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Hydroalkylation of Unsaturated Fatty Compounds

ABSTRACT

The alkylation of long-chain unsaturated fatty compounds is of great importance because alkyl branched oleochemicals have interesting properties. They are used for many applications such as lubricants, cosmetics, softeners, defoamers and wood-protecting agents. The ethylaluminum sesquichloride (Et3Al2Cl3)-induced Friedel-Crafts alkylation using alkyl chloroformates is a new method for the hydro-alkylation of unsaturated fatty compounds.1 The reaction of e.g. oleic acid with isopropyl chloroformate gave, mediated by Et3Al2Cl3, after a reaction time of 2h, an approximately 1:1 mixture of the regioisomers 9- and 10-isopropyloctadecanoic acid in a yield of 72%. In the presence of Et3Al2Cl3 isopropyl chloroformate decomposes by formation of CO2 and the isopropyl cation, which adds to the C,C-double bond of the fatty acid. Transfer of a hydride ion from Et3Al2Cl3 to the adduct carbenium ion gives the saturated product. In some cases as, e.g., in hydro-alkylations of 10-undecenoic acid addition of a hydride donor such as triethylsilane was necessary. With respect to the wide spectrum of applications for alkyl-branched fatty compounds, it should be of interest to find more simple reaction conditions to perform the hydro-alkylation. 1 U. Biermann, J. O. Metzger, J. Am. Chem. Soc. 2004, 126, 10319-10330.