

All data taken at Pacific Northwest National Laboratory (PNNL)  
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Composite spectrum for MVE\_25T

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

Equivalent concentration x path-length of composite spectrum:  $2.3912 \times 10^{-6}$  grams/liter-meter

### Sample Conditions-

- Chemical name and CAS number: Methyl vinyl ether; Ethene, methoxy-; Methoxyethylene; Methyl vinyl ether; Vinyl methyl ether; 1-Methoxyethylene; CH<sub>2</sub>=CHOCH<sub>3</sub>; Methoxyethene; C<sub>3</sub>H<sub>6</sub>O : [107-25-5]
- Physical properties: MW=58.0791 g/mole, mp= -121.6. °C, bp=5 °C, Density (25 C) = 0.744 g/cm<sup>3</sup>
- Supplier and stated purity: Customgas Solutions Inc., > 98 %
- Sample class: I (PNNL scale).
- Temperature of sample: 25.01 ± 0.02 C
- Diluent: Sample back filled with ultra high purity nitrogen to 760 ± 5 Torr.
- Individual samples at 1.03210, 0.51410, 2.9483, 0.25706, 2.0120, 3.4963, 6.0060, 29.93, 15.05 60.86, 84.40 and 43.11 Torr. Path length= 19.96 cm. Final data is a composite spectrum.
- Preparation: Multiple freeze-thaw cycles at 77K to remove air.

### Instrument Parameters-

- Bruker-66V FTIR, 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 550 cm<sup>-1</sup> (1.538 to 18.18 microns)
- Instrumental resolution based on maximum interferometer displacement is 0.112 cm<sup>-1</sup>
- Spectral interval after 2X zero-filling interferogram and FFT: 0.06 cm<sup>-1</sup>
- 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<sup>-1</sup>

### Post Processing and Related Parameters-

- Non-linearity detector correction (Bruker proprietary) applied to interferogram ( $\alpha=0.90$ ,  $\epsilon=500$ )
- 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<sup>2</sup> (transmission squared), all absorbance values  $\geq 1.6$  are given zero weight
- Calculated and estimated errors: Type A =0.257%, Type B  $\leq 3\%$
- Frequency correction (already applied):  $V(\text{corrected})=V(\text{instrument})*1.00000135+8.5741 \times 10^{-4}$
- Axis units: X=wavenumbers (cm<sup>-1</sup>), Y=Absorbance (base-10)

- Trace acetylene was removed by spectral subtraction
- Baseline correction via 7<sup>th</sup> order polynomial subtraction