MICROWAVE ROTATIONAL SPECTRUM OF THE Kr-CH_4 VAN DER WAALS COMPLEX

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The first pure rotational spectra of a rare gas-methane van der Waals complex, namely Kr-CH_4, were recorded, using a pulsed molecular beam Fourier transform microwave spectrometer. Five isotopomers, including ^{86}Kr-CH_4, ^{84}Kr-CH_4, ^{83}Kr-CH_4, ^{82}Kr-CH_4, and ^{80}Kr-CH_4, 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.

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

[b] I. Pak, D. A. Roth, M. Hepp, G. Winnewisser, D. Scouteris, B. J. Howard, and K. M. T. Yamada, *Z. Naturforsch.* **53a**, 725 (1998).