

Abstract in English

Fluorinated organics exhibit unusual physio-chemical properties and for this reason, they have found numerous practical applications. Consequently, there is remarkable need for straightforward access to various fluoroorganics, and the development of new synthetic methods is one of major goals of modern organic synthesis. In this context, the presented PhD thesis focuses on the chemistry of little known fluorinated nitrile imines, formally derived from trifluoroacetonitrile, as building blocks for preparation of nitrogen heterocycles. In order to examine the reactivity of the title nitrilimines, they were tested towards three selected groups of reagents, namely (i) arynes (benzynes) as extremely reactive electron-rich dipolarophiles, (ii) chalcones as well as structurally related α,β -unsaturated compounds selected as model electron-deficient dipolarophiles, and (iii) amino acid esters indicated as attractive bifunctional electrophilic/nucleophilic agents.

The main goal of the first project was to check whether it would be possible to apply *in situ* generated arynes/benzynes as suitable agents for trapping CF_3 -functionalized nitrile imines (also available *in situ*). As demonstrated, the designed (3+2)-cycloaddition reaction can be successfully carried out in dry organic solvents such as THF leading to indazoles bearing the CF_3 group at C(3) of the heterocycle. Application of TBAF as a convenient source of fluoride anion (which play a dual role of *desililating agent* in aryne generation and *a base* in dehydrohalogenation step) should be considered a key achievement. Furthermore, an easy route towards *N*-unsubstituted 3- CF_3 -indazole as handful building block in preparation of *N*-alkylated and *N*-acylated analogues was also demonstrated.

Another project was focused on (3+2)-cycloadditions of title nitrile imines and chalcones (but also other enones). As demonstrated, the designed Huisgen reactions proceed highly regio- and diastereoselectively, and leads to 5-acyl-3- CF_3 -pyrazolines recognized as highly useful precursors of the respective pyrazoles. Particularly, the mentioned intermediates could be smoothly aromatized with activated MnO_2 , and depending on the solvent

applied, the oxidation proceed either via dehydrogenative pathway (in polar solvents) or by deacylation (in non-polar media). Moreover, the mechanochemical approach of the mentioned reactions was checked, and the devised protocols were applied for preparation of biologically relevant 3-CF₃-pyrazole-alkanecarboxylic acids.

The final project of the Thesis was aimed at application of title nitrile imines in a formal stepwise (3+3)-cycloaddition reaction with natural α -amino esters to access hitherto unknown trifluoromethylated 1,2,4-triazine derivatives. The scope and limitations of the devised reaction was checked in detail, and three series of variously functionalized final products were obtained, including enantiomerically pure 3-CF₃-1,2,4-triazines derived from chiral starting materials. Model functional group transformations in selected products, carried out under mild oxidation/reduction conditions, demonstrated remarkable synthetic usefulness of this class of fluorinated heterocycles.