FOURIER TRANSFORM INFRARED EMISSION SPECTRA OF MgH AND MgH_2

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We have recorded the vibration-rotation spectra of gaseous MgH and MgH_2 in emission using a furnace-discharge source. The molecules were generated at 650°C and 333 mA discharge current with magnesium and a mixture of argon and hydrogen gases. The recorded spectra contained several emission bands, as well as the absorption of atmospheric H_2O. The highest signal-to-noise ratio for MgH lines was about 200. Three vibrational bands, v=1-0 to v=3-2, for ^{24}MgH and two vibrational bands for ^{25}MgH and ^{26}MgH were observed in the $^2\Sigma^+$ ground electronic state. The analysis of the infrared data combined with our previous data on the B$'$-X electronic transition will lead to an improved potential energy curve for the ground state using a direct-potential-fit approach. In addition to MgH, we found the antisymmetric stretching mode (ν_3) of $^{24}MgH_2$ and three hot bands involving ν_2 and ν_3 in our spectrum. The bands were rotationally analyzed and the spectroscopic constants were determined. The MgH_2 molecule has a linear structure with an R_0 Mg-H bond length of 1.703327(3) Å.