THE FAR-INFRARED SPECTRUM OF $ClNO_2$ (NITRYL CHLORIDE)

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$ClNO_2$ is a molecule of potential stratospheric and tropospheric importance, formed by heterogeneous reactions on polar stratospheric clouds and sea-salt particles. In 1994, high-resolution infrared spectra of $ClNO_2$ were measured and analyzed in the 500–2500 cm^{-1} range[a]. However, up to now, no high-resolution absorption spectra of the ν_3 and ν_5 fundamental bands of $ClNO_2$ in the far-infrared region were reported, except for microwave observation of a few transitions in the excited vibrational states[b].
In the present study, absorption spectra in 300–500 cm^{-1} range were recorded at resolutions of up to 0.0017 cm^{-1}, using the Bruker IFS-120HR FTS at University of Giessen. Using these spectra, nearly 2000 transitions of the *a*-type ν_3 band around 370 cm^{-1} were assigned. The *b*-type ν_5 band around 411 cm^{-1} is too weak to be observed, in agreement with *ab-initio* predictions. However, the $(\nu_2 - \nu_3)$ *a*-type difference band was observed and could be used to confirm rotational constants of both vibrational states.

[a] J. Orphal, *Ph.D. dissertation*, University of Paris-Sud (1995)
[b] Y. Morino and T. Tanaka, *J. Mol. Spectrosc.* **16**, 179 (1965)