

SUMMARY

Strained Carbocyclic Systems in the Synthesis of Bioactive Products Methodologies and Total Synthesis.

The cyclobutyl moiety has come to be quite frequently used as an all carbon functional group in direct effort toward the synthesis of complex organic molecules. Four-membered ring chemistry can be likewise turned by the appropriate choice of substituents. In addition to various chemoselective ring openings there are ring enlargements to five- and ring contraction to three-membered carbocycles, all of which have their specific range of applications.

This thesis is devoted to our investigations around the chemistry of three and four-membered rings, their reactivity and their convenient application in the synthesis of bioactive and natural products.

In the first part, the synthesis, the reactivity and the regio- chemo- and stereospecific peculiarities of ring expansion of cyclopropyl derivatives have been studied. Focusing the attention to cyclobutanones, a convenient method for the generation of pure non racemic oxaspiropentanes has been developed.

In the second part, the synthesis of 2;2-dimethyl-3-arylcyclopentanones obtained from cyclopropyl phenyl sulfide was described through a successive double ring expansion according to previous methodologies. This route allowed the formal or total synthesis of different natural products such as *planocoyl acetate*, α - and β -*necrodol*, *lancifolol*, *herbertene*, *enokipodins B and C* and α -*cuparenone*.

In the third part, the total synthesis of two natural products has been related, in this case racemic *grandisol* and its diastereomer *fragranol*. The key step consisted of a palladium (0) mediated nucleophilic substitution on cyclobutylidenyl esters. Moreover, application of the Kulinkovich cyclopropanation on (*S*)-citramalic acid derivative allowed the (+)-*grandisol* to be obtained.

The fourth part detailed the use of lithium dialkylcuprates in the enantioselective total synthesis of (-)-*grandisol*. The experimental results proved to be in good agreement with the empirical data resulting from theoretic calculations.