THE VIBRATION-ROTATION EMISSION SPECTRA OF GASEOUS CdH_2 AND CdD_2

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The vibration-rotation emission spectra of CdH_2 and CdD_2 molecules have been recorded at high resolution using a Fourier transform spectrometer. The molecules were generated in a furnace-discharge emission source by reaction of cadmium vapor with molecular hydrogen or deuterium. The fundamental bands for the antisymmetric stretching mode (ν_3) of CdH_2 and CdD_2 were detected at about 1771.5 cm^{-1} and 1278.3 cm^{-1}, respectively. In addition, the $002(\Sigma_g^+)$ – $001(\Sigma_u^+)$ and $011(\Pi_g)$ – $010(\Pi_u)$ hot bands were observed for CdH_2. Spectroscopic constants were determined for each of the twelve observed isotopologues: $^{110}CdH_2$, $^{111}CdH_2$, $^{112}CdH_2$, $^{113}CdH_2$, $^{114}CdH_2$, $^{116}CdH_2$, $^{110}CdD_2$, $^{111}CdD_2$, $^{112}CdD_2$, $^{113}CdD_2$, $^{114}CdD_2$, $^{116}CdD_2$. The average Cd–H and Cd–D bond distances (r_0) were determined to be 1.683028(10) Å and 1.679161(16) Å, respectively.