Chinese Chemical Letters Vol. 11, No. 1, pp. 9–10, 2000

Synthesis of a New Chiral Cyclic β-Amino Alcohol

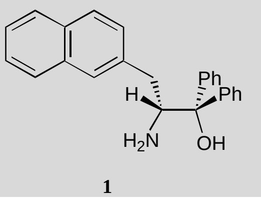
Zong Xuan SHEN, Jing LIANG, Ya Wen ZHANG*

School of Chemistry and Chemical Engineering, Suzhou University, Suzhou 215006

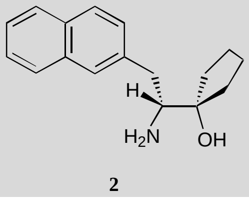
Abstract: A new chiral cyclic β-amino alcohol (*R*)-1-(1'-amino-2'-naphthylethyl)-cyclopentanol **2**, which had not been reported previously, was prepared from (*R*)-3-(2-naphthyl)-alanine **3**.

Keywords: β-Amino alcohol, chiral, cyclic.

The enantioselective chiral 1,3,2-oxazaborolidine-catalyzed reduction of prochiral ketones by borane has been intensively investigated[1-3]. Most oxazaborolidine catalysts have been prepared from chiral β-amino alcohols. In our previous study on the catalyst structure-enantioselectivity relationships, we prepared (R)-2-amino-1,1-diphenyl-3-(2-naphthyl)-1-propanol **1** which proved to be a good precursor of chiral catalyst for the enantioselective borane reduction of prochiral ketones[4-9]. This letter describes the synthesis of a new chiral cyclic β-amino alcohol (*R*)-1-(1'-amino-2'-naphthylethyl)-cyclopentanol **2** from (*R*)-3-(2-naphthyl)-alanine **3**. According to Marttens[10], the less flexible **2** may achieve more efficient enantioselectivity than **1** does. The synthesis of **2** is shown in **Scheme 1**.



1

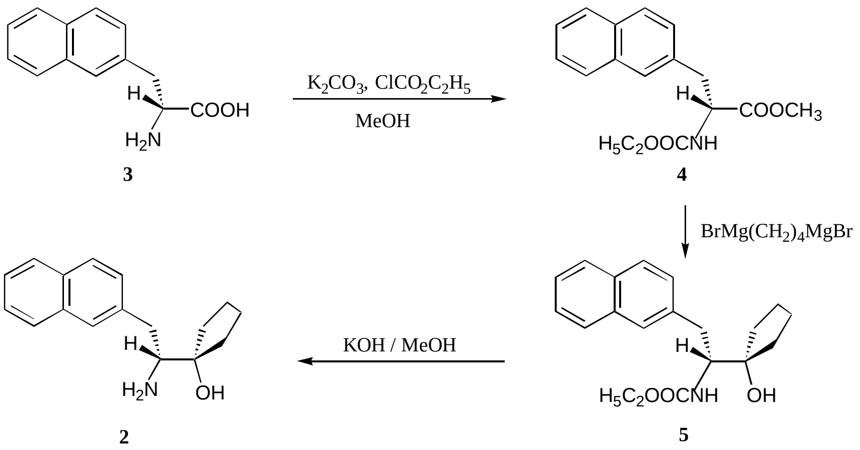


2

The reaction of **3** with ethyl chloroformate in MeOH with K_2CO_3 gave the ethyl ester of the N-ethoxycarbonyl amino acid **4** in one-pot reaction[11]. Treatment of **4** with excess Grignard reagent prepared from 1,4-dibromobutane afforded *N*-ethoxycarbonyl cyclic β-amino alcohol **5,** which, after deprotection by alkaline hydrolysis gave the target compound **2,** m.p. 64-66°C, $[\alpha]_D^{20}$ 9.97($CHCl_3$, c = 1.72). Elemental anal. calcd for $C_{17}H_{21}NO$: C, 79.96; H, 8.29; N, 5.49. Found: C, 79.65; H, 8.48; N, 5.50. ^1H NMR (δppm, $CDCl_3$): 1.45 (s, 2H, NH_2), 1.70 (m, 8H, $CH_2CH_2CH_2CH_2$), 1.92 (s, 1H, OH), 2.66 (m, 1H, NCH), 3.10 (m, 2H, $ArCH_2$), 7.22-7.80 (m, 7H, ArH).

Further investigation of the enantioselective reduction of prochiral ketones catalyzed by oxazaborolidine formed by **2** would be reported soon.

Scheme 1



Acknowledgment

Thanks to the National Natural Science Foundation of China for financial support.

References

1. V. K. Singh, , *Synthesis*, **1992**, 605.
2. S. Wallbaum, J. Martens, *Tetrahedron: Asymmetry*, **1992**, *3*, 1475.
3. L. Deloux, M. Srebnik, *Chem. Rev.*, **1993**, *93*, 763.
4. Y. W. Zhang, Z. X. Shen, C. L. Liu, W. Y. Chen, *Synth. Commun.* **1995**, *25*(21), 3407.
5. Y. W. Zhang, Z. X. Shen, D. B. Gu, W. Y. Chen, Z. H. Fei, Q. F. Dai, *Synth. Commun.*, **1996**, *26*(23), 4415.
6. Y. W. Zhang, Z. X. Shen, D. B. Gu, W. Y. Chen, Z. H. Fei, Q. F. Dai, X. W. Yan, *Chin. J. Synth. Chem.* **1996**, *4*(4), 289.
7. Z. X. Shen, J. Lu, Q. Zhang, Y. W. Zhang, *Tetrahedron: Asymmetry*, **1997**, *8*(4), 2287.
8. Z. X. Shen, Y. W. Zhang, J. Lu, X. N. Xu, C. R. Lu, *Chin. J. Chem.* **1997**, *15*(5), 459.
9. Z. X. Shen, W. Huang, J. W. Feng, Y. W. Zhang, , *Tetrahedron: Asymmetry*, **1998**, *9*, 1091.
10. C. Dauelsberg, J. Marttens, *Synth. Commun*. 1993, *23* (15), 2091.
11. A. S. Demir, I.. Mecitoglu, C. Tanyeli, *Tetrahedron: Asymmetry*, **1996**, *7*, 3359.

Received 19 July 1999