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

(Trifluoromethyl)trimethylsilane

Compiled by Thi Minh Ha Vuong

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Abstract

(A) Oxidative Trifluoromethylation of Terminal Alkynes and Heteroarenes:
Qing and co-worker described a powerful method for the synthesis of a broad range of trifluoromethylated acetylenes in good yields by using the copper-mediated protocol. Recently, they have developed an alternative copper-catalyzed trifluoromethylation. This method is also applied to the oxidative trifluoromethylation of heteroarenes and highly electron-deficient arenes via C–H activation.

(B) Oxidative Trifluoromethylation of Boronic Acids:
Copper-mediated or -catalyzed oxidative cross-couplings of aryl- and alkenylboronic acids with TMSCF3 under mild condition have been reported. This procedure can be employed in the various ranges of functionalized aryl, heteroaryl and alkenyl boronic acids.

(C) Cu-Catalyzed Reaction of Arylboronic Acid with TMSCF3 and S8:
This study provides an efficient and convenient protocol for the synthesis of aryl trifluoromethyl thioethers.

(D) Cu-Mediated Nucleophilic Trifluoromethylation of Allyl Halides:
The trifluoromethylated allylic products have been synthesized in good yields.

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(E) Ag-Mediated Trifluoromethylation of Arenes:
The innovative procedures for silver-mediated CH trifluoromethyl-
ation of aromatic substrates were developed by Melanie S. Sanford
and co-workers.10 The mechanism of these reactions is suggested to
proceed via an AgCF$_3$ intermediate.

(F) Pd-Catalyzed Trifluoromethylation of Aryl Halides and Vinyl
Sulphonates:
Hartwig,11 Sanford,12 Grushin13 and Buchwald14,15 have contributed
to a notable feature of this reaction.

(G) Pd-Catalyzed Intermolecular Oxidative Aryltrifluoromethyl-
ation of Activated Alkenes:
The powerful synthesis of oxidile derivatives containing CF$_3$ was
explored by Liu and colleagues.16 The desired products were ob-
tained via initial arylpalladation of alkenes, continued by sequential
oxidation and reductive elimination of Csp$^2$ PdIVCF$_3$ species.

(H) Synthesis of $\alpha$-CF$_3$/N-Heterocycles Through Tandem Nucleo-
philic Additions:
A powerful strategy for the synthesis of precursors of biologically
important unnatural cyclic amino acids and fluorinated N-hetero-
cycles by tandem reactions based on amination and trifluoromethylation
catalyzed by AgF was reported by Hammond.17

(I) Addition to the Carbonyl Group:
The catalytic nucleophilic enantioselective trifluoromethylation of
carbonyls, including aldehydes,18 ketones19 (alkynylketones19 and
aryl ketones20), acyltrifluoromethane,21 acylphosphonates22 and
acetylsilanes23,24 was reported. The addition to related carbonyl com-
pounds (enones, amides, esters sulfonic, sulfinic, selenic esters and
$\alpha$-keto esters) was also described.18

(J) Addition to Imines, Nitrones, Thiocyanate and Selenocyanate:
This series of trifluoromethylation by addition allows for generating
promising candidates for the pharmaceutical and agrochemical in-
dustry.18

References
(3) Tomashenko, O. A.; Grushin, V. V. Chem. Rev. 2011, 111, 4475.