

All data taken at Pacific Northwest National Laboratory (PNNL)
Operators: Timothy J. Johnson, Luisa T. Profeta and Robert L. Sams:
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Composite spectrum for OCTANOIC_25T

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

Equivalent concentration x path-length of composite spectrum: 5.9373×10^{-6} grams/liter-meter

Sample Conditions-

- Chemical name and CAS number: Octanoic acid; n-Caprylic acid; n-Octanoic acid; n-Octoic acid; n-Octylic acid; Neo-Fat 8; Caprylic acid; Enantic acid; Octylic acid; 1-Heptanecarboxylic acid; Heptane-1-carboxylic acid; Octic acid; Octoic acid; 1-octanoic acid $C_8H_{16}O_2$: [124-07-2]
- Physical properties: MW=144.2114 g/mole, mp=16° C, bp=237° C, Density (25 C) = 0.91 g/cm³
- Supplier and stated purity: Sigma Aldrich, 99%
- Sample class: I (PNNL scale).
- Temperature of White cell (805.0 cm optical path length) 25 ± 2 C
- Diluent (high purity nitrogen) flowed at 23.3 liter/min (21.1° C), ambient atmospheric pressure 760 ± 5 Torr.
- Samples flowed at microliters/minute 0.500, 0.250, 0.375 and 0.125.
- Individual samples at equivalent pressures of: 0.002521, 0.001259, 0.001887 and 0.000629 Torr. Final data is a composite spectrum.
- Preparation: None

Instrument Parameters-

- Bruker-66V FTIR, evacuated optics bench.
- Modified to include second aperture, between interferometer output and White cell. This substantially reduces both “ghosting” and warm aperture effects.
- Spectral range: 6,500 to 600 cm^{-1} (1.538 to 16.67microns)
- 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 ($\alpha=0.90$, $\epsilon=500$)
- Composite spectrum created from 4 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 =15.8%, Type B \leq 7%
- Frequency correction (already applied): $V(\text{corrected})=V(\text{instrument})\cdot 0.9999996+6.17682\times 10^{-4}$
- Axis units: X=wavenumbers (cm^{-1}), Y=Absorbance (base-10)
- A broad dimer feature is in the 3000 cm^{-1} region and a small feature at 1717 cm^{-1} .
- Baseline correction via 7th order polynomial subtraction