STEREO- AND REGIOSELECTIVE ALDOL-TYPE REACTION OF ACTIVE METHYLENE GROUPS OF NITROGEN-CONTAINING HETEROAROMATIC COMPOUNDS

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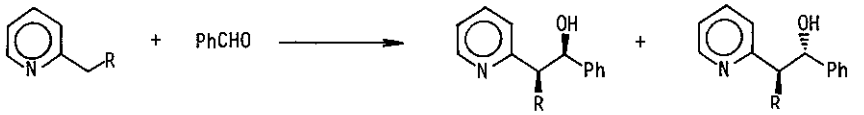
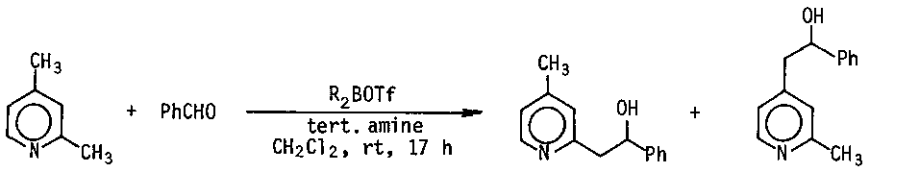
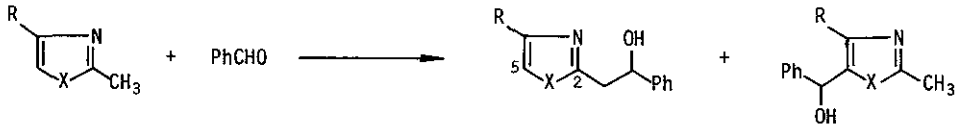
The combination of dialkylboryl triflates and aliphatic tertiary amines was successively applied to the aldol-type reaction of "active methylene groups" of nitrogen-containing heteroaromatic compounds with benzaldehyde. The stereoselectivity and regioselectivity were much better than those of conventional methods using strong bases such as n-butyllithium or lithium diisopropylamide as shown below.



R	Reaction conditions	Yield (%)	erythro	threo
Me	i) LDA/THF/-78° → rt, ii) PhCHO/-78° → rt	78	26	74
Me	i) n-Bu_2BOTf/-78°, ii) Et_3N, PhCHO/rt/17 h	50	94	6
Ph	i) 9-BBN-OTf/-78°, ii) Et_3N, PhCHO/rt/17 h	66	100	0



R_2BOTf	tert. amine	Yield (%)	2-Substituted	4-Substituted
n-Bu_2BOTf	Et_3N	68	100	0
9-BBN-OTf	i-Pr_2NEt	73	0	100



R	X	Reaction conditions	Yield (%)	2-Substituted	5-Substituted
H	S	i) n-BuLi/THF/-78° → rt, ii) PhCHO/-78° → rt	43	0	100
Ph	O	i) n-BuLi/THF/-78° → rt, ii) PhCHO/-78° → rt	60	0	100
H	S	i) 9-BBNOTf/-78°, ii) i-Pr_2NEt, PhCHO/rt/17 h	77	100	0
Ph	O	i) 9-BBNOTf/-78°, ii) Et_3N, PhCHO/rt/17 h	70	100	0