2OH overtone spectroscopy of water-containing dimers.

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We have used continuous-wave cavity ring-down spectroscopy to record part of the 2OH excitation range in an Ar/Kr supersonic expansion seeded with H_2O. Various bands were observed and are being rotationally analysed, of Ar–H_2O, Kr–H_2O and $(H_2O)_2$. At present, the analysis of experimental linewidths allowed determining the mean upper state predissociation lifetime to be 3 ns for Ar–H_2O, 4 ns for Kr–H_2O and, probably, 60 ps for $(H_2O)_2$. The latest results of the analyses will be highlighted, focusing on Ar–H_2O. This investigation is helped by theoretical modeling to obtain information about the water-rare gas complex intermolecular potential energy surface. For instance, although the upper state of the band observed for Ar-H_2O at 7275.1 cm^{-1} has been unambiguously assigned to $\nu_1+\nu_3 \leftarrow$ GS, $\Pi(1_{01}) \leftarrow \Sigma(0_{00})$,[1] the dark states perturbing this state have not been assigned, yet, due to the large number of levels of the water monomer near 7250 cm^{-1}. Based on the intermolecular potential derived by Makarewicz[2] a systematic calculation of all the states of the complex near this energy value will be carried out and should allow us to identify possible candidates for the perturbers.

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[2] J. Makarewicz, *J. Chem. Phys.* 129 (2008) 184310.