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Anion Sensing

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With contributions by

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S. P. J. Higson · R. J. T. Houk · P. Lhoták · F. P. Schmidtchen · I. Stibor

C. Suksai · S. L. Tobey · T. Tuntulani · P. Zlatušková



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Preface

It has often been deplored that anion complexation is a less developed area of supramolecular chemistry. Many recently published reviews and several books illustrates the current high interest in the field as well as its rapid expansion. In contrast to most cations, anions (and organic anions in particular) are usually structurally very diverse group of guests in Cram's host-guest notation. A relatively complicated structure, strong solvation and sometimes narrow pH window of anion existence – all these features make anion sensing relatively complicated topics with many challenges to inorganic, organic as well as analytical chemists. Anion sensing is a typical multifaceted subject that can be treated from several directions. This was exactly our intention when structure of the present Volume was being prepared.

Several anion binding proteins with precisely defined crystal structure reported recently. Nevertheless, by far the most attention is still being devoted to synthetic host. This is the reason that the first chapter of the present volume written by *F. P. Schmidtchen* reviews the basic principles imposed on artificial host molecules used for the sensing of anions. This is followed by chiral recognition of anions written by *I. Stibor and P. Zlatušková*. It can be better expressed as enantioselective sensing of chiral anions. This subject to the best of our knowledge has not been treated in literature so far. In fact it is usually hidden in reviews on enantioselective recognition of chiral organic acids. Changing pH one can easily switch from free organic acids to their anions. Most of receptors, however, have been designed for recognition of free chiral acids which means the completely different structure of binding site in comparison with that for anions. Much less is known on the principles of recognition of chiral anions. The following chapter is devoted to one famous molecular scaffold – calixarene. It has been chosen and reviewed as structural basis for design, synthesis and study of abiotic anion receptors by *P. Lhoták*. The fourth review is covering the analytically oriented topic – construction and operation of anion sensors written by *F. Davis, S. D. Collyer and S. P. J. Higson*. Synthetic metal-based receptors have been reviewed by *P. D. Beer and S. R. Bayly*. The bottom-line of all these artificial molecules is the presence of metal ion(s) in the form of organometallic and coordination complexes that is useful as a reporter group. The most recent advances in the field are also detailed including the use of metallo-receptors in dendrimer, functionalised nanoparticle and surface-bound anion

sensor. The extremely broad subject of chromogenic anion sensors has been reviewed by *C. Suksai and T. Tuntulani* followed by abiotic guanidinium receptors for anion recognition and sensing written by *R. J. T. Houk, S. L. Tobey, and E. V. Anslyn*. These receptors have found a number of very interesting applications as sensors for anions in practice.

Prague, January 2005

Ivan Stibor

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