

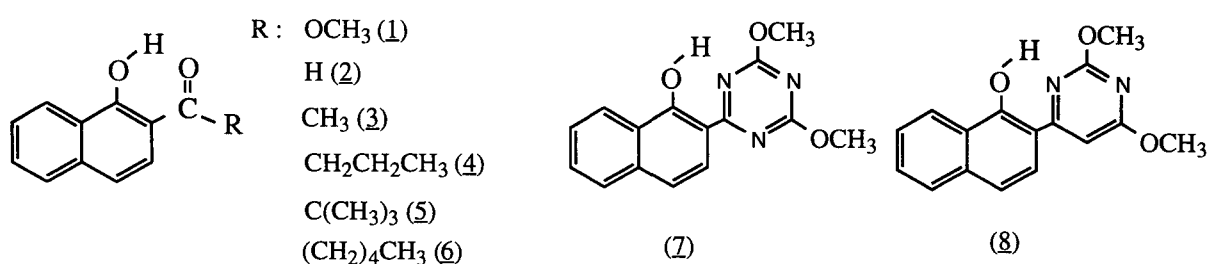
Excited-State Intramolecular Proton Transfer Followed by Cis-Trans Isomerization in 1-Naphthol Derivatives

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Excited-state intramolecular proton transfer (ESIPT) of the following 1-naphthol derivatives was investigated by means of the laser photolysis method, time-resolved thermal lensing technique, and time-resolved fluorometry [1,2].



Because of relatively small exothermicities for the ESIPT reactions of 1-naphthol derivatives compared to those in phenol analogues, the occurrence of ESIPT depended strongly on the electronic nature of the substituent R. Since the electron-donating substituent destabilized the S₁ state of the proton-transferred keto-form, ESIPT was not observed for (1). All the compounds except for (1) showed large Stokes-shifted fluorescences resulting from ESIPT. The transient absorption spectra of (2)-(8) exhibited a long-lived transient which was not quenched by dissolved oxygen. The transient could be assigned to the ground-state trans-keto tautomer produced by cis-trans isomerization just after ESIPT. Temperature effect experiments were carried out on the fluorescence lifetime, fluorescence quantum yield, and the initial absorbance of the ground-state trans-keto tautomers of (2)-(8) in 3-methylpentane. The results were reasonably explained by the occurrence of cis-trans isomerization competing with fluorescence from the S₁ state of the cis-keto form. Ab-initio MO calculations on the S₁ state of the cis-keto tautomer showed anti-bonding character for the double bond associated with the cis-trans isomerization. The effects of temperature and viscosity on the cis-trans isomerization were examined for (7) and (8) by using a series of alkane solvents.

[1] S. Tobita, M. Yamamoto, N. Kurahayashi, R. Tsukagoshi, Y. Nakamura, and H. Shizuka, *J. Phys. Chem. A*, **102**, 5206 (1998).

[2] M. Moriyama, Y. Kawakami, S. Tobita, and H. Shizuka, *Chem. Phys.*, **231**, 205 (1998).