A novel synthetic method for Capsule-type Oxaphosphacyclophane and Substituted Oxaphosphacyclophane

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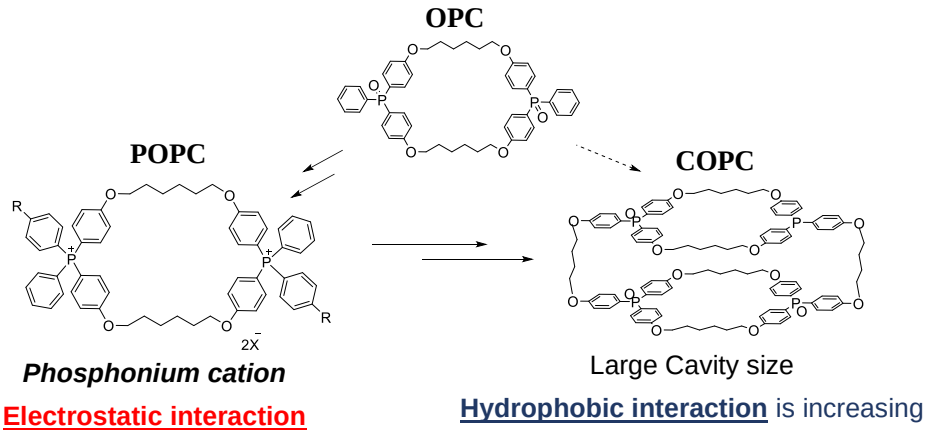
Tetraarylphosphonium salts (TAPS) have been widely used in phase transfer catalyst and ionic liquid. Aryl-substituted phosphonium salts, which are lipophilic cations, have become increasingly popular in cellular biology. TAPS were easily synthesized by the reaction of a phosphine compound and an equivalent amount of aryl halide with a 10% Pd catalyst in xylene.[1] Therefore, we focus on the cationic properties of TAPS, synthesize host molecules with them as the basic skeleton, and aim at the anionic molecular recognition.

In our laboratory, we synthesize oxaphosphacyclophanes(OPC) having bis-(triphenylphosphine oxide) linked by dioxyalkyl chains. They have succeeded in molecular recognition of toluene and cyclohexane via CH/π and π/π interaction by vapor diffusion method.[2] But they have a disadvantage that the molecular recognition ability of guest compounds is weak.

In this study we performed two molecular designs to improve molecular recognition. The first compound is Phosphoniumoxaphosphacyclophane(POPC), which has a cationic property and is expected to recognize anionic guests via electrostatic interaction. The second compound is Capsule-type oxaphosphacyclophane (COPC), which is expected that the hydrophobic space will increase and the molecular recognition ability will be improved. POPC is obtained by reduction of OPC and then C－P cross-coupling reaction. In addition COPC can be obtained by using novel synthetic method such as the hydrolysis of phosphonium under basic conditions along with C－P cross-coupling reaction.[3]

In this presentation, we report the synthesis of the two host compounds which the molecular design was performed and the study of hydrolysis under basic conditions.



1) A. B. Charette et al. *J. Org. Chem.* **2008**, *73*, 590–593. 2) K. Katagiri et al. *ACS Omega*, **2020**, *5*, 23621–23630. 3) W. Huang et al. *ACS Omega* **2020**, *5*, 16010-16020.