AN IMPROVED FIT OF THE MICROWAVE SPECTRUM OF SO_2-O_2

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The van der Waals complex, SO_2-O_2, has been studied by Fourier-transform microwave spectroscopy. Combination differences confirm the assignment of 74 a- and c-type transitions. The spectrum is complicated by a large-amplitude tunneling motion and the S=1 electron spin of the O_2 subunit, with the observed transitions correlating to the $\Omega = 0$ component of the $^3\Sigma$ state of O_2. The Boson statistics for this dynamically C_{2v} complex allows only symmetric tunneling states for K even and only antisymmetric states for K odd. As discussed last year at this meeting, a preliminary fit of the lines for $K < 3$ using a computer program developed by Fawzy gives a standard deviation of $\sim$ 1 MHz, significantly worse than the $<$ 5 kHz measurement precision. To insure that the large uncertainties are not due to errors in the computer code, we have extensively compared the program predictions with the output from Pickett's general Hamiltonian program, wh! ich has the flexibility to incor porate the Hamiltonian used in the Fawzy program. Also, we have fit the K-even and K-odd states separately, which results in two sets of asymmetric-rotor effective rotational constants and a standard deviation of each fit close to the estimated experimental precision. Future efforts will address Coriolis coupling between the two tunneling states and coupling to the $\Omega = \pm 1$ state, for which no transitions have yet been assigned. Also, initial results from a study of another O_2 containing complex, propene-O_2, will be reported.