

Chemistry of Nanocontainers

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Preface

Recently, “nanosphere”, “nanocontainer”, “nanovessel” or “nanoflask” have become keywords in a fast developing area of supramolecular chemistry. This vivid chemistry was developed based on Donald Cram’s early vision to make molecules with a huge internal cavity able to incorporate guest species. Today’s approaches to preparing container molecules follow different strategies. One option is to prepare covalently connected derivatives step-by-step using “classical” synthetic methodologies. Another way is to use self-assembly processes which allow easy access to the desired derivatives. In this case, non-covalent linkages (hydrogen bonding, metal coordination or electrostatics) or weak covalent bonds (imines or disulfides) keep the supramolecular entities together. Due to the different natures of the connections, the obtained aggregates are more or less stable.

In addition to their beauty, many of the described nanovessels also show interesting endo/exo chemistry (“inside” and “outside”). In the interior, species can be bound, and highly reactive intermediates can be stabilized, or chemical reactions supported or catalyzed. In the latter case, unusual reactivity or selectivity might be observed. Thus, container molecules act as homogeneous equivalents of heterogeneous porous materials like zeolites or MOFs.

Due to the immense interest in this type of chemistry, the field has rapidly expanded and diversified over the last two decades. In this volume, some of the most prominent scientists in the field contribute extensive reviews, which show the versatility of approaches towards nanocontainers, and give some examples of processes occurring in their interior. The science of nanovessels is still in its infancy and therefore this field is expected to emerge further and develop a high impact in future chemistry. With the size and the special properties of the described derivatives, it bridges the gap between “traditional” chemistry and nanotechnology.

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