JET-COOLED INFRARED LASER SPECTROSCOPY OF DIMETHYL SULFIDE: HIGH RESOLUTION ANALYSIS OF THE $\nu_{14}$ CH$_3$-BENDING MODE

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The rovibrational spectrum of the $\nu_{14}$ CH$_3$-bending mode of dimethyl sulfide (CH$_3$)$_2$S was recorded in the 963-987 cm$^{-1}$ spectral region using our sensitive tunable quantum cascade laser spectrometer coupled to a pulsed slit jet$^a$ $^b$. The combined use of a high dilution (CH$_3$)$_2$S/Ar gas mixture expanded at high backing pressure through a slit nozzle enabled to obtain an efficient vibrational cooling which narrows the rotational distribution and eliminates hot bands arising from three low frequency modes below 300 cm$^{-1}$ $^c$. The characteristic PQR band contour of a $b_1$ symmetry mode centered at 975.29 cm$^{-1}$ was observed and will be compared with theoretical calculations at the CCSD(T)/VTZ level$^c$ ($\nu_{14}$ mode at 986 cm$^{-1}$) and room temperature experiments at low resolution (974 cm$^{-1}$) $^d$. Starting from the accurate set of ground state parameters derived from microwave, millimeter and far-infrared measurements, the rovibrational analysis will be presented and discussed.


$^d$J. W. Ypenburg & H. Gerding, Recueil des Travaux Chimiques des Pays-Bas, 90, 885 (1971)