

HIGH RESOLUTION FOURIER TRANSFORM EMISSION SPECTROSCOPY OF THE $\tilde{A}^2\Pi - \tilde{X}^2\Pi$ TRANSITION OF THE OCS^+ ION

YOSHIHIRO NAKASHIMA, KEIICHI TANAKA, and TAKEHIKO TANAKA, *Department of Chemistry, Faculty of Science, Kyushu University 33, Hakozaki, Higashiku, Fukuoka 812-8581, Japan.*

The OCS^+ ion was produced by Penning ionization of OCS with metastable He^* , and UV emission in the 370 – 500 nm region was measured by Fourier transform spectrometer. The $\tilde{A}^2\Pi - \tilde{X}^2\Pi$ electronic transition has been reported in the 300 – 500 nm region, but only the emission bands from the vibrational ground state of the $\tilde{A}^2\Pi$ state were observed because of the predissociation in the $\tilde{A}^2\Pi$ state ^a. High resolution study of the 0-0 band has been reported for both the $\Omega = 3/2$ and $\Omega = 1/2$ spin states ^{b, c}.

In the present study, seven rotationally resolved bands were observed in the 370 – 500 nm region and assigned to the CO stretch (ν_3'') progression: $\tilde{A}^2\Pi_{3/2}(000) - \tilde{X}^2\Pi_{3/2}(00v)$ ($v = 2 - 5$) and $\tilde{A}^2\Pi_{1/2}(000) - \tilde{X}^2\Pi_{1/2}(00v)$ ($v = 3 - 4$). The observed lines of the $\Omega = 1/2$ substate were split into the two components due to the Λ -type doubling. The spectra for $\Omega = 3/2$ and $\Omega = 1/2$ were analysed separately to obtain molecular constants for each spin state.

Band origins, vibrational frequencies, rotational constants, vibrational-rotational constants for both spin substates and Λ -type doubling constant for the $\Omega = 1/2$ substate were determined by a least squares fitting. Rotational constants in the vibrational ground state were determined for both spin states. The spin-orbit interaction constants derived from these rotational constants, $A' = -125.0 \text{ cm}^{-1}$ and $A'' = -383.8 \text{ cm}^{-1}$, are consistent with those derived from the photodissociation study ^d.

^aD. L. Judge and L. C. Lee, *Int. J. Mass Spectrom. Ion Phys.*, **17**, 329, (1975)

^bM. Oschner, M. Tsuji, and J. P. Maier, *Chem. Phys. Lett.*, **115**, 373, (1985)

^cR. Weinkauff and U. Boesl, *J. Chem. Phys.*, **101**, 8482, (1994)

^dR. Kakoschke, U. Boesl, J. Hermann and E. W. Schlag, *Chem. Phys. Lett.*, **119**, 467, (1985)