doi:10.1351/goldbook.F02488

Förster excitation transfer (dipole–dipole excitation transfer)

Also contains definition of: critical quenching radius, r_0

A mechanism of excitation transfer which can occur between molecular entities separated by distances considerably exceeding the sum of their van der Waals radii. It is described in terms of an interaction between the transition dipole moments (a dipolar mechanism). The transfer rate constant $k_{\mathrm{D}\rightarrow\mathrm{A}}$ is given by:

$$k_{\mathrm{D}\rightarrow\mathrm{A}} = \frac{K^2\, J\, 8.8\times 10^{-28}\,\mathrm{mol}}{n^4\,\tau_0\, r^6}$$

where K is an orientation factor, n the refractive index of the medium, τ_0 the radiative lifetime of the donor, r the distance (cm) between donor (D) and acceptor (A), and J the spectral overlap (in coherent units $\mathrm{cm}^6\,\mathrm{mol}^{-1}$) between the absorption spectrum of the acceptor and the fluorescence spectrum of the donor. The critical quenching radius, r_0, is that distance at which $k_{\mathrm{D}\rightarrow\mathrm{A}}$ is equal to the inverse of the radiative lifetime.

See also: Dexter excitation transfer, energy transfer, radiative energy transfer

Source:

PAC, 1996, *68*, 2223 *(Glossary of terms used in photochemistry (IUPAC Recommendations 1996))* on page 2243

