Manganese Catalase Models with Halide Substituted Tripodal Ligands – Kinetic Properties and Fields of Application

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Manganese catalases belong to a group of enzymes which are responsible for the disproportionation of hydrogen peroxide into water and dioxygen. They protect cells from deleterious effects and play an important role in aerobe life forms.[1] During the catalytic cycle the oxidation states of the dinuclear manganese center change between Mn_2(II/II) and Mn_2(III/III). The so far most efficient catalase mimic is based on a tripodal ligand that surrounds the dinuclear metal center.[2] Catalase model complexes can be used in many applications, as therapeutic agents against oxidative stress in treatment of diverse diseases or in industrial areas as bleaching reagents and more.[3]

A series of symmetric tripodal ligands with varying halide substitutions were synthesized. The resulting dinuclear manganese compounds were structurally characterized by various techniques such as X-ray crystallography, cyclovoltammetry, mass spectrometry, and elemental analysis. They represent good models for the active site of manganese catalases and show high catalytic activity regarding hydrogen peroxide disproportionation. The influence of the respective halide substituents on the geometry of the first coordination sphere and on the catalytic and spectroscopic features was examined.[4]

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