Evaluation of Homogeneous Transition Metal Catalysts for The Epoxidation of Unsaturated Fatty Acid Esters

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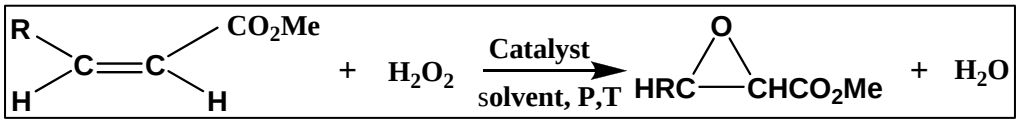
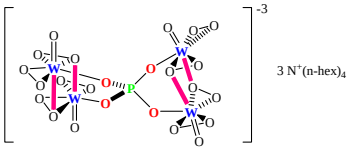
Many catalysts have been proposed for the conversion of fatty acids and their esters into their epoxides and derivatives as a first critical step in the preparation of an array of important products, polyether polyols, plasticizers for PVC and their resins, high viscosity lubricants, urethane coatings, antifoaming agents and antifungal agents. The process is envisioned in the equation in the figure below:





Venturello's catalyst

OR $[\gamma\text{–}SiW_{10}O_{34}(H_2O)_2]^{-4}$ **Mizuno's catalyst**

OR $[Mn^{IV}(Me_2EBC)(OH)_2]^{2+}$ **The KU Catalyst** **OR** **TS-1** **OR** **??**

Figure: exploring catalysts for epoxidation of FAMES

Catalysts range from such exotic precious metal derivatives as methyl trioxorhenium (MTO), and gold nanoparticles to inexpensive derivatives of common transition metals as shown in the figure. These studies will make use of examples from readily available catalysts categories, and perhaps newly designed catalysts with the long term goal of providing a continuous process competitive with current industry in both economics and sustainability. Research will be conducted in KU laboratories at the Center for Environmentally Beneficial Catalysis.