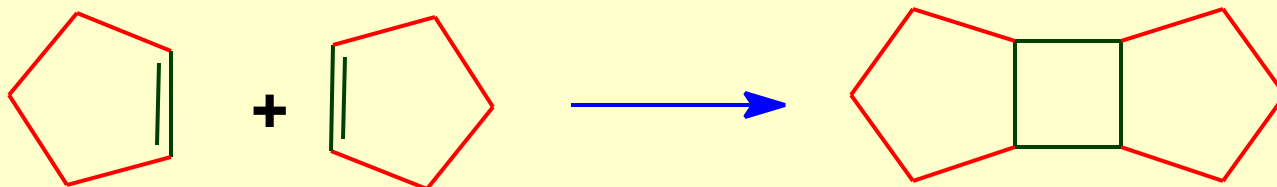
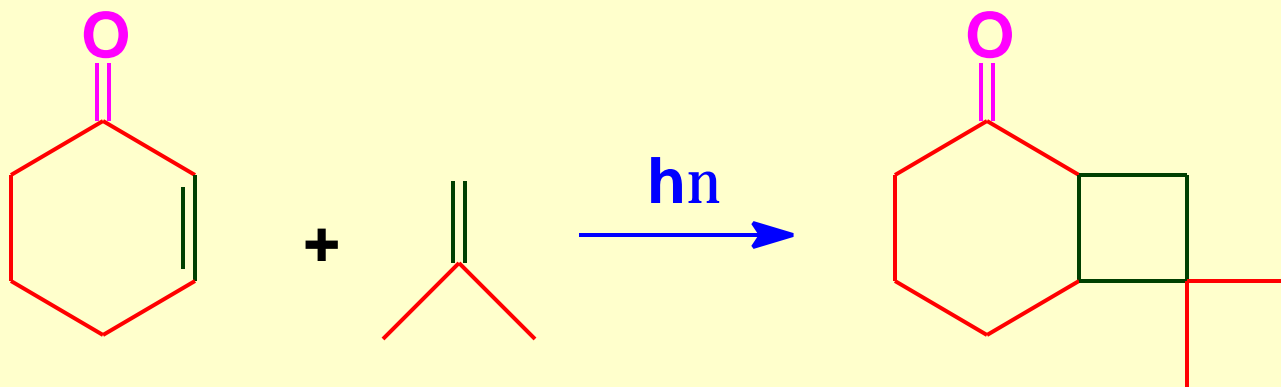


**Asymmetric Synthesis of Both  
Enantiomers of Bicyclo[3.2.0]heptanes  
through Chirality Transfer**

**Subrata Ghosh**

**Indian Association for the Cultivation of Science  
Kolkata**

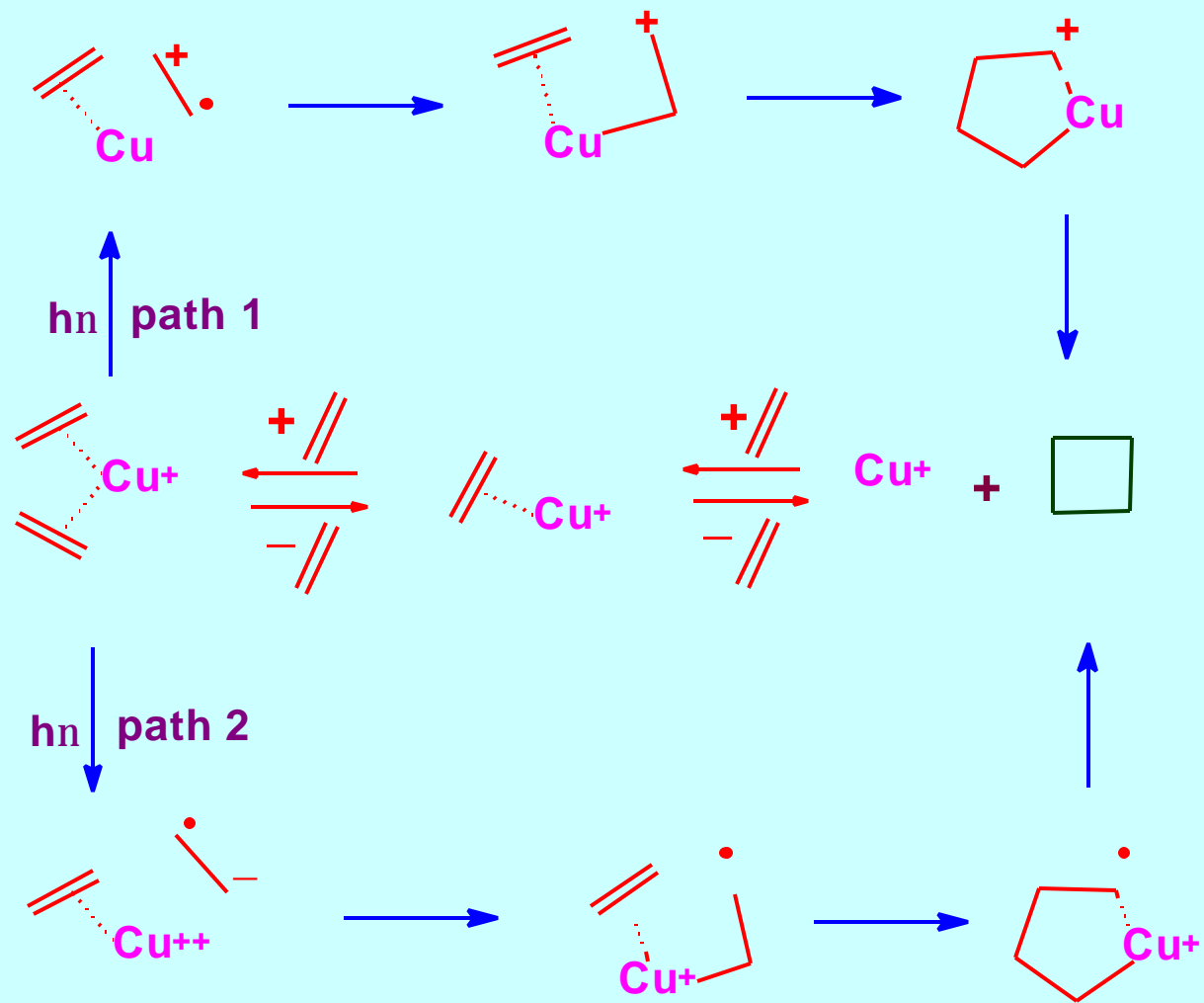


$h\nu$ , direct / sensitiser

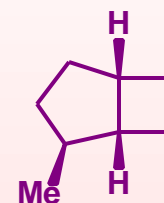
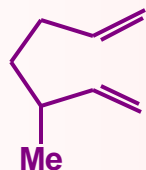
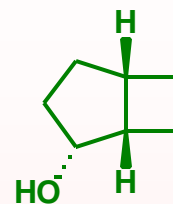
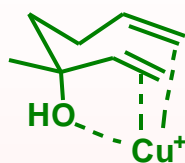
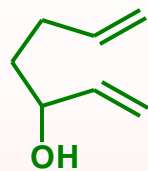
CuOTf

No reaction

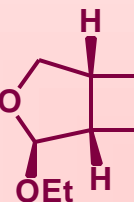
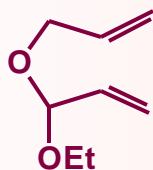
80%



## Stereoselectivity

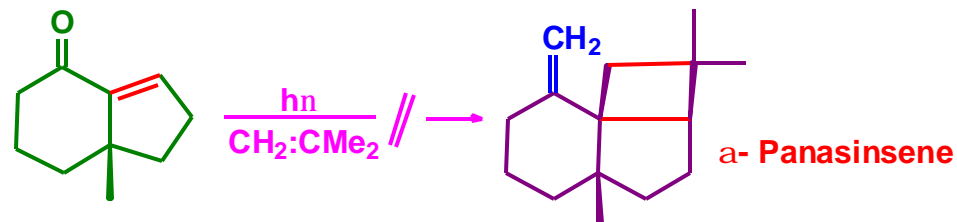
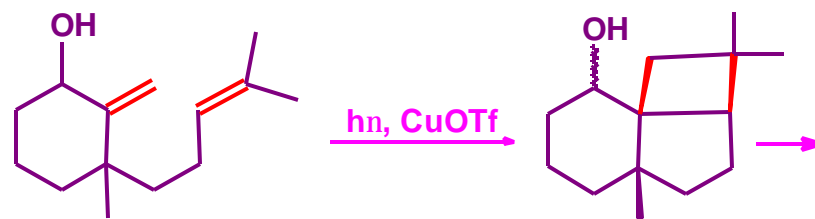


Salomon, Coughlin, Ghosh, Zagorski, *J. Am. Chem. Soc.* **1982**, 104, 998

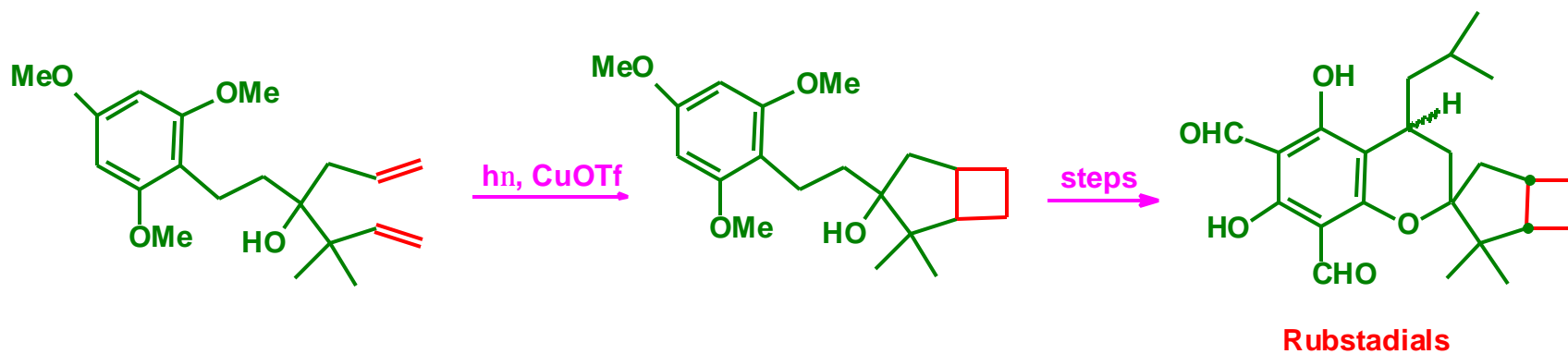


Ghosh *et al*, *Tetrahedron Lett.* **1999**, 40, 6693

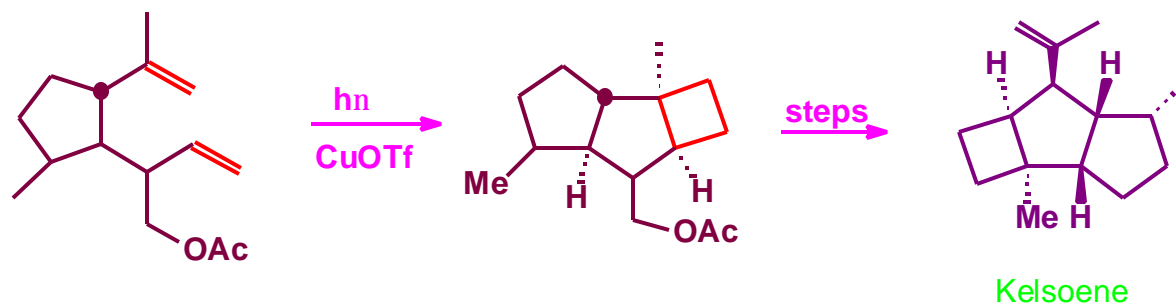
*Arkivoc* **2001**, vii, 146



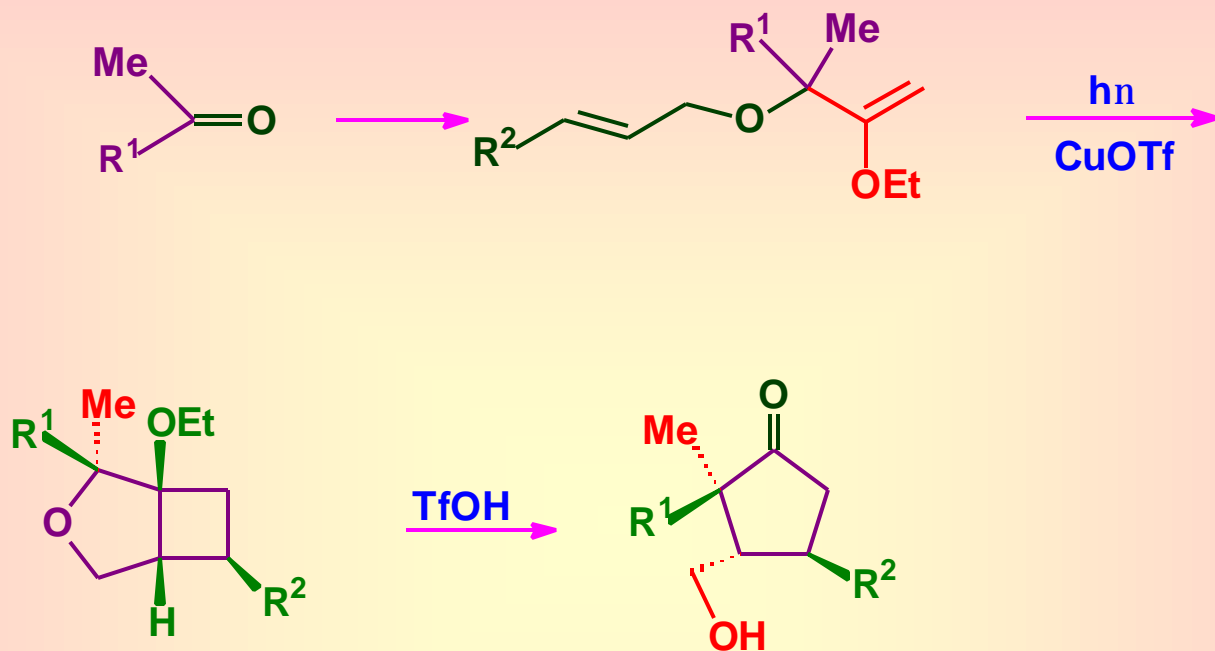
Mc Murry *et al*, *Tetrahedron Lett* **1980**, 21, 2477



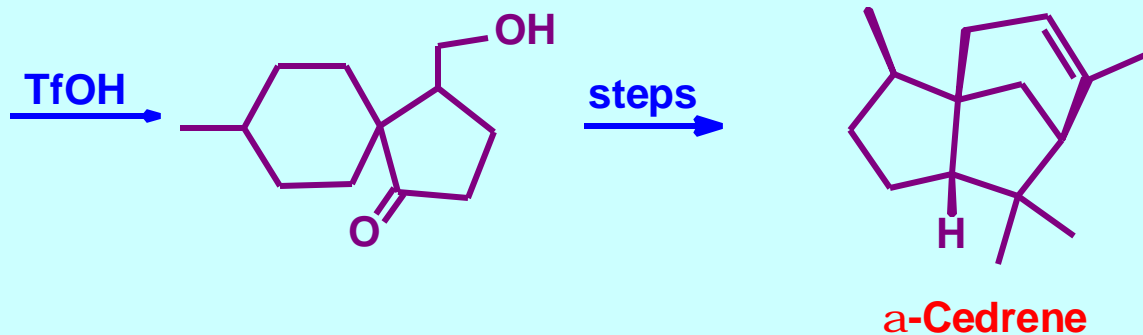
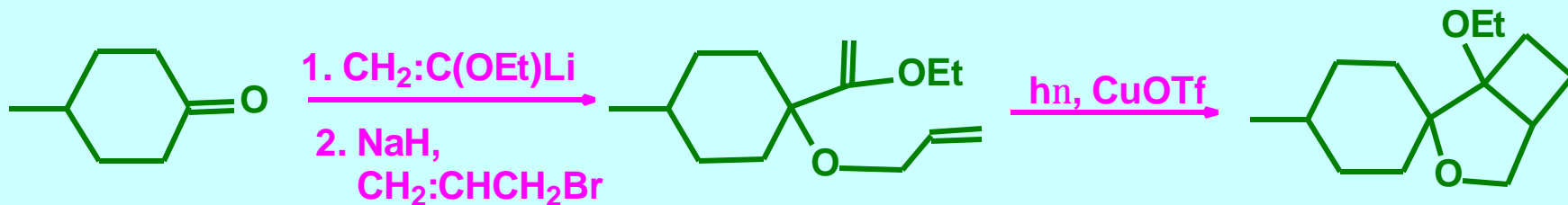
Salomon *et al*, *J. Am. Chem. Soc.* **1986**, 108, 1311



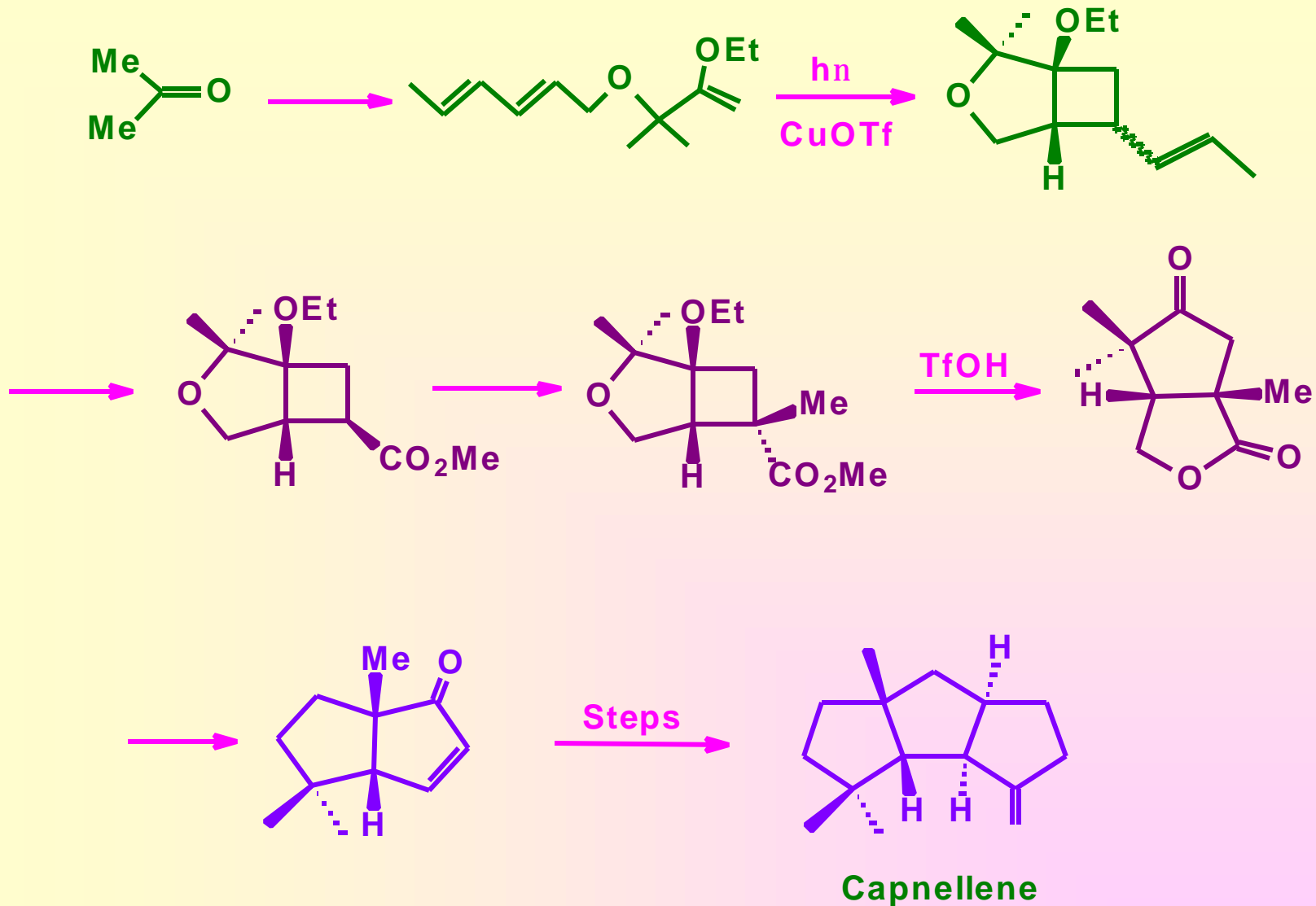
Bach *et al*, *Synlett* **2002**, 1305



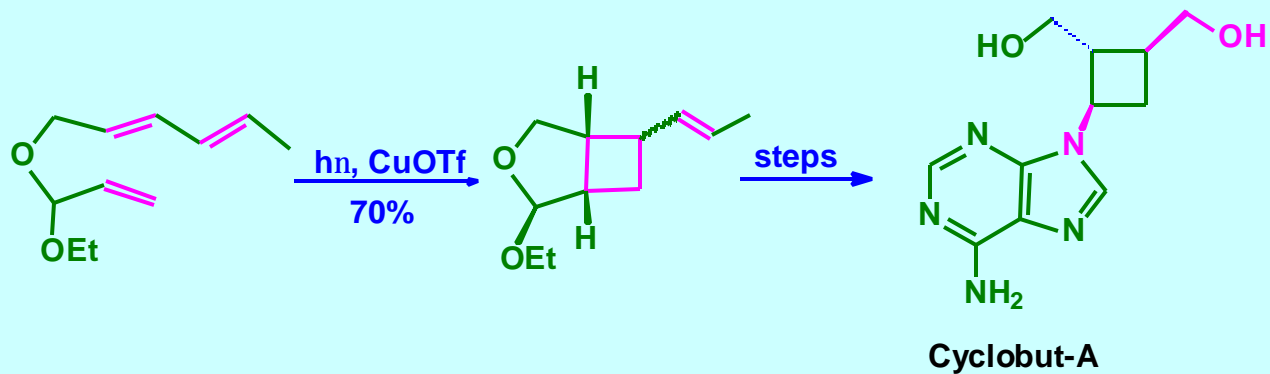
Ghosh *et al* *Tetrahedron Lett* **1993**, 34, 4565  
*J. Org. Chem* **1995**, 60, 2526  
*Tetrahedron Lett* **1996**, 37, 2703  
*Pure & Appl. Chem* **1996**, 68, 597  
*J. Org. Chem* **1997**, 62, 5211



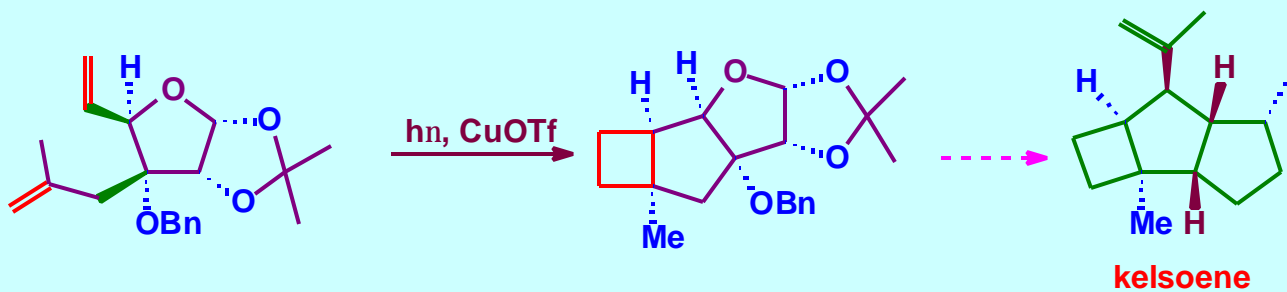
Ghosh *et al*, *Chem Commun* **1993**, 783  
*Perkin Trans1* **1995**, 2635



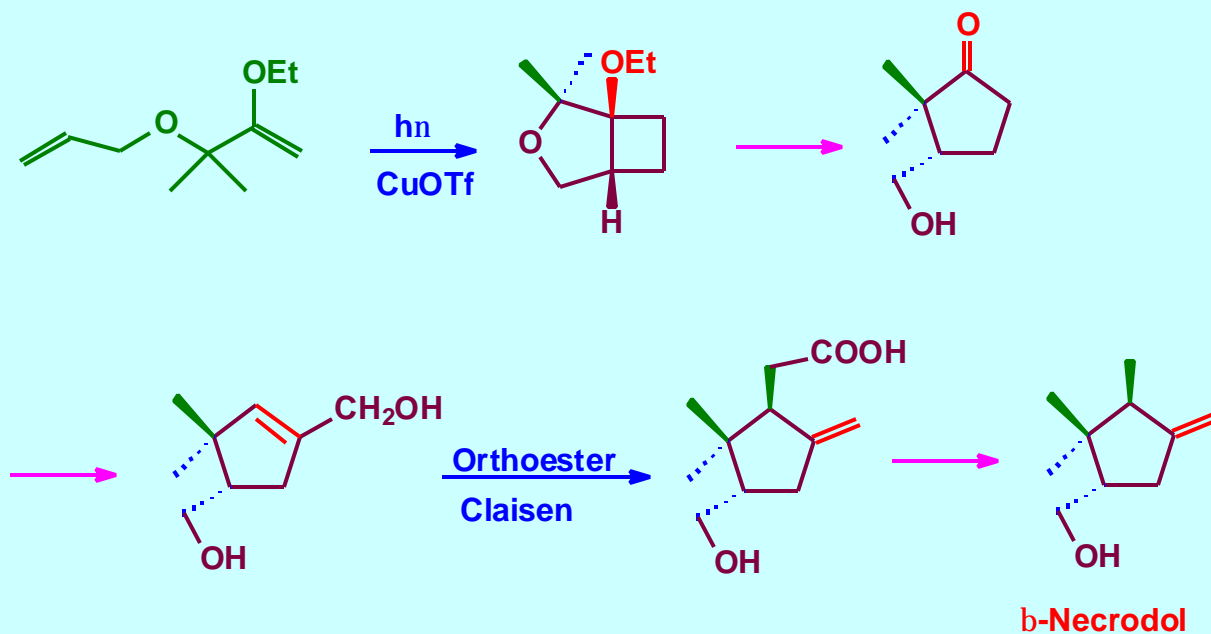
Ghosh *et al* , *Tetrahedron* **1998**, *54*, 1789



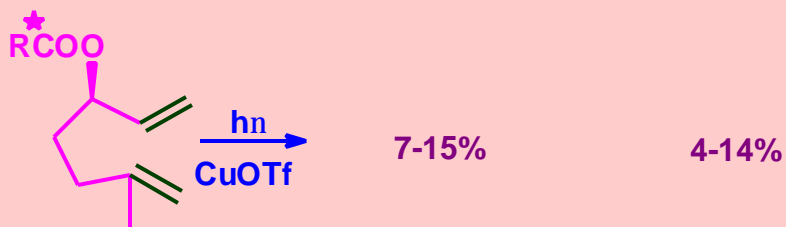
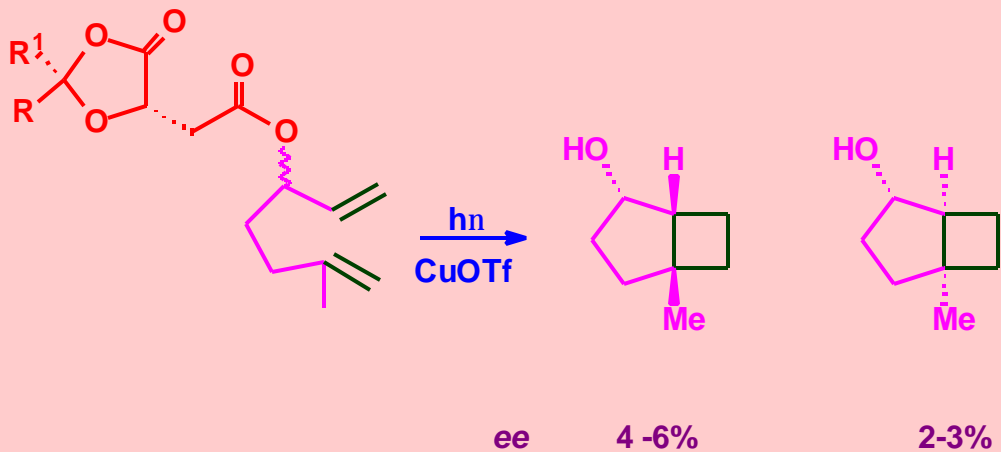
Ghosh *et al*, *J. Chem. Soc. Perkin Trans.1* **2001**, 3013



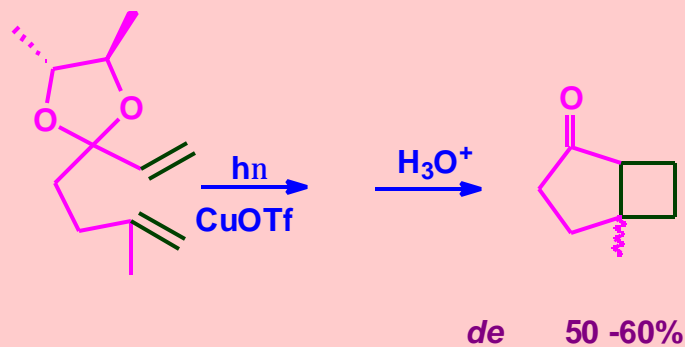
Ghosh *et al*, *Tetrahedron Lett* **2001**, 42, 5997  
*J. Org. Chem* **2003**, 68, 3981



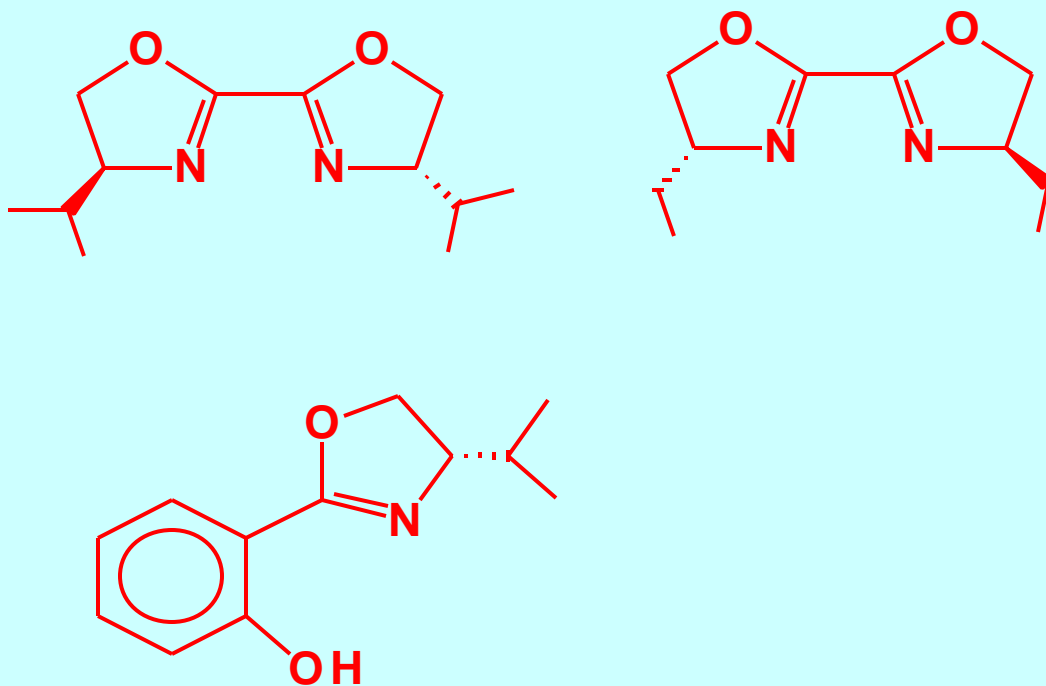
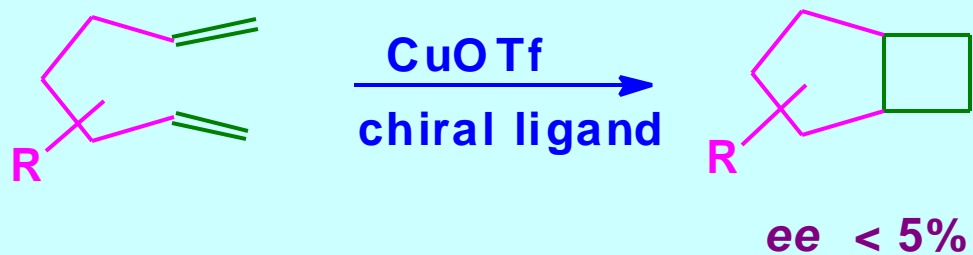
Ghosh *et al* *Tetrahedron Lett* **1999**, *44*, 4401  
*Tetrahedron* **2001**, *57*, 2011



★  
R = chiral amino acid

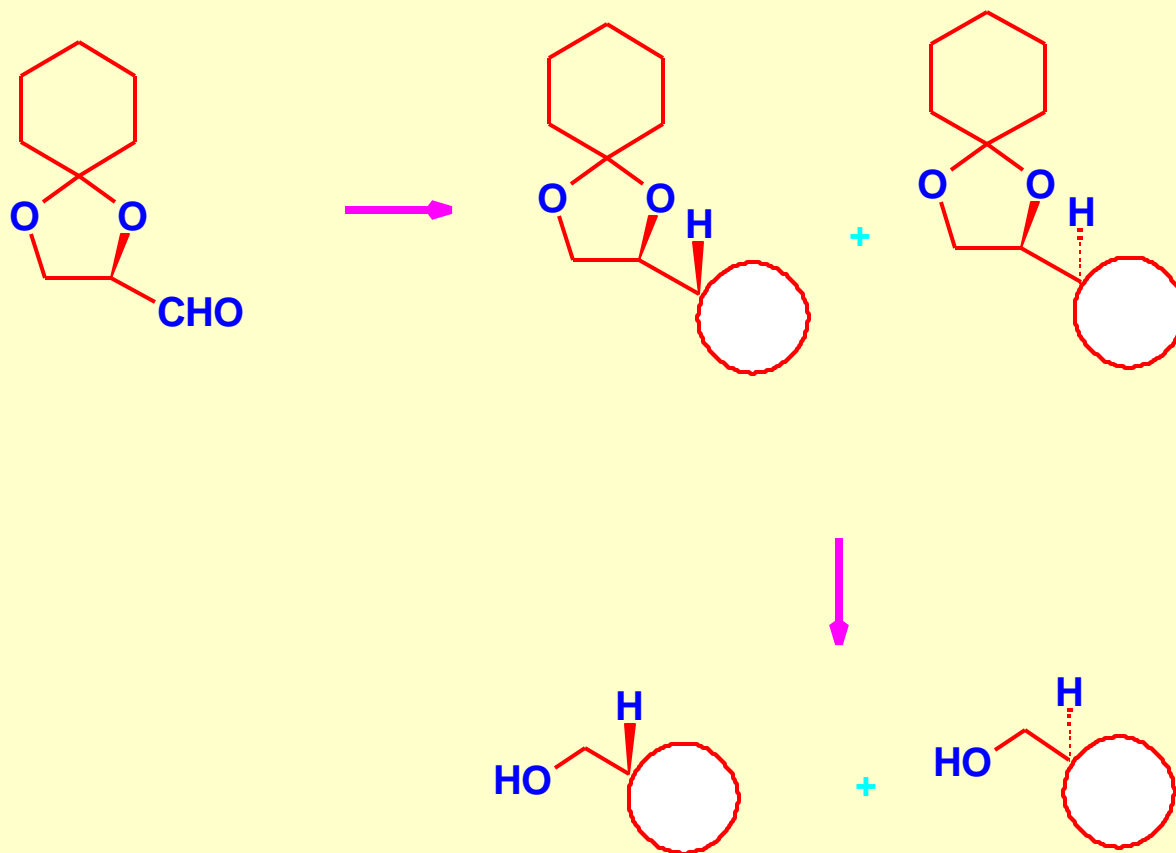


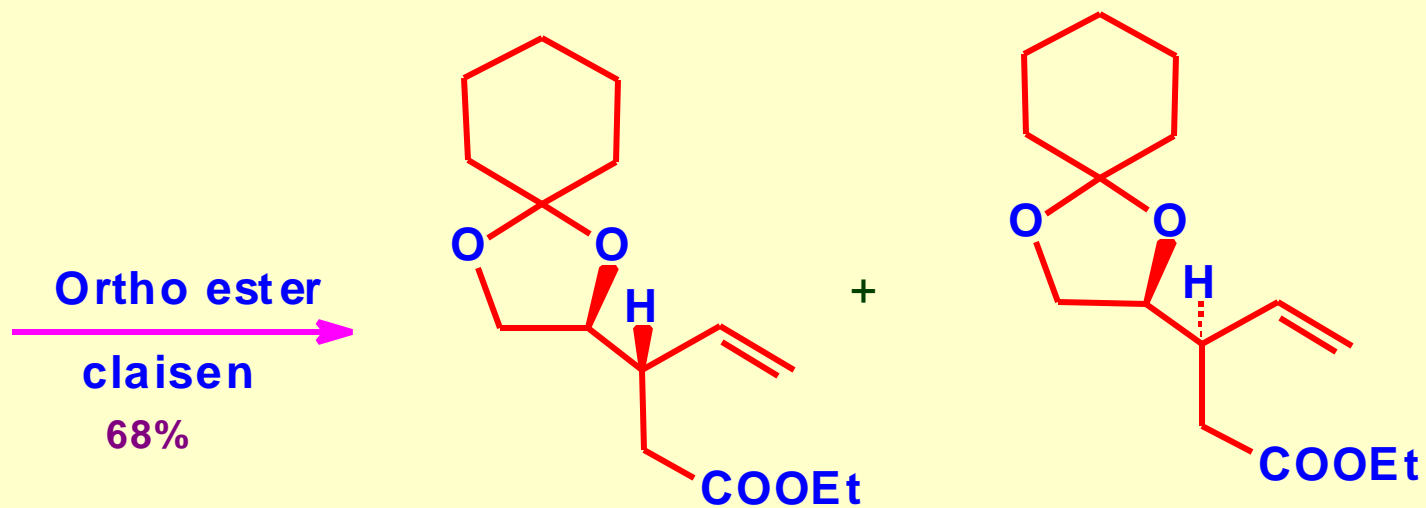
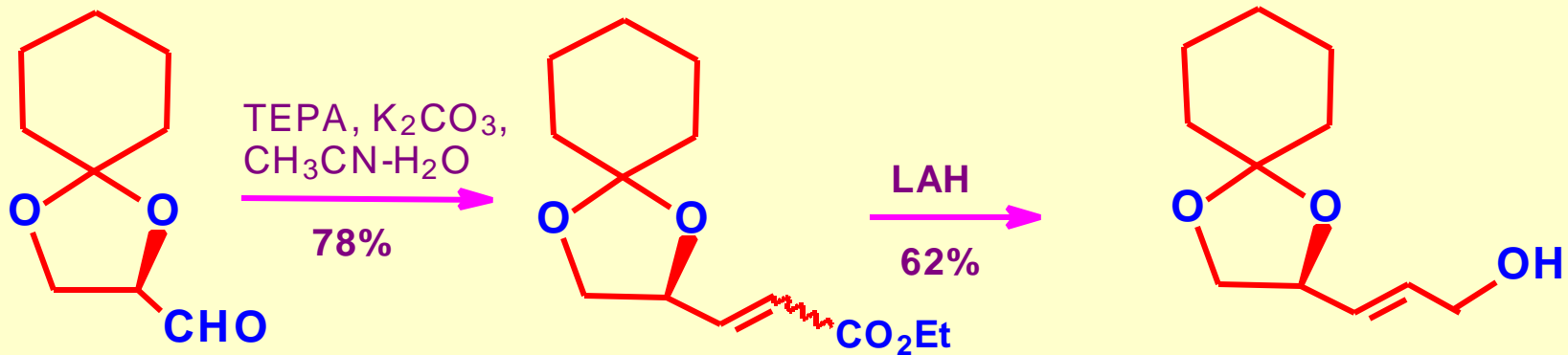
Langer and Matthey, *J. Org. Chem.* **1995**, *60*, 7256



Langer and Matthey, *J. Org. Chem.* **1995**, *60*, 7256

# Chirality Transfer

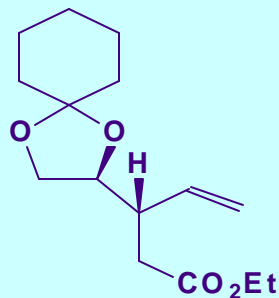




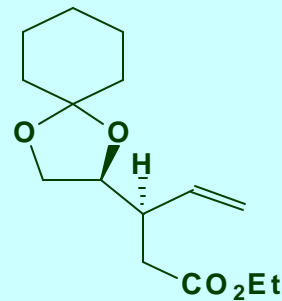
1 : 1

$R_t = 2.67$  (CT 200°C)

$R_t = 2.87$  (CT 200°C)

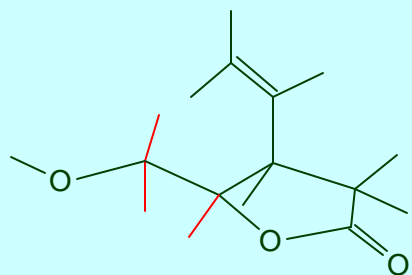
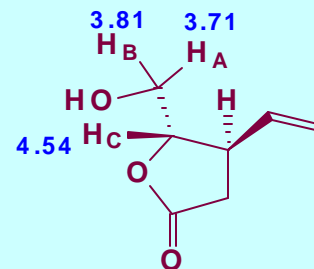
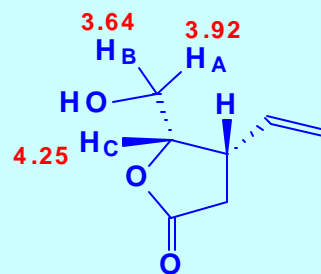


$R_t = 2.67$  (CT 200°C)

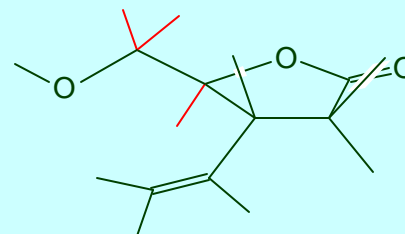


$R_t = 2.87$  (CT 200°C)

1. KOH, EtOH-H<sub>2</sub>O,  
85°C, 2h  
2. 80% AcOH, 85°C  
4h, 61%

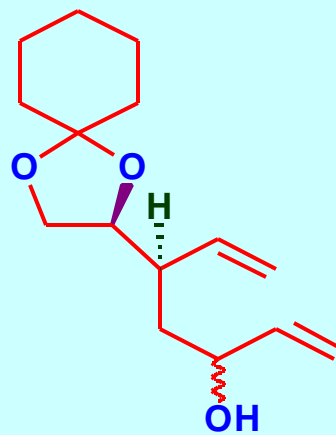
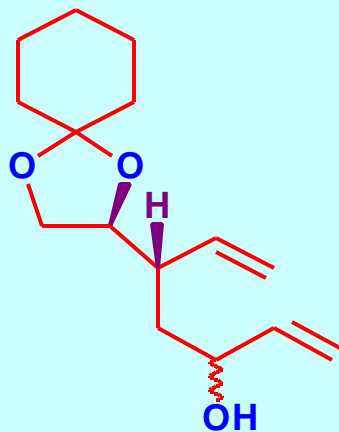
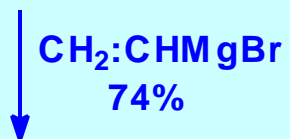
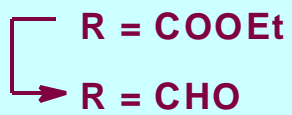
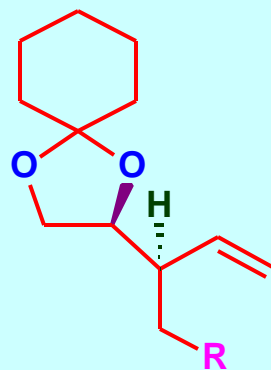
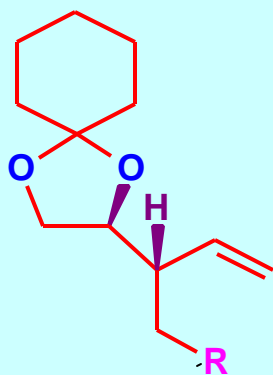


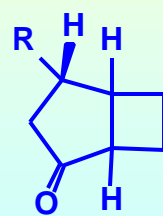
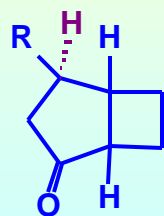
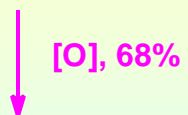
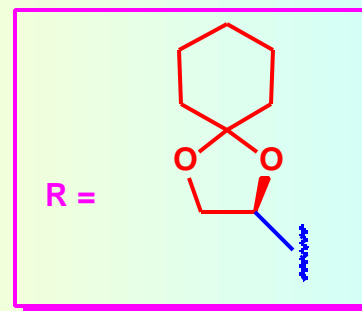
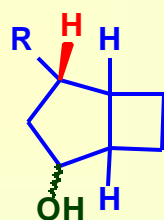
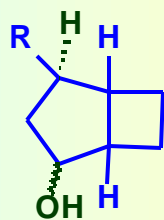
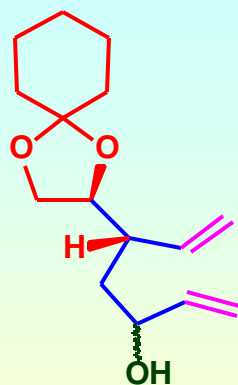
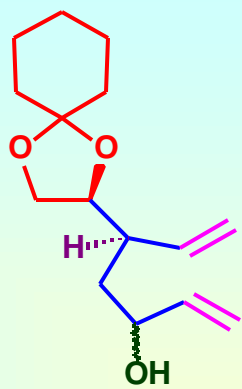
$E = -2013.9149$  Kcal/mol

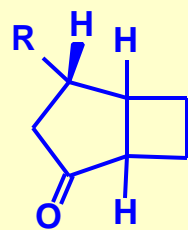
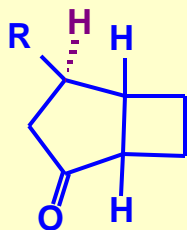


$E = -2015.9574$  Kcal/mol

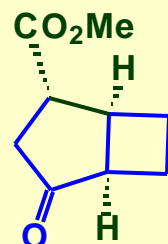
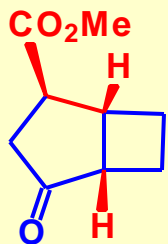
A line drawing of the stereoview





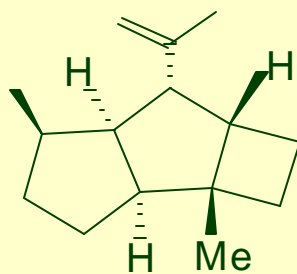


1, HOAc - H<sub>2</sub>O, 74%  
2, RuO<sub>4</sub>, 64%  
3, CH<sub>2</sub>N<sub>2</sub>, 82%

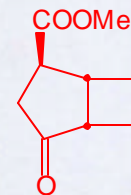
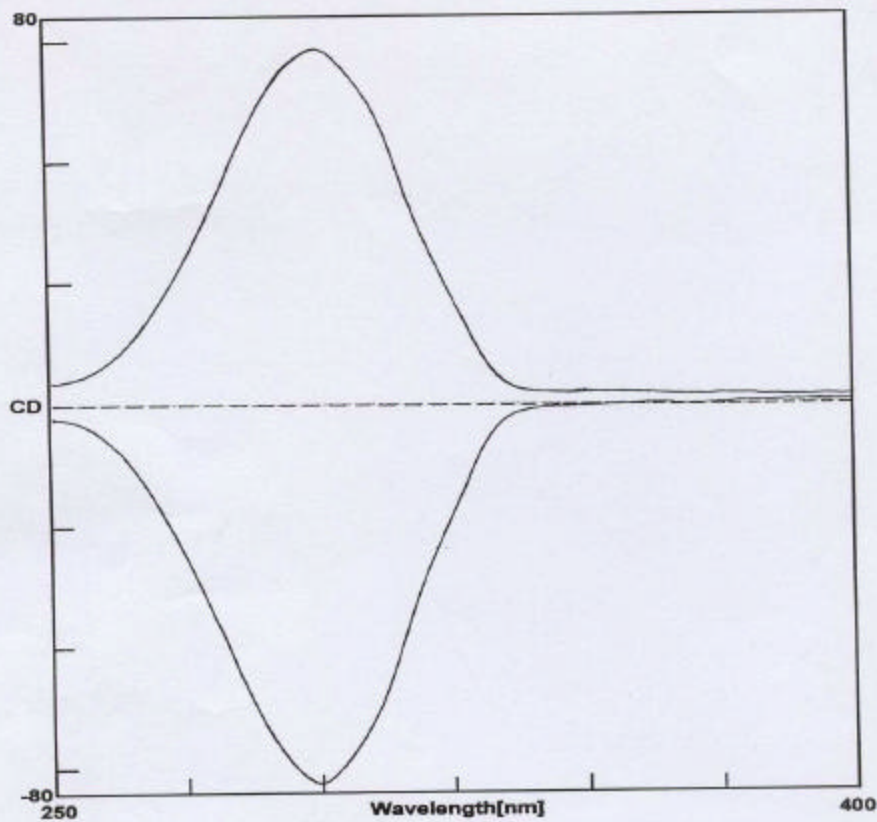


$[\alpha]_D^{30} = + 248.13$

$[\alpha]_D^{30} = - 250.25$



Kelsoene

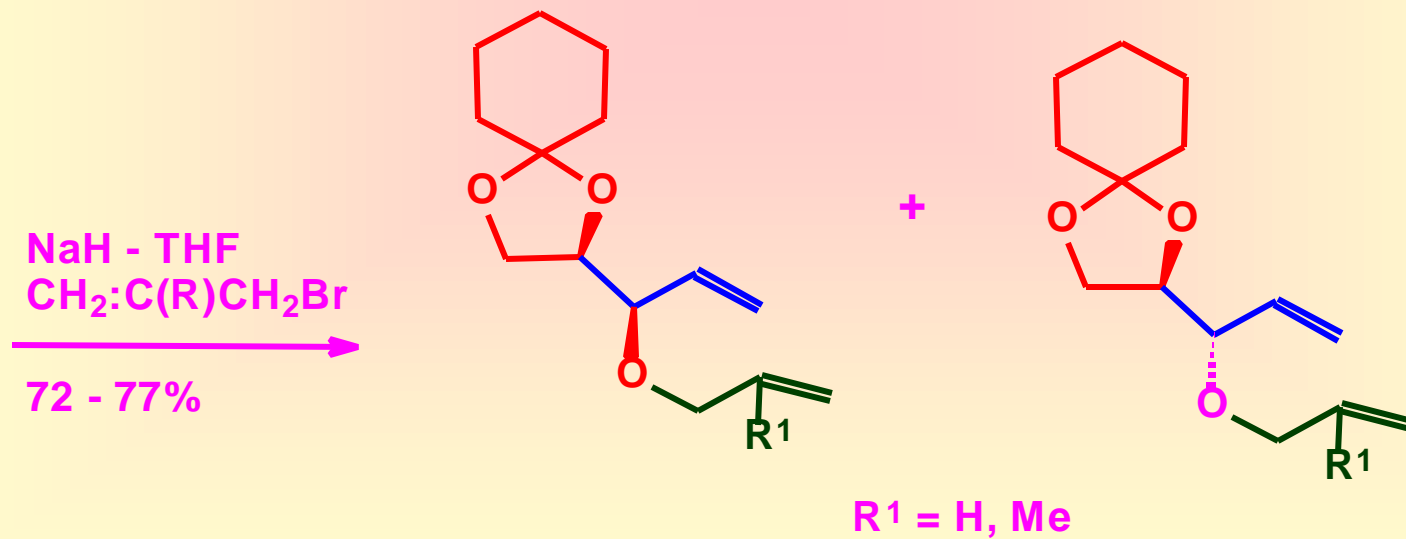
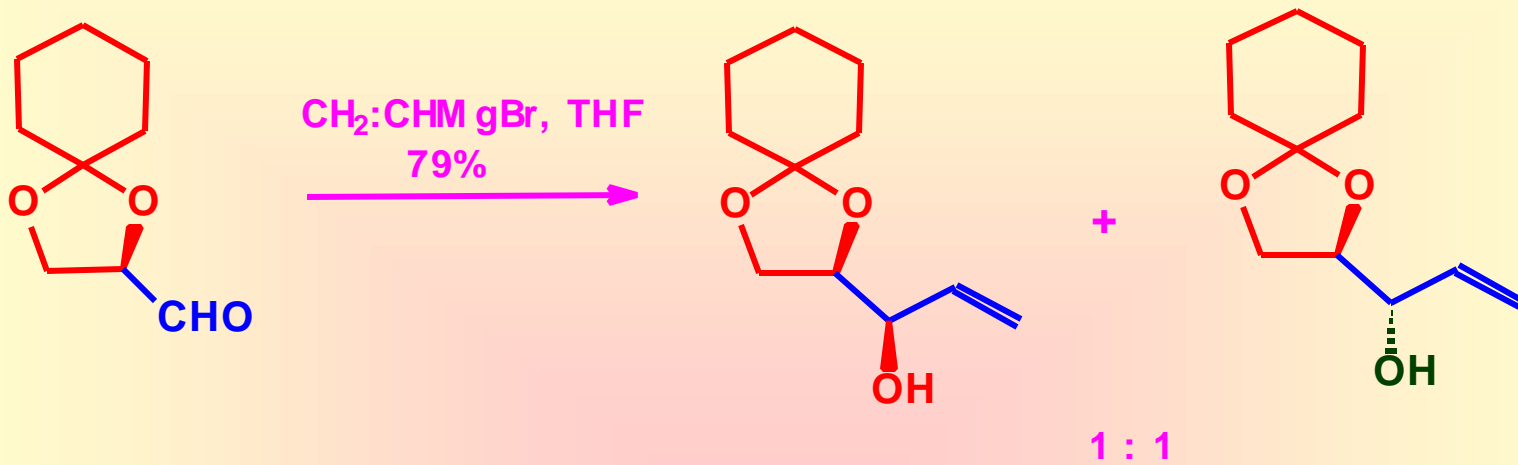


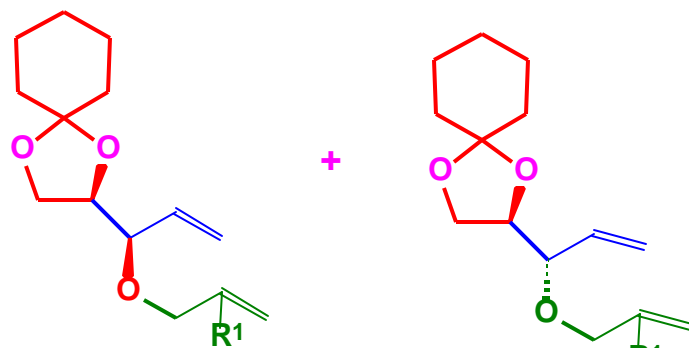
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 Ch2-mode : HT  
 Range : 400 - 250 nm  
 Sensitivity : 50 mdeg  
 Resolution : 0.2 nm  
 Accumulation : 1  
 Comment :

Band width : 1.0 nm  
 Response : 1 sec  
 Speed : 500 nm/min

*λ<sub>max</sub> : 299.5 nm*

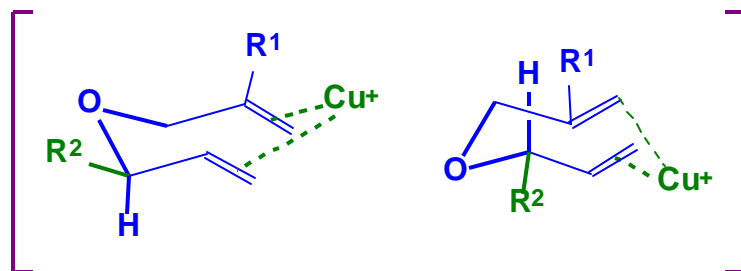
*G. Suresh Kumar*



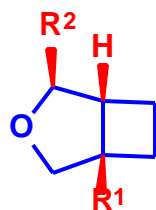


R<sup>1</sup> = H, Me

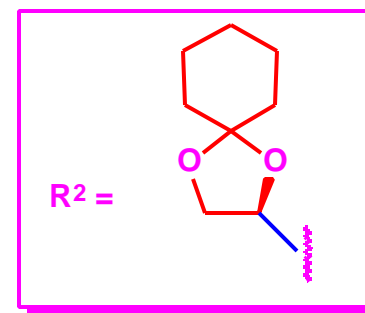
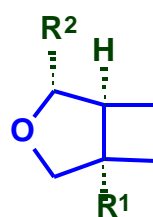
hν, CuOTf  
Et<sub>2</sub>O

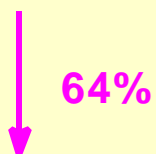
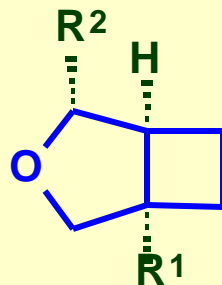
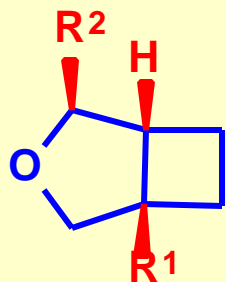


51 - 54%

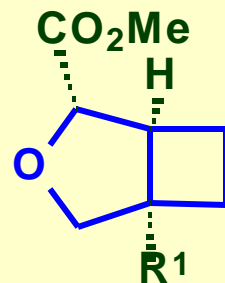
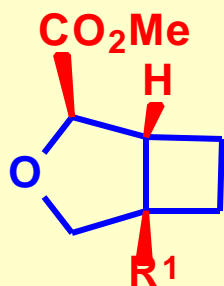
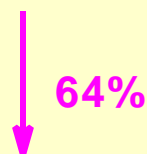


38 - 39%





i, HOAc - H<sub>2</sub>O  
 ii, RuO<sub>4</sub>  
 iii, CH<sub>2</sub>N<sub>2</sub>

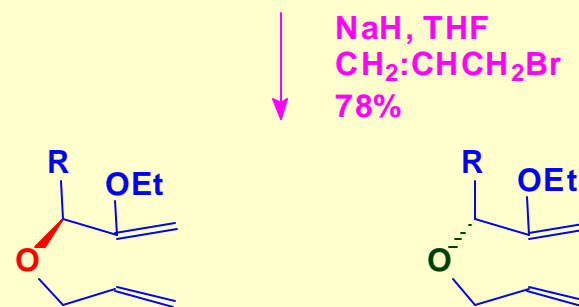
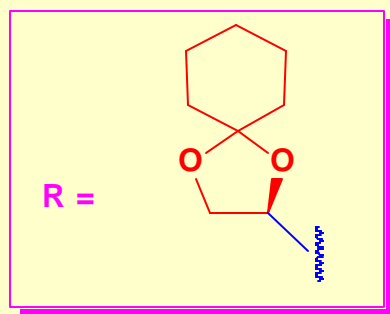
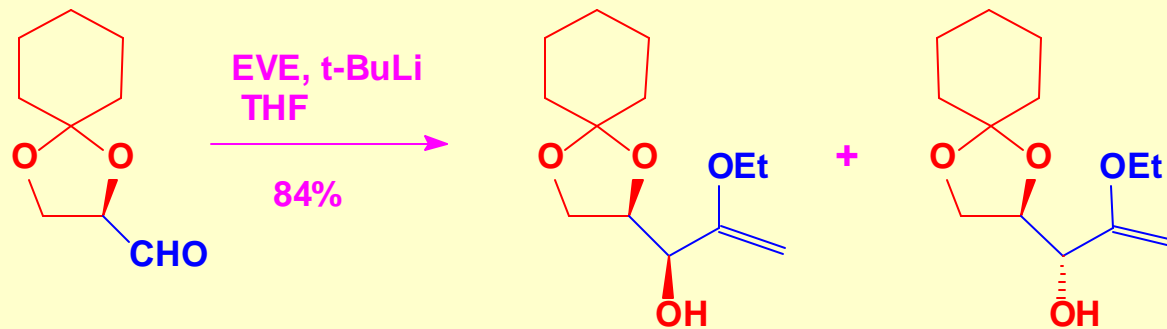


$$[\alpha]_D^{30} + 17.5^\circ$$

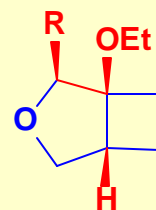
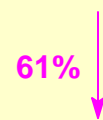
$$[\alpha]_D^{30} - 17.5^\circ \quad (R^1 = H)$$

$$[\alpha]_D^{30} + 20^\circ$$

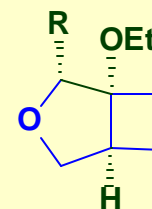
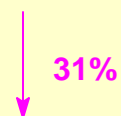
$$[\alpha]_D^{30} - 20^\circ \quad (R^1 = Me)$$

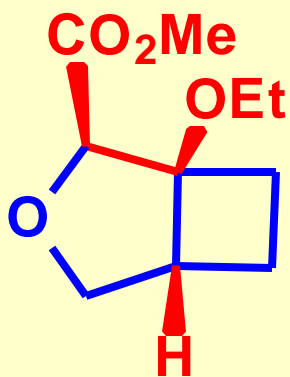
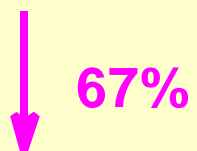
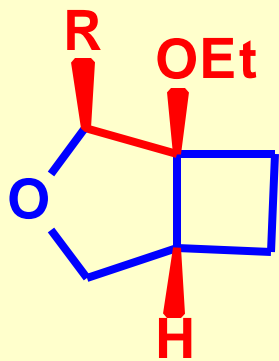


7 : 4 (GC)

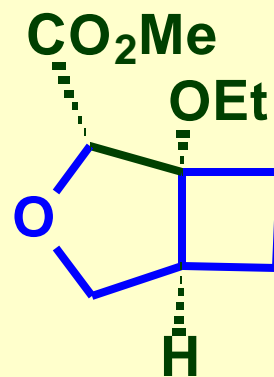
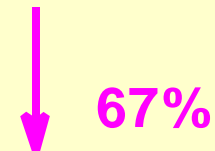
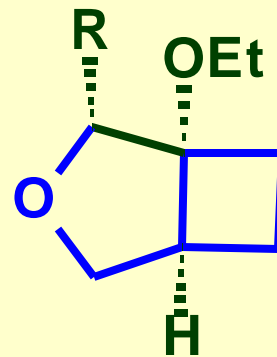


hn, CuOTf, Et<sub>2</sub>O

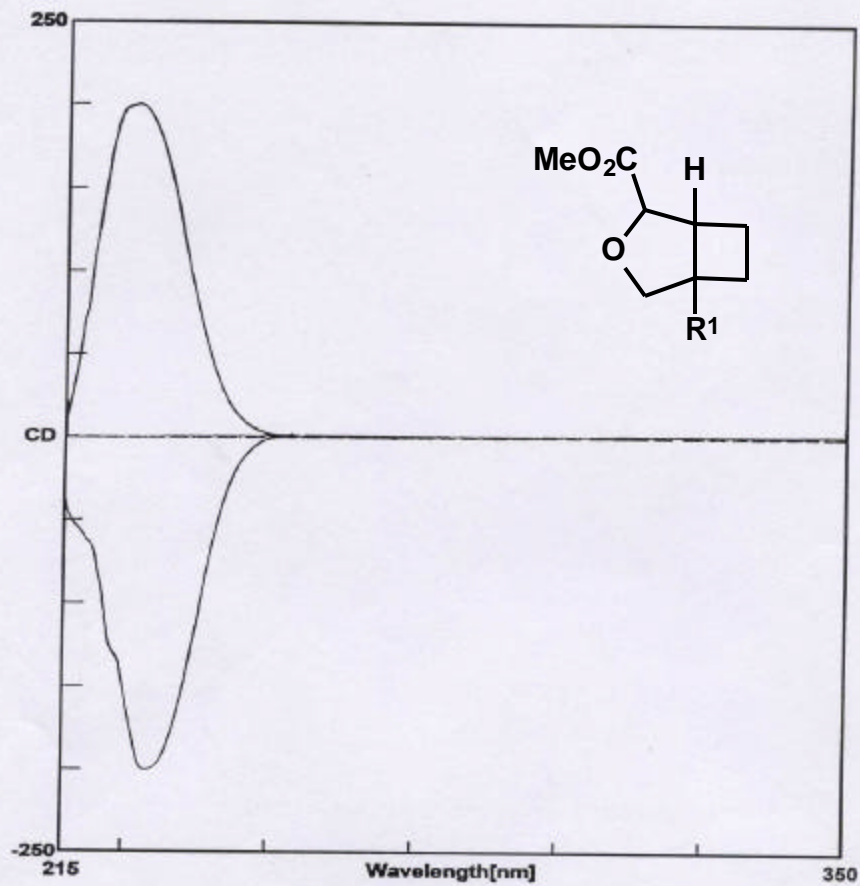




$$[\alpha]_D^{30} + 36.5^\circ$$



$$[\alpha]_D^{30} - 36.5^\circ$$



Filename : noname00.jws

Data mode : CD

Ch2-mode : HT

Range : 350 - 215 nm

Sensitivity : 50 mdeg

Resolution : 0.2 nm

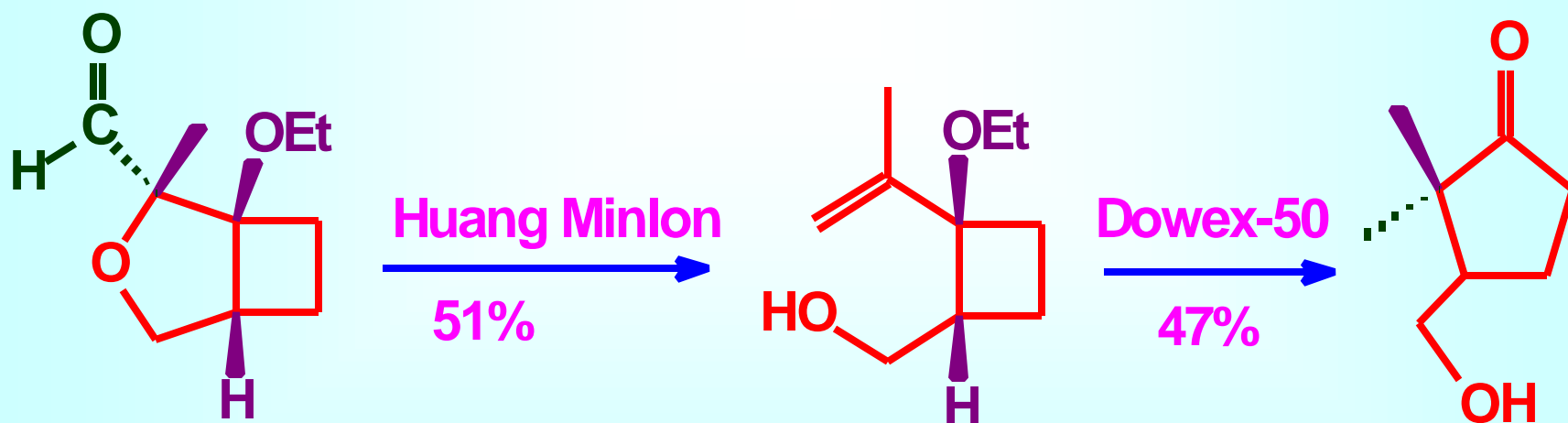
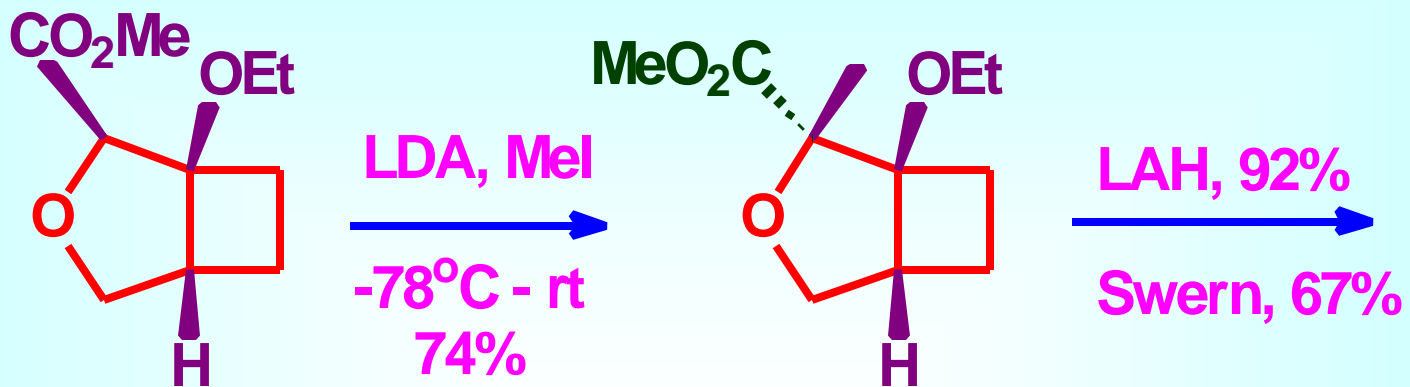
Accumulation : 2

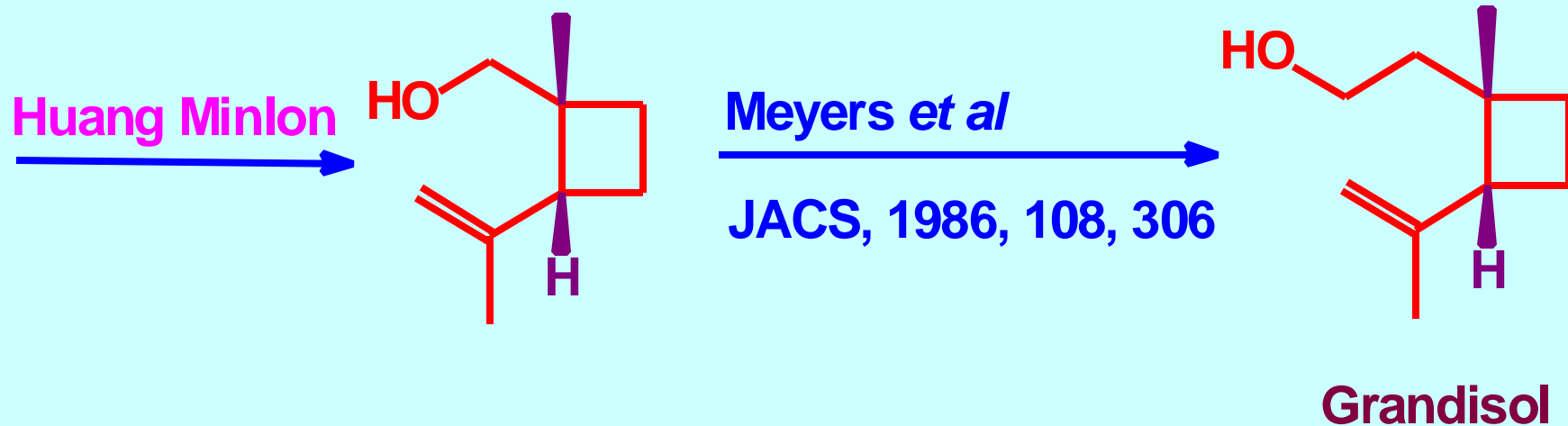
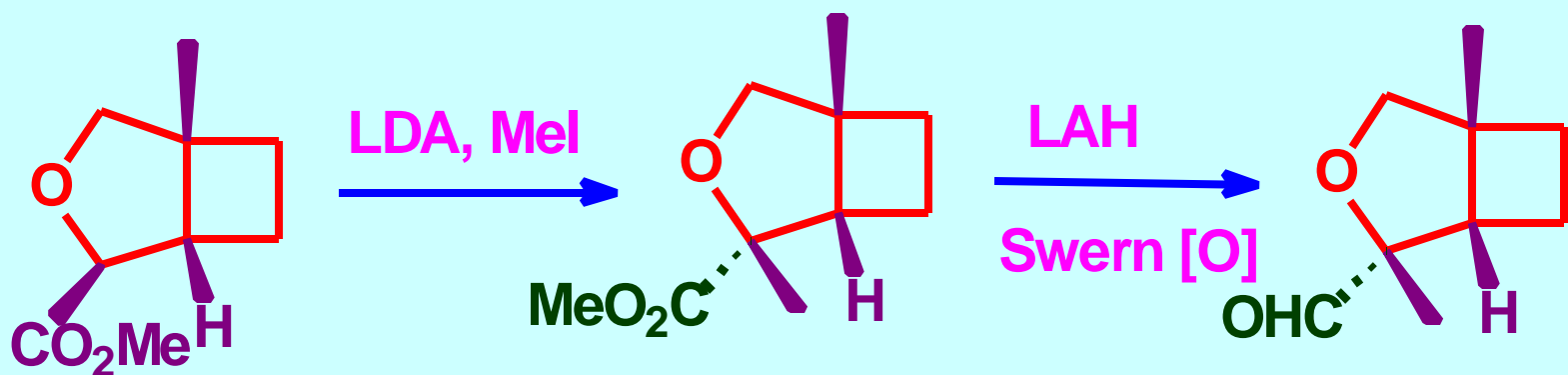
Comment :

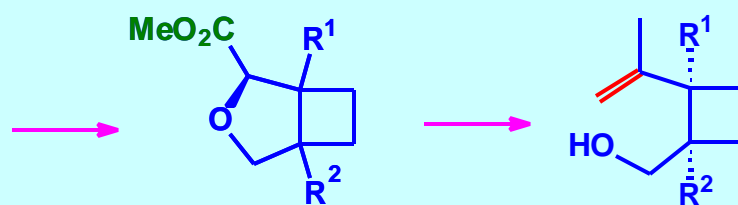
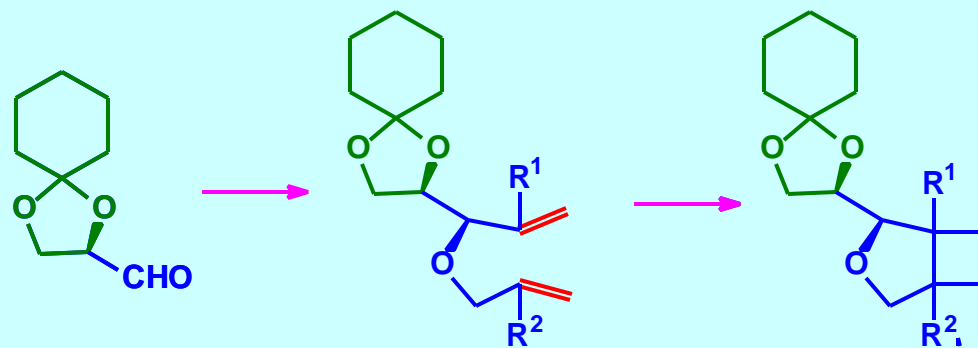
Band width : 1.0 nm

Response : 1 sec

Speed : 500 nm/min







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