SINGLE VIBRONIC LEVEL EMISSION SPECTROSCOPY OF JET-COOLED HALOSILYLENES (HSiF, HSiCl, and HSiBr)

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Using the technique of single vibronic level emission spectroscopy, the ground state vibrational manifolds of HSiF, HSiCl, and HSiBr and their deuterated analogs have been studies. The silylenes were produced in a pulsed electric discharge jet with the appropriate halosilane ($HSiX_3$) as the precursor. The gas phase harmonic vibrational frequencies and anharmonicities have been determined for the first time and the ground state harmonic force fields have been obtained for all three species. Our previous ground state rotational constants[a b c] have been determined with the calculated harmonic contributions to the α constants to obtain average (r_z) structures and estimates of the equilibrium (r_e^z) structues. The reliability of the force constants has been evaluated by Franck-Condon simulations of the emission spectra and comparisons of the calculated and experimentally determined inertial defects.

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