

THESIS ABSTRACT

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TITLE Photophysical Behavior of 1,8-Diaminonaphthalene in Acidic Aqueous Solutions and in Zeolite Sieves

FIELD Physical Chemistry

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The proton-transfer reaction of 1,8-Diaminonaphthalene (1,8-DAN) in acidic medium and in zeolite sieves was studied by means of laser-induced picosecond spectroscopy. It has been found that there are three clear different forms of 1,8-DAN in the ground state, but only two different forms in the excited state. The absorption of the mono-cation form of 1,8-DAN is found to be a mixture of the neutral form and the di-cation form. However, the emission is found to be only from the neutral form, due to the fast dissociation of the mono-cation form once it is excited. The mono-cation form of 1,8-DAN behaves as dual fluorescence under different excitation wavelengths. The di-cation form only fluoresces if no free water cluster is available as a proton acceptor. The reaction in the excited state was shown to be a diabatic quenching reaction. With the help of quantum yields and fluorescence lifetime measurements these results are interpreted in terms of a new photochemical scheme. All dissociation and quenching rate constants, pK_a and k_q , have been determined. 1,8-DAN was investigated inside zeolite Y sieves and has been shown that it may be used as a probe molecule to assess zeolite acidity.

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