

HIGH RESOLUTION INFRARED SPECTRUM OF THE RING-PUCKERING BAND, ν_{10} , OF DIBORANE

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We are in the process of studying all the infrared active fundamentals of diborane; the spectrum from 280 cm^{-1} to 2700 cm^{-1} has been recorded, and band-by-band analysis is in progress. The analysis of the lowest frequency band centered near 369 cm^{-1} , ν_{10} , which results from the ring puckering vibration, will be presented in this talk. The spectrum of a sample with boron in natural abundance (19% ^{10}B , 81% ^{11}B) as well as one enriched in ^{10}B has been obtained with a resolution of 0.0015 cm^{-1} and a S/N of better than 500 to 1. This band appears to be the only unperturbed band in the diborane spectrum, and assignment of the three beautiful b-type bands of the $^{10}\text{B}_2\text{H}_6$, $^{10}\text{B}^{11}\text{BH}_6$ and $^{11}\text{B}_2\text{H}_6$ isotopomers was straightforward despite the fact that the band centers of all three isotopomers fall within 0.05 cm^{-1} of each other. In the enriched ^{10}B sample the hot band, $2\nu_{10}-\nu_{10}$, could be completely assigned and spectroscopic constants obtained for the $A_g\ 2\nu_{10}$ state.