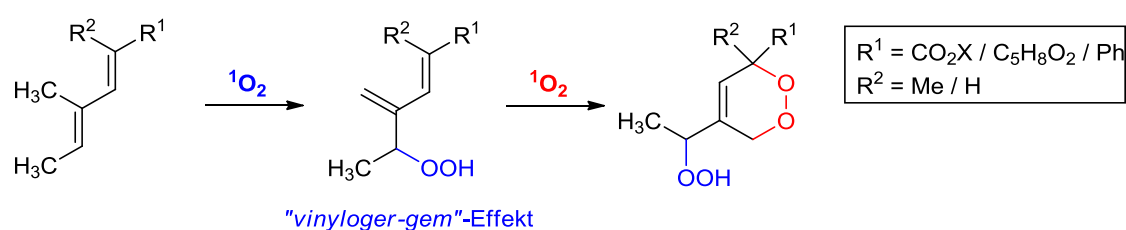


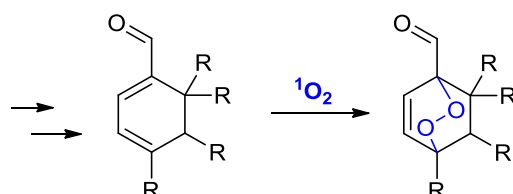
Abstract

In this work a new directing effect for singlet oxygen ene reactions is described. This "vinyllogous-gem"-effect leads in a highly chemo- and regioselective fashion to (ω -2)-hydroperoxy-substituted compounds for the Schenck-ene reactions of polyunsaturated donor and acceptor substituted compounds. These primary reactions enable the addition of a second equivalent singlet-oxygen yielding hydroxyl-endoperoxides as products of these domino ene/[4+2] processes.



The primary formed hydroperoxides as well as the secondary formed hydroperoxy-endoperoxides can be used for further synthetic applications. Accessible product classes are **alcohols**, **furanes**, **epoxides** and **triazoles** (as example for thermal Diels-Alder-reactions). Furthermore ester based starting materials can be linked to alcohols like dihydroartemisinin and reacted with singlet oxygen.

In another part of this work cyclic conjugated dienales are formed via organocatalytic induced cycloaddition reactions of α,β -unsaturated aldehyde compounds. These so formed molecules can be reacted with singlet oxygen furnishing bicyclic endoperoxides. In addition the reactivity of organocatalytic formed dienamines towards singlet oxygen will be explored.

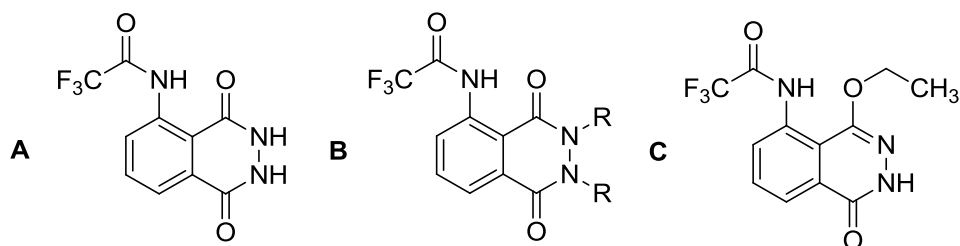


A comparative experimental and computational study concerning the singlet oxygen ene reactions of cyclic versus acyclic β,γ -unsaturated ketones is presented.

Furthermore a novel approach to stilbenoids is introduced.

Abstract

In this work the luminol derivative **A** as well as fully protected luminol derivatives of type **B** and a luminol isomere **C** are analyzed as fluorescent probes for the detection of ion pairs. In this sensor the trifluoroacetamide receptor unit is directly linked to the fluorophore luminol via amidation.



Compound **C** represents the first compound of a new class of fluorescent probes and is the only probe of all sensors described herein which yields satisfying results in the detection of ion pairs. Strong intramolecular hydrogen bonding in the luminol derivatives of type **A** and **B** inhibit the trifluoroacetamide receptor unit from being efficient in the detection of analytes. Whereas probe **C** in its neutral form allows a selective detection of the halide ions fluoride and bromide. In its deprotonated form the selective detection of lithium ions is possible. For the detection of halides different mechanisms occur: Fluoride acts as a base towards compound **C** in which deprotonation of the amidic proton results in enhanced fluorescence intensity. Bromide acts as a nucleophile towards compound **C** resulting in enhanced fluorescence intensity accompanied by a blue shift of the fluorescence maximum.

Furthermore the probe **D** for the selective detection of cyanide anions in water is presented. The trifluoroacetamide receptor unit acts as electrophile towards cyanide ions, whereas addition of cyanide results in a strong enhancement of the fluorescence intensity accompanied by a blue shift.

