Tautomerization in porphycenes

Michał Gil, Natasza Urbańska, Marek Pietraszkiewicz, Jacek Waluk
Institute of Physical Chemistry, PAS, Kasprzaka 44/52, 01-224 Warsaw, Poland

Porphyrene (1), constitutional isomer of porphyrin, differs in many properties from the parent molecule. The exchange of inner hydrogen atoms is much faster for 1 in both ground and the lowest excited electronic singlet states. Rates of this tautomerization depend strongly on the NH···N distance and can be controlled by varying the substituents in beta and meso positions. In order to assess the role of nitrogens separation, we have investigated porphyrene (1), its 9,10,19,20-tetra-n-methyl (2) and 9,10,19,20-tetra-n-propyl (3) derivatives.

Various fluorescence polarization and time-resolved techniques were used to investigate tautomerization rates and to search for cis tautomeric forms. In the latter, inner hydrogens reside on the adjacent nitrogen atoms, whereas in the more stable trans form they are located on the opposite nitrogens.