MICROWAVE ROTATIONAL SPECTRUM OF THE Kr-CH₄ VAN DER WAALS COMPLEX

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The first pure rotational spectra of a rare gas-methane van der Waals complex, namely Kr-CH₄, were recorded, using a pulsed molecular beam Fourier transform microwave spectrometer. Five isotopomers, including $^{86}$Kr-CH₄, $^{84}$Kr-CH₄, $^{83}$Kr-CH₄, $^{82}$Kr-CH₄, and $^{80}$Kr-CH₄, were studied. Two sets of transitions were measured in the range of 4-18 GHz: one with $K=0$, $J=0$ to $J=4$, the other with $K=1$, $J=1$ to $J=4$. These transitions were assigned to occur within the $A$, $K=0$ and $F$, $K=1$ states, respectively. Of the latter set, two transitions of the $^{84}$Kr and $^{86}$Kr containing isotopomers were first measured at NIST. a Rotational constants and centrifugal distortion constants were fitted separately for both states. The determined rotational constants agree well with the values determined in the previous IR study by Pak et al., b with a difference of less than one MHz for the $A$, $K=0$ state, and a somewhat larger difference of 24 MHz for the $F$, $K=1$ state. This larger difference might indicate a misassignment in the IR region for the $F$, $K=1$ state. The search for the $E$-state transitions is still ongoing.

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a I. Pak and R. Suenram, private communication.