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Positron Binding to Molecules: Interplay between permanent dipole moments and polarizability[1] A.C.L. JONES, J.R. DANIELSON, M.R. NATISIN, C.M. SURKO, University of California, San Diego — Energy resolved studies of positron-molecule collisions exhibit vibrational Feshbach resonances in annihilation, thus providing evidence that positrons can bind to these pecies.[2] The downshifts of the observed resonances provides a measure of the positron-molecule binding energies which range from 1 to 300 meV. Presented here are annihilation spectra and binding energies for a wide range of chemical species, including aldehydes, ketones, formates, acetates, nitriles, alcohols, and halogenated compounds.[3,4] Within a group, the measured binding energies often show an approximate linear correlation with molecular dipole polarizability. However, other effects, including the permanent dipole moment (μ) and molecular geometry, play significant roles as well. For example, for compounds with $\mu \geq 2$ D, it appears that localization of the positron wave function leads to enhanced binding and an increased dependence upon both μ and electron-positron correlations.[5] The relationship of these results to theoretical calculations is discussed.

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[2]G. F. Gribakin, et al., Rev. Mod. Phys. **82**, 2557 (2010).
[3]J. R. Danielson, et al., Phys. Rev. A, in press (2012).
[4]A. C. L. Jones, et al., New J. Phys., in press (2012).
[5]Danielson, op. cit.

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