



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 2651

Propane in Nitrogen and Oxygen

(Nominal 100 $\mu\text{mol/mol}$ Propane and 5 mole percent Oxygen)

(Mobile-Source Emission Gas Standard)

(In Cooperation with the Motor Vehicle Manufacturers Association)

This Standard Reference Material (SRM) is intended for the calibration of instruments used for the analysis of hydrocarbons in mobile-source emissions when the oxygen content of the calibration gas is of concern. It is not intended as a working standard, but rather as a primary standard to which the concentration in working standards may be related.

This SRM is supplied in an aluminum cylinder at a nominal pressure of 12.4 MPa (1800 psi) with a deliverable volume of 0.88 m³ (31 ft³) at normal temperature and pressure. The cylinder conforms to DOT specifications and is equipped with a CGA-350 valve. The cylinder becomes the property of the purchaser.

Propane concentration: \pm $\mu\text{mol/mol}$

Cylinder number: Sample number:

The concentration of propane 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% confidence interval. This uncertainty includes the estimated inaccuracy of the NIST primary gravimetric standards, the imprecision of the comparison of the batch standards with the NIST primary gravimetric standards, and the imprecision of the comparison of the SRM with the batch standards.

This SRM is certified only for the concentration of propane and oxygen; however, representative samples from the "lot" have been examined for the presence of other hydrocarbons. The estimated concentration of total other hydrocarbons is _____ $\mu\text{mol/mol}$, expressed as propane. The oxygen concentration is given below:

Oxygen concentration: \pm mole percent

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

The original development and evaluation of the gravimetric primary standards used to certify this SRM were performed at NIST by W.R. Miller, W.J. Thorn, E.E. Hughes, and H.L. Rook.

The overall direction and coordination of the technical measurements leading to the certification were performed by W.D. Dorko, F.R. Guenther, 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 6, 1993

(Revision of certificate dated 7-16-80)

Thomas E. Gills, Acting Chief
Standard Reference Materials Program

(over)

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

Each cylinder of gas is individually analyzed, and the concentration given applies only to the cylinder identified by cylinder number and sample number on this certificate.

The certified value on this certificate is valid for 4 years from the date of shipment from NIST. A validation sticker is supplied with each gas cylinder to validate its certification period. This sticker should be affixed to the cylinder upon the receipt of the SRM.

Material Preparation: 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 propane and oxygen content.

Analysis: The concentration of propane in this SRM was determined by comparison with the NIST batch standards that had been previously intercompared with a set of NIST primary gravimetric standards. The analyses were performed using a gas chromatograph equipped with a flame ionization detector. The results of this analysis indicated a high degree of homogeneity within the lot. Consequently, only 10% of the samples were analyzed for oxygen. The analyses were performed with an analyzer that responds to the paramagnetic properties of oxygen which had been calibrated with gravimetrically prepared standards. All of the samples analyzed were found to have the same oxygen content.

The value for the estimated other hydrocarbons was determined by detailed gas chromatographic measurements on two samples from the lot.

Stability: The stability of this SRM is considered excellent and no losses of concentration have been observed for similar samples contained in aluminum cylinders for periods of time greater than 4 years. However, periodic reanalyses of representative samples from this lot will be performed, and if significant changes are observed within a 4-year period, 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 2.1 MPa (300 psi).

Reanalysis: The NIST will reanalyze this SRM for the original purchaser for a fee not to exceed the current analytical 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.