THE PURE ROTATIONAL SPECTRUM OF ZnCl ($X^2\Sigma^+$)

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The radical ZnCl has been studied with high-resolution millimeter-wave spectroscopy in its $^2\Sigma^+$ ground state. Pure rotational spectra of $^{64}Zn^{35}Cl$, $^{64}Zn^{37}Cl$, and $^{66}Zn^{35}Cl$ were measured in the ground and excited vibrational states (v=1,2), and measurements of $^{67}Zn^{35}Cl$, $^{66}Zn^{37}Cl$, and $^{68}Zn^{35}Cl$ were recorded in the ground state. Each rotational transition was found to be split into doublets by spin-rotation interactions, and for $^{67}Zn^{35}Cl$, hyperfine splittings due to the nuclear spin of ^{67}Zn (I=5/2) were also observed. Rotational, fine structure, and hyperfine constants have been determined from these data, and equilibrium parameters calculated. The equilibrium bond length of $^{64}Zn^{35}Cl$ was found to be 2.13003(57)$\mathring{A}$, in good agreement with recent theoretical predictions. Interpretation of the hyperfine constants indicates that the ZnCl bond is mostly ionic.