

# Steady State and Dynamic Photophysical Properties of 2-Benzoimidazole-acetonitrile- $\alpha$ -Phenylmethylenes and 1-Aryl-2,2-Dicyanoethenes

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The steady state and dynamic photophysical characteristics of newly synthesized 2-benzoimidazoleacetonitrile- $\alpha$ -phenylmethylenes (BIA's) and 1-aryl-2,2-dicyanoethenes (DCE's) have been investigated in solution at 300 K and in a frozen matrix at 77 K.

The compounds have a very low or no emission in solution at 300 K both in non-polar and polar solvents. While in BIA's a significant fluorescence ability is registered in a frozen ethanol matrix at 77 K, freezing solutions of DCE's at 77 K does not lead to the appearance of either fluorescence or phosphorescence at 77 K even in the presence of C<sub>2</sub>H<sub>5</sub>J. The comparison of the fluorescence ability in aprotic and protic solvents does not show any evidence for the specific influence of the proton-donating ability of the solvents on the weak fluorescence caused by the formation of intramolecular hydrogen bonds in excited states.

The high fluorescence quantum yield of BIA's in a frozen matrix at 77 K indicates that intramolecular libration of two heavy groups in the allyl chain is the reason for the weak fluorescence at 300 K. Quantum-chemical calculations support the hypothesis of quenching processes in the excited state of BIA's at 300 K.

*Key words:* 2-Benzoimidazoleacetonitrile- $\alpha$ -Phenylmethylenes; 1-Aryl-2,2-Dicyanoethenes; Fluorescence; Frozen Matrix.