MILLIMETER-WAVE SPECTROSCOPY OF MgI ($\tilde{X}^2\Sigma^+$)

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The pure rotational spectrum of MgI in its ground electronic state ($\tilde{X}^2\Sigma^+$) has been measured using millimeter/submillimeter wave direct-absorption techniques. Rotational transitions arising from the v = 0, 1, and 2 vibrational states of ^{24}MgI, as well as the v = 0 state for the isotopologues (^{25}MgI and ^{26}MgI), have been measured in their natural abundance in the region of 200 – 300 GHz. Rotational, centrifugal distortion, and spin-rotation constants were determined for each isotopologue and the excited vibrational states of ^{24}MgI. Equilibrium parameters B_e, α_e, D_e, and γ_e were ascertained and used to calculate an equilibrium bond length (r_e) for MgI. The spin-rotation coupling constants of several magnesium monohalides were examined and the contribution to the spin-rotation parameter appears to be dominated by second order spin-orbit coupling of the nearby excited $A^2\Pi$ electronic state.