

DESIGN OF OLEFIN METATHESIS CATALYSTS:
FROM ENANTIOSELECTIVE REACTIONS TO TETRASUBSTITUTED OLEFINS

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Abstract

The widespread use of olefin metathesis in organic and polymer chemistry has been due in large part to the emergence of highly active stable ruthenium catalysts for this transformation. To date, the most successful catalysts for asymmetric olefin metathesis reactions are molybdenum based. It is expected that the development of more effective ruthenium-based catalysts for asymmetric olefin metathesis reactions will dramatically expand the synthetic utility of these reactions. Chapter 2 of this thesis describes the synthesis of novel chiral ruthenium-based olefin metathesis catalysts. These catalysts are applied to asymmetric ring-closing metathesis in chapter 3 and asymmetric ring-opening cross metathesis along with the first examples of asymmetric cross metathesis in chapter 4.

Another area in which the use of ruthenium-based catalysts is limited is the preparation of very sterically encumbered olefins. One example of this limitation is ring-closing metathesis to form tetrasubstituted olefins, chapter 5 describes the synthesis of a family of ruthenium-based catalysts that demonstrate improved activity for this transformation.

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