THE ROTATIONAL SPECTRUM OF CHLORINE NITRATE ($ClONO_2$): ν_6 AND THE $\nu_5/\nu_6\nu_9$ DYAD

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Chlorine nitrate is an important stratospheric molecule and analyses of extensive measurements of rotational transitions in the ground state and ν_9 (120 cm^{-1})[a], the $2\nu_9/\nu_7$ dyad (262 cm^{-1})[b], and the $3\nu_9/\nu_7\nu_9$ dyad (361 cm^{-1})[c] have already been reported. The available experimental data for $ClONO_2$ have been extended by a new FASSST spectrum recorded between 118-378 GHz at greater sensitivity and resolution than hitherto and on a more pure sample.

The new spectrum allowed an improvement in the spectroscopic constants for the ground state and ν_9, as well as more confident assignment of rotational transitions in higher vibrational states. Application of the AABS package for *Assignment and Analysis of Broadband Spectra*[d] was crucial in keeping track of the transitions already assigned and rapid extension of datasets for new states. The analyses of the relatively isolated ν_6 (435 cm^{-1}) and of the $\nu_5/\nu_6\nu_9$ dyad (551 cm^{-1}) have now been completed for both $^{35}ClONO_2$ and $^{37}ClONO_2$. In the parent isotopologue the ν_5 and $\nu_6\nu_9$ states are found to be 4.124652(6) cm^{-1} apart and to be connected by a sufficiently strong Coriolis interaction to give rise to measurable interstate transitions and to perturbed hyperfine splitting patterns.

[a] H.S.P.Müller, et al., *J. Mol. Spectrosc.*, **181**, 363-378 (1997).
[b] R.A.H.Butler et al. *J. Mol. Spectrosc.*, **213**, 8-14 (2002).
[c] R.A.H.Butler et al. *J. Mol. Spectrosc.*, **220**, 150-152 (2003).
[d] Z.Kisiel, PROSPE - Programs for ROtational SPEctroscopy, http://info.ifpan.edu.pl/~kisiel/prospe.htm