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Photoinduced Electron Transfer Interaction of Anthraquinones with Aniline Quenchers: Influence of Methyl Substitution in Aniline Donors

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ABSTRACT

Photoinduced electron transfer between triplet state of 9,10-anthraquinone (AQ) and its two derivatives: 2-chloro-9,10-anthraquinone (CAQ) and sodium anthraquinone-2-sulfonate (AQS) and ground state aniline (AN) and its dimethyl substitutions: 2,3-dimethylaniline (2,3-DMA), 2,6-dimethylaniline (2,6-DMA), 3,5-dimethylaniline (3,5-DMA) and N,N-dimethylaniline (N,N-DMA) is studied using nanosecond laser flash photolysis at room temperature.

Detection of radical bands of quinone anions and aniline cations along with their formation and/or decay kinetics are used to confirm the electron transfer (ET) process. In MeCN medium, AN quenches the triplet state of CAQ (CAQ^T) but not the triplets AQ^T or AQS^T. However in aqueous medium, AN quenches AQS^T and forms radical ion pair. All the DMAs can react through ET with all the triplet quinones at different degrees of efficiency in MeCN medium. Noticeably, the ring substituted DMAs are less efficient in electron donation to AQ^T or AQS^T while the N,N-DMA shows high efficiency in donating electron to all triplet quinones in MeCN medium.