

SYNLETT  
Spotlight 287DABAL-Me<sub>3</sub>: A Versatile  
Methylating Agent

Compiled by Abhishek Goswami



This feature focuses on a reagent chosen by a postgraduate, highlighting the uses and preparation of the reagent in current research

Abhishek Goswami was born in Jorhat, Assam, India, in 1981. He completed his B.Sc. degree in 2002 at the Dibrugarh University and M.Sc. degree in 2005 at the Gauhati University, Assam, India, with specialization in Physical Chemistry. At present, he is working towards his Ph.D. degree at Natural Products Chemistry Division, North-East Institute of Science & Technology (CSIR), Jorhat, Assam, India, under the guidance of Dr. Nabin C. Barua. His area of research interest is partial and total synthesis of natural products of biological significance and development of new synthetic methodologies for target oriented synthesis.

Natural Products Chemistry Division, North-East Institute of Science & Technology, Jorhat-785 006, Assam, India  
E-mail: abhijrt@yahoo.com

## Introduction

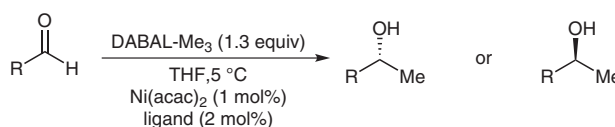
DABAL-Me<sub>3</sub> is a very suitable, easy to use reagent to methylate a variety of functional groups like aldehydes, imines, enones, amides, etc. Although trimethyl aluminium has been traditionally used as a methylating agent, its pyrophoric nature stands as a major obstacle in its sustainability. Several other Me<sub>3</sub>Al·NR<sub>3</sub> species such as Me<sub>3</sub>Al·pyridine, Me<sub>3</sub>Al·TMEDA (tetramethylethylenediamine) are also reported, but they are too reactive to be used under normal laboratory conditions. DABAL-Me<sub>3</sub>,

which is actually a 2:1 complex of Me<sub>3</sub>Al and DABCO, is free from these shortcomings as it can be manipulated without the need for an inert atmosphere.<sup>1,2</sup>

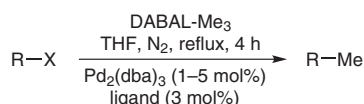
DABAL-Me<sub>3</sub> can be prepared by adding neat AlMe<sub>3</sub> to freshly sublimed DABCO in toluene at 0 °C. The white precipitate is separated from toluene and washed several times with diethyl ether.<sup>3</sup> The versatility of the reagent can be easily assessed by its capability to methylate a wide variety of substrates.

## Abstracts

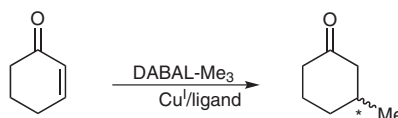
(A) Woodward and co-workers reported the first asymmetric synthesis of secondary alcohols from prochiral aldehydes in the presence of nickel(acetylacetonate)<sub>2</sub> and a phosphoramidite ligand.<sup>3</sup>



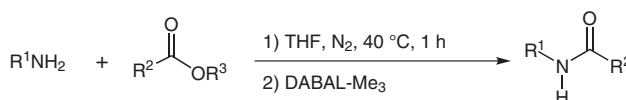
(B) Methylation of aryl and vinyl halides is another example of a very efficient route of forming C–C bonds. DABAL-Me<sub>3</sub> is quite capable of carrying out this transformation.<sup>4</sup>



(C) In pursuance of developing a suitable route for addition of an alkyl group to different Michael acceptors, Woodward and co-workers used DABAL-Me<sub>3</sub> in an enantioselective manner employing appropriate ligands.<sup>5</sup>



(D) Direct formation of amides from the corresponding inactivated esters and lactones can be conveniently carried out with DABAL-Me<sub>3</sub> excluding the risk of using other pyrophoric AlR<sub>3</sub> reagents.<sup>6</sup> Woodward and co-workers later utilized microwave irradiation in DABAL-Me<sub>3</sub>-mediated amide bond formation in order to carry out the reaction in a shorter span of time.<sup>7</sup>



## References

- (1) Bradford, A. M.; Bradley, D. C.; Hursthouse, M. B.; Motevalli, M. *Organometallics* **1992**, *11*, 111.
- (2) Woodward, S. *Synlett* **2007**, 1490.
- (3) Biswas, K.; Prieto, O.; Goldsmith, P. J.; Woodward, S. *Angew. Chem. Int. Ed.* **2005**, *44*, 2232.
- (4) Cooper, T.; Novak, A.; Humphreys, L. D.; Walker, M. D.; Woodward, S. *Adv. Synth. Catal.* **2006**, *348*, 686.
- (5) Alexakis, A.; Albrow, V.; Bisaws, K.; d'Augustin, M.; Prieto, O.; Woodward, S. *Chem. Commun.* **2005**, 2843.
- (6) Novak, A.; Humphreys, L. D.; Walker, M. D.; Woodward, S. *Tetrahedron Lett.* **2006**, *47*, 5767.
- (7) Glynn, D.; Bernier, D.; Woodward, S. *Tetrahedron Lett.* **2008**, *49*, 5687.