Chemistry 248A Synthesis Report Due Friday, May 12, 2023

Work alone or with a partner to complete this assignment.
If working with a partner, you MUST set up a time to conference with me.
If you worked with a partner first semester, you may not work with a partner this semester (sorry!)
Please turn in ONE copy of your collective work.

50 points. Do not wait until the last minute to do this assignment. **Read these instructions TODAY** so that you have an idea of what is involved. This assignment is a significant part of your grade (about 5%).

Total synthesis (http://en.wikipedia.org/wiki/Total_synthesis) is the development of a practical laboratory route from simple "readily available" materials to a generally quite complex organic compound, usually of medicinal interest. It is one of the most challenging (and, to some of us, most interesting!) areas of research in chemistry because it demands and develops in the researcher a broad range of knowledge of organic chemistry and provides exposure to a wide variety of laboratory skills and procedures. Researchers doing total synthesis are often pushing the frontiers of organic chemistry, inventing new ways to do reactions to make compounds that have never been made before. A PhD in the area of total synthesis is an excellent starting point for a career in medicinal chemistry.

Your job in this assignment is to find one **total synthesis** article **published since Jan. 1, 2023,** that includes in its title the phrase **"Total Synthesis"** and is specifically from *The Journal of Organic Chemistry, The Journal of the American Chemical Society, Organic Letters*, or from another journal that is approved by me. **This phrase MUST appear in the title.** There are many tools you can use to find such an article, including a journal web site, Google, Web of Knowledge, and SciFinder Scholar. **Always retrieve the PDF version**, not the HTML version. **Send me the article as an attachment to an email message or a link to the article by email** so I can clear it. I may say no – the rule will be first-come, first-served, and no two reports on the same article. Please look it over first to make sure it is in the **right date range** and *probably* has the requisite five reactions. Almost certainly you will need to come in and talk with me about the paper. These are not trivial to read. The sooner you can clear this with me, the better!

Turn in this assignment as a **Google doc in your portfolio.** Also in your portfolio include the **PDF of the paper** and the **PDF of its supporting information.** Feel free to past screen clips of figures in the article into your document wherever you feel that would be useful.

Answer the following questions:

a. (2 pts) How did you find this paper?

b. (2 pts) Who are the authors? Where (at what university or company) was the work done?

c. (5 pts) What was their reason for carrying out this synthesis? (Was the target compound of some medicinal value? Was it of theoretical interest? What do they say in their introduction?)

d. (16 pts) Outline the overall retrosynthesis. *This does not have to be highly detailed, but do consider that it is 24% of the grade on this assignment.* If you have a good paper, there will be a discussion of this already. I'm just asking you to summarize the authors' retrosynthetic approach in your own words. Key in on where carbon-carbon bonds, especially rings, were made. What sort of reactions were involved? Was there something interesting? Something that we have or have not discussed? Feel free to clip the retrosynthesis image from the paper into your report, and absolutely, do come talk with me about this.

e. (25 pts) Identify **five reactions discussed this semester** that were used in this synthesis. You may also discuss reactions that we have not learned about, but if you do that, be sure to clear those with me first. See if you can find some of those organometallic reactions, for example. Or carbonyl reactions. Protections and deprotections – that sort of thing. There should be a lot more than five in a good total synthesis paper. But I just want you to find five of them. What sort of reactant—alkyl halide, tosylate, alcohol, primary, secondary, tertiary, ketone, aldehyde, etc.—was involved? What conditions were used? What was the solvent? Was the solvent protic or aprotic? Were these acidic, basic, or neutral conditions? **Use the supporting information document for answers to these questions.** Why (do you think or do they say) were these conditions used? What was the yield? **Include no more than one protection and one deprotection**.

Your job is to convince me that you know what you are talking about. It may be necessary to do some web-based research to look up terms or acronyms. You will lose points if I am not convinced. Organize your paper for clarity – use your best liberal-arts skills. Use full sentences, not just a list of bullet points. Refer to compounds by their functional group and compound number as, for example, *alkene 31* or *phenol 15*, not just "Compound 31" or "Compound 15". This makes the paper *way* easier to read.

5 pts bonus: Provide a detailed NMR analysis of one of your reaction products. If you are interested in doing this, let me know. We will negotiate how much is worth 5 points.