

# SYNLETT Spotlight 1

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

## 9-Borabicyclo[3.3.1]nonane (9-BBN)

Compiled by Rosemary Stentiford

E-mail: r.stentiford@bris.ac.uk

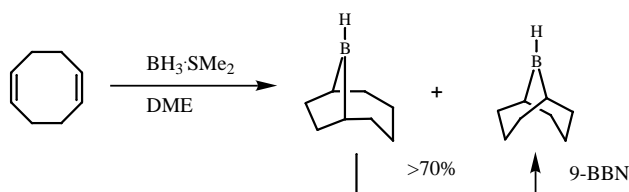
Rosie A. Stentiford received her M. Sci. from the University of Bristol in 1998. She is currently studying for her Ph. D. under the supervision of Dr Guy Lloyd-Jones at the University of Bristol. Her research, sponsored by Zeneca Agrochemicals involves indium mediated cyclopropanation reactions and Ru-catalysed RCM.



In the solid state 9-borabicyclo[3.3.1]nonane exists as an easily handled dimer "(9-BBN)<sub>2</sub>", which readily dissociates in solution, to give the active monomeric species. 9-BBN is a very versatile reagent, tolerant of many functional groups, facilitating highly selective hydroborations and selective reductions. Facile conversion to B-substituted-9-BBN offers a wide variety of selective transformations such as reductions, C-C bond forming reactions and stereoselective crossed aldol reactions.<sup>1</sup>

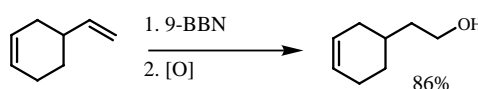
### Preparation

9-BBN is simply prepared via a cyclic hydroboration reaction of 1,5-cyclooctadiene.<sup>2</sup> In comparison with other boranes, the dimeric solid exhibits remarkable thermal stability, permitting hydroboration over a range of temperatures (0-100°C) and storage in an inert atmosphere for indefinite periods.

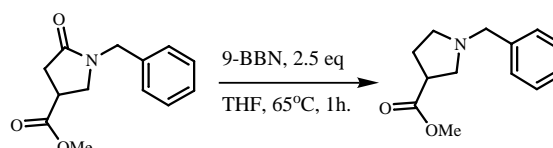


### Abstracts

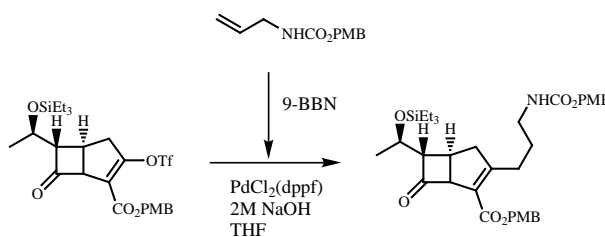
(1) 9-BBN achieves excellent chemoselectivity in the hydroboration of nonsymmetrical dienes, resulting in the anti Markovnikov products, often in >99% selectivity.<sup>3</sup>



(2) Selective reduction of many functional groups can be achieved with 9-BBN, for example, the reduction of tertiary lactams to cyclic amines.<sup>4</sup> However, no reduction of nitro groups, alkyl halides and aryl halides is seen and conversion of groups such as epoxides and nitriles is slow.<sup>5</sup>



(3) Carbon-carbon bond formation *via* palladium-catalysed cross-coupling reactions of alkyl and alkenyl boranes allows synthesis of a wide variety of highly functionalised compounds.<sup>6</sup>



### References and Notes

- Midland, M. *Chem. Rev.* **1989**, 89, 1553-1561.
- Knights, E. F.; Brown, H. C. *J. Am. Chem. Soc.* **1968**, 90, 5280-5281.
- Ohba, M.; Kawase, N.; Fujii, T. *J. Am. Chem. Soc.* **1996**, 118, 8250-8257.
- Collins, C. J.; Lunz, M.; Singaram, B. *Tetrahedron Lett.* **1999**, 40, 3673-3676.

- Krishnamurthy, S.; Brown, H. C. *J. Org. Chem.* **1977**, 42, 1197-1201.
- Narukawa, Y.; Nishi, K.; Onoue, H. *Tetrahedron Lett.* **1996**, 37, 2589-2592.

Article Identifier:  
1437-2096,E;2000,0,01,0159,0159,ftx,en;V01599ST.pdf