

BROADBAND CHIRPED-PULSE FOURIER-TRANSFORM MICROWAVE SPECTROSCOPIC INVESTIGATION OF THE STRUCTURES OF THREE DIETHYLSILANE CONFORMERS

AMANDA L. STEBER, DANIEL A. OBENCHAIN, REBECCA A. PEEBLES, and SEAN A. PEEBLES, *Department of Chemistry, Eastern Illinois University, 600 Lincoln Avenue, Charleston, IL 61920*; JUSTIN L. NEILL, MATT T. MUCKLE, and BROOKS H. PATE, *Department of Chemistry, University of Virginia, Charlottesville, VA 22904*; GAMIL A. GUIRGIS, *Department of Chemistry and Biochemistry, The College of Charleston, Charleston, SC 29424*.

The rotational spectrum of diethylsilane has been assigned using broadband chirped-pulse Fourier-transform microwave (CP-FTMW) spectroscopy. Previously, Fourier-transform microwave rotational spectra were observed using a Balle-Flygare type instrument for the ^{28}Si isotopologues of the gauche-gauche, trans-gauche, and trans-trans conformers.^a In the present study, a broadband microwave spectrum was obtained at the University of Virginia, taking advantage of the ability to perform deep signal averaging to increase the measurement sensitivity. To obtain a full structural determination of the conformers of this molecule, spectra for the ^{29}Si , ^{30}Si , and single ^{13}C substitutions for the gauche-gauche, the trans-gauche, and the trans-trans species were assigned. Substitution (r_s) structures and inertial fit (r_0) structures were determined and a comparison between the experimental and ab initio structures will be presented. For the ^{28}Si isotopologues, the percent differences between the experimental and ab initio rotational constants are less than 1.5% for the trans-trans and trans-gauche and are between 2.0 and 5.0% for the gauche-gauche conformer. The structural parameters will be compared between this molecule, diethylgermane and other silicon containing molecules and the relative abundances of the three conformers will be discussed.

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