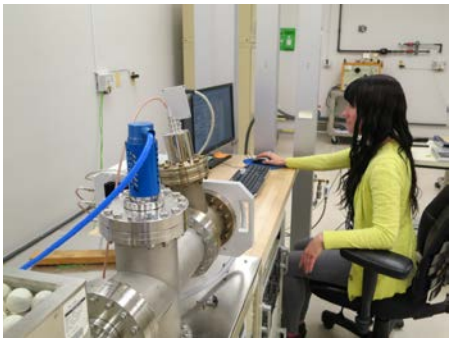
Primary Standards Laboratory
Gas Leaks Project

Fact Sheet

The PSL maintains a wide variety of primary vacuum gas leak standards to assure accurate and traceable measurements for its customers. Capabilities include both fundamental and direct comparison leak measurements for any nonreactive, nontoxic, nonradioactive gas from 2 to 128 atomic mass units (range of mass spectrometers). The range covered is 1×10-7 mol/s to 1×10-14 mol/s. In addition, the Leaks Laboratory measures temperature coefficients from 5°C to 50°C for permeation leaks and measures either open or closed reservoir leaks.



Accumulate Dump System

Major Resources

- Accumulate-dump system uses a Pfieffer QMS 422 Quadrupole Mass Spectrometer inlet and gas fill system.
- PΔV system uses dual MKS capacitance diaphragm gages (1 torr and 10 torr) and calibrated volumes.
- Leak Compare II system uses Leybold Ultratest F helium LD, inlet manifold, and temperature chambers.
- A set of Brooks precision bore tubes are used for calibrating volumes from 6 to 4000 cm^3.

Capabilities

Below is a representative sample of the project's uncertainties. The PSL is National Voluntary Laboratory Accreditation Program (NVLAP) accredited under Lab Code 105002-0 by the National Institute of Standards and Technology/NVLAP (NIST/NVLAP) in most of its capabilities. For full details, see http://ts.nist.gov/standards/scopes/1050020.pdf

Gas Leak: PΔV Technique

Range	Best Uncertainty in %, k=2	Remarks
1×10^{-7} moles/s	0.4	Total Gas Measurement
1×10^{-8} moles/s	0.5	Total Gas Measurement
1×10^{-9} moles/s	0.9	Total Gas Measurement
1×10^{-10} moles/s	1.2	Total Gas Measurement

Gas Leak: Accumulate Dump Technique

Range	Best Uncertainty in %, k=2	Remarks
1×10^{-10} moles/s - 1×10^{-14} moles/s	2.2	1-200 Atomic Mass Units for any nonreactive, nonhazardous, nonradioactive gas

Gas Leak: Comparison Technique

Range	Best Uncertainty in %, k=2	Remarks
1×10^{-10} moles/s	3.3	Helium
1×10^{-11} moles/s	3.3	Helium
1×10^{-12} moles/s	2.5	Helium
1×10^{-13} moles/s	2.8	Helium
1×10^{-14} moles/s	3.6	Helium

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