HIGH-RESOLUTION INFRARED SPECTRA OF THE METHYL C-H-VIBRATIONS IN ETHYL RADICAL

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All three CH-stretch vibrations of the methyl group in ethyl radical have been measured using high-resolution infrared spectroscopy in a slit supersonic discharge expansion source. Rotational assignment and analysis has been performed on each of these spectra providing rotational and centrifugal-distortion constants. We see one A-type band, which corresponds nominally to the symmetric stretch vibration, with a band origin at 2854.1027(3) cm^{-1}. Instead of a nominally degenerate vibration, the methyl asymmetric CH stretch is split into two B- and C-type bands with a separation of 124.5361 cm^{-1} due to internal rotation around the C-C bond. When compared to the splitting in nitromethane,[ab] an analogous model system for hindered internal rotation, this separation is substantially larger.

[a] D. C. McKean and R. A. Watt, J. Mol. Spectrosc. 61, 184 (1976)

[b] D. Gorse, D. Cavagnat, M. Pesquer, and C. Lapouge, J. Phys. Chem. 97, 4262 (1993)