AROMATIC NUCLEOPHILIC SUBSTITUTION BY HYDRIDE ELIMINATION

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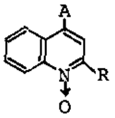
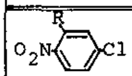
In the course of studies of nucleophilic reactions of aromatic N-oxides, we happened to find that base-catalyzed reactions of 4-chloroquinoline N-oxide (1) with some active methylenes of rather lower acidity in t-BuNH$_2$ or liq NH$_3$ gave 2-alkylated quinoline N-oxides without any participation of the 4-chloro group. For instance, when 1 was slowly added at -10∿-15°C to a suspension of pinacolon and t-BuOK in t-BuNH$_2$, the reactants turned yellow, orange, orange-red and then dark brown, and afforded 4-chloro-2-pinacolylquinoline N-oxide in 79.5% yield after stirring for 40 min.

Among the various conditions, the use of 2 mol equiv of nucleophile and 2.5 mol equiv of bases gave the best results. Besides 1, N-oxides of quinoline and 3-bromoquinoline, p-chloronitrobenzene and nitrobenzene were found to undergo this type of reaction. In reactions of nitrobenzenes the use of 3 mol nucleophiles and 4 mol bases were more preferable. Some representative example are listed below.

	A	*Products, R, Reaction Conditions*[1], *Yields(%)*
	Cl	-CH$_2$COMe: (c) 2h, 34. -CH$_2$COCMe$_3$: (a) 40min, 79.5; (b) 30min, 54; (c) 2h, 90; (d) 2h, 70. MeCHCOMe: (c) 1h, 65. -CH$_2$COPh: (a) 20min, 65; (c) 2h, 41.6. : (c) 2h, 64.6; (d) 1h, 51.3. -CH$_2$COOEt: (a) 1h, 18.5. -CH$_2$COOCMe$_3$: (a) 40min, 62; (b) 1h, 67.
	H	-CH$_2$COMe: (c) 2h, 37.4. -CH$_2$COCMe$_3$: (a) 20min, 81; (b) 2h, 65; (c) 2h, 47.3. -CH$_2$COPh: (a) 1h, 65. : (c) 2h, 46.7. -CH$_2$COOCMe$_3$ (b) 2h, 48. -CH$_2$CN: (a) 1h, 44.4.
		-CH$_2$COMe: (c) 8h, 56.3. -CH$_2$COCMe$_3$: (c) 2.5h, 62.4; (d) 4h, 44. -CH$_2$COPh: (c) 5h, 53.5. -CH$_2$COOCMe$_3$: (c) 3h, 21. -CH$_2$CN 6h, 22.

1) (a): t-BuOK—t-BuNH$_2$, -10∿-15°C. (b): n-BuLi—t-BuNH$_2$, -10∿-15°C. (c): t-BuOK—liq NH$_3$, -70°C. (d): KNH$_2$ (or NaNH$_2$)—liq NH$_3$, -70°C.

These reactions should be considered as aromatic nucleophilic substitutions by hydride elimination. However a few reactions conducted under nitrogen were found to give also the same products in somewhat lower yields; the combination of base and solvent seems to be a crucial factor for the reaction to proceed. Further studies are in progress to reveal the essential features of the reaction and extend its scope.