

HIGH-RESOLUTION SPECTROSCOPY OF THE ν_8 BAND OF METHYLENE BROMIDE USING A QUANTUM CASCADE LASER-BASED CAVITY RINGDOWN SPECTROMETER

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Our group has constructed a cavity ringdown spectrometer based on a quantum cascade laser (QCL) in an effort to obtain a high-resolution gas phase spectrum of buckminsterfullerene (C_{60}). To test the performance of our spectrometer we have observed the ν_8 band of methylene bromide (CH_2Br_2) from 1196 to 1197.5 cm^{-1} . This band had previously only been recorded at low resolution. Cold methylene bromide molecules were produced in a continuous supersonic expansion from a 700 μm pinhole and probed using continuous wave cavity ringdown spectroscopy (cw-CRDS). To our knowledge, this is the first experiment to measure a supersonic jet-cooled sample using a QCL-based cw-CRDS spectrometer. We have assigned the observed ro-vibrational lines from the three isotopomers of CH_2Br_2 to effective Hamiltonians, and find that the molecules have been cooled to a rotational temperature of $\sim 3-10$ K.