Cleavage of Sterically Hindered Esters with Boron Trichloride

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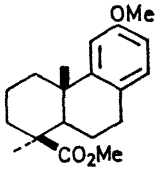
Summary The use of boron trichloride in the conversion of hindered esters into the corresponding acids is described.

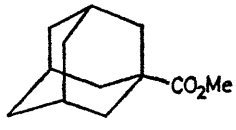
VARIOUS methods are available for the conversion of sterically hindered esters into acids; they include the use of strong bases in high boiling solvents, Lewis bases in highly polar solvents,[1] reductive hydrolysis with lithium in liquid ammonia,[2] and treatment with strong mineral acids.[3] The use of Lewis acids for the cleavage of hindered esters has not been studied previously.

Preliminary studies, now reported, indicate that relatively simple hindered esters can be efficiently cleaved by boron trichloride in methylene chloride. The following example illustrates the method. A 10% solution of methyl *O*-methylpodocarpate (I) in methylene chloride is cooled to −25° and treated with boron trichloride (4 mol. equiv.) in methylene chloride (20% solution). The mixture is then left at 0° for 5—6 h, cautiously poured into ice-water and extracted to give a 90% yield of *O*-methylpodocarpic acid, m.p. 159°. No cleavage of the methyl ether function occurred under these conditions. Similarly, the methyl esters of adamantane-1-carboxylic acid (II) and 2,4,6-trimethylbenzoic acid gave the corresponding acids in excellent yields. Methyl *O*-methyl-7-oxopodocarpate was not cleaved under these conditions and compound (III) gave a 40% yield of the α- and β-acids (epimeric at C-18).

The mechanism, scope and limitations of this reaction with hindered and unhindered esters[4] will be discussed in the definitive paper.



(I)



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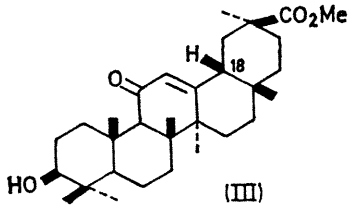

(III)

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