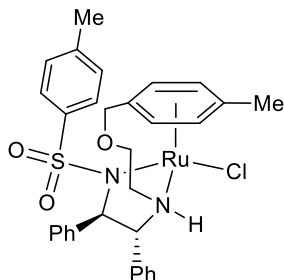


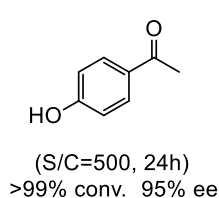
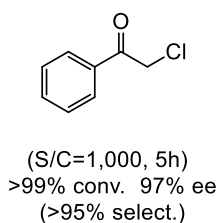
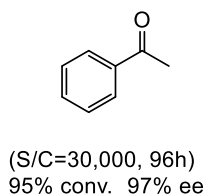
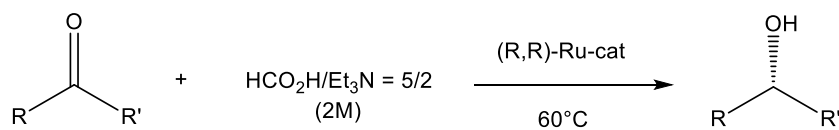
Catalog # 44-0185 N-[(1R,2R)-1,2-Diphenyl-2-(2-(4-methylbenzyloxy)ethylamino)-ethyl]-4-methylbenzene sulfonamide(chloro)ruthenium(II) (R,R)-Ts-DENEB®



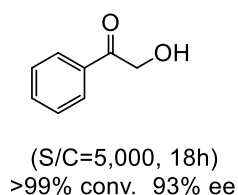
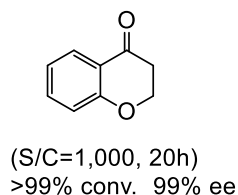
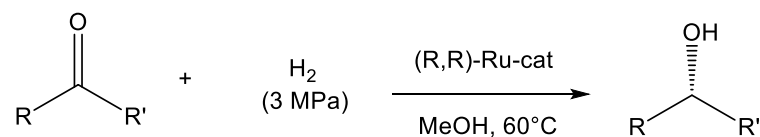
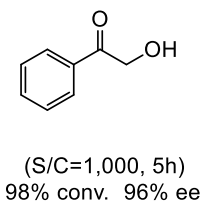
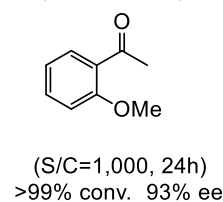
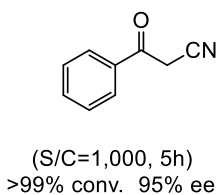
Note: Sold in collaboration with Takasago. US. Patent 9079931.

Technical Notes:

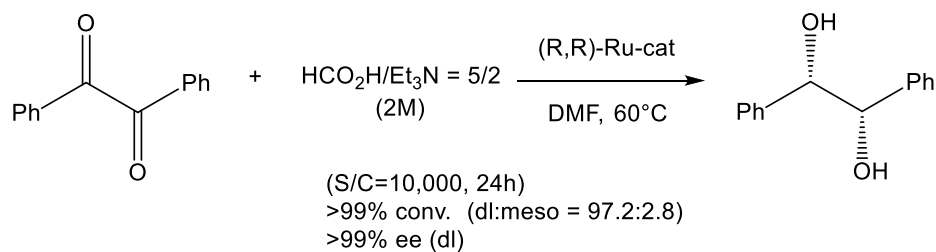
1. Catalyst used for asymmetric α -transfer hydrogenation.
2. Catalyst used for asymmetric H_2 – hydrogenation.
3. Catalyst used for dynamic kinetic resolution.
4. Catalyst used for asymmetric transfer hydrogenation of unsymmetrical benzophenones.
5. Catalyst used for asymmetric transfer hydrogenation of Aryl N-Heteroaryl Ketones.
6. Catalyst used for asymmetric transfer hydrogenation of α -Substituted Ketone.
7. Development of Asymmetric Transfer Hydrogenation with a Bifunctional Oxo-Tethered Ruthenium Catalyst in Flow for the Synthesis of a Ceramide (D-erythro-CER[NDS]).
8. Multiple Absolute Stereocontrol in Cascade Lactone Formation via Dynamic Kinetic Resolution Driven by the Asymmetric Transfer Hydrogenation of Keto Acids with Oxo-Tethered Ruthenium Catalysts.
9. Convincing Catalytic Performance of Oxo-Tethered Ruthenium Complexes for Asymmetric Transfer Hydrogenation of Cyclic α -Halogenated Ketones through Dynamic Kinetic Resolution.



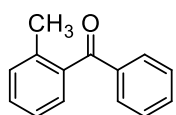
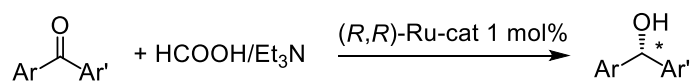
Tech. Note (1)
Ref. (1)



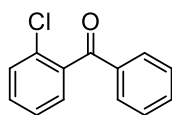
Tech. Note (2)
Ref. (1)



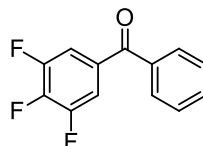
Tech. Note (3)
Ref. (1)



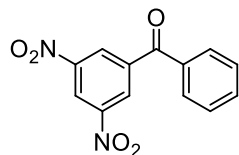
(60 °C, 18 h)
98% yield. 98% ee



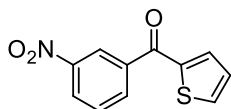
(40 °C, 17 h)
>99% yield. 98% ee



(30 °C, 16 h)
>99% yield.
95% ee

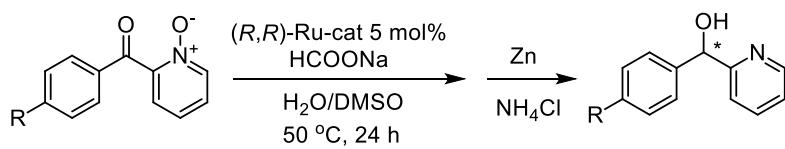


(30 °C, 26 h)
90% yield. >99% ee



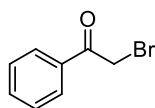
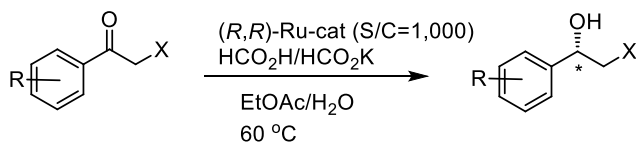
(10 °C, 8 h)
96% yield. 98% ee

Tech. Note (4)
Ref. (2)

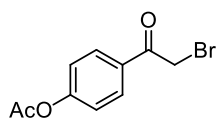


R=H : 86% yield. 97.8% ee
 R=Cl : 92% yield. 99.8% ee

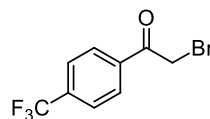
Tech. Note (5)
Ref. (3)



(4 h)
93% yield. 96% ee



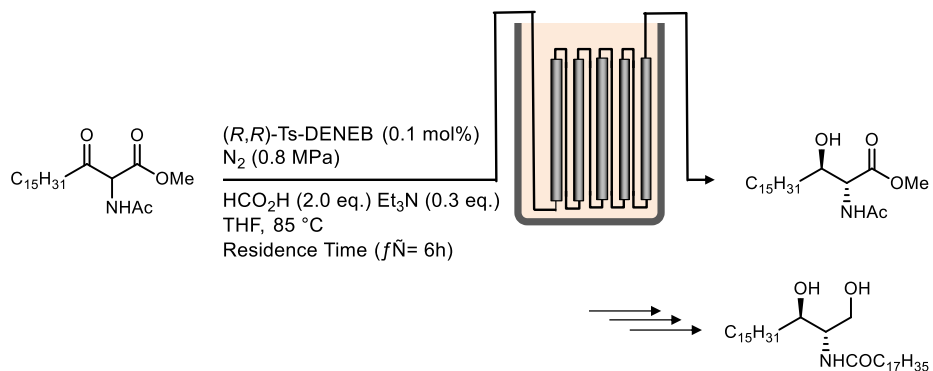
(6 h)
93% yield. 95% ee



(4 h)
94% yield. 94% ee

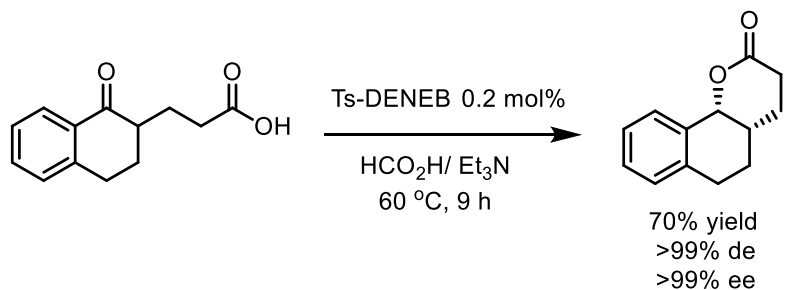
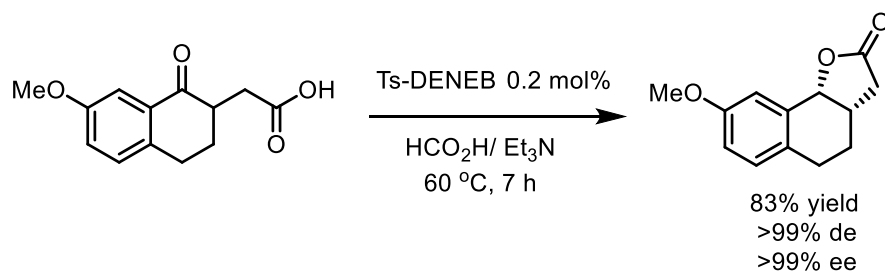
Tech. Note (6)
Ref. (4)

100 L Vertical
Pipes-in-series Reactor

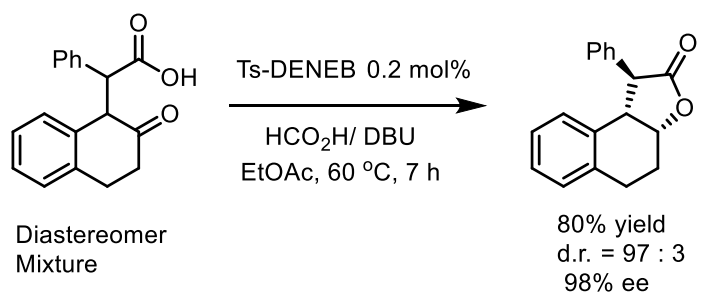
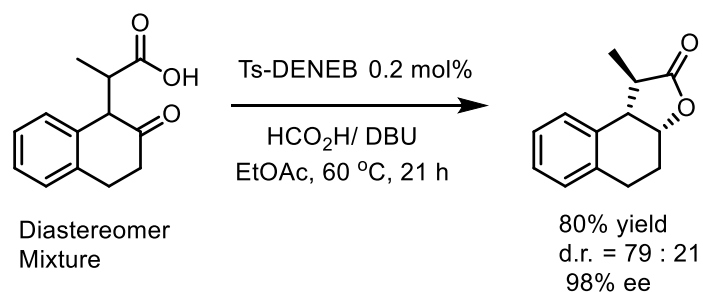


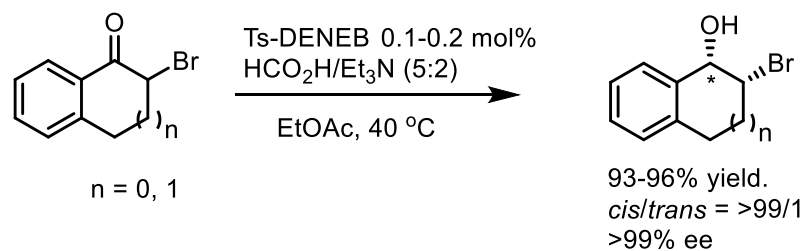
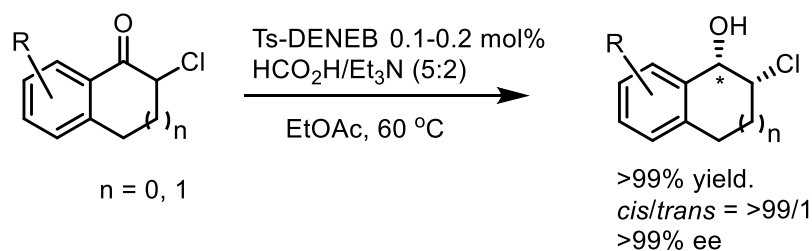
Tech. Note (7)
Ref. (5)

Ceramide
(D-erythro-CER[NDS])
58 kg
>99% de, >99% ee

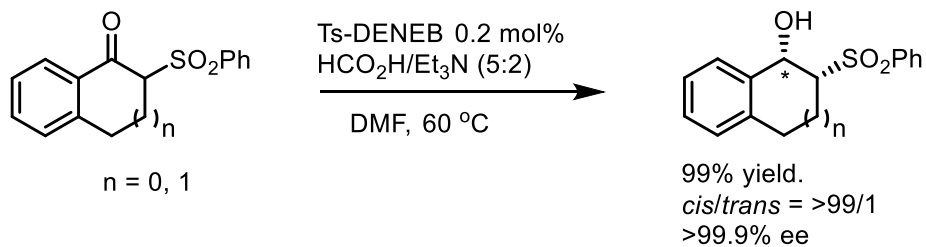
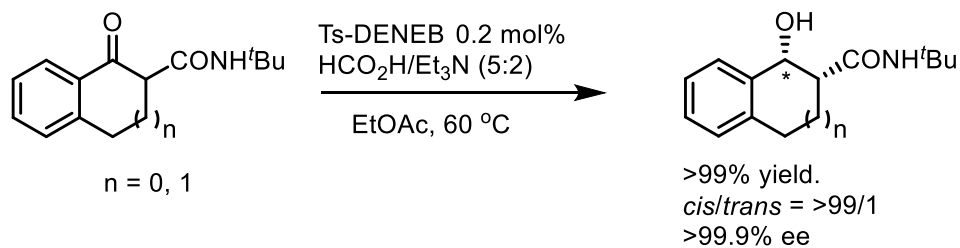


Tech. Note (8)
Ref. (6)





Tech. Note (9)
Ref. (7)



Reference:

1. *J. Am. Chem. Soc.*, **2011**, 133, 14960.
2. *J. Am. Chem. Soc.* **2016**, 138, 10084.
3. *Org. Lett.* **2017**, 19, 2094.
4. *Adv. Synth. Catal.* **2017**, 360, 568.
5. *Org. Process Res. Dev.* **2019**, 23, 452.
6. *J. Am. Chem. Soc.* **2019**, 141, 16354.
7. *Org. Lett.* **2021**, 23, 3070.