



National Institute of Standards & Technology
Certificate of Analysis
Standard Reference Material 1687b

Nitric Oxide in Nitrogen

(Nominal Concentration 1000 $\mu\text{mol/mol}$)

(Mobile-Source Emission Gas Standard)

This Standard Reference Material (SRM) is intended primarily for the calibration of instruments used for the analysis of oxides of nitrogen in mobile-source emissions. It is not intended as a working standard, but rather as a primary laboratory standard to which the concentration of nitric oxide in other standards can be related.

This SRM is supplied in an aluminum cylinder with a deliverable volume of 0.85 m³ (30 ft³) at normal temperature and pressure. The cylinder conforms to DOT specifications and is equipped with a CGA-660 valve. The cylinder becomes the property of the purchaser.

Nitric oxide concentration: \pm $\mu\text{mol/mol}$

Cylinder Number:

Sample Number:

The uncertainty shown is the estimated upper limit of error of the nitric oxide concentration and is expressed as the 95 percent confidence interval. This uncertainty includes the estimated inaccuracy of the primary standards and the imprecision of the analysis of the SRM versus the primary standards.

Each cylinder of gas in the SRM lot is individually analyzed, and the certified value above applies only to the cylinder identified by cylinder number and sample number on this certificate.

The certified value on this certificate is valid for 2 years from the date of shipment from the National Institute of Standards & Technology (NIST). A validation sticker is supplied with each gas cylinder to validate its certification period. Please affix this sticker to the cylinder upon the receipt of the SRM.

CAUTION: Care must be taken to avoid accidental contamination of the sample during the use of the cylinder with any gas handling system.

The original research and development leading to the certification of this SRM were supported in part by the Motor Vehicle Manufacturers Association of the United States, Inc., Detroit, Michigan.

The measurements leading to the certification of this SRM were performed in the NIST Organic Analytical Research Division by W.J. Thorn and G.D. Mitchell.

The overall direction and coordination of the technical measurements leading to the certification were performed by W.D. Dorko and W.E. May of the NIST Organic Analytical Research Division.

The technical and support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by T.E. Gills.

Gaithersburg, MD 20899
April 10, 1992
(Revision of certificate dated 5-22-89)

William P. Reed, Chief
Standard Reference Materials Program

(over)

Certification Information

The cylinder identified on this certificate is one of a group or "lot" of cylinders. A lot contains a minimum of 50 cylinders and is prepared commercially according to rigid specifications to ensure that the lot is homogeneous and stable. Each cylinder in the lot is individually analyzed at NIST for nitric oxide content.

Analysis

The analysis was performed by means of a continuous analyzer that detects the energy (light) given off by the reaction of the nitric oxide with ozone, chemiluminescence. The analyzer was calibrated with a "batch" standard, one of the cylinders from the SRM lot, that had been previously compared to a set of primary standards of nitric oxide in nitrogen, which bracketed the SRM concentration.

The upper limit of uncertainty was estimated from 1) the inaccuracy of the set of primary standards, 2) the imprecision of the comparison of the batch standard against the primary standards, and 3) the imprecision of the intercomparison of the SRM with the batch standard.

This SRM was analyzed for the presence of other oxides of nitrogen by passing the sample through a high-temperature catalytic furnace which converts other oxides of nitrogen to nitric oxide. Under the conditions of analysis, other oxides of nitrogen would have been detected at one-half percent of the nitric oxide concentration. No other oxides of nitrogen were detected.

Stability

This sample is contained in an aluminum cylinder. The stability of this SRM is considered excellent and no losses of nitric oxide have been observed for similar samples contained in aluminum cylinders for periods of time greater than two years. The value appearing on this certificate is considered valid for 2 years from date of shipment. Periodic reanalyses of representative samples from this lot will be performed, and if significant changes are observed within a two year period, the purchaser will be notified.

Some samples from similar gas mixtures have exhibited a change in constituent concentration when the cylinder pressure fell below 1.04 MPa (150 psi). Therefore, it is recommended that the SRM not be used after the pressure has fallen below 2.1 MPa (300 psi).

Reanalysis

The NIST will reanalyze this SRM for the original purchaser for a fee not to exceed the cost of similar SRMs available at the time of the request for reanalysis, providing the cylinder pressure is at least 6.9 MPa (1000 psi). The original purchaser should contact the NIST Organic Analytical Research Division (301) 975-3108 to arrange for this service.