



# National Institute of Standards & Technology

## Certificate of Analysis Standard Reference Material 2741

### Carbon Monoxide in Nitrogen

Nominal Concentration: 13 mole percent

(In Cooperation with the Motor Vehicle Manufacturers Association)

This Standard Reference Material (SRM) is intended primarily for the calibration of instruments and the evaluation of methods used for the determination of carbon monoxide in mobile-source emissions. It is not intended as a working standard, but rather as a primary laboratory standard, to which the concentration of the carbon monoxide in working standards may be related.

The SRM is supplied in an aluminum cylinder at a nominal pressure of 12.4 MPa (1800 psi) with a deliverable volume of approximately 3.7 m<sup>3</sup> (130 cubic feet) at NTP. The cylinder conforms to DOT specifications and is equipped with a CGA-350 valve. The cylinder becomes the property of the purchaser.

Carbon monoxide concentration:  $\pm$  mole percent

Cylinder Number: Sample Number:

The concentration of carbon monoxide is relative to all other constituents of this gas mixture. The uncertainty shown is the estimated upper limit of error of the certified value at the 95 percent confidence level. This uncertainty includes the estimated inaccuracy of the National Institute of Standards & Technology (NIST) primary gravimetric standards, the imprecision of the intercomparisons of the batch standards with the primary gravimetric standards, and the imprecision of the comparison of the SRM with the batch standards.

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

Note: The certified value in this certificate is valid for four years from the date of shipment from the NIST. A validation sticker is supplied with the gas cylinder that specifies its certification period. Please affix sticker to the cylinder upon receipt.

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

The research and development leading to the certification of this SRM were supported by the Motor Vehicle Manufacturers Association (MVMA) of the United States, Detroit, Michigan.

The development and evaluation of the gravimetry primary standards used to certify this SRM were performed at NIST by MVMA Research Associate, W. J. Thorn.

Gaithersburg, MD 20899  
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William P. Reed, Acting Chief  
Standard Reference Materials Program

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The overall direction and coordination of the technical measurements leading to the certification of this SRM were performed under the chairmanship of W. D. Dorko of the NIST Gas and Particulate Science 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.

#### Material Preparation

This SRM is one of a group or "lot" of cylinders that was prepared commercially according to rigid NIST specifications to ensure that the lot is homogeneous and stable. A lot consists of a minimum of 12 cylinders. Each cylinder of gas within the lot is individually analyzed at the NIST for conformity to NIST specifications and is certified according to the NIST protocols and procedures.

#### Analysis

The carbon monoxide concentration was determined by comparison to the NIST batch standards that were previously intercompared with a set of NIST primary gravimetric standards. The gravimetric standards were prepared from high purity carbon monoxide and nitrogen. The method of intercomparison was by means of a gas chromatograph equipped with a thermal conductivity detector.

#### Stability

As stated on the first page of this certificate, the certified value for carbon monoxide is valid for four years from the date of shipment from the NIST. Periodic reanalyses of representative samples from this lot will be performed during the four-year period, and if a significant change in the certified value is observed, the purchaser will be notified.

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 2.8 MPa (400 psi).

#### Reanalysis

The NIST will reanalyze this SRM for the original purchaser at a cost not to exceed the cost of similar SRMs available at the time of the request for reanalysis. The original purchaser should contact the Gas and Particulate Science Division to arrange for reanalysis.