Organic Oxidations with Manganese Catalysts - A Total Analysis Approach to Elucidation Mechanisms and Origins of H_2O_2 Decomposition

Wesley Browne
Stratingh Institute for Chemistry, Faculty of Science and Engineering,
University of Groningen, The Netherlands

The oxidation of organic compounds and especially alkene oxidation is central to fine chemical production. H_2O_2 is the oxidation of choice for atom efficiency and minimizing environmental impact. Its activation by 1st transition metals is especially attractive but presents the challenge to suppress the wasteful and potentially hazardous decomposition of H_2O_2 to water and O_2. The species responsible for substrate oxidation and H_2O_2 decomposition can be expected to respond differently to changes in reaction conditions. Common approaches are the use of additives, and in particular carboxylic acids, as well as maintaining a low steady state concentrations of oxidant. Catalyst discovery and optimization for overall efficiency benefits from in line reaction monitoring and in this lecture we will discuss the use of combined spectroscopies in reaction monitoring with two examples to illustrate how a total analysis mechanistic approach can be used to understand why various approaches to reaction optimization work or not.