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REACTIONS OF IMIDAZO[4,5-b]PYRIDINE 4-OXIDES

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Reactions of 1H-imidazo[4,5-b]pyridine 4-oxide(1) and a pair of its methyl derivatives with acetic anhydride, phosphoryl chloride, or benzoyl chloride—silver cyanide have been investigated. In these reactions corresponding quaternized intermediates were initially formed which in turn were attacked by the nucleophiles to give final products. It was found that a methyl substituent exerts a profound influence on the site of the attack of the nucleophiles.

(A) Reactions with Acetic Anhydride(under reflux for 5 hours) Followed by Methanolic Ammonia Treatment

1-Methyl-1H-imidazo[4,5-b]pyridin-5(4H)-one was isolated as a sole product in 60% yield from 1-methyl-1H-imidazo[4,5-b]pyridine 4-oxide(2). On the other hand, from the N-oxide(1) and 3-methyl-3H-imidazo[4,5-b]pyridine(3) unexpected compounds were obtained. Thus, heating the former(1) gave 1(or 3)H-imidazo[4,5-b]pyridin-6-ol along with a comparable amount of 5-substituted product. In the case of the 3-methyl derivative(3) substitution occurs at position 2 to give 2-hydroxyl derivative as a main product(63%)

(B) Reaction with Phosphoryl Chloride(under reflux for 5 hours)

Reactions of the N-oxide(1) and its 3-methyl derivative(3) gave the corresponding 5- and 7-chloroimidazo[4,5-b]pyridines. The N-oxide(2) also reacted with phosphoryl chloride to yield a sole product, 7-chloro-1-methyl-1H-imidazo[4,5-b]pyridine.

(C) Reissert Reactions(with benzoyl chloride and silver cyanide)

A nitrile group was successfully introduced at the position 5 in 63% yield starting from the 1-methyl derivative(2). In sharp contrast no substances bearing a nitrile group were detected in the reaction mixture from the 3-methyl isomer(3), but 5-chloro-3-methyl-3H-imidazo[4,5-b]pyridine in 13% yield.