NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017388	NIST Sample Number: 43-L-04
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

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[3] 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 Jun 2026).

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017400	NIST Sample Number: 43-L-05
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017361	NIST Sample Number: 43-L-06
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
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Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

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Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017385	NIST Sample Number: 43-L-08
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

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Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

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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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017335	NIST Sample Number: 43-L-09
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017304	NIST Sample Number: 43-L-11
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017332	NIST Sample Number: 43-L-13
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017418	NIST Sample Number: 43-L-14
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017397	NIST Sample Number: 43-L-16
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017301	NIST Sample Number: 43-L-18
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017412	NIST Sample Number: 43-L-21
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

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Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017391	NIST Sample Number: 43-L-25
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017344	NIST Sample Number: 43-L-26
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017362	NIST Sample Number: 43-L-27
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017380	NIST Sample Number: 43-L-28
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

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Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017387	NIST Sample Number: 43-L-29
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

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[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017356	NIST Sample Number: 43-L-30
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017392	NIST Sample Number: 43-L-32
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017316	NIST Sample Number: 43-L-33
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017330	NIST Sample Number: 43-L-35
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017390	NIST Sample Number: 43-L-36
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017363	NIST Sample Number: 43-L-41
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017306	NIST Sample Number: 43-L-42
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017386	NIST Sample Number: 43-L-44
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017402	NIST Sample Number: 43-L-45
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017310	NIST Sample Number: 43-L-46
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017406	NIST Sample Number: 43-L-47
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017408	NIST Sample Number: 43-L-48
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017307	NIST Sample Number: 43-L-49
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017327	NIST Sample Number: 43-L-51
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017331	NIST Sample Number: 43-L-52
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017409	NIST Sample Number: 43-L-53
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

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[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017411	NIST Sample Number: 43-L-54
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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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 2026).

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017377	NIST Sample Number: 43-L-55
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017416	NIST Sample Number: 43-L-58
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017293	NIST Sample Number: 43-L-59
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017355	NIST Sample Number: 43-L-60
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017339	NIST Sample Number: 43-L-61
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017318	NIST Sample Number: 43-L-64
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
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Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017303	NIST Sample Number: 43-L-66
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017308	NIST Sample Number: 43-L-71
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017358	NIST Sample Number: 43-L-72
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017413	NIST Sample Number: 43-L-73
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017364	NIST Sample Number: 43-L-74
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017313	NIST Sample Number: 43-L-75
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017383	NIST Sample Number: 43-L-78
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017338	NIST Sample Number: 43-L-80
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 244.50 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017384	NIST Sample Number: 43-L-82
Hydrotest Date: September 2006	Blend Date: November 2026

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL016332	NIST Sample Number: 43-L-07
Hydrotest Date: May 2005	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017296	NIST Sample Number: 43-L-10
Hydrotest Date: September 2026	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL016400	NIST Sample Number: 43-L-12
Hydrotest Date: May 2005	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017394	NIST Sample Number: 43-L-17
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017328	NIST Sample Number: 43-L-20
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017407	NIST Sample Number: 43-L-22
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017378	NIST Sample Number: 43-L-24
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017389	NIST Sample Number: 43-L-31
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017314	NIST Sample Number: 43-L-34
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL016524	NIST Sample Number: 43-L-37
Hydrotest Date: May 2005	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017396	NIST Sample Number: 43-L-38
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017404	NIST Sample Number: 43-L-40
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017399	NIST Sample Number: 43-L-43
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017321	NIST Sample Number: 43-L-50
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017374	NIST Sample Number: 43-L-57
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017367	NIST Sample Number: 43-L-62
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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* * * * * * * End of Certificate of Analysis * * * * * * *

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017414	NIST Sample Number: 43-L-63
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017395	NIST Sample Number: 43-L-65
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017393	NIST Sample Number: 43-L-67
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017405	NIST Sample Number: 43-L-68
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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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 2026).

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL016526	NIST Sample Number: 43-L-70
Hydrotest Date: May 2005	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017326	NIST Sample Number: 43-L-76
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017342	NIST Sample Number: 43-L-77
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) 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.

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 2026).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Unit (SI)*; NIST Special Publication (NIST SP) 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/pml/special-publication-811 (accessed Jun 2026).

[3] 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 Jun 2026).

If you use this SRM in published work, please reference:

Cecelski C, Harris K, Goodman C, Kimes W, Liu Q, Miller W, Carney J (2021) Certification of NIST Gas Mixture Standard Reference Materials. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-222. https://doi.org/10.6028/NIST.SP.260-222

Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (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; or the Internet at https://www.nist.gov/srm.

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Date of Issue:
02 June 2026

Standard Reference Material® 1685b
Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

CERTIFICATE OF ANALYSIS

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for use in producing metrologically traceable secondary standards for the calibration of instruments used for nitric oxide determinations.

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 12.4 MPa (1800 psig), which provides the user with 0.73 m^3 (25.8 ft^3) of usable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless-steel valve, which is the recommended outlet for this nitric oxide mixture.

Certified Value: 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 nitric oxide 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.

Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL017410	NIST Sample Number: 43-L-79
Hydrotest Date: September 2006	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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 Value: 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). 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).

Marcela Najarro, Acting Chief
Chemical Sciences Division

Steven J. Choquette, Director
Office of Reference Materials

Certificate Revision History on Page 2

Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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-660 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.

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 within the lot be identical in nitric oxide mole fraction and stable with time.

Analytical Method: Analyses of the nitric oxide mole fraction for this lot of cylinders were conducted by comparison to a representative cylinder chosen from the lot, designated as the SRM lot standard (LS). The LS was compared to NIST primary gravimetric standards using non-dispersive ultraviolet (NDUV) spectrometry. Each of the nitric oxide mixtures that comprise this SRM lot was then compared to the LS using NDUV.

CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

NOTICE TO USERS

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REFERENCES

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Certificate Revision History: 02 June 2026 (Updated uncertainty value; removal of Total Oxides of Nitrogen (NOx) value; change of period of validity; editorial changes; format update); **28 January 2008** (Original certification date).

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Nitric Oxide in Nitrogen
(Nominal Amount-of-Substance Fraction 250 µmol/mol)
Lot 43-L-XX

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Nitric Oxide Mole Fraction: 243.30 µmol/mol ± 2.00 µmol/mol[(a)]

Cylinder Number: CAL016476	NIST Sample Number: 43-L-81
Hydrotest Date: May 2005	Blend Date: January 2007

[(a)] 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. The uncertainty is expressed as an expanded uncertainty $U = ku_c$ with u_c determined by experiment and a coverage factor $k = 2$. For guidance in propagating this uncertainty, see reference 3.

Period of Validity: The certified value delivered by **SRM 1685b**, **Lot No. 43-L-XX** is valid within the measurement uncertainty specified until **26 March 2037**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Storage" and "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).

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Marcela Najarro, Acting Chief
Chemical Sciences Division

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Safety: Consult the Safety Data Sheet (SDS) for hazard information.

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Cylinder and Gas Handling Information: NIST recommends the use of a high purity, two stage pressure regulator with a stainless-steel diaphragm and CGA-660 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.

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CAS Registry Numbers: This SRM is certified for nitric oxide in nitrogen. The relevant CAS Registry numbers for these components are: nitric oxide CAS Registry 10102-43-9; nitrogen (balance gas) CAS Registry 7727-37-9.

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