

DETERMINATION OF THE STRUCTURE OF NEON CYCLOPENTANONE

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Rotational spectra of the neon cyclopentanone van der Waals complex were studied using a pulsed-jet Fabry-Perot Fourier transform microwave spectrometer. Spectra of the normal isotopomer along with those of five ^{13}C , the ^{18}O , and the ^{22}Ne substituted isotopomers were assigned in the frequency region of 6-23 GHz. The asymmetry of the neon location within the complex allows the observation of a , b , and c -type transitions. The rotational constants and centrifugal distortion constants for the parent isotopomer were determined to be $A = 2728.8119(7)$, $B = 1736.5880(5)$, and $C = 1440.4682(5)$ MHz; and $\Delta_J = 15.051(7)$, $\Delta_{JK} = -13.96(4)$, $\Delta_K = 49.97(5)$, $\delta_J = 3.603(3)$, and $\delta_K = 6.55(8)$ kHz. The coordinates of the neon in the principal axis system of $\text{C}_5\text{H}_8\text{O}$ are $a = 0.91$, $b = 0.78$, and $c = 3.26$ Å, where the carbonyl bond lies along the a -axis and the oxygen position is $a = 2.05$ Å. Comparisons between the bonding and wide amplitude motions of the rare gases in the neon versus the argon cyclopentanone complexes will be discussed.