

## SPECTROSCOPIC OBSERVATION OF CS<sub>2</sub> DIMER

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Infrared spectra of the CS<sub>2</sub> dimer are observed in the region of the CS<sub>2</sub>  $\nu_3$  fundamental band ( $\sim 1535\text{ cm}^{-1}$ ) using a tuneable diode laser spectrometer. The weakly-bound complex is formed in a pulsed supersonic slit-jet expansion of a dilute gas mixture of carbon disulfide in helium. Contrary to the planar slipped-parallel geometry previously observed for (CO<sub>2</sub>)<sub>2</sub>, (N<sub>2</sub>O)<sub>2</sub> and (OCS)<sub>2</sub>, the CS<sub>2</sub> dimer exhibits a cross-shaped structure with  $D_{2d}$  symmetry. Two bands were observed and analyzed: the fundamental (C–S asymmetric stretch) and a combination involving this mode plus an intermolecular vibration. In both cases, the rotational structure corresponds to a perpendicular ( $\Delta K = \pm 1$ ) band of a symmetric rotor molecule. The intermolecular center of mass separation (C–C distance) is determined to be  $3.539(7)\text{ \AA}$ . Thanks to symmetry, this is the only parameter required to characterize the structure, if the monomer geometry is assumed to remain unchanged in the dimer. From the band centers of the fundamental and combination band an intermolecular frequency of  $10.96\text{ cm}^{-1}$  is obtained, which we assign as the torsional bending mode. This constitutes the first high resolution spectroscopic investigation of CS<sub>2</sub> dimer.