

Complexation-induced ^1H -NMR shifts of ligands calculated from MD-simulations

Matthias Wildauer¹⁾, Christof M. Jaeger¹⁾, Jürgen Schatz²⁾, Timothy Clark¹⁾

¹⁾ *Computer-Chemie-Centrum, Friedrich-Alexander-Universität Erlangen-Nürnberg, Nögelsbachstraße 25, D-91052 Erlangen, Germany*

²⁾ *Institute of Organic Chemistry, Friedrich-Alexander-Universität Erlangen-Nürnberg, Henkestraße 42, D-91054 Erlangen, Germany*

NMR-titration experiments are used to observe complexation-induced chemical shifts (CIS) of the ligand's protons in order to measure association constants of host-guest complexes. Since these chemical shifts are caused by anisotropic shielding and deshielding effects due to the ligand's environment in the complex, it is also possible to determine general features of the structure, orientation and conformation of the ligand within the host.

In this study, we calculate the ^1H CIS of four phenyl-based ligands in two different calix[4]arene hosts that were experimentally measured and published prior to this study.^[1] The aim is to gain deeper insights into how small geometrical changes of the host-guest interactions may influence the chemical shifts and how those are represented in equilibrium.

Atomistic molecular dynamics (MD) simulations of all complexes and free ligands were used to generate a large number of structures that represent conformational flexibility as a basis for DFT calculations in order to obtain the NMR shieldings and subsequently the desired CIS. The calculated and the experimental CIS values will be compared and some conformations will be discussed.

[1] Rehm M., Frank M., Schatz J., *Tetrahedron Letters*, **2009**, *50*, 93-96.