

Standard Reference Material<sup>®</sup> 2730  
Hydrogen Sulfide in Nitrogen  
(Nominal Amount-of-Substance Fraction 5  $\mu\text{mol/mol}$ )  
Lot 65-D-XX

**CERTIFICATE OF ANALYSIS**

**Purpose:** The certified value delivered by this Standard Reference Material (SRM) is intended for the calibration of instruments used for hydrogen sulfide determinations and for other applications.

**Description:** This SRM is a primary gas mixture supplied in a DOT 3AL-specification aluminum (6061 alloy) cylinder with a water volume of 6 L. Mixtures are shipped with a nominal pressure exceeding 11.0 MPa (1600 psig), which provides the user with 0.63 m<sup>3</sup> (22.2 ft<sup>3</sup>) of useable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-330 stainless steel valve, which is the recommended outlet for this hydrogen sulfide mixture.

**Certified Values:** A NIST certified value is a value for which NIST has the highest confidence in that all known or suspected sources of bias and imprecision have been accounted [1]. This SRM mixture has been certified for hydrogen sulfide amount-of-substance fraction (mole fraction, sometimes termed “molar concentration”) [2]. This certified value is traceable to the International System of Units (SI) through the gravimetric primary standards and procedures used in the preparation of this mixture. The certified value given below applies to the identified cylinder and NIST sample number.

Hydrogen Sulfide Concentration:	5.05 $\mu\text{mol/mol} \pm 0.10 \mu\text{mol/mol}$
Cylinder Number: SAMPLE	NIST Sample Number: SAMPLE
Hydrotest Date: April 1996	Blend Date: October 1996

<sup>(a)</sup> The certified value is expressed as  $x \pm U_{95\%}(x)$ , where  $x$  is the value and  $U_{95\%}(x)$  is the expanded uncertainty of the value. The true value of the analyte lies within the interval  $x \pm U_{95\%}(x)$  with 95 % confidence [3]. For guidance in propagating this uncertainty, see reference 4.

**Period of Validity:** The certified value delivered by **SRM 2730 Lot No. 65-D-XX** is valid within the measurement uncertainty specified until **22 June 2026**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see “Cylinder and Gas Handling Information”). The certification is nullified if the SRM is damaged, contaminated or otherwise modified, or if the internal pressure drops below 0.7 MPa (100 psig).

**Maintenance of Certified Values:** NIST will monitor this SRM over the period of its validity. If substantive technical changes occur that affect the certification, NIST will issue an amended certificate through the NIST SRM website (<https://www.nist.gov/srm>) and notify registered users. SRM users can register online from a link available on the NIST SRM website or fill out the user registration form that is supplied with the SRM. Registration will facilitate notification. Before making use of any of the values delivered by this material, users should verify they have the most recent version of this documentation, available through the NIST SRM website (<https://www.nist.gov/srm>).

**Storage:** This SRM should be stored under normal laboratory conditions within the temperature range of 15 °C to 30 °C.

**Cylinder and Gas Handling Information:** NIST recommends the use of a high-purity, two-stage pressure regulator with a stainless-steel diaphragm and CGA-330 outlet to safely reduce the pressure and to deliver this mixture to the instrument. The regulator should be purged to prevent accidental contamination of the SRM by repeatedly (minimum three times) opening the valve and pressurizing the regulator, then closing the valve and releasing the pressure safely into a vent line.

**Traceability:** The measurand is the total concentration of hydrogen sulfide in nitrogen and the certified value is metrologically traceable to the SI unit of micromoles of hydrogen sulfide per total moles of hydrogen sulfide and nitrogen.

**Mixture Preparation:** The gas mixtures comprising this SRM lot were prepared in accordance with NIST technical specifications by a commercial specialty gas vendor under contract to NIST. The specifications stipulate that each SRM mixture be identical in hydrogen sulfide concentration and stable with time.

**Analytical Methods:** Analyses of the hydrogen sulfide concentration for this lot of cylinders were conducted by comparing each cylinder mixture to a representative cylinder chosen from the lot, the lot standard (LS), to primary gravimetric standards using cavity ring-down spectroscopy (CRDS).

**Homogeneity Analysis:** Each of the hydrogen sulfide mixtures that comprise this SRM lot was compared to the LS using CRDS. A statistical analysis of the analytical results indicated that sample-to-sample hydrogen sulfide concentration differences were not statistically significant. This indicates that, within the precision of the NIST measurements, all of the cylinders comprising this SRM lot have identical hydrogen sulfide concentrations. Therefore, one concentration has been assigned to the entire SRM lot.

**Hydrogen Sulfide Concentration Value Assignment:** The certified hydrogen sulfide concentration for this SRM lot was computed from the assigned concentration for the lot standard and the homogeneity analysis.

**CAS Registry Numbers:** This SRM is certified for hydrogen sulfide in nitrogen. The relevant CAS Registry numbers for these components are: hydrogen sulfide CAS Registry 7783-06-4; nitrogen CAS Registry 7727-37-9.

#### NOTICE TO USERS

NIST strives to maintain the SRM inventory supply, but NIST cannot guarantee the continued or continuous supply of any specific SRM. Accordingly, NIST encourages the use of this SRM as a primary benchmark for the quality and accuracy of the user's in-house reference materials and working standards. As such, the SRM should be used to validate the more routinely used reference materials in a laboratory. Comparisons between the SRM and in-house reference materials or working measurement standards should take place at intervals appropriate to the conservation of the SRM and the stability of relevant in-house materials. For further guidance on how this approach can be implemented, contact NIST by email at [srms@nist.gov](mailto:srms@nist.gov).

#### REFERENCES

- [1] Beauchamp, C.R.; Camara, J.E.; Carney, J.; Choquette, S.J.; Cole, K.D.; DeRose, P.C.; Duewer, D.L.; Epstein, M.S.; Kline, M.C.; Lippa, K.A.; Lucon, E.; Molloy, J.; Nelson, M.A.; Phinney, K.W.; Polakoski, M.; Possolo, A.; Sander, L.C.; Schiel, J.E.; Sharpless, K.E.; Toman, B.; Winchester, M.R.; Windover, D.; *Metrological Tools for the Reference Materials and Reference Instruments of the NIST Material Measurement Laboratory*; NIST Special Publication (NIST SP) 260-136, 2021 edition; U.S. Government Printing Office: Washington, DC (2021); available at <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-136-2021.pdf> (accessed Jun 2022).
- [2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Units (SI)*; NIST Special Publication 811; U.S. Government Printing Office: Washington, DC (2008); available at <https://www.nist.gov/pml/special-publication-811> (accessed Jul 2022).
- [3] JCGM 100:2008; *Evaluation of Measurement Data — Guide to the Expression of Uncertainty in Measurement* (GUM 1995 with Minor Corrections); Joint Committee for Guides in Metrology (2008); available at <https://www.bipm.org/en/publications/guides> (accessed Jul 2022); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at <https://www.nist.gov/pml/nist-technical-note-1297> (accessed Jul 2022).

- [4] Possolo, A.M.; *Evaluating, Expressing, and Propagating Measurement Uncertainty for NIST Reference Materials*; NIST Special Publication (NIST SP) 260-202; U.S. Government Printing Office: Washington, DC (2020); available at <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-202.pdf> (accessed Jul 2022).

**Certificate Revision History:** 11 July 2022 (Change of period of validity; updated format; editorial changes); 25 September 2017 (Change of expiration date; editorial changes); 05 September 2014 (Extension of certification period; editorial changes); 20 August 2012 (Extension of certification period; amended minimum useable pressure; editorial changes); 15 October 2009 (Extension of certification period and updated certified value); 20 July 2001 (Extension of certification period); 10 April 1998 (Original certification date)

*Certain commercial equipment, instruments, or materials may be identified in this Certificate of Analysis to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.*

*Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the Office of Reference Materials 100 Bureau Drive, Stop 2300, Gaithersburg, MD 20899-2300; telephone (301) 975-2200; e-mail [srminfo@nist.gov](mailto:srminfo@nist.gov); or the Internet at <https://www.nist.gov/srm>.*

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