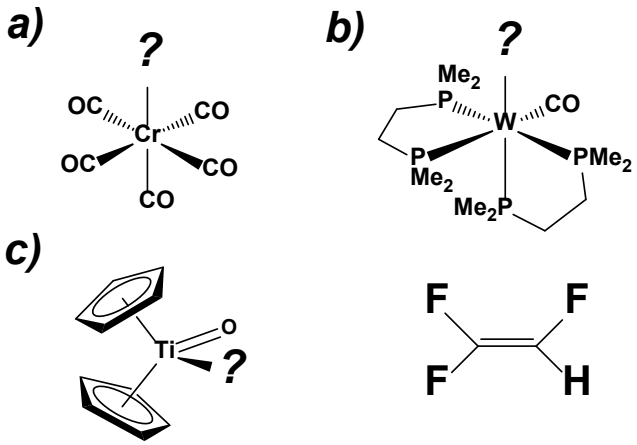
Student name: **Student ID:**

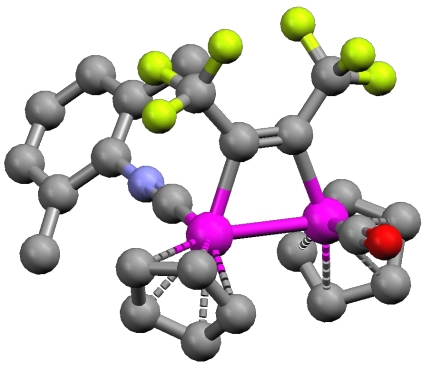
CHEM.524 **Homework 3** **1st semester 1445**

---

1. **To which of the following (each with a single open coordination site) will trifluoroethylene bond to the most strongly? Why?**

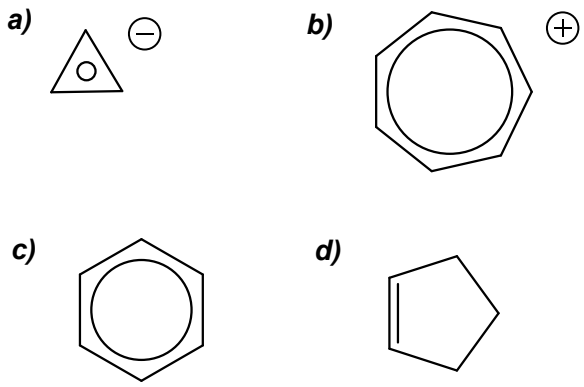


2. **The $Cp_2Rh_2[m\text{-}(CF_3C{\equiv}CCF_3)](CO)(C{\equiv}N\text{-}R)$ complex shown below has a Rh-Rh bond distance of 2.67 Å, strongly indicating a covalent bond between the rhodium atoms. How would you electron count this complex to accommodate a Rh-Rh covalent bond?**

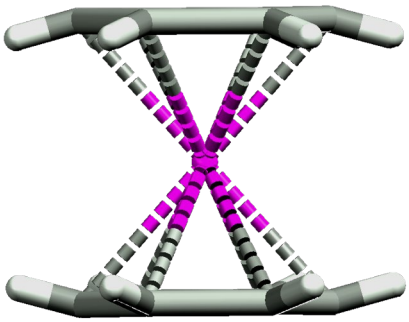


Student name: **Student ID:**

3. **Which of the following ligands will coordinate the *most strongly* to a generic metal center (not too electron-rich or deficient, with enough open coordination sites)?**

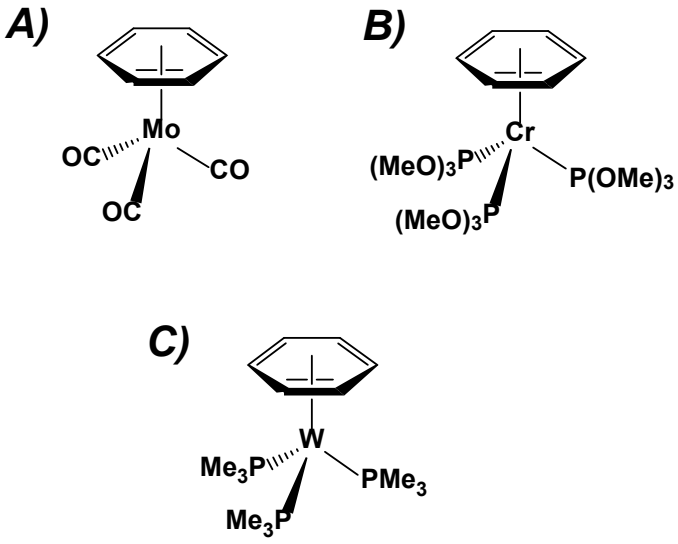


4. **The crystal structure of $[Cr(C_6H_6)_2]^+$ clearly shows that the hydrogen atoms on the benzene distinctly lean in towards the metal center. Explain why.**



Student name: **Student ID:**

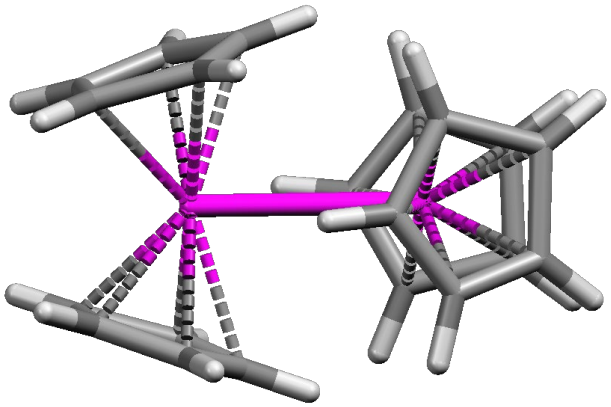
5. **In which of the following complexes should the η^6-benzene ligand coordinate the strongest? Why??**



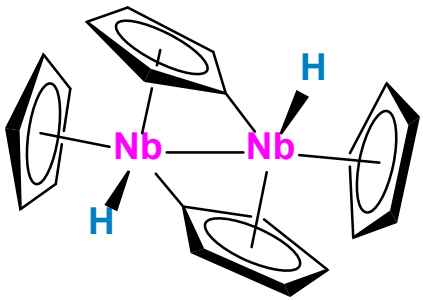
6. **Explain why the Fe-C distance *lengthens* for $[Cp_2Fe]^+$, while the Co-C distance *shortens* for $[Cp_2Co]^+$.**

Student name: **Student ID:**

7. **Oxidation of Cp_2Os does not produce a simple cationic monomer as seen for Co and Fe. Instead one gets dimerization to produce the following bimetallic complex that has an Os-Os bond (3.04 Å). Electron-count this complex. Is it para- or diamagnetic?**

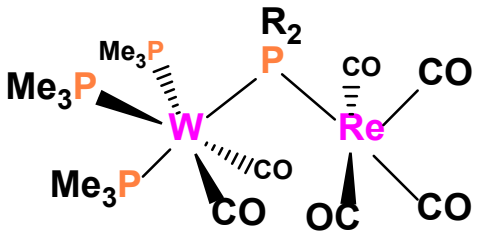


8. **Electron-count this Ti_2 complex. Is it para- or diamagnetic?**



Student name: **Student ID:**

9. **Electron-count the following complex using both the covalent and dative M-M bonding methods:**



10. **Electron-count the following complex. What is the order of the Re-Re bond? Why wouldn't it be appropriate to use the dative bond method for this complex?**