Variations in efficiencies of triplet state and exciplex formation following fluorescence quenching of 9,10-dicyanoanthracene due to charge transfer interactions

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Data is presented on the quenching of 9,10-dicyanoanthracene by benzene derivatives in acetonitrile. The quenching occurs via a charge transfer mechanism with the quenching rate constants exhibiting a Rehm-Weller dependence on the free energy change of the electron transfer reaction. The quenching of the prompt fluorescence brings about an increase in the delayed fluorescence of DCA as a result of intersystem crossing in the exciplex, and a modified Wilkinson's plot has been used to determine the efficiency of triplet formation during the quenching of DCA fluorescence by benzene derivatives. We suggest that intersystem crossing yields in the exciplex are unity, and variations in triplet state yields as a result of singlet state quenching reflect partitioning between exciplex formation and solvent-separated radical ion pair (SSRIP) formation. The data clearly show competition between exciplex formation and SSRIP formation, with the latter becoming dominant when the free energy for elect