DETERMINATION OF THE STRUCTURE OF CYCLOPENTENEOXIDE AND THE ARGON CYCLOPENTENEOXIDE VAN DER WAALS COMPLEX

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Rotational spectra of cyclopenteneoxide and the argon cyclopenteneoxide van der Waals complex were studied using pulsed-jet Fabry-Perot Fourier transform microwave spectroscopy. Spectra of the normal isotopomer along with those of the ^{13}C singly substituted isotopomers for both the monomer and the complex were measured in the frequency region of 6-20 GHz. The boat structure for cyclopenteneoxide was confirmed with naturally abundant ^{13}C isotopic substitution. For the argon cyclopenteneoxide complex, both *a* and *b*-type transitions were observed and the rotational constants for the all ^{12}C isotopomer were determined to be A = 3268.2537(5), B = 993.3458(2), and C = 950.4300(2) MHz. The coordinates of the argon in the principal axis system of cyclopenteneoxide are a = 0.27, b = 0.42, and c = 3.91 Å, such that the argon atom is *exo* to the bridged oxygen of the ring. An investigation into whether or not the argon atom undergoes large amplitude cross-ring motion will be presented.