

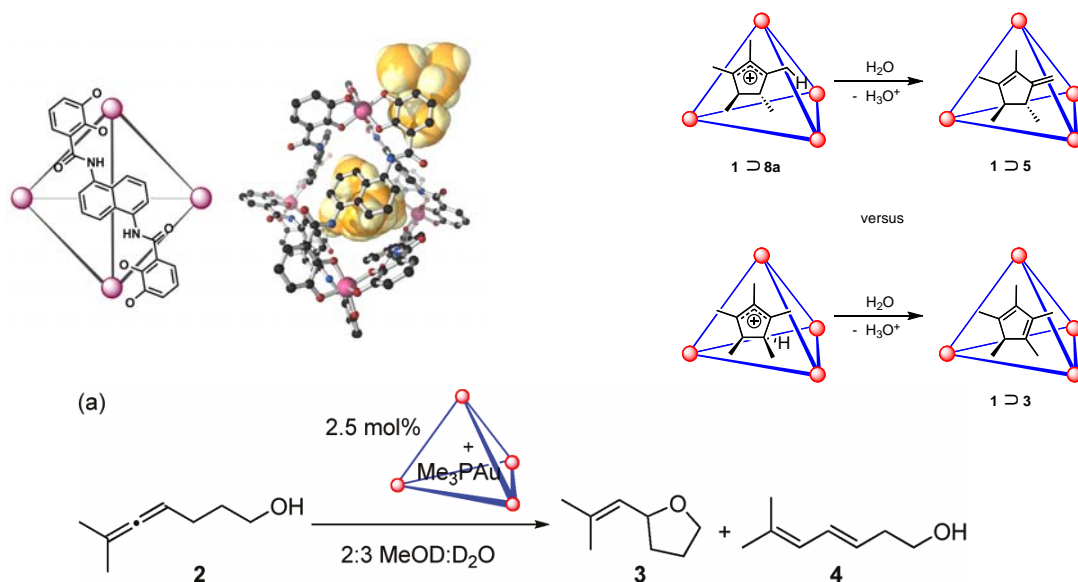
Confinement and Catalysis in Chiral, Self-Assembled, Nanoscale Flasks

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The cluster shown below binds cationic guests selectively and strongly in water (to $10^5 M^{-1}$).^[1,2] Encapsulated guest reactivity and catalysis of three types has been observed in aqueous solution: 1) Size- and shape-selective C-H activation reactions;^[3] 2) Catalysis of encapsulated neutral substrates that undergo proton-catalyzed reactions;^[4] 3) Host-mediated catalysis of encapsulated cationic dienes that undergo electrocyclic rearrangements.^[5]

Some enzymes exert kinetic control over the deprotonation of intermediates, determining which products are ultimately formed. Similar behavior is shown in the Nazarov cyclization products shown at upper right.^[6] Finally, the recent encapsulation and functional catalysis of the gold phosphine complex shown at bottom is another demonstration of the versatility of this system.^[7]



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References:

- [1] D.L. Caulder, K.N. Raymond, *Acc. Chem. Res.* **1999**, *32*, 975.
- [2] C. Sgarlata, J.S. Mugridge, M.D. Pluth, B.E.F. Tiedemann, V. Zito, G. Arena, K.N. Raymond, *J. Am. Chem. Soc.* **2010**, *132*, 1005.
- [3] D. Fiedler, D.H. Leung, R.G. Bergman, K.N. Raymond, *Acc. Chem. Res.*, **2005**, *38*, 351.
- [4] M.D. Pluth, R. G. Bergman, K.N. Raymond, *Acc. Chem. Res.*, **2009**, *42*, 1650.
- [5] C.J. Brown, R.G. Bergman, K.N. Raymond, *J. Am. Chem. Soc.*, **2009**, *131*, 17530.
- [6] C.J. Hastings, M.P. Backlund, R.G. Bergman, K.N. Raymond, *submitted for publication*.
- [7] Z.J. Wang, C.J. Brown, R.G. Bergman, K.N. Raymond, F.D. Toste, *J. Am. Chem. Soc.* **2011**, *133*, 7358.