

All data taken at Pacific Northwest National Laboratory (PNNL)

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Composite spectrum for HCFC142B\_25T

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

Equivalent concentration x path-length of composite spectrum  $4.1375 \times 10^{-6}$  grams/liter-meter

Unidentified impurity bands observed at 2984, 1446, 1429 and 1301 (strongest)  $\text{cm}^{-1}$ . Suspect that there is a trace of another halocarbon(s) in sample. Was able to remove strongest feature using spectral subtraction based on deviation vector.

### Sample Conditions-

- Chemical name and CAS number: 1-Chloro-1,1-difluoroethane, 1,1,1-Chlorodifluoroethane, gentron-101, Freon-142, HCFC-142B,  $\text{CH}_3\text{CF}_2\text{Cl}$ : [75-68-3]
- Physical properties: fw=100.4955 g/mole, fp=-131° C, bp=-10° C
- Supplier and stated purity: Aldrich, 98%
- Sample class: I (PNNL scale).
- Temperature of sample:  $25.04 \pm 0.02$  C
- Diluent: Sample back filled with ultra high purity nitrogen to  $760 \pm 5$  Torr
- Individual samples at 2.1296, 1.03550, 8.6003, 0.57050, 4.0415, 1.5720, 32.05, 16.41, 0.73000 and 68.82 Torr. Path length = 19.94 cm. Final data is a composite spectrum.
- Preparation: Multiple freeze-thaw cycles at 77 K 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:  $6,500$  to  $600 \text{ cm}^{-1}$  (1.534 to 16.667 microns)
- Instrumental resolution based on maximum interferometer displacement is  $0.112 \text{ cm}^{-1}$
- Spectral interval after 2X zero-filling interferogram and FFT:  $0.06 \text{ cm}^{-1}$
- 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  $0 \text{ cm}^{-1}$

### Post Processing and Related Parameters-

- Non-linearity detector correction (Bruker proprietary) applied to interferogram ( $\tau = 0.85$ ,  $\tau = 530$ )
- Composite spectrum created from 10 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 = 0.31%, Type B = 3%
- Frequency correction (already applied):  $V(\text{corrected}) = V(\text{instrument}) * 0.99999896 + 8.812 \times 10^{-4}$
- Axis units: X=wavenumbers ( $\text{cm}^{-1}$ ), Y=Absorbance (base-10)

- Trace CO<sub>2</sub> features removed via spectral subtraction
- Baseline correction via 7<sup>th</sup> order polynomial subtraction