

Traceable Calibrations Gases: SRMs, NTRMs, and EPA Protocol Gases

Two NIST programs provide calibration gas standards with NIST analyses and concentration value assignment: the gas mixture Standard Reference Material (SRM) program and the NIST Traceable Reference Material (NTRM) program. These two programs meet the traceability needs of the specialty gas industry. However the demand for traceable gases from end users is too great for NIST to meet, and NIST must rely on the specialty gas industry to extend traceability to these users through the U.S. Environmental Protection Agency (EPA) Protocol Gas Program. The EPA specifies the Protocol Gas program in regulations that apply to measurement of stack gas emissions; the Protocol Gas mixtures extend traceability to end users in the U.S.

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The Gas Mixture SRM and NTRM Programs provide the specialty gas industry with gas standards with defined NIST traceability. These calibration gas standards are mixtures contained in high-pressure compressed-gas metal cylinders. In the SRM program, NIST initiates the production of mixtures after which NIST analyzes every SRM mixture against primary standards and assigns certified concentration values. Standards supplied through the SRM program have the lowest uncertainties, but are not always available and are resource-intensive for NIST to provide. In the NTRM program, specialty gas companies initiate production with NIST concurrence, after which the company analyzes 100% of the cylinders against an SRM; NIST selects 10% for analysis against NIST primary standards. Certified concentration values are assigned by combining the NIST data with the producer's data. The NTRM program provides standards that, by their nature, have greater uncertainties than the SRMs, and are used primarily by specialty gas companies to calibrate production lines of protocol gas mixtures. Both programs require that mixtures be made as a group of cylinders with identical content. These mixtures are specified in the Code of Federal Regulations (CFR) for use in calibration of instruments used to monitor regulated emissions. The NTRM program was developed to augment the SRM program because the SRM program could not provide all of the required standards in a timely manner. Recently the NTRM program was expanded to include the NTRM Prime (NTRM¹), in which NIST analyzes every sample, to address the high-accuracy and precision needs of certain customers in the automotive industry.

The EPA Protocol Gas program was initiated in 1980 to meet an even greater demand for standards required by the EPA. In this program, the specialty gas companies follow

an EPA protocol to blend and analyze individual mixtures calibrated against SRMs or NTRMs. Protocol mixtures are then sent to end users with no direct involvement of either EPA or NIST. To provide quality assurance (QA) for the Protocol Gases, NIST is now working with EPA on a verification program where Protocol Gases can be sampled and analyzed by NIST to determine compliance with producer certificates.

NIST-traceable calibration gas standards are stipulated in the CFR to be used for the calibration of instruments employed in the monitoring of regulated emissions.

NIST is striving to improve the traceability link so that end users can confidently rely on the specialty gas industry to provide their gas mixtures. At every stage of increased need for calibration gas standards, NIST has been flexible and responsive in development of programs to meet the needs of the EPA and the specialty gas industry.

NIST TRACEABLE GAS STANDARDS:

SRM: NIST initiates production of the gas mixtures, analyzes each cylinder, and assigns certified concentration values.

NTRM: Specialty gas companies initiate mixture production and analyze 100% of the cylinders; NIST selects 10% for NIST analysis.

NTRM¹: Expanded from the NTRM program; NIST analyzes every sample to meet customer needs.

EPA Protocol Gas: Specialty gas companies follow an EPA protocol that specifies blending and analysis of protocol mixtures using SRMs or NTRMs for their analyses. NIST is currently working on a quality assurance procedure with EPA.

Future Plans: To support the needs of the SRM, NTRM, and NTRM¹ programs, NIST plans to continue its efforts to increase the number and concentration ranges of gas species for which it maintains primary standards, the foundation of these programs. NIST will continue with the Protocol Gas verification program. Meetings with interested parties – NTRM producers, regulating bodies, and end users – will be held during FY07 to discuss the NIST programs and to evaluate the results of recent verification analyses.