This paper (*Organometallics* **2015**, *34*, 2707) outlines the synthesis and reactivity of a platinum benzyne compound.

1. Pincer ligands are an important component of this paper. What is a pincer ligand and what are they used for?
2. Compound 1 is the starting point in this study. Provide an electron count, the ligand bond number, the valence on platinum and the dn count for platinum in compound 1.
3. Compound 2 contains a benzyne ligand. Benzyne is not a terribly stable free molecule, why?
4. The benzyne is formed *in situ* by the reaction of *o*-C6H4(SiMe3)(OTf) with F-. What are the products of this reaction and provide some rationale for why these products form.
5. The benzyne that is generated *in situ* binds to compound 1 to make compound 2. Describe the bonding interaction between the benzyne and the platinum. It would likely be helpful to include pictures of the orbitals involved in this interaction.

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1. Coordination of benzyne to platinum serves to stabilize this reactive molecule. Although an X-ray crystal structure of compound 2 could not be obtained, the authors performed a computational analysis of this compound. In this study they found the coordinated C≡C bond length to be 1.344 Å, while the corresponding distance in free benzyne was calculated to be 1.244 Å. Why does coordination of benzyne stabilize this reactive molecule? Your answer to the previous question as well as some of the structures in scheme 1 may help in answering this question.
2. In the second sentence of the introduction, the authors present two possible ways to think about the coordination of the benzyne ligand, either as a π-L or as an X2 ligand. For compound 2, provide an electron count, the ligand bond number, the valence on platinum and the dn count for platinum for each of the possible coordination modes. Based on this information, which type of coordination would you consider to be most likely for compound 2? Why?
3. In the first paragraph of the results and discussion section of the paper, the authors report 31P NMR data for compounds 1 and 2. At several points in that section values for 1*J*PtP (which is used to indicate coupling constants) and platinum satellites are reported. However, all of the peaks in the 31P NMR spectra are reported as being singlets which should not have coupling constants. Account for this description.
4. Upon heating, compound 2 can either form compound 3 or to a lesser extent lose benzyne to yield compound 1. Why would the formation of compound 3 be preferable to loss of benzyne?
5. What type of reaction is taking place in the conversion of compound 2 to compound 3? As part of your discussion provide an electron count, the ligand bond number, the valence on platinum and the dn count for platinum in compound 3.
6. Compound 3 reacts with H+ in acetonitrile to yield compound 4. Two different mechanisms are proposed in scheme 2. For mechanism A, the first step is the conversion of compound 2 to compound 3. Describe the reactions that are taking place in the formation of intermediate I followed by the formation of compound 4. As part of your discussion you should provide an electron count, the ligand bond number, the valence on platinum and the dn count for platinum in each of these compounds.
7. For mechanism B, the first step is the conversion of compound 2 to intermediate II. Intermediate II rearranges to give intermediate III which then forms compound 4. Describe the reactions that are taking place in the formation of intermediates II and III and compound 4. As part of your discussion you should provide an electron count, the ligand bond number, the valence on platinum and the dn count for platinum in each of these compounds (your answer for compound 4 in the previous question should not change for this question).
8. Which mechanistic path is preferred by the authors? Why?