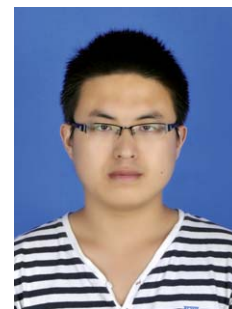


SYNLETT Spotlight 395

Azidotrimethylsilane

Compiled by Bao-Le Li



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

Bao-Le Li was born in Hengshui, Hebei Province (P. R. of China) in 1987. He graduated from the Hebei Normal University and received his B.Sc. in chemistry in 2011. Currently, he is working towards his M.Sc. degree under the supervision of Professor Zhan-Hui Zhang at the same university. His current interests are the development of new methods for the synthesis of biologically active heterocyclic compounds.

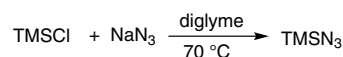
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Introduction

Azidotrimethylsilane (TMSN₃) is a clear, colorless, quite stable organosilane reagent and decomposes slowly even at 200 °C. It is considered a very convenient and safer replacement for hydrazoic acid as an azide source in many reactions.¹ It has been used for the synthesis of aryl 1,2,3-triazoles,^{2–5} tetrazoles,^{6,7} functionalized bicyclic triazoles,⁸ azides,^{9–15} and *N*-tetrazolated diamine derivative.¹⁶ In addition, azidotrimethylsilane has been employed for the preparation of proline-derived chiral aminotriazole ligands.¹⁷ It was found to be a useful re-

agent for the aziridine ring opening to obtain azidomethyl-substituted pyrrole precursors,¹⁸ or kinetic resolution of monosubstituted epoxide for the synthesis of optically pure 1-azido-2-trimethylsilyloxyalkanes.¹⁹

Azidotrimethylsilane can be conveniently and rapidly prepared by adding chlorotrimethylsilane dropwise to a stirred solution of NaN₃ in diethylene glycol dimethyl ether.¹

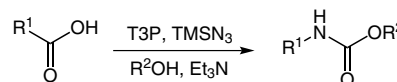


Scheme 1

Abstracts

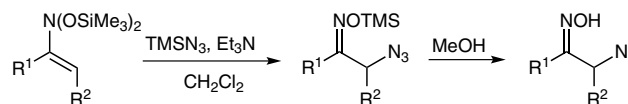
(A) One-Pot Rearrangement of Carboxylic Acids to Carbamates:

Augustine and co-workers have developed a simple and efficient procedure for a one-pot conversion of carboxylic acids into carbamates through the Curtius rearrangement by employing propylphosphonic anhydride (T3P®) and azidotrimethylsilane in the presence of an alcohol.²⁰



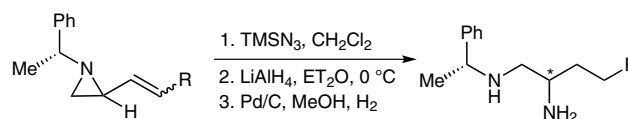
(B) Preparation of α -Azido Oximes:

Sukhorokov and co-workers reported that α -azido oximes could be obtained from aliphatic nitro compounds via interaction of *N,N*-bis(silyloxy)enamines with trimethylsilylazide.²¹



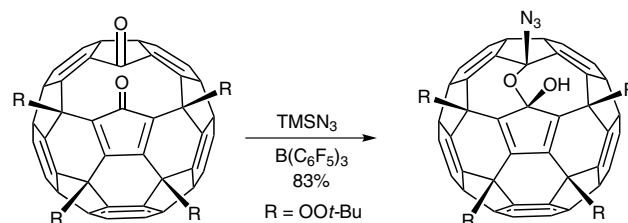
(C) Synthesis of Chiral Terminal 1,2-Diamines:

A regioselective ring opening of aziridines with TMSN₃ has been developed and the azido group and the double bond were reduced by LiAlH₄ to give chiral terminal 1,2-diamines in high yields.²²



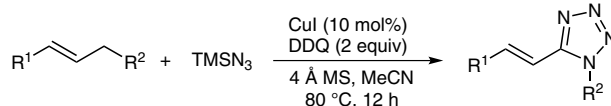
(D) Synthesis of Fullerenyl Azide:

In the presence of a Lewis acid, the first fullerenyl azide compound has been synthesized via addition of azidotrimethylsilane effectively to a cage-opened fullerene derivative.²³

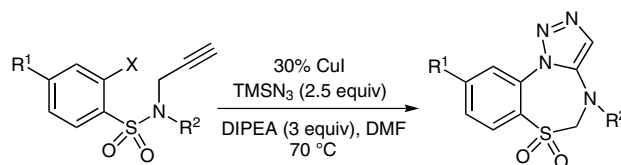


(E) *Synthesis of Tetrazoles:*

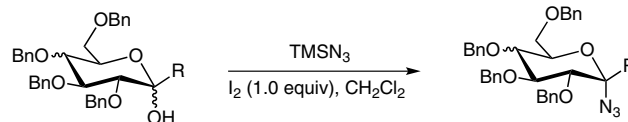
Direct conversion of 1,3-diarylprop-1-enes into tetrazole was demonstrated in the presence of azidotrimethylsilane and 2,3-dichloro-5,6-dicyano-1,4-benzoquinone (DDQ) using CuI as the catalyst at 80 °C in MeCN.²⁴

(F) *Synthesis of Triazolothiadiazepine-1,1-dioxides:*

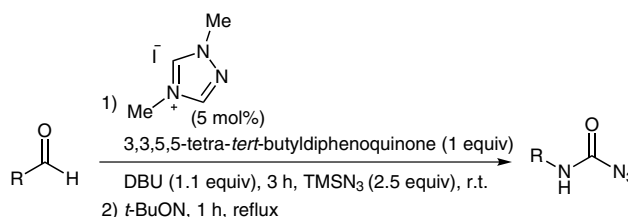
Recently, a one-pot synthesis of triazolothiadiazepine-1,1-dioxides via copper-catalyzed [3+2] cycloaddition has been achieved in the presence of azidotrimethylsilane and Hünig's base (DIPEA).²⁵

(G) *Azidation of Hemiketals:*

Azidotrimethylsilane is also used as an efficient azide source for azidation of hemiketals using molecular iodine as promoter. The reaction proceeded smoothly at room temperature to afford the desired glycosylazide as a single isomer in good yield.²⁶

(H) *Oxidative Azidation of Aldehydes:*

In addition to the above cases, azidotrimethylsilane can also be applied as an azide source of reaction oxidative azidation of aldehydes in the presence of 1,3-dimethyltriazolium iodide, 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU) and 3,3,5,5-tetra-*tert*-butyldiphenylquinone.²⁷



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