LIFETIME BROADENING IN THE ROTATIONALLY RESOLVED ELECTRONIC SPECTRA OF SOME FURAN DERIVATIVES AND ANALOGS IN THE GAS PHASE [a]

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Fluorescence lifetimes of the electronic origin and some higher vibronic bands of dibenzofuran (DBF) [1] and dibenzothiophene (DBT) have been determined from the analyses of their rotationally resolved $S_1 \leftarrow S_0$ fluorescence excitation spectra in the gas phase. A decrease by a factor of eight in the fluorescence lifetime has been observed for DBT with respect to DBF, where presumably the heavy atom effect plays a significant role in the intersystem crossing mechanism of these heterocycles. The high resolution spectra of the electronic origin transitions of two non-concatenated furan derivatives, 2,5-diphenylfuran (DPF) and 2,5-diphenyl-1,3,4-oxadioxole (DPO), exhibit similar lifetime broadening, about four times greater than that of DBF. Detailed information about radiationless transitions in the "statistical" limit will be discussed.

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1) J. T. Yi, L. Alvarez-Valtierra, and D. W. Pratt, J. Chem. Phys. 124, (2006), 244302.