

All data taken at Pacific Northwest National Laboratory (PNNL)

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Version 1.0, December, 02

Composite spectrum for TEA_25T

Effective burden of composite spectrum: 1 part-per-million-meter (ppm-meter) at 296 K

Equivalent concentration x path-length of composite spectrum: 4.1661×10^{-6} grams/liter-meter

Sample Conditions-

- Chemical name and CAS number: Triethylamine, triethyl amine, TETN, TEN, TEA, N,N-Triethylamine, N,N,N-Triethylamine, $(C_2H_5)_3N$: [121-44-8]
- Physical properties: fw=101.1912 g/mole, fp=-114.7° C, bp=88.9° C
- Supplier and stated purity: Aldrich, 99.5%
- Sample class: I (PNNL scale).
- Temperature of sample: 24.98 ± 0.02 C
- Diluent: Sample back filled with ultra high purity nitrogen to 760 ± 5 Torr
- Individual samples at 1.1727, 5.0710, 0.60340, 8.0500, 2.0569, 0.81833, 4.0535, 0.41300, 25.16, 3.0655, 14.13 and 6.5144 Torr. Path length = 19.96 cm. Final data is a composite spectrum.
- Preparation: Sample placed over $CaSO_4$ to remove water. Pump on sample at -60 C to remove air.

Instrument Parameters-

- Bruker-66V FTIR, temperature controlled environment, evacuated optics bench
- Modified to include second aperture, between interferometer output and sample cell. This substantially reduces both “ghosting” and warm aperture effects.
- Spectral range: $7,100$ to 575 cm^{-1} (1.409 to 17.391 microns)
- Instrumental resolution based on maximum interferometer displacement is 0.112 cm^{-1}
- Spectral interval after 2X zero-filling interferogram and FFT: 0.06 cm^{-1}
- Interferogram zero-fill: 2X
- Apodization: Boxcar
- Phase correction: Mertz
- Beam splitter: Potassium bromide (KBr)
- IR source: Carbide glowbar (22 V)
- Scanner velocity: 60KHz (HeNe crossing frequency)
- Number of interferograms averaged per single channel spectra: 256
- Detector: Mid-band HgCdTe, photoconductive, 77K operation
- Folding limits: 15798 to 0 cm^{-1}

Post Processing and Related Parameters-

- Non-linearity detector correction (Bruker proprietary) applied to interferogram ($\alpha = 0.90$, $\beta = 500$)
- Composite spectrum created from 12 individual absorbance (base-10) spectra via classical least squares fit: Intercept=0, slope is fitted, individual absorbance values weighted by T^2 (transmission squared), all absorbance values > 1.6 are given zero weight
- Calculated and estimated errors: Type A = 0.34%, Type B = 3%
- Frequency correction (already applied): $V(\text{corrected}) = V(\text{instrument}) * 0.999998 - 2.75000e-6$
- Axis units: X=wavenumbers (cm^{-1}), Y=Absorbance (base-10)
- Trace water vapor and carbon dioxide features removed via spectral subtraction

- Baseline correction via 3rd order polynomial subtraction