SYNLETT
Spotlight 285

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

Lithium tri-*sec*-Butylborohydride (L-Selectride): A Powerful and Highly Stereoselective Reducing Reagent

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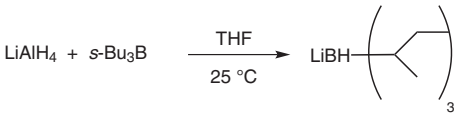
Introduction

Lithium tri-*sec*-butylborohydride (L-Selectride) is known to be an exceptionally powerful and highly stereoselective reducing agent. It has been used for the diastereoselective reduction of the ketones to give the alcohol,[1–10] selective 1,4-reduction of the enones by conjugate addition of hydride to afford ketones[11,12] or alcohols,[13] conjugate reduction of exocyclic acrylonitrile derivatives,[14] reduction of the double bond[15] and iodide.[16] It was also found to be an efficient reagent for the desymmetrization of *meso*-diesters,[17] dehalogenation of monohalopyridines,[18] rearrangement of 5-trimethylsilylthebaine,[19] reductive cleavage of exoxides,[20] and deprotection of *N*-carbomethoxy-substituted opioids to *N*-noropioids.[21]

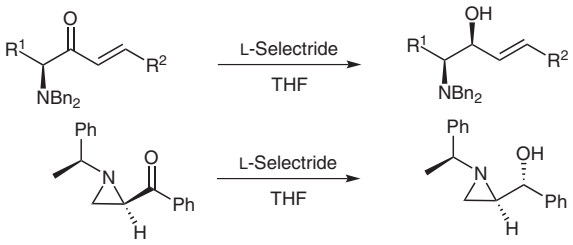
Lithium tri-*sec*-butylborohydride is commercially available, but can also be readily prepared by addition of tri-*sec*-butylborane to a tetrahydrofuran solution of lithium aluminium hydride at room temperature. It is obtained as colorless solution in tetrahydrofuran.[22]



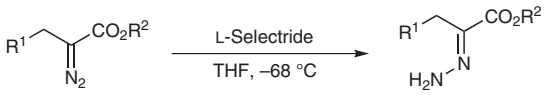
Scheme 1

Abstracts

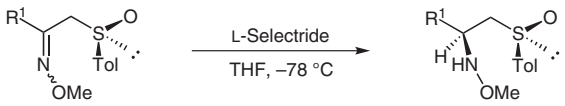
(A) *Reduction of Carbonyl Compounds to the Corresponding Alcohols*: L-Selectride can be applied for the diastereoselective reduction of α′-amino enones to afford chiral β-amino alcohols.[23] Various enantiomerically pure aziridino ketones can be stereoselectively reduced by L-Selectride to provide the corresponding alcohols with high diastereoselectivities and yields.[24] L-Selectride is also employed for the reduction of steroidal aldehydes.[25]



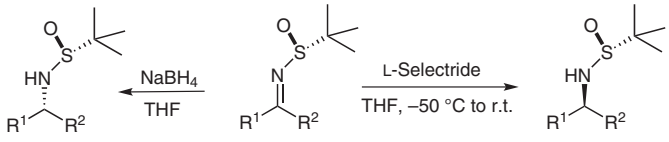
(B) *Reduction of α-Diazo Esters to Hydrazones*: L-Selectride reduces α-diazo esters to give *anti*-hydrazones as the major products in THF solution.[26]



(C) *Diastereoselective Reduction of α-Sulfinylketoximes*: An efficient procedure for stereoselective reduction of various α-sulfinylketoximes to the corresponding (*S*)-(*N*-methoxyamino)sulfoxides in THF solution is achieved with L-Selectride.[27]



(D) *Reduction of N-tert-Butanesulfinyl Imines*: Andersen and co-workers[25] reduced *N-tert*-butanesulfinyl imines with L-Selectride in THF to provide the corresponding secondary sulfinamides in high yield and diastereoselectivity. Reductions of the same sulfinyl imine afforded the opposite diastereomer in high yield and selectivity by changing the reductant to $NaBH_4$.[28]



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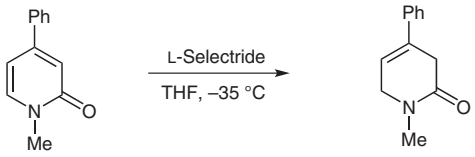
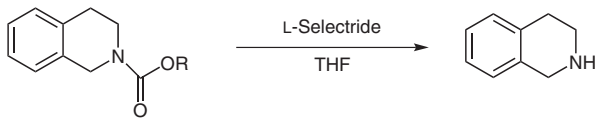
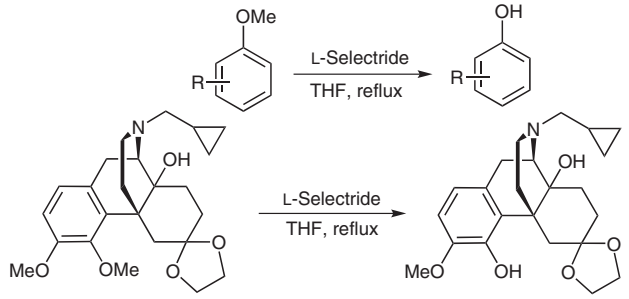
(E) *Selective Reductions of 1-Methyl-4-phenyl-2-pyridone*: Mabic and Castagnoli reported that the reaction of 1-methyl-4-phenyl-2-pyridone with L-Selectride in THF gave exclusively the 1,4-reduction product.[29]



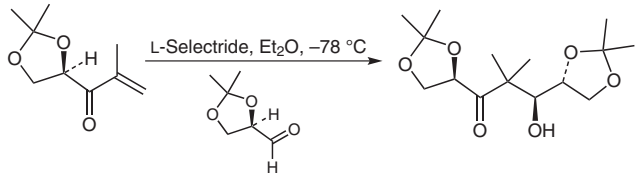
(F) *Selective Cleavage of Carbamates*: A mild method for the cleavage of a variety of carbamates has been developed using L-Selectride. The selective cleavage of methyl carbamates in the presence of more sterically demanding carbamates can be accomplished efficiently.[30]



(G) *Demethylation of Methyl Phenyl Ethers*: L-Selectride has successfully been used for the deprotection of methyl phenyl ethers.[31] L-Selectride is also an efficient agent for the 3-*O*-demethylation of opioids.[32]



(H) *Asymmetric Reductive Aldol Reaction*: Ghosh et al. have demonstrated that L-Selectride can be used to mediate reductive aldol coupling of enones and optically active α-alkoxy aldehydes to provide α,α-dimethyl-β-hydroxy ketones with excellent diastereoselectivity.[33]



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