Frequency Analysis of the 10 μm Region of the Ethylene Spectrum using the D_{2h} Top Data System

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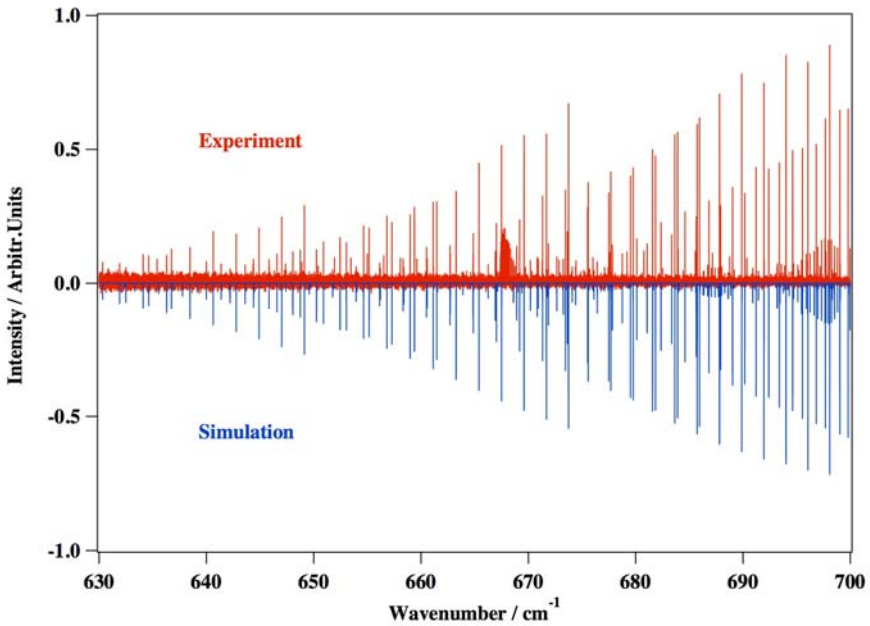
New high-resolution IR spectra of the ν_{10} / ν_7 / ν_4 region of ethylene, lying from 600 cm^{-1} to 1200 cm^{-1}, have been recorded. Following our work devoted to the ν_{12} band near 1442 cm^{-1} considered as isolated [1], these spectra were used simultaneously with a previously recorded spectrum of the ν_{12} region to perform a global frequency analysis of the ν_{10} / ν_7 / ν_4 / ν_{12} infrared tetrad in the 600 – 1500 cm^{-1} region. We used the tensorial formalism developed in Dijon for X_2Y_4 asymmetric-top molecules with D_{2h} symmetry. The strong Coriolis interaction a ecting the upper vibrational levels 10^1, 7^1, 4^1 and 12^1 was taken into account. A total of 11723 lines have been assigned (including 9624 lines in the 600 – 1200 cm^{-1} region, which can be compared to the 5816 assignments available in HITRAN 2008 [2]) and fitted with a global root mean square deviation for the line positions of 3.6 × 10^{-4} cm^{-1}.



Zoom of the infrared absorption spectrum of the tetrad of C_2H_4 compared to the simulation.

[1] M. Rotger, V. Boudon, J. Vander Auwera, *JQSRT* **2008**, *109*, 952–962.
[2] L. S. Rothman et al, *JQSRT* **2009**, 110, *533*–572.