An Efficient and Rapid Regeneration of Carbonyl Compounds from Their *N,N*-Dimethylhydrazones in Presence of Chlorotrimethylsilane/Sodium Iodide

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A new efficient and extremely facile regeneration of carbonyl compounds from their *N,N*-dimethylhydrazones is developed in presence of chlorotrimethylsilane/sodium iodide.

Regeneration of carbonyl compounds from their C=N derivatives under mild conditions is an important step in the synthesis of some complex organic molecules. Hydrazones are employed as ketone and aldehyde functional group equivalents in synthesis,[1] as they provide convenient protection for the carbonyl groups. They also exhibit many advantages over their parent carbonyl compounds.[2] *N,N*-Dimethylhydrazones are of increasing importance as protecting,[3] activating and directing groups in carbonyl chemistry, especially in controlled C-C bond formation reactions.[4-10] As a result, there has been considerable interest in the development of mild techniques for the regeneration of carbonyl compounds.[11-14] However, most of the known methods for the conversion of hydrazones back into parent carbonyl compounds require strongly oxidative and/or reducing conditions, basic or acidic media and involve expensive reagents or cumbersome procedures. Recently, Enders and co-workers,[14a] have described a mild method for this transformation employing saturated solution of oxalic acid which requires about 0.5 to 14 h. However, there is further scope for milder and improved methods for the regeneration of carbonyl compounds.

In our earlier studies on the deprotection of hydrazones and oximes to their corresponding carbonyl compounds we developed some biocatalytic methods.[15] We have also reported an efficient conversion of *N,N*-dimethylhydrazones to ketones in presence of dimethylsulphate/potassium carbonate under reflux conditions.[16]

In this communication, we wish to report a new practical regeneration of carbonyl compounds from their hydrazones in presence of chlorotrimethylsilane/sodium iodide, TMSCl/NaI. In recent years, there has been an upsurge in the use of organosilicon reagents towards the synthesis of organic compounds.[17] Recently, we found some new applications of the above reagent system such as for the reduction of azido functionality,[18] preparation of cyclic imides[19]and regeneration of alcohols from their allyl ethers.[20] In continuation of this study, particularly for the total synthesis of natural products, the present investigation describes a facile C=N conversion to carbonyl compounds. Although, deprotection of hydrazones, oximes and semicarbazones to their corresponding carbonyl compounds empolying TMSCl-DMSO system under reflux conditions has been reported,[21] the use of TMSCl-NaI remained unexplored. Further, TMSCl/NaI system has been found to be a convenient method for the generation of HI[22a] over the conventional generation of HI from KI and 95% orthophosphoric acid.[22b]

Therefore, this reagent system has been utilized for the regeneration of carbonyl compounds from their *N,N*-dimethylhydrazones employing this procedure: To a solution of *N,N*-dimethylhydrazones (1mmol) in 1% water in CH_3CN (5ml), NaI (1.5 mmol) was added and the mixture stirred for 1 min. To

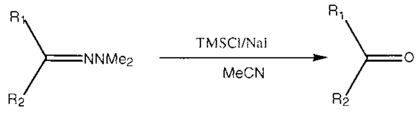
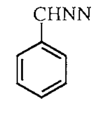
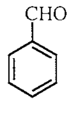
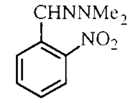
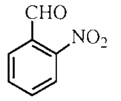
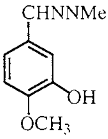
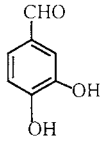
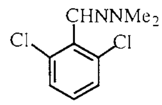
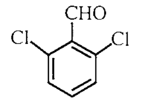
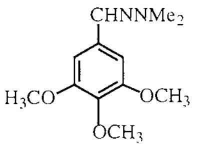
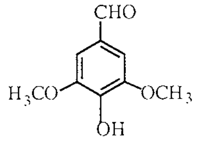
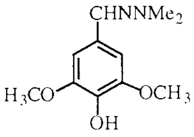
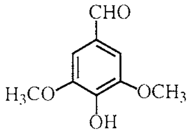
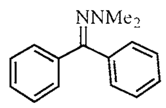
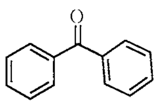
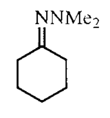
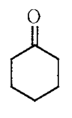
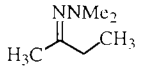
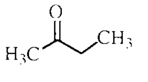


Table 1. Regeneration of carbonyl compounds from their *N,N*-dimethylhydrazones in presence of chlorotrimethylsilane/sodium iodide.

Entry	Substrate	Time/min	Product	Yield/%
1		2		95
2		2		93
3		3		88
4		2		94
5		5		87
6		3		98
7		5		93
8		3		92
9		2		92

this suspension chlorotrimethylsilane (1.5 mmol) was added and the stirring continued for another 2-5 min. On completion of the reaction, as indicated by TLC the reaction mixture was quenched using sodium thiosulphate and extracted with ethyl acetate.The organic layer was dried over anhydrous Na_2SO_4 and concentrated under reduced pressure to give the product which was purified by column chromatography (silica, 60-120, hexane:ethylacetate, 4:1) to give the final product. The generality of this method is given in the table.

Interestingly, this reaction when carried out under near anhydrous condition seems to be sluggish, while it is very fast in 1% water in acetonitrile. Therefore, it appears HCl/HI is formed by the hydrolysis of TMSCl or TMSI, as has been earlier observed.[22a] Furthermore, water could be the source of the carbonyl oxygen in this reaction process. In entries 3 and 5 simultaneously O-demethylation at 4-position also takes place in this method.

In summary, the method described in this communication is rapid, efficient, cost-effective and proceeds under extremely mild as well as near neutral conditions with simple work up. Hence, it will find application in organic synthesis which require deprotection of hydrazones.

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