COMMUNICATIONS

LETTERS

Fluoride-Assisted Acetylation of Alcohols and Phenols

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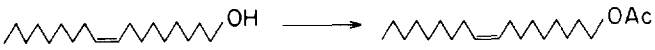
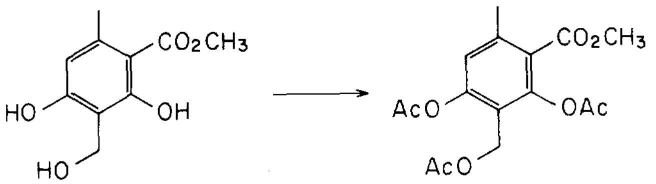
Many examples are now reported for the fluoride-assisted reactions in organic synthesis. Tetraalkylammonium fluorides are used in C-monoalkylation[1] and sulfenylation[2] of β-dicarbonyl compounds. Nitromethylation of aldehydes,[3] Michael addition reactions with nitromethane,[4] and benzyloxycarbonylation of tryptophan[5] are catalyzed with potassium fluoride and crown ether. Potassium fluoride itself is used for self-condensation of enolizable ketones,[6] phenacylation of carboxylic acids,[7] and alkylation of phenols and cyclic amines.[8] Catechol methylenation is best achieved with cesium fluoride and methylene chloride.[9] These reactions utilize the enhanced nucleophilicity of enols, phenols, and carboxylic acids which tend to form hydrogen bonds with fluoride ions.

We now wish to report that alcohols and phenols can be acetylated with acetic anhydride in DMF in the presence of inorganic fluorides. Oleyl alcohol was inert in DMF in the presence of acetic anhydride at room temperature. Addition of 0.1 equivalent anhydrous potassium fluoride did not cause acetylation but complete acetylation was achieved in 3 hours by stirring the suspension containing one equivalent of solid potassium fluoride at room temperature. With larger amount of the salt, the reaction required slightly less time.

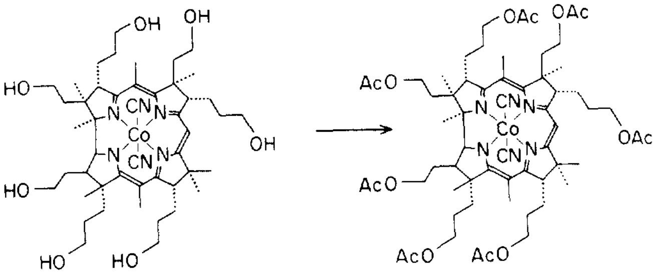


Methyl 3-hydroxymethylorsellinate yielded the triacetate in quantitative yield when the DMF solution with excess acetic anhydride and half equivalent of solid potassium fluoride was stirred 40 minutes at room temperature.

Secondary alcohols react more slowly and cholesterol was only partially acetylated under similar conditions with potassium fluoride. However, with 10 equivalents of cesium fluoride the acetylation was almost complete in 5 hours.



Fluoride-assisted acetylation was best employed when the usual pyridine-acetic anhydride condition resulted in undesirable side reactions. The corrin heptaalcohol, obtained from lithium aluminum hydride reduction of heptamethyl dicyanocobyrinate (dicyanocobester), was converted to two closely related products with different colors (blue and red) in pyridine-acetic anhydride suggesting partial modification of the chromophore. On the contrary, clean acetylation to the red heptaacetate[10] was achieved when the heptaalcohol was reacted overnight with one equivalent of cesium fluoride and excess acetic anhydride in DMF under nitrogen at room temperature.



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