

Databases of Infrared Spectra of Ethylene, Methane and Water for the VAMDC european e-infrastructure

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Ethylene is a volatile organic compound (VOC) that is present in the Earth troposphere as a pollutant, produced by road traffic and biomass fires [1]. It is also present in the atmosphere of giant planets [2], of Titan [3] and possibly of exoplanets like GJ436b [4]. However, present data bases (HITRAN, GEISA ...) contain too few C₂H₄ lines, whose spectrum is poorly simulated. We presently work on the analysis of the bending tetrad in the 10 microns region as well as on the (ν_9/ν_{11}) C–H stretch dyad in the 3 microns region.

Methane is a key species in many atmospheric environments. On Earth, it is one of the most important greenhouse gases and it is present in significant quantities in the atmospheres of giant planets, Titan, exoplanets, brown dwarves... We are presently working on the global analysis of the CH₄ absorption spectrum in the 0 to 6200 cm⁻¹ region. This is especially motivated by the need of extensive methane line lists for the interpretation of data from the Cassini-Huygens mission [5,6].

Water vapor has a key role in the physics and chemistry of the Earth atmosphere. The numerous studies dealing with its rovibrational spectrum are being processed by an IUPAC task group [7]. The long path experimental database originating from studies performed at GSMA from 26000 cm⁻¹ down-to 4200 cm⁻¹ is included in the VAMDC e-Infrastructure [8] in order to provide access to the original experimental values. The database structure is implemented to provide access to the standard line positions, intensities self-broadening and broadening by air or nitrogen or any other species.

References :

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