SHORT COMMUNICATION

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Influence of Metals and Reduced Oxygen Species on the Photooxidation of 2-Propanol with a Cesium Peroxidotitanate Complex

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The mechanism of the photocatalytic degradation of 2-propanol under anaerobic condition was investigated in the presence of the novel cesium peroxoidotitanate complex $Cs_2(NH_4)_6[Ti_4(O_2)_4(Hcit)_2(cit)_2]Cl_2 \cdot 8H_2O$ (**1**) (cit = citrate). This complex contains two different kinds of peroxido units. Two peroxido groups bind to the titanium atom in a side-on η^2-fashion, the other peroxido units are directly bonded to the titanium and cesium atoms. These bridging peroxido groups are responsible for the inhibited activity in the photooxidation in contrast to what was found in previous studies about unbridged peroxidotitanate complexes. The decelerated oxidation of the alcohol is useful for the determination of the mechanism during the photocatalytic oxidation process. Therefore, ESI mass spectrometry and ^{13}C NMR spectroscopy were applied to obtain a deeper insight into the mechanism in the alcohol oxidation. Furthermore, an influence of the metal salt (Cs vs. Li) with respect of the photocatalysis was detected. The cesium peroxido complex **1** shows significant results in the photochemical oxidation of 2-propanol to acetone. More than 50 % acetone was obtained without detection of any side products. The conversion yield from 2-propanol to acetone was monitored by ^1H and ^{13}C NMR spectroscopy and by Raman spectroscopy. The catalytic activity is not limited to 2-propanol; 1-phenylethanol could also be oxidized by **1**. An intermediate of the photooxidation could be isolated and was characterized.