

Millimeter and Submillimeter Spectroscopic Investigation of Chloryl Chloride, ClClO_2

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ClClO_2 is a molecule of atmospheric interest. Its rotational spectrum in the ground vibrational state has been studied between 94 and 417 GHz in a flowing system as a product of the $\text{FCIO}_2 + \text{HCl}$ reaction. The pyramidal ClClO_2 is an asymmetric prolate top, $\kappa = -0.7598$ for $^{35}\text{Cl}^{35}\text{ClO}_2$. It has C_s symmetry with a large dipole component along the c-axis and a smaller one along the a-axis. The highest quantum numbers accessed are larger than 70 and 30 for J and K_a , respectively, permitting rotational and centrifugal distortion constants to be determined precisely. Splittings due to both Cl nuclei have been resolved, and a quadruple analysis will be presented. The molecular structure has been derived from four main isotopomers. The results will be compared with those from an earlier matrix-isolation study and from *ab initio* calculations, as well as with the structures of related molecules.

Rotational spectra of the $\nu_4 = 1$ and $\nu_6 = 1$ have been studied for $^{35}\text{Cl}^{35}\text{ClO}_2$ between 223 and 500 GHz. The states are interacting through a strong c-type and a weaker a-type Coriolis interaction. The spectra are well described by a Hamiltonian which includes several Coriolis interaction constants. These will be compared with those derived from the harmonic force field.