Wavelength REFERENCES

Hydrogen Cyanide
Fiber coupled gas cell for Remote Optical Gas Sensor and Calibration C-Band

Gas cells are precision filters whose absorption wavelengths depend on specific molecular energy level transitions. $H^{13}C^{14}N$ molecular absorption lines have been identified by national standards bodies as a primary wavelength reference in the C-band (1530nm-1565nm).

Our NIST-traceable $H^{13}C^{14}N$ gas cells are offered in two standard pressures: 100 Torr and 25 Torr (equiv. to SRMs 2519 and 2519a, respectively). Cells are available in two standard sizes –5.5cm path length (*shown here*) and 16.5cm. Generally, path length will affect measured absorption depth and pressure will affect the linewidth.

Gas cells are hard-sealed for long life and feature advanced optical design for very low level of interference artifacts.

Cells may be ordered fully fiber-coupled (single-mode fiber, with or without connectors), or with a built-in InGaAs photo-detector on one end for direct board mount.

Additional housing sizes and gases available.

Specifications[1]

Gas Lines:		
Wavelength Range	nm	1525 to 1565
Wavelength Accuracy[2]	pm	< ± 0.2pm (expanded uncertainty)
Absorption line depth[3] (R8 line)	dB	3.2 (16.5cm; typ.) 1.1 (5.5cm; typ.)
Linewidth (R8 line; FWHM, log scale)	pm	68 (100 Torr; typ.) 16 (25 Torr; typ.)
Temperature Dependence	pm	<0.01/°C
Custom Pressures (25 °C)	Torr	1 to 150 ± 10%
Carbon Isotope		13 standard (nat.isotopic abundance optional)
Gas Cell:		
Cell Transmission	%	>50; fiber to fiber
Spectral ripple (P-P)	dB	<0.1 P-P in any 2nm span
Cell Lifetime	years	>10
Operating temperature	°C	+5 to +70
Storage temperature	°C	-40 to +80
Shock	g	>100, 3 axes
Connector Type		FCAPC, SCAPC, FCPC, SCPC, none, PD(photodetector)
Photodetector:		
Net Responsivity	A/W	>0.5
Capacitance (0V)	pF	4 typical
Shunt Resistance	MΩ	>5

1. 25 °C; Specifications subject to change without notice
2. Expanded uncertainty on least accurate line (P7) for 25 Torr. See table next page.
3. For instruments with resolution better than the linewidth. Using lower resolution instruments could understate absorption.

Features

- **Hermetic seal, >10 year life**
- **Wedged windows and coated optics for minimum interference artifacts**
- **Rugged miniaturized package (5.5cm path length)**
- **Custom pressures and options available**
- **Low cost**
- **Full C band coverage**

Applications

- **Remote optical gas sensing systems**
- **Bump testing gas detectors**
- **Tunable laser calibration**
- **OSA or tunable filter calibration**
- **Wavelength/frequency locking**

Ordering Information (example)

HCN-13-H(5.5)-25-FCAPC

- Carbon isotope
- H(5.5): 5.5cm path; H(16.5): 16.5cm path
- Pressure (Torr)
- Connector type (include /PD for photodetector)

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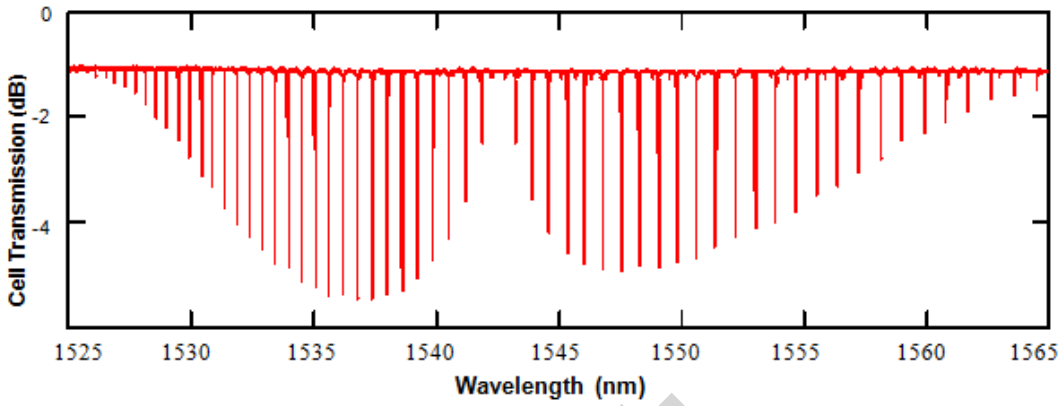

Graph of cell transmission vs. wavelength for 16.5cm $H^{13}C^{14}N$ cell.

R Branch	Wavelength (nm)	P Branch	Wavelength (nm)
26	1527.63342(12)	1	1543.11423(5)
25	1528.05474(15)	2	1543.80967(18)
24	1528.48574(9)	3	1544.51503(8)
23	1528.92643(6)	4	1545.23033(7)
22	1529.37681(7)	5	1545.95549(7)
21	1529.83688(6)	6	1546.69055(8)
20	1530.30666(8)	7	1547.43558(24)
19	1530.78615(8)	8	1548.19057(7)
18	1531.27537(7)	9	1548.95555(4)
17	1531.77430(8)	10	1549.73051(4)
16	1532.28298(8)	11	1550.51546(5)
15	1532.80139(7)	12	1551.31045(9)
14	1533.32954(8)	13	1552.11546(10)
13	1533.86745(7)	14	1552.93051(9)
12	1534.41514(6)	15	1553.75562(12)
11	1534.97258(6)	16	1554.59079(10)
10	1535.53981(5)	17	1555.43605(11)
9	1536.11683(4)	18	1556.29141(15)
8	1536.70364(5)	19	1557.15686(15)
7	1537.30029(6)	20	1558.03240(15)
6	1537.90675(13)	21	1558.91808(14)
5	1538.52305(7)	22	1559.81389(14)
4	1539.14921(12)	23	1560.71983(10)
3	1539.78523(9)	24	1561.63593(9)
2	1540.43120(10)	25	1562.56218(13)
1	1541.08703(10)	26	1563.49859(16)
0	1541.75280(6)	27	1564.44519(21)

25 Torr $H^{13}C^{14}N$ Center Wavelengths

Values as stated by NIST. Expanded (2 sigma) uncertainties are stated in parenthesis and apply to least significant digits.

NIST Traceability

The resulting absorption spectra exhibited by Wavelength References $H^{13}C^{14}N$ Cells are determined by fundamental molecular energy level transitions that have been well characterized by standards bodies such as NIST. As such, the presence of $H^{13}C^{14}N$ at a specified pressure guarantees repeatable absorption spectra characteristics. Our pressure uncertainty of +/- 10% falls within NIST's stated uncertainty of +/-20%. We can therefore state with assurance that our cells are NIST-traceable.

Material Handling

Safety is always an appropriate concern. Occupational Safety & Health Administration (OSHA) lists a Permissible Exposure Limit (PEL) for $H^{13}C^{14}N$ of 11mg/m^3 over an 8-hour period (time-weighted average). Our 16.5cm 100 Torr cells contain approximately 1 mg of $H^{13}C^{14}N$, while the 5.5cm path 25 Torr cells contain <40 µg – far below any quantity deemed hazardous by OSHA. Therefore, no special provisions are necessary for the handling of these cells, and they may be shipped by any customary means.

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