

SYNLETT Spotlight 226

Allyltributylstannane

Compiled by Arun Jyoti Borah



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

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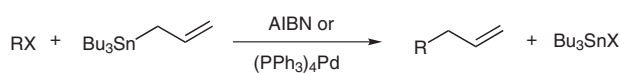
Introduction

Allyltributylstannane is a valuable reagent in organic synthesis. This reagent is a colorless liquid and stable towards air, heat, and hydrolysis. It is commercially available and has been widely used in organic synthesis as powerful reagent for C–C bond-forming reactions. Transmetalation,

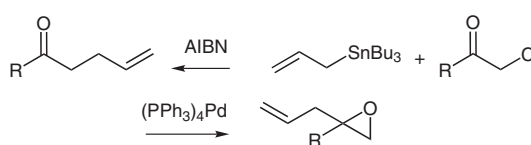
nucleophilic substitution, stereoselective carbonyl addition, and transition-metal- or radical-mediated substitution reactions have been accomplished using allyltributylstannane.¹ Although this reagent is mainly used in allylation reactions, other reactions such as cyclization and Diels–Alder reactions are also carried out using this reagent.

Abstracts

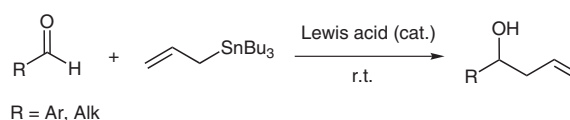
(A) Organic halides react with allyltributylstannane to produce the allylated product in the presence of azobisisobutyronitrile (AIBN) or a catalytic amount of tetrakis(triphenylphosphene)palladium.²



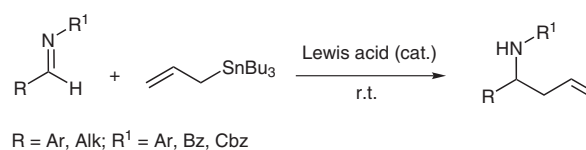
(B) Reaction of α -chloro ketones with allyltributylstannane in the presence of AIBN proceeds to afford 4-butenyl ketones while, in the presence of a catalytic amount of tetrakis(triphenylphosphene)palladium, allyl epoxides are obtained.³



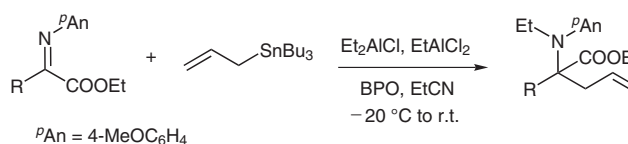
(C) Lewis acid catalyzed reactions of allyltributylstannane produce homoallylic alcohols from aldehydes and ketones.⁴ A number of catalytic systems were also used to carry out asymmetric allylation of aldehydes and ketones.⁵



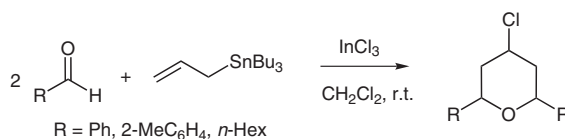
(D) Synthesis of homoallylamines can be achieved by allylation of aldimines using allyltributylstannane in the presence of a Lewis acid catalyst.⁶ Homoallyl amines were also synthesized by three-component condensation of aldehyde, allyltributylstannane, and an amine in the presence of a Lewis acid catalyst.⁷



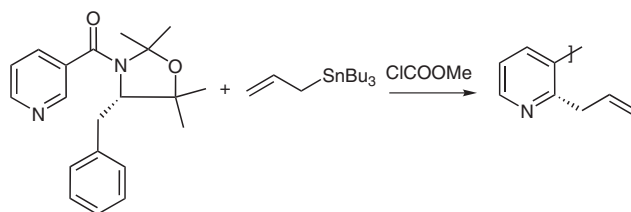
(E) Aliphatic as well as aromatic α -imino esters undergo a tandem N-alkylation–C-allylation reaction with allyltributylstannane and an organoaluminum reagent to give the addition product in moderate to good yield.⁸



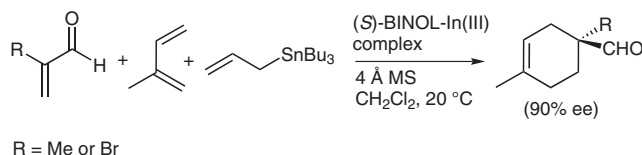
(F) Li and co-workers reported a method for the synthesis of 4-halo-tetrahydropyrans by indium trichloride mediated tandem carbonyl allylation–Prins-cyclization of aldehydes with allyl-tributylstannane.⁹



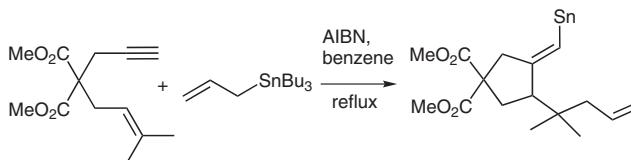
(G) Regio- and diastereoselective allylations of pyridinium and quinolinium salts were promoted by addition of allyltributylstannane towards intermediary cation π -complexes. The reactions afforded the 1,2-adducts.¹⁰



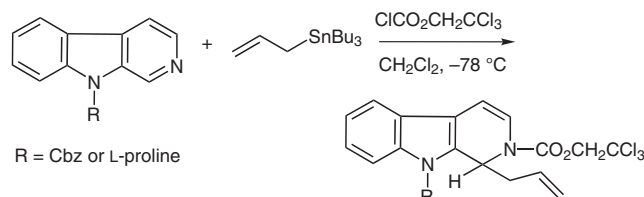
(H) Allyltributylstannane promotes the cycloaddition of dienes to 2-methacrolein catalyzed by chiral BINOL-In(III) complex. Addition of allyltributylstannane facilitates the transmetalation reaction to afford the formation of a chiral BINOL-In-allyl complex.¹¹



(I) Allylstannanes serve as radical transfer agents to promote the radical cyclization of 1,6-enynes.¹²



(J) β -Carbolines react with allyltributylstannane and 2,2,2-trichloroethyl chloroformate to afford 1-allyl-1,2-dihydro- β -carboline derivatives in a diastereoselective manner.¹³



References

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