**In-Class Activity: N-Stabilized Carbenes**

***Before the class meeting***

Please read the following article from Chemical and Engineering News, the ACS trade publication. We will address the guiding questions below during the next class meeting, but you may wish to refer to them when reading the article. A PDF of this paper may be found on the course Moodle page.

Stephen K. Ritter “Versatile Chemistry With Carbenes” *Chem. & Eng. News* **2012**, *90(17)*, 34-36. [ <https://cen.acs.org/articles/90/i17/Versatile-Chemistry-Carbenes.html> ]

In this article, the author describes research related to isolable carbenes and analogues.

***During the class meeting***

Complete the questions below, working with your peers to discuss responses. Your instructor will share a google document that we will edit collaboratively in real time. For questions that request a chemical equation or structure, create these as a group using ChemDraw or similar software. Only one response document is needed for each group.

1. What does the term “persistent carbene” mean? What was the structure of the first such persistent carbene, and who discovered it?
2. The persistent carbene shown below is known as IAd, and is prepared by treating the corresponding imidazolium chloride with NaH in DMSO/MeOH.



Which portions/functional groups in this molecule could be easily swapped to adjust the steric and electronic parameters of the ligand? How might you do this? (NOTE - some of these modifications are hinted at in the paper, and in our prior lecture discussion).

1. Bertrand has reported the formation of a borylene stabilized by the cyclic alkyl amino carbene (CAAC) shown below.



What is the structure of the borylene discussed in this article?

1. How do the carbene analogues reported by Ragogna differ from the persistent carbenes already discussed? What properties of these have been investigated? Are these likely singlet or triplet carbene analogues?