

Synthesis, Characterization and Application of Silica-Calix[4]arene as a NMR Chemical Shift Reagent and Catalyst in Organic Syntheses

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Twelve principles were organized in green chemistry in order to optimize reactions conditions, increase the yield of reactions, use of environmentally friendly compounds and produce biodegradable products. Finally, these measures could reduce environmental damages. So, in this project, heterogeneous systems were investigated as one of the best way to reach these aims. For this purpose, supramolecular chemistry and in particular calixarenes were chosen for chemical bonding to the surface of silica gel. This new compound, was designed to act as a catalyst in some reactions and as well as a chemical shift reagent in NMR. Accordingly, para-tert-butyl calix[4]arene was prepared para-tert-butyl phenol in alkaline medium and then tetra-chlorosulfonyl calix[4]arene were synthesized by ipso sulfonation process in high yield. The results of spectroscopic studies and the other characterization methods showed that chlorosulfonylcalix[4]arene had chemically bonded to the surface of silica gel. On the next step, this compound was applied as a catalyst in the reduction of ketones to alcohols in the presence of sodium borohydride. The comparisons of reaction time in presence and absence of chlorosulfonylcalix[4]arene-silica as a catalyst, resulted a remarkable reduction in the reaction time when it was used as catalyst. Moreover, this catalyst has a capacity to be reused in the aforementioned reaction for several times, while retaining its structural stability.

Keywords : para-tert-butyl calix[4] arene, chlorosulfonylcalix [4] arene, Silica Gel

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