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Literature Discussion: Directed Reading Questions

Article: Danis, J. A.; Lin, M. R.; Scott, B. L.; Eichhorn, B. W.; and Runde, W. G. *Inorg. Chem.* **2001**, 40, 3389-3394.

Title: Coordination Trends in Alkali Metal Crown Ether Uranyl Halide Complexes: The Series $[A(\text{Crown})]_2[\text{UO}_2\text{X}_4]$
Where A = Li, Na, K, and X = Cl, Br

For this literature discussion, read through the assigned journal article. In general, unless I direct you to do so, you do not have to read the materials and methods section. As you will see in the results and discussion section, the authors assume that you did not read it, and tell you how they made everything in general terms. Nobody reads the materials and methods section unless they want to do the experiment themselves or want to double check something.

Since we haven't covered it in class yet, you may skip over the section on Raman spectroscopy of the uranyl compounds.

As you are reading through the journal article, think about or look up the answers to these questions to help direct your attention. I'll be checking to make sure you completed this work when you arrive to class. Come prepared to think about the concepts brought up in this paper, because you will have a more specific problem set to work on when you come to class.

1. What is single-crystal X-ray crystallography, and how do the authors in this study take advantage of it?
2. What is a uranyl group?
3. Draw Lewis structures of all 6 uranyl compounds crystallized in this study, and identify them by their numbers in the paper (these can be easily found in figures and tables).
4. Identify all the individual cations, anions, and molecules that make up these structures.
5. Rank the Lewis acids and bases in terms of relative hardness/softness.
6. What are crown ethers, and what are they good for? What do the numbers in their names mean?

Bonus Question: If you take a look at the experimental section (which is a good example of what you should be turning in for your lab reports) for compound **3**, you'll see that the authors report a 99.9% isolated yield. Is this a reasonable value?