ROTATIONAL SPECTRUM OF N_2–CO: THE ORTHO-N_2 AND PARA-N_2

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Observations of the infrared spectra of N_2–CO by diode laser spectroscopy have been reported previously[a] [b]. The present study is an observation of the rotational spectra of $^{14}N_2$–CO, $^{15}N^{14}N$–CO, and $^{15}N_2$–CO using a Fourier transform microwave spectrometer. Two sets for the J = 2-1, 3-2, and 4-3 transitions are observed for $^{14}N_2$–CO and $^{15}N_2$–CO, while only one set for $^{15}N^{14}N$–CO. The hyperfine structures are observed for the complexes containing ^{14}N nucleus. The first set is assigned to the K=0 state of ortho-N_2 and the second to the K=1 state of para-N_2,based on the infrared analysis and eQq splittings. The transitions with the K=1 state are stronger than those with the K=0 state for $^{14}N_2$–CO complex, while the reversed is observed for $^{15}N_2$–CO. In the case of $^{15}N^{14}N$–CO only lowest transition is observed because of lack of symmetry in the complex. The nuclear electric quadrupole coupling constant of the ^{14}N nucleus is much smaller than related complexes. The value of the van der Waals stretching frequency for N_2–CO is calculated to be 19 cm^{-1} from the rotational and the centrifugal distortion constants obtained. We concluded that both moieties, N_2 and CO, are rotating almost freely in the complex N_2–CO.

[a] Y. Kawashima and K. Nishizawa, Chem. Phys. Lett. 249, 87 (1996)
[b] Y. Xu and A. R. W. McKellar, J. Chem. Phys. 104, 2488 (1996).