



Designation: D3608 – 19

Standard Test Method for Nitrogen Oxides (Combined) Content in the Atmosphere by the Griess-Saltzman Reaction¹

This standard is issued under the fixed designation D3608; 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 the manual determination of the combined nitrogen dioxide (NO_2) and nitric oxide (NO) content, total NO_x , in the atmosphere in the range from 4 to 10 000 $\mu\text{g}/\text{m}^3$ (0.002 to 5 ppm (v)).

1.2 The maximum sampling period is 60 min at a flow rate of 0.4 L/min.

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

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

D1071 Test Methods for Volumetric Measurement of Gaseous Fuel Samples

D1193 Specification for Reagent Water

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D1357 Practice for Planning the Sampling of the Ambient Atmosphere

D3195 Practice for Rotameter Calibration

D3609 Practice for Calibration Techniques Using Permeation Tubes

D3631 Test Methods for Measuring Surface Atmospheric Pressure

E1 Specification for ASTM Liquid-in-Glass Thermometers

E128 Test Method for Maximum Pore Diameter and Permeability of Rigid Porous Filters for Laboratory Use

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology **D1356**.

4. Summary of Test Method

4.1 The NO is quantitatively **(1)**³ converted to NO_2 by a chromic acid oxidizer. The resulting NO_2 , plus the NO_2 already present, are absorbed in an azo-dye-forming reagent **(2)**. A red-violet color is produced within 15 min, the intensity of which is measured spectrophotometrically at 550 nm.

5. Significance and Use

5.1 Both NO_2 and NO play an important role in photochemical-smog-forming reactions. In sufficient concentrations NO_2 is deleterious to health, agriculture, materials, and visibility.

5.2 In combustion processes, significant amounts of NO may be produced by combination of atmospheric nitrogen and oxygen; at ambient temperatures, NO can be converted to NO_2 by oxygen and other atmospheric oxidants. Nitrogen dioxide also may be generated from processes involving nitric acid, nitrates, the use of explosives, and welding.

6. Interferences

6.1 Any significant interferences due to sulfur dioxide (SO_2) should be negated by the oxidation step. The addition of acetone to the reagent retards color-fading by forming a temporary addition product with SO_2 . This will protect the reagent from incidental exposure to SO_2 and will permit reading the color intensity within 4 to 5 h (instead of the 45 min required without acetone) without appreciable losses.

¹ This test method is under the jurisdiction of ASTM Committee **D22** on Air Quality and is the direct responsibility of Subcommittee **D22.03** on Ambient Atmospheres and Source Emissions.

Current edition approved March 1, 2019. Published April 2019. Originally approved in 1977. Last previous edition approved in 2011 as D3608 – 95 (2011). DOI: 10.1520/D3608-19.

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 The boldface numbers in parentheses refer to a list of references at the end of this standard.