

# Triple Cascade Reaction Leading to Tetra-Substituted Cyclohexenes

Category

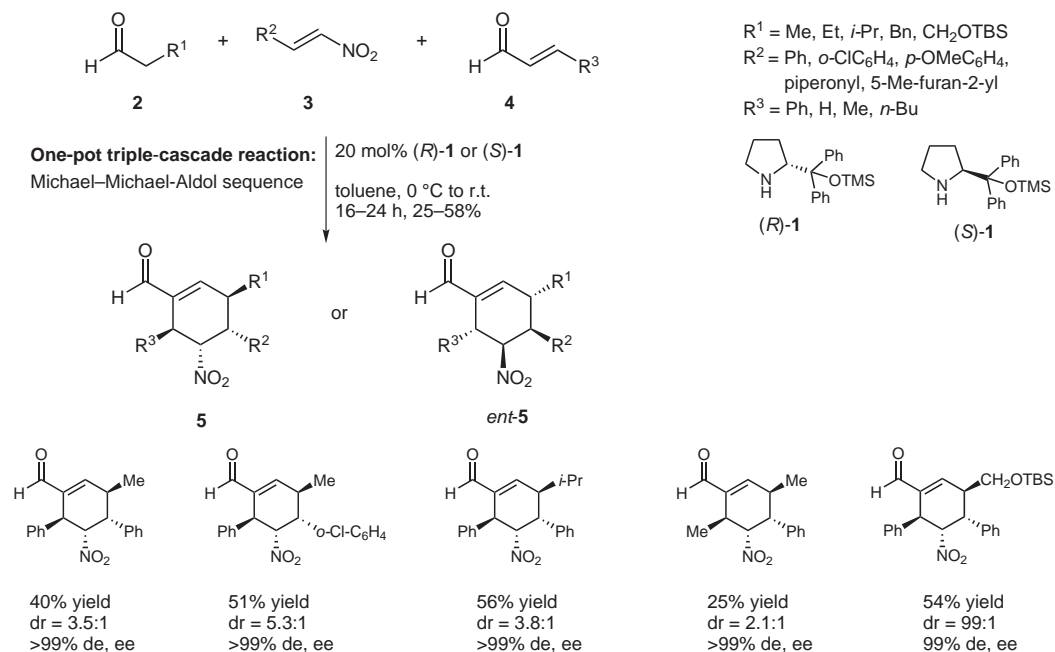
Organo- and Biocatalysis

Key words

cascade reaction

Michael reaction

aldol reaction



**Significance:** A novel 3-component organocatalytic cascade reaction is reported that generates cyclohexene derivatives **5** with four contiguous stereogenic centers in good diastereoselectivities (from 2.1:1 to 99:1) and high enantioselectivities (>99%). A large variety of substrates can be used: aldehyde **2** can be aliphatic or highly functionalized; the  $\alpha,\beta$ -unsaturated aldehyde **4** tolerates aromatics as well as aliphatics. However, nitroolefin **3** is limited to aromatic substrates. Surprisingly, the product itself did not react further with the catalyst, possibly due to steric hindrance.

**Comment:** Construction of several stereogenic centers in complex molecules in a single step is one of the most challenging and desirable processes in synthetic chemistry. Herein the authors present a remarkably broad substrate scope for such a cascade reaction, which allows for building blocks that can be used in natural product synthesis. Moreover, the easy access to both enantiomers of the catalyst gives rise to a large diversity of products. One advantage of this transformation is that it can be employed to combinatorial processes without the need of any protecting groups.