

DETECTION AND CHARACTERIZATION OF THE STANNYLENE (SnH_2) RADICAL IN THE GAS PHASE

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The electronic spectrum of the jet-cooled SnH_2 radical has been detected by LIF spectroscopy. The radical was produced in a pulsed electric discharge through a precursor mixture of SnH_4 in argon. Each band in the LIF spectrum consists of a small number of rovibronic transitions to the lowest energy ($K_a = 0$, $J = 0, 1, 2, 3$) rotational levels in the excited state. High resolution spectra of the $^3P_1(1)$ line of the 2^2_0 band show 7 components whose relative intensities are characteristic of the tin major isotopic abundances. The emission spectra are also consistent with assigning the spectrum as due to SnH_2 . The fluorescence lifetimes of the upper state rotational levels decrease with increasing J' , indicative of a rotationally dependent predissociation process in the excited state, similar to that previously observed in SiH_2 and GeH_2 . Fluorescence hole burning experiments have located the upper state $K_a = 2$ levels which allow a determination of the molecular structure.