

Solvent effects on the sensitized photooxygenation of lidocaine

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Detection of $O_2(1^1g)$ phosphorescence emission, $\lambda_{max}=1270\text{nm}$, following laser excitation and steady state methods were employed to determine both the total constant, k_T LID, and the chemical reaction rate constants, k_R LID, for reaction between the anaesthetic lidocaine and singlet oxygen in several solvents. Values of k_T LID range from $0.20 \pm 0.09 \times 10^6 \text{M}^{-1} \text{s}^{-1}$ in trifluoroethanol to $45.8 \pm 2.40 \times 10^6 \text{M}^{-1} \text{s}^{-1}$ in N,N-dimethylacetamide. Values of k_R LID are at least one order of magnitude lower than k_T LID values in a given solvent. Solvent effect on quenching rates shows that reaction mechanism involves formation of a charge transfer exciplex. Correlation of k_T LID values with solvent parameters does not follow that observed for a typical tertiary amine such as triethylamine. Although k_T LID values are lower in hydrogen bond donor solvents, this solvent effect is significantly smaller than that for triethylamine, and no expected decrease in lidocaine reactivity with change from aprotic to protic sol