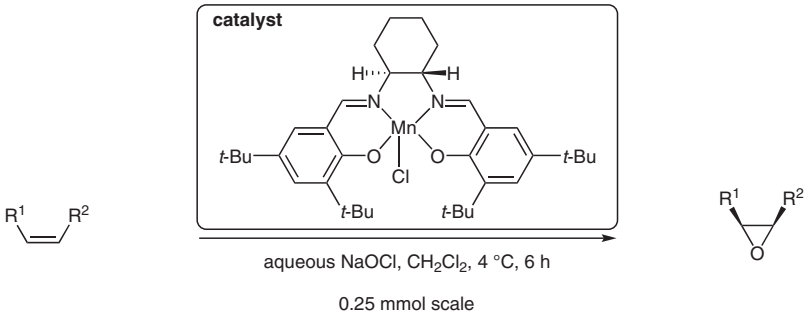
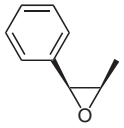
E. N. JACOBSEN*, W. ZHANG, A. R. MUCI, J. R. ECKER, L. DENG (HARVARD UNIVERSITY, CAMBRIDGE, USA)

Highly Enantioselective Epoxidation Catalysts Derived from 1,2-Diaminocyclohexane
J. Am. Chem. Soc. **1991**, *113*, 7063–7064.

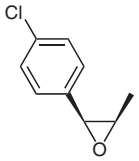
The Jacobsen Epoxidation



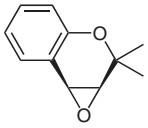
Reported examples:



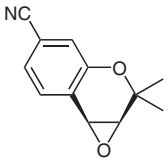
84% yield, 92% ee
4 mol% of catalyst required



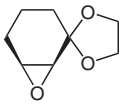
67% yield, 92% ee
4 mol% of catalyst required



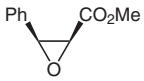
72% yield, 98% ee
2 mol% of catalyst required



96% yield, 97% ee
3 mol% of catalyst required



84% yield, 92% ee
15 mol% of catalyst required



84% yield, 92% ee
10 mol% of catalyst required

Significance: Although manganese-catalyzed enantioselective epoxidation of nonactivated alkenes had been previously described by Jacobsen (*J. Am. Chem. Soc.* **1990**, *112*, 2801) and Katsuki (*Tetrahedron: Asymmetry* **1991**, *2*, 481), this report was the first general and highly enantioselective method to achieve this transformation. When compared to the Sharpless epoxidation, this method does not require allylic alcohols and works best with *cis*-alkenes.

Comment: Jacobsen found that by optimizing the size of the salen ligand, the approach of the olefin towards the metal center could be controlled. Thus, the bulky *tert*-butyl groups on the aromatic rings of the salen ligand limit the chance of competing approaches to the substrate.

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Metals in Synthesis

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