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NEW 1,3-DIPOLAR CYCLOADDITION LEADING TO PYRROLIDINES

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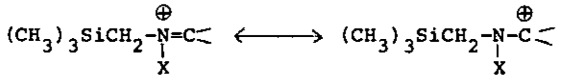
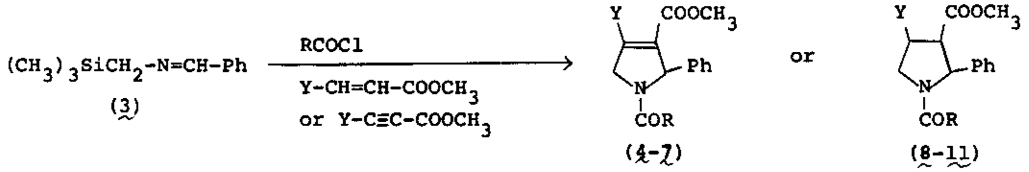
As a part of our studies on the chemistry of trimethylsilylmethylamines, we now wish to report new 1,3-dipolar cycloadditions of ylides, $>\overset{\ominus}{C}-\underset{X}{\overset{\oplus}{N}}=C< \longleftrightarrow >\overset{\ominus}{C}-\underset{X}{N}-\overset{\oplus}{C}<$ (X= RCO, $(CH_3)_3Si$), derived from intermediary trimethylsilylmethyliminium salts, (1) and (2), to olefinic and acetylenic dipolarophiles, leading to pyrrolidines.



$$(CH_3)_3SiCH_2-\underset{X}{\overset{\oplus}{N}}=C< \longleftrightarrow (CH_3)_3SiCH_2-\underset{X}{N}-\overset{\oplus}{C}<$$

X= RCO(1), $(CH_3)_3Si$(2)

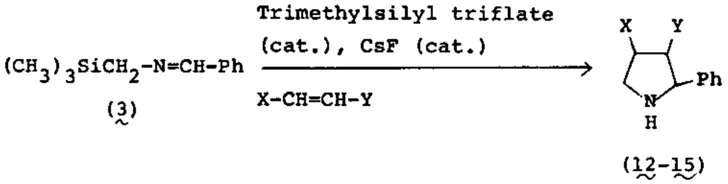
A schiff base of trimethylsilylmethylamine (3) reacts with conjugated alkenes and alkines in the presence of acyl chlorides to give N-acylated pyrrolidines and 2,5-dihydropyrroles. Path of this reaction involves a formation of intermediate, 1, followed by a heterolytic fission of its C-Si bond.



	Y	R
4	$COOCH_3$	Ph
5	$COOCH_3$	$PhCH_2O$
6	$COOCH_3$	CH_3
7	H	Ph

	Y	R
8	$COOCH_3$(t)	Ph
9	$COOCH_3$(t)	$PhCH_2O$
10	$COOCH_3$(c)	Ph
11	H	Ph

Another cycloaddition involves a reaction of 3 catalyzed by trimethylsilyl triflate and cesium fluoride. This catalytic process involves regeneration of the triflate by a fission of C-Si bond of the intermediary 2. This cycloaddition is admirably suited for synthesizing N-unsubstituted pyrrolidines by simple procedure.



	X	Y
12	$COOCH_3$	$COOCH_3$(t)
13	$COOCH_3$	$COOCH_3$(c)
14	$CO-\underset{CH_3}{N}-CO$	
15	H	$COOCH_3$