COPE ELIMINATION
（COPE REACTION）

VS Hofmann elimination

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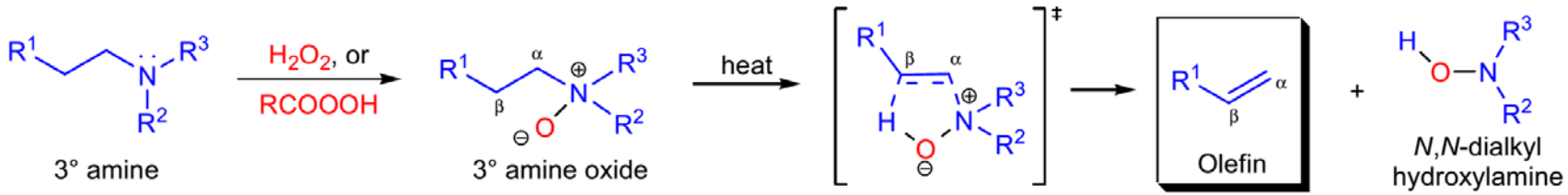
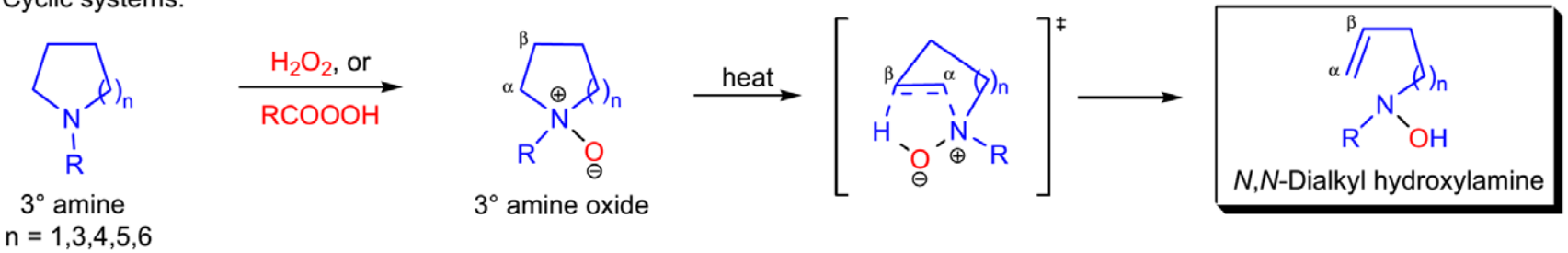
In 1949, A.C. Cope and co-workers discovered that by heating trialkylamine-N-oxides having hydrogens in the β-position, an olefin and N,N-dialkylhydroxylamine are formed. The transformation involving the stereoselective syn elimination of tertiary amine oxides is now referred to as the Cope elimination or Cope reaction.

Acyclic systems:

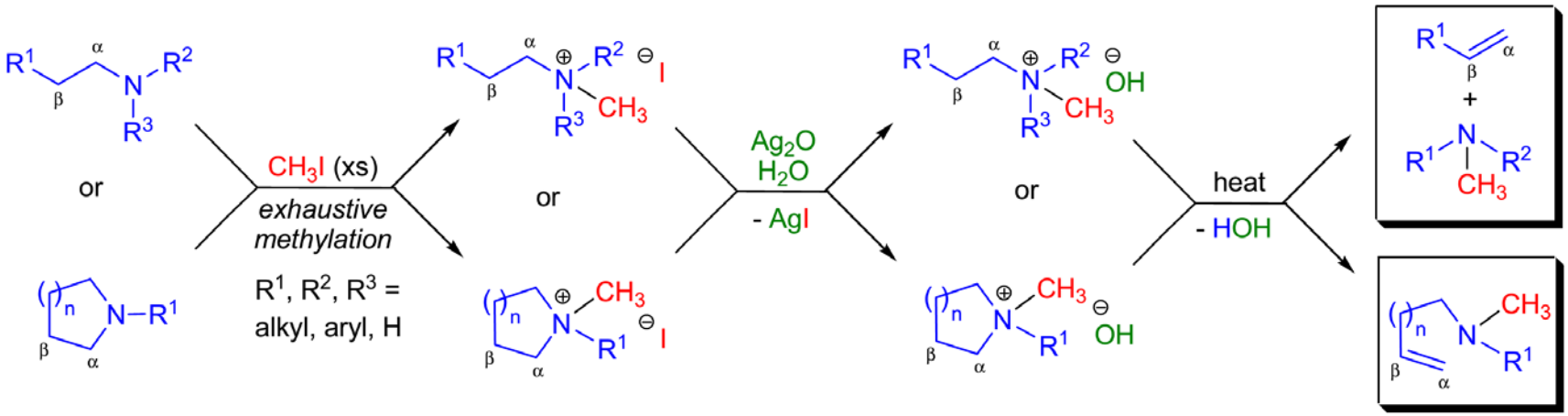


Cyclic systems:

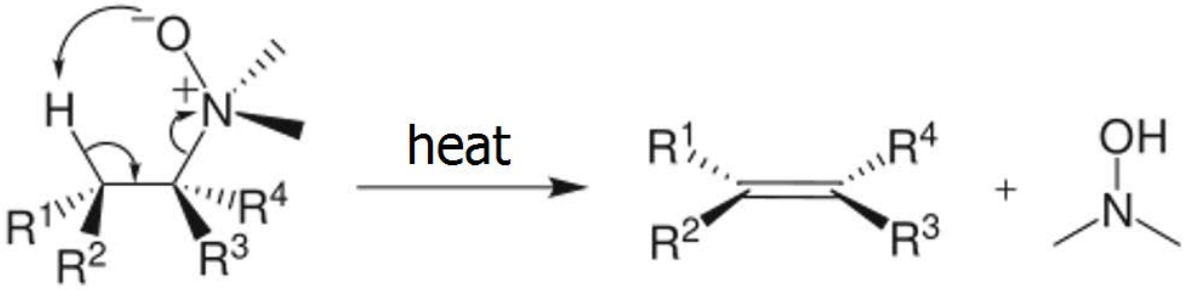


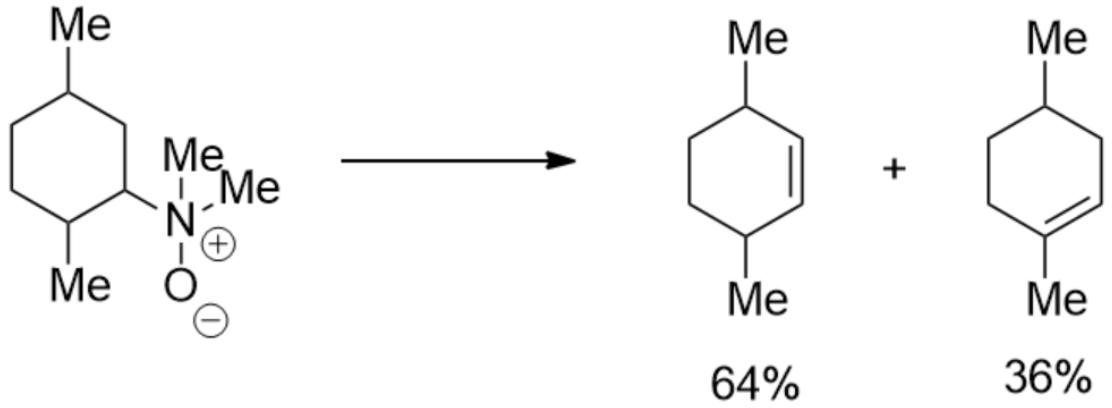
Hofmann elimination

The pyrolytic degradation of quaternary ammonium hydroxides to give a tertiary amine, an olefin and water is known as the Hofmann elimination.



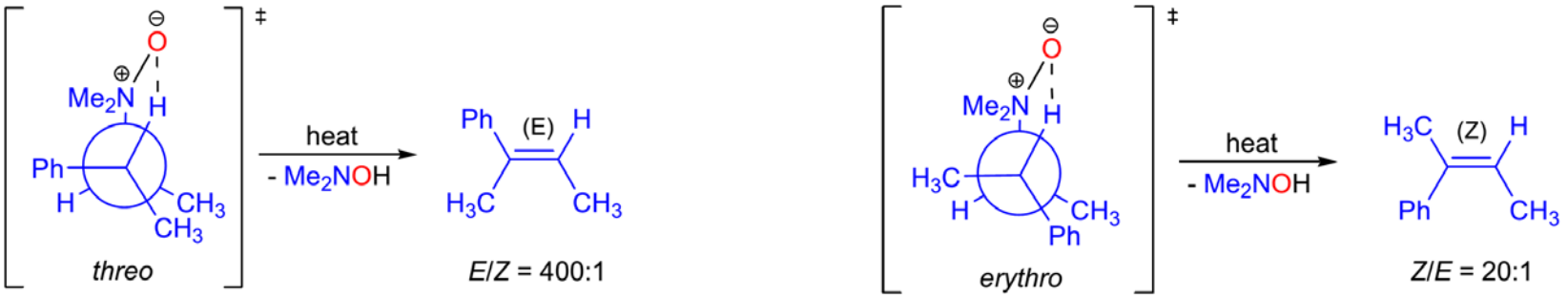
Piperidines are resistant to an intramolecular Cope reaction but with pyrrolidine and with rings of size 7 and larger, the reaction product is an unsaturated hydroxyl amine. This result is consistent with the 5-membered cyclic transition state.





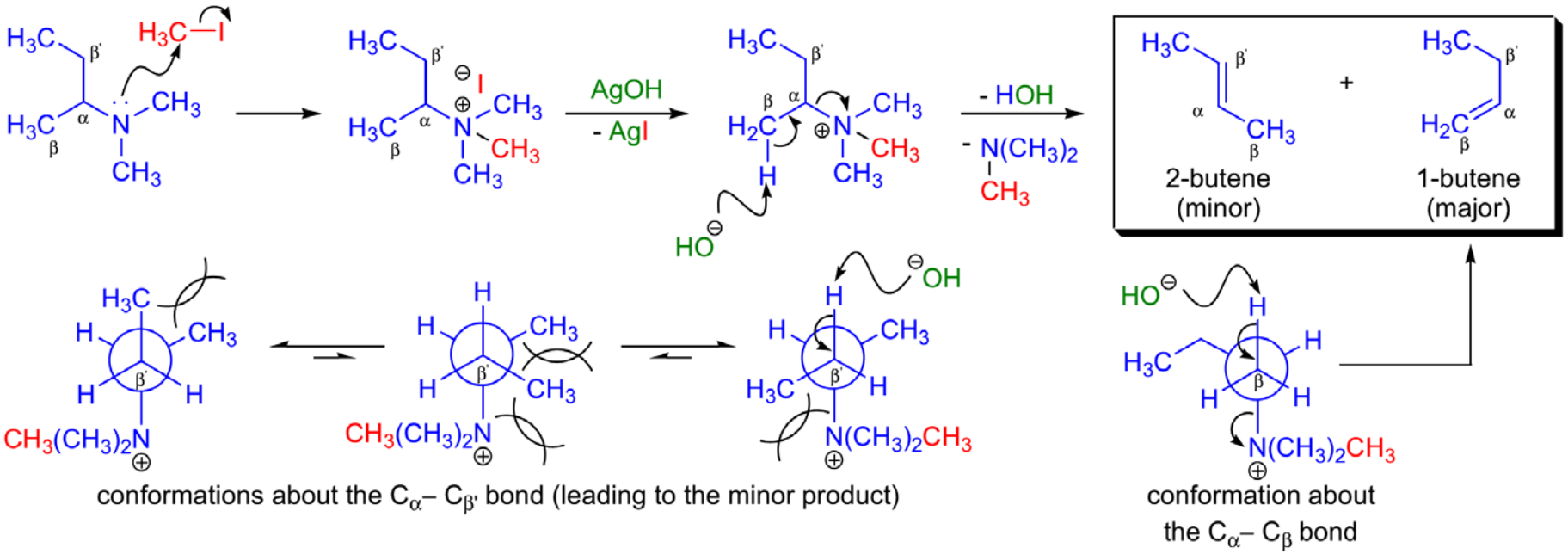
Mechanism (Cope elimination):

The reaction mechanism involves an intramolecular 5-membered cyclic transition state, leading to a syn elimination product.

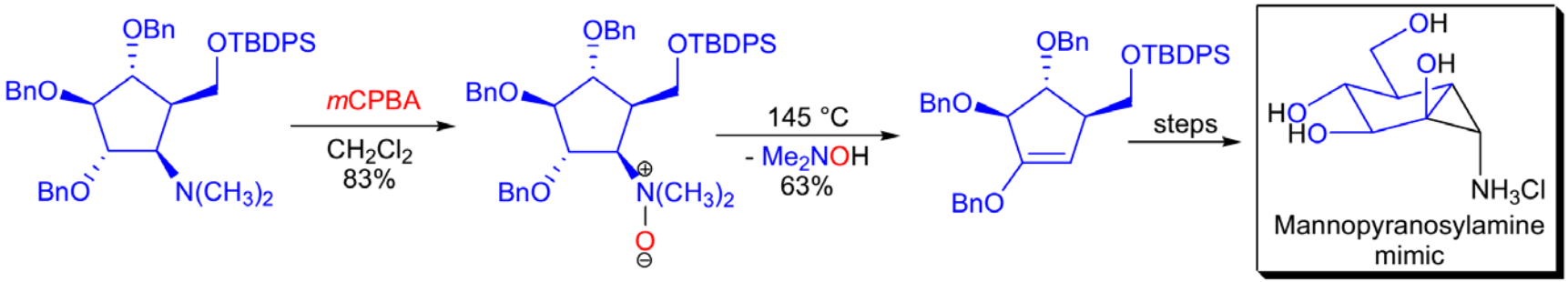


Mechanism (Hofmann elimination) :

Generally the mechanism of the Hofmann elimination is E2, and it is an antielimination (the leaving groups have to betrans-diaxial/antiperiplanar).



Synthetic Applications:



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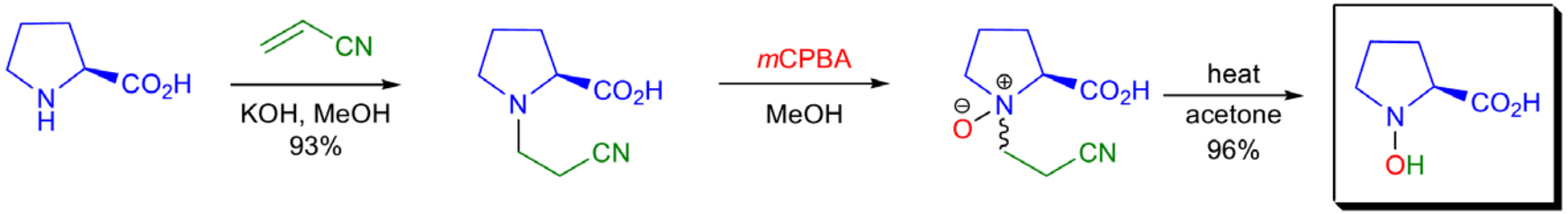

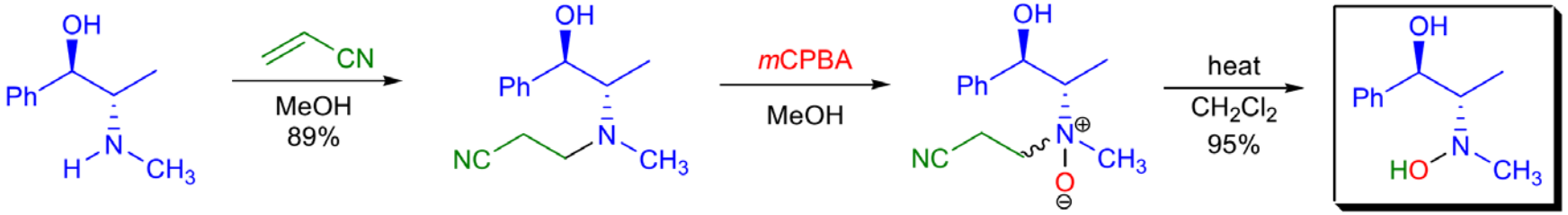

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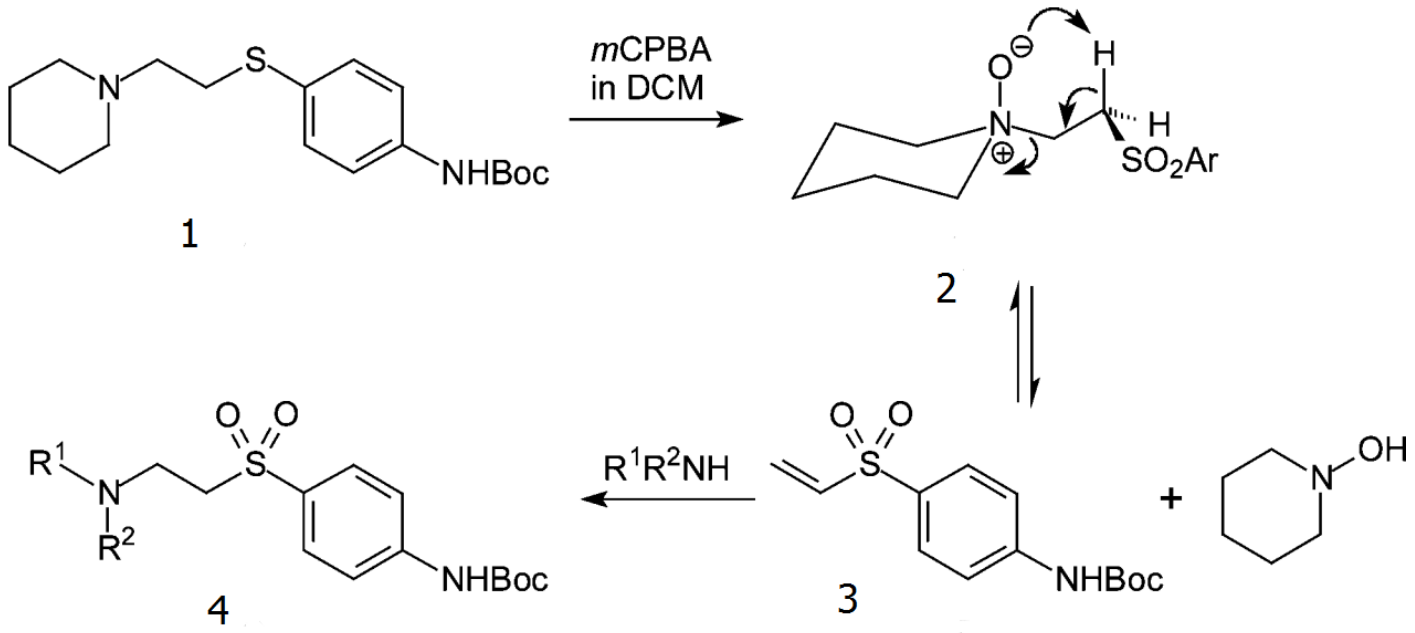

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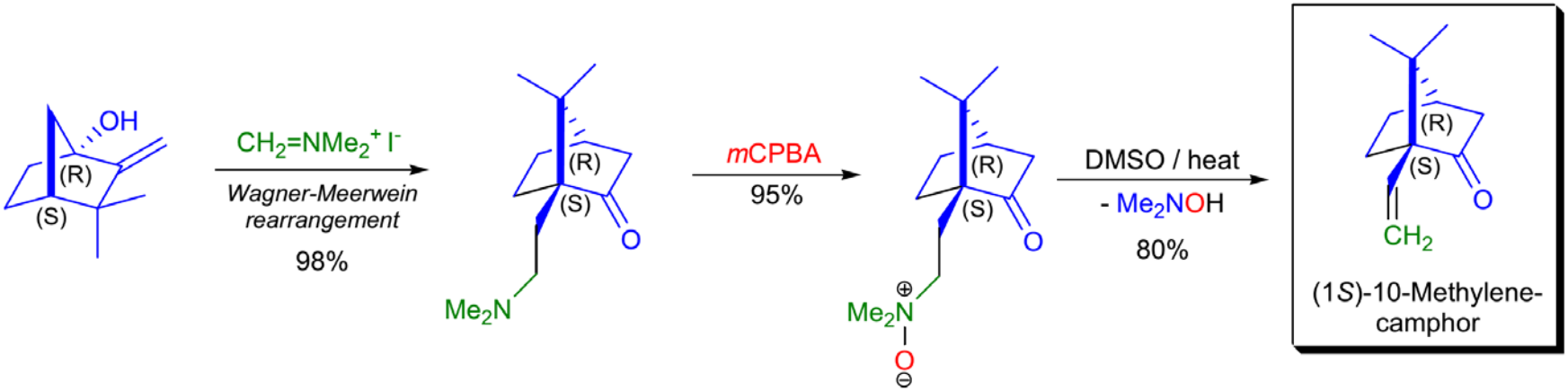

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