Solvent effects on reactions of singlet molecular oxygen, O2(1?g), with antimalarial drugs

Lemp, Else

Valencia, Cristina

Zanocco, Antonio L.

Detection of O2(1?g) emission, ?max=1270 nm, following laser excitation and steady-state methods were employed to measure total reaction rate constants, k T, for the reaction between singlet oxygen and the antimalarial drugs quinine (QU), quinacrine (QC), chloroquine (CQ) and amodiaquine (AQ) in several solvents. Values for k T range from 0.45±0.03×107 M-1 s-1 for AQ in benzene to 25.1±0.88×107 M-1 s-1 for CQ in N, N -dimethylformamide. Analysis of solvent effect on k T for QU, QC, and CQ by using the LSER formalism indicates that singlet oxygen deactivation by these drugs is accelerated by solvents with large ?* values and hydrogen bond acceptor (HBA) properties and is inhibited by hydrogen bond donors (HBD) solvents. This result support the formation of an exciplex intermediate of charge transfer character, as proposed for reactions of tertiary amines with singlet oxygen, process largely governed by physical quenching. AQ behaves in a different manner. The LSER equation for this drug