

DETECTION OF THE MW TRANSITION BETWEEN ORTHO AND PARA STATES

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Thorough the detailed analysis of the hyperfine resolved rotational transitions^{ab}, we have been pointed out that there exists not a little interaction between *ortho* and *para* states in the molecular Hamiltonian of S₂Cl₂. Using the *ortho-para* mixed molecular wavefunctions derived from the Hamiltonian, we calculated the transition moment and frequency of the *ortho-para* forbidden transitions in the cm- and mm-wave region, and picked up some promising candidate transitions for the spectroscopic detection.

In the experiment, the S₂Cl₂ vapor with Ar buffer gas in a supersonic jet condition was used with FTMW spectrometer at National Chiao Tung University. As a result, seven hyperfine resolved rotational transitions in the cm-wave region were detected as the *ortho-para* transition at the predicted frequency within the experimental error range. The observed intensity was 10⁻³ smaller than that of an allowed transition, which is also consistent with the prediction. This is the first time the electric dipole transition between *ortho* and *para* states has been detected in a free isolated molecule.

^aA. Mizoguchi, S. Ota, H. Kanamori, Y. Sumiyoshi, and Y. Endo, J. Mol. Spectrosc, 250, 86 (2008)

^bZ. T. Dehghani, S. Ota, A. Mizoguchi and H. Kanamori, J. Phys. Chem. A, 117(39), 10041, (2013)