



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material 2726

#### Carbon Monoxide and Propane in Nitrogen

(Nominal Concentrations: CO, 8 mole percent; C<sub>3</sub>H<sub>8</sub>, 3000  $\mu$ mole/mole)  
(Auto Emission Inspection/Maintenance Gas)

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

This SRM is supplied in an aluminum cylinder which has a deliverable volume of approximately 0.85 m<sup>3</sup> (30 cubic feet) of gas at STP. The aluminum cylinder conforms to DOT specifications and is equipped with a packless brass valve with tapered threads, CGA-350. The cylinder becomes the property of the purchaser.

Carbon monoxide  $\pm$  mole/mole (mole percent)

Propane  $\pm$   $\mu$ mole/mole (ppm)

Cylinder Number:

Sample Number:

The concentrations of carbon monoxide and propane are relative to all other constituents of this gas mixture. Representative samples from the lot were examined for the presence of other hydrocarbons. The estimated concentration of total other hydrocarbons (TOHC), expressed as propane, is  $\mu$ mole/mole(ppm).

The uncertainty shown is the estimated upper limit of error of the certified component and is the 95 percent confidence interval based on allowances for known sources of possible error.

The certified values given above apply to the contents of the cylinder identified by cylinder number and sample number on this certificate.

The certified values on this certificate are valid for two years from the date of shipment from the National Institute of Standards and Technology (NIST). A validation sticker is supplied with the cylinder to validate its certification period. Please affix this sticker to the cylinder upon 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 technical and support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Office of Standard Reference Materials by T.E. Gills.

Gaithersburg, MD 20899  
January 13, 1989

Stanley D. Rasberry, Chief  
Office of Standard Reference Materials

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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 Gas and Particulate Science Division.

The preparation of the primary standards and/or the analytical measurements leading to the certification of this SRM were performed in the Gas and Particulate Science Division by R.V. Kelly, W.R. Miller, G.C. Rhoderick, and J.E. Suddueth.

### Material Preparation

This SRM is one of a group or "lot" of cylinders that was prepared commercially according to rigid specifications to ensure that the lot is homogeneous and stable. A lot contains a minimum of 10 cylinders. Each cylinder of gas within the lot is individually analyzed at NIST for conformity to NIST specifications and is certified according to NIST protocols and procedures.

### Analysis

The carbon monoxide and propane content of each cylinder in the lot were determined by comparison to NIST working standards that had been previously intercompared with a set of primary gravimetric standards. The method of intercomparison was gas chromatography coupled to a thermal conductivity detector for carbon monoxide and gas chromatography coupled to a flame ionization detector for the propane. The method separates the components of the gas mixtures and enables quantitation of each with no interference from the other. This is important as these mixtures may be used with analyzers that are not as specific as GC for the individual components and are therefore employed to ascertain the magnitude of interferences.

The other hydrocarbons in this SRM were determined by gas chromatography and by a total hydrocarbon continuous analyzer; both analyzers were equipped with flame ionization detectors. The total hydrocarbon content of this SRM is equal to the sum of the propane concentration and the TOHC concentration.

The water vapor was determined in representative samples from this SRM lot using a trace moisture analyzer that is an electrochemical measurement of water with phosphorus pentoxide. The average water content was found to be 10  $\mu$ mole/mole. The water content is not certified but given as additional information on the contents of each cylinder.

### Stability

Samples from similar SRM's have exhibited an increase in concentration when the cylinder pressure fell below 1.04 MPa (150 psi). Therefore, it is recommended that the sample not be used as an analytical standard after the pressure has fallen below 2.76 MPa (200 psi).

Periodic reanalyses of representative samples from this lot will be performed at NIST, and if significant changes in the certified values are observed, the purchasers of cylinders from this SRM lot will be notified.

### Reanalysis

As stated on the first page of this certificate, the certified values are valid two years from the date of shipment from NIST. However, when this SRM is used as a standard in a long-term monitoring program, it may be necessary to confirm the original certification during or at the end of the certification period.

The NIST will reanalyze this SRM for the original purchaser at a cost not to exceed the cost of similar SRM's available at the time of the request for reanalysis. The original purchaser should contact R.C. Myers (301) 975-3937, of the NIST Gas and Particulate Science Division, to arrange for reanalysis.