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SYNFACTS Highlights in Chemical Synthesis

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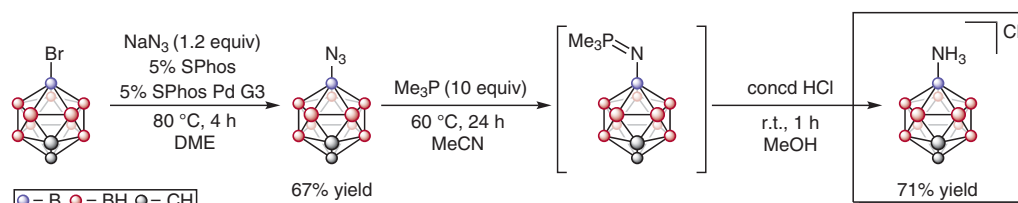
Carborane Guests for Cucurbit[7]uril Facilitate Strong Binding and On-Demand Removal
J. Am. Chem. Soc. **2020**, *142*, 20513–20518, DOI: 10.1021/jacs.0c09361.

Making a Strong Binder Weak

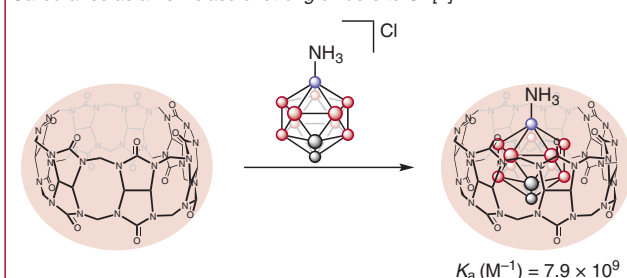
Preparation of B9-aminated *ortho*-carborane

Pd-catalyzed B–N cross coupling

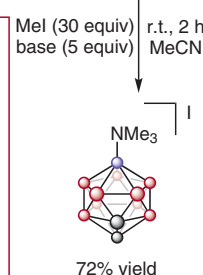
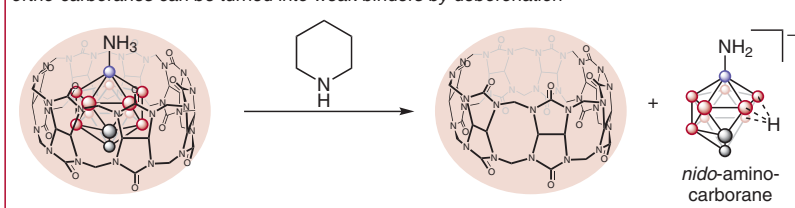
Staudinger reduction and hydrolysis



Carboranes as a new class of strong binders to CB[7]



ortho-carboranes can be turned into weak binders by deboronation



Significance: Host–guest chemistry is a powerful tool for the design of functional materials and has been leveraged in the synthesis of polymers and other supramolecular molecules. The pumpkin-shaped class of hosts, called cucurbiturils, are known for their strong complexation with primary amines. Therefore, the removal of the guest is often challenging. In this publication, Sletten and co-workers determine carboranes as a new class of high-affinity binders, which can be modified into weak binders through base-mediated deboronation.

Comment: Synthetic manipulations on carboranes pose a significant challenge. The authors successfully devised a new strategy to aminate *ortho*-carborane at B9. With the desired molecule in hand, the binding constants of CB[7] with a series of carboranes were determined. Additionally, it was found that piperidine can efficiently deboronate *ortho*-carboranes in only one hour, and thus trigger decomplexation from CB[7]. This was utilized in the recycling of a Wang-CB[7] resin.

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Category

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Key words

carboranes

host–guest
chemistry