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**Non-resonant positron-on-molecule annihilation.**<sup>1</sup> J.A. YOUNG, L.D. BARNES, C.M. SURKO, University of California, San Diego — Positronon-molecule annihilation rates for many atoms and molecules have been measured previously using thermal distributions of positrons; and more recently, as a function of positron energy, using a cold, trap-based positron beam [1]. Large vibrational Feshbach resonances (VFR) dominate the energy resolved annihilation spectra in hydrocarbons and are thought to be responsible for their large thermal annihilation rates. This paper reports measurements of so-called "direct" annihilation rates at energies above the vibrational modes but below positronium formation. The normalized rates,  $Z_{eff}^{(d)}$ , are generally small (compared to the VFR values) and approximately independent of energy. Trends as a function of target species are discussed. As  $Z_{eff}^{(d)}$  is free of resonances, it could appropriately be compared to the predictions of fixed-nuclei calculations. A new experiment, to study annihilation as a function of target molecule temperature, will also be described. [1] L. D. Barnes, *et al.*, *Phys. Rev. A* **67**, 032706 (2003).

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