Molecular recognition of carboxylic acids and carboxylate anions by synthetic receptor

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Abstract

Synthetic molecules able for efficient and selective binding of carboxylic acids belong to very promising receptor structures. Special focus on hydroxy- and dicarboxylic acids is due to the central role of these molecules in metabolic paths of the living organisms and commercial importance in biotechnology. In addition, wide range of biological and organic molecules contain carboxylic group. For this reasons, great attention is paid to modeling of the synthetic receptors able to specifically bind carboxylic acids or their fragments. This chapter describes the current state-of-the-art in research and development of the methods for development of artificial receptors for carboxylic acids. The focus is on the structural and physical properties of synthetic receptors because the efficiency of interaction between the receptors and acids depends on various factors, i.e. nature of the substituents, their structural accepting characteristics, geometrical complementarity of the binding sites etc. In general, the development of artificial receptors for carboxylic acids has some difficulties and now full understanding of all the principles of molecular recognition of acids is still far from being completed. Due to their unique properties, the synthetic receptor molecules can contribute to solution of these problems. They offer new opportunities for modeling artificial living systems and physiological processes, designing therapeutic agents and sensitive elements of (bio)sensors and others diagnostic tools devoted to fast detection of pathogens and pathological stages in medicine. Active search in the area led to development of artificial receptors different in efficiency of recognition toward a number of hydroxy-, amino and dicarboxylic acids. In this chapter, general approaches to the design of synthetic receptor, their classification and performance in recognition of various substrates are considered. © 2011 Nova Science Publishers, Inc. All rights reserved.

Keywords

Calixarenes, Molecular recognition, Self-assembly, Thiacalixarenes