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A SIMPLE METHOD FOR THE PREPARATION OF N-SUBSTITUTED HYDROXAMIC ACIDS BY REDUCTIVE ACYLATION OF OXIMES

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Abstract. The reductive acylation of oximes with triethylsilane and acylation agents provides an attractive one-pot synthesis of N-substituted hydroxamic acids.

There is considerable interest in hydroxamic acids as corrosion inhibitors, flotation reagents in extractive metallurgy, and for various biological activities.[1] In our study of flash vacuum thermolysis,[2] it was necessary to synthesize various N-substituted hydroxamic acids. A general method for preparing them from aldoximes was sought.

Sodium cyanoborohydride reduction of aldoximes[3] requires close monitoring of pH in order to provide consistent, good yields of hydroxylamines. The use of pyridine-borane[4] proved to be more convenient, except that the reaction mixture is heterogeneous; thus, large scale reactions are difficult. The reported reduction of O-acyl oximes with triethylsilane and acid[5] suffered from the propensity of such compounds to form nitriles *via* elimination of a mole of carboxylic acid.

We thought it might be simpler, and overall more efficient, to mix the oxime with the acylating agent in the presence of triethylsilane. The acid liberated by acylation of the oxime could then serve to promote the immediate reduction. This method works, and the general procedure is as follows. At room temperature, 1 equivalent of aldoxime is mixed with 2 equivalents of triethylsilane and 2 equivalents of a chloroformate is added. The mixture is stirred at room temperature overnight. After that time, the product is concentrated *in vacuo*, purified by chromatography over florisil, and characterized spectroscopically.[6] The isolated product yields are given in Table 1. Work is continuing in this laboratory to extend this method to acid chlorides, and ketoximes; and to elucidate the nature of the reaction intermediates and mechanism.

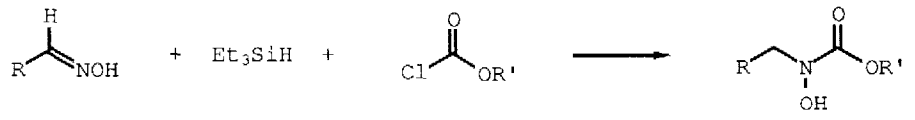
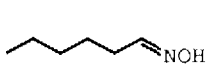
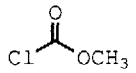
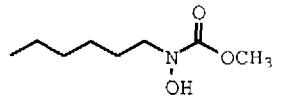
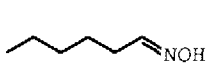
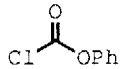
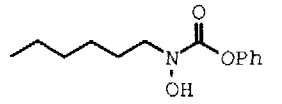
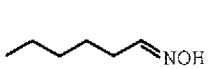
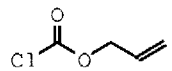
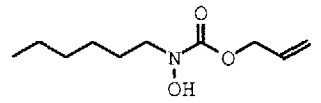
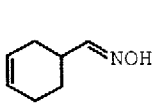
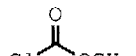
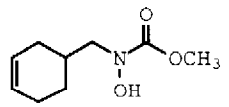
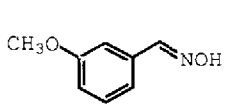
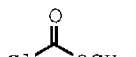
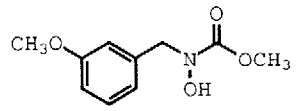


Table 1. The reductive acylation of aldoxime

Oxime	Acylating agent	Hydroxamic acid	Yield
			74%
			58%
			67%
			64%
			52%

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6. The NMR, IR and microanalyses of all new compounds are consistent with the assigned structure.

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