**The Synthesis and Electronic Structure of [NiX4]2- Complexes and the Role of Crown Ethers in Inorganic Synthesis**

This Literature Discussion is based on the following reference: Zheng, B.; Miranda, M. O.; DiPasquale, A. G.; Golen, J. A.; Rheingold, A. L.; Doerrer, L. H. Synthesis and Electronic Spectra of Fluorinated Aryloxide and Alkoxide [NiX4]2- Anions. *Inorg. Chem.* **2009**, *48*, 4274 - 4276. DOI: 10.1021/ic9003593

Questions:

1. Define metathesis in your own words.
2. Consider the synthesis of complex **4** in Scheme 1. Rewrite this reaction with all byproducts and proper balancing. Do the same for complex **5** in Scheme 2.
3. The structure of 18-crown-6 is shown in Scheme 2 (above the reaction arrow). What is the structure of benzo-18-crown-6?
4. Consider the formula for compound **1**. Why is the K+ ion included within the brackets with 18-crown-6 (18C6)? What does this imply structurally?
5. In compound **5**, the formula has one K+ ion shown within brackets with 18-crown-6 (18C6), and one is alone outside of these brackets. What does this imply about the structure?
6. What purpose does 18-crown-6 serve in the syntheses of **1**, **2**, **3**, and **5**?
7. Consider the fluorinated aryloxide/alkoxide ligands in this article. Are these stronger or weaker pi-donors than Cl-? What data from the paper support your conclusion?
8. The molecules described in this paper are tetrahedral, not square planar, and paramagnetic (prove this to yourself by looking up characterization data in the paper). Draw the ligand field splitting diagram for this geometry, and add the appropriate number of d electrons. Is your result consistent with the magnetic data presented?
9. Compounds **2** and **4** contain the same ligands; however, they display distinct electronic spectra and Dq  values. Carefully analyze their structures in Figure 1 of the paper. Suggest and discuss reasons for the differences in the electronic spectra.