Steady-state and Time-resolved Spectroscopic Studies of Benzanilides

Józef Heldt[a, b], Janina R. Heldt[b], and Jerzy Kamiński[b]

[a] Institute of Physics, Pedagogical University at Słupsk, 76-200 Słupsk, Poland
[b] Institute of Experimental Physics, University of Gdańsk, 80-952 Gdańsk, Poland

Reprint requests to Dr. J. R. Heldt; Fax: +48-58 341-31-75

Z. Naturforsch. **54 a,** 495 – 502 (1999); received May 18, 1999

Steady-state and time-resolved spectroscopic studies of benzanilide (I) and *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 $\lambda_{max} = 320$ nm, F_2'(PT) fluorescence from the proton transfer tautomer with $\lambda_{max} = 468$ nm, F_2''(CT) fluorescence from the species where intramolecular charge transfer appears, with $\lambda_{max} = 510$ nm. At 77 K in MCH a new fluorescence band, F_{ag}, appears at $\lambda_{max} = 415$ nm instead of the F_2'(PT) and F_2''(CT) fluorescence. This new emission originates from benzanilide dipolar aggregates or *cis*-imidol dimers. The decay times of these emission modes are different.

N-methylbenzanilide, dissolved in nonpopular 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.

Key words: Benzanilides; Absorption; Emission and Picosecond Transient Absorption Spectra; Fluorescence Decay Times.