

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

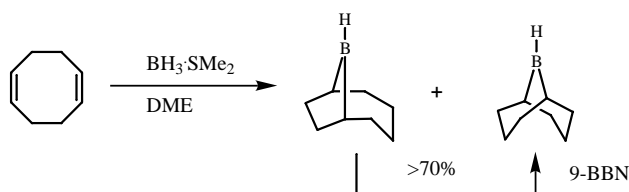
Rosie A. Stentiford received her M. Sci. from the University of Bristol in 1998. She is currently studying for her Ph. D. under the supervision of Dr Guy Lloyd-Jones at the University of Bristol. Her research, sponsored by Zeneca Agrochemicals involves indium mediated cyclopropanation reactions and Ru-catalysed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



In the solid state 9-borabicyclo[3.3.1]nonane exists as an easily handled dimer "(9-BBN)₂", 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.¹

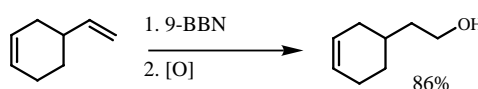
Preparation

9-BBN is simply prepared via a cyclic hydroboration reaction of 1,5-cyclooctadiene.² 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.

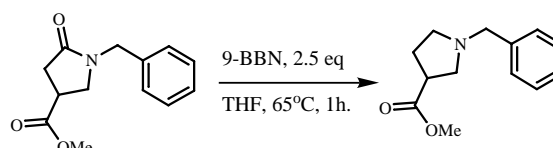


Abstracts

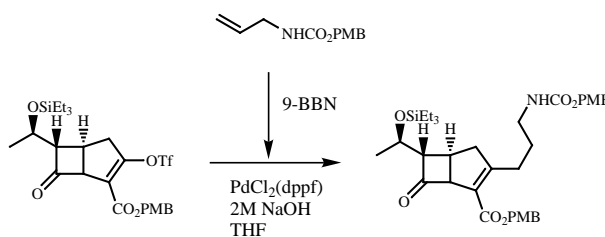
(1) 9-BBN achieves excellent chemoselectivity in the hydroboration of nonsymmetrical dienes, resulting in the anti Markovnikov products, often in >99% selectivity.³



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



(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.⁶



References and Notes

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