Steady-state and Time-resolved Spectroscopic Studies of Benzanilides

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Steady-state and time-resolved spectroscopic studies of benzanilide (I) and \textit{N}-methylbenzanilide (II) were performed at 298 and 77 K in various solvents. The results indicate that benzanilide fluorescence in non-polar solvents at room temperature involves three independent modes of emission: \( F_1 \) (LE) normal fluorescence from the initially excited state \( S_1 \) (LE) with \( \lambda_{\text{max}} = 320 \) nm, \( F'_{2} \) (PT) fluorescence from the proton transfer tautomer with \( \lambda_{\text{max}} = 468 \) nm, \( F''_{2} \) (CT) fluorescence from the species where intramolecular charge transfer appears, with \( \lambda_{\text{max}} = 510 \) nm. At 77 K in MCH a new fluorescence band, \( F_{\text{ag}} \), appears at \( \lambda_{\text{max}} = 415 \) nm instead of the \( F'_{2} \) (PT) and \( F''_{2} \) (CT) fluorescence. This new emission originates from benzanilide dipolar aggregates or \textit{cis}-imidol dimers. The decay times of these emission modes are different.

\textit{N}-methylbenzanilide, dissolved in non-polar and weakly polar solvents at room temperature and at 77 K, shows only two fluorescence modes, i.e., the normal and the charge-transfer emissions at 320 nm and 520 nm, respectively. The fluorescence is deactivated with two decay times, 30 ps and 2.05 ns, in MCH solution.

\textit{Key words:} Benzanilides; Absorption; Emission and Picosecond Transient Absorption Spectra; Fluorescence Decay Times.