur Hexafluoride ¹

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1. Scope

1.1 This test method covers the determination of the acidic fluorides of sulfur hexafluoride (SF_6).

1.2 *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:*

D 1193 Specification for Reagent Water ²

D 2472 Specification for Sulfur Hexafluoride ³

3. Summary of Test Method

3.1 Acidic constituents of the sample are absorbed in slightly alkaline water containing an indicator and the excess base titrated with a standard acid solution. The resultant acidity is expressed as equivalents of hydrofluoric acid (HF).

4. Significance and Use

4.1 Acidic fluorides are undesirable in SF_6 used as an electrical insulating gas in that they may contribute to corrosion or constitute dielectric hazard.

4.2 This test method is valid for both new and used SF_6 . In used SF_6 , it will only measure those active species which are hydrolyzable.

5. Apparatus

5.1 *Gas Washing Bottles*, 500-mL capacity, two required.

5.2 *Microburet*, graduated to 0.01 mL.

5.3 *Wet Test Meter*.

NOTE 1—The meter is used to measure the volume of dry gas in litres and hence the weight of SF_6 samples. The density of sulfur hexafluoride at 0°C and 1 atm. of pressure (STP) is 6.52 g/L. The density of sulfur hexafluoride at 25°C and 1 atm. of pressure (normal temperature and pressure) is 5.97 g/L. Alternatively, the sample weight may be determined by weighing the sample cylinder before and after sampling.

¹ This test method is under the jurisdiction of ASTM Committee D-27 on Electrical Insulating Liquids and Gases and is the direct responsibility of Subcommittee D27.06 on Chemical Test.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 10.03.

6. Reagents

6.1 *Purity of Reagents*—Use reagent grade chemicals in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. ⁴ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent grade water conforming to Specification D 1193.

6.3 *Phenolphthalein Indicator Solution* (10 g/L)—Dissolve 1 g of phenolphthalein in 100 mL of ethanol (95 %).

6.4 *Sodium Hydroxide Solution* (0.01 N)—Dissolve 0.4 ± 0.01 g of sodium hydroxide (NaOH) in water and dilute to 1 L. Prepare a fresh solution weekly. Standardize by titrating against a weighed amount of potassium acid phthalate.

6.5 *Sulfuric Acid* (0.01 N)—Add 0.25 mL of concentrated sulfuric acid (H_2SO_4 , sp gr 1.84) to water and dilute to 1 L. Standardize against standard 0.01 N NaOH solution.

7. Sampling

7.1 Take the sample as a liquid from the cylinder to be sampled. This may be done by inverting the cylinder so that the outlet valve is at the bottom.

8. Preparation of Apparatus

8.1 Place the cylinder to be sampled as suggested in Section 7 and connect a needle valve to the cylinder outlet. Connect the inlet of one of the gas sampling bottles to the cylinder needle valve and the outlet to the wet test meter. Flexible rubber or plastic tubing can be used. Set the meter to zero and note the reading.

9. Procedure

9.1 Boil about 600 mL of deionized water in a 1-L beaker for about 5 min and cool quickly to room temperature. Add 10 drops of phenolphthalein indicator solution and enough 0.01 N NaOH solution to color the solution faintly pink. Pour half of

⁴ “Reagent Chemicals, American Chemical Society Specifications,” Am. Chemical Soc., Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see “Reagent Chemicals and Standards,” by Joseph Rosin, D. Van Nostrand Co., Inc., New York, NY, and the “United States Pharmacopeia.”