

ENERGY TRANSFER MECHANISMS IN MIXED SYSTEMS INVOLVING FLAVINS

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Intermolecular energy transfer process has been studied in radical ion chemiluminescence (electro chemiluminescence) and in photoluminescence experiments to understand the mechanism of energy transfer. The electro chemiluminescence experiments were carried out using 9,10-diphenyl anthracene and lumiflavin or riboflavin in *N,N*-dimethyl formamide; the emission intensity arising from the diphenyl anthracene at 430 nm is decreased by the presence of the flavin. When the concentrations of flavin and diphenyl anthracene are 2.5 mM and 4.0 mM respectively, the emission comes from the flavin at 520 nm. The emission coming from diphenyl anthracene is quenched completely. The luminescence pulse area ratio of 430 nm to 520 nm of about 400 has been obtained; the emission values which have been used in the above calculation are for diphenyl anthracene when present alone and in the presence of 2.5 mM flavin. The emission studies were conducted by adjusting the potentials corresponding to the generation of radical anion of diphenyl anthracene and its own cation. In order to understand more on the mechanism magnetic field studies were conducted. The emission intensity is not altered in the presence of magnetic field when flavin was present in the medium.

Photophysical measurements on diphenyl anthracene and flavin have been carried out to obtain the energy transfer distances. The fluorescence of diphenyl anthracene decreases in the presence of flavin and was completely quenched at 2.5 mM concentration of flavin. The fluorescence spectrum of diphenyl anthracene and absorption spectrum of flavins overlap considerably. The results obtained in these studies suggest a dipole-dipole energy transfer; energy transfer distances of 46.5 Å and 59 Å have been obtained with riboflavin and lumiflavin.

Radiative transfer of energy has been observed both in electro chemiluminescence and photoluminescence experiments in the present studies; such an energy transfer was unsuccessful earlier with diphenyl anthracene and rubrene in electro chemiluminescence experiments. Detailed mechanisms will be discussed.