

Abstract

Investigations concerning the formation of substituted cyclohexene and cyclohexadiene derivatives (e. g. amino-functionalized carbocycles) in a one-pot procedure were accomplished.

An operationally simple two-step synthesis of substituted anilides has been developed. The methodology utilizes amides, aldehydes, and dienophiles such as alkynes and maleimides as simple starting materials and relies upon the sequential combination of condensation, tautomerization, cycloaddition, and oxidation events. The intermediate cycloadducts display various functional groups (e. g. Br, OAc, NR₂, COR, Cbz) for further chemical manipulation at the ring periphery or core. The anilides are highly crowded with up to four further substituents (carboxylate, nitrile, nitro, bromo, alkyl, aryl).

The photophysical and chemiluminescence properties of a series of structurally related 4-aminophthalimides and the corresponding 5-aminophthalic hydrazides (luminols) were investigated. Absorption, steady-state, and time-resolved fluorescence spectra of luminols exhibited substitution, solvent and pH dependence. Singlet lifetimes have been determined by time-resolved laser flash spectroscopy. UV spectra in gas phase and DMSO solution calculated by TD-DFT revealed the existence of two low-energy excited singlet states with strong pH-sensitivity. Significant differences in the luminescence enhancement in the presence of different metal ion/H₂O₂-oxidation systems displayed a strong dependence on substitution pattern.

Singlet oxygen ene reactions with a series of amido cyclohexenes synthesized from acetamide, *N*-methyl maleimide and α,β -unsaturated aldehydes in a one pot procedure were carried out to investigate their potential in the synthesis of oxygenated carbocycles and biologically active compounds. The reactions gave selectively the 1,2-aminoalcohols in *anti*-configuration.