

## Research Proposal Guidelines

As part of the honors component of S343, you are required to complete a Research Proposal that will involve literature research to design an organic reaction procedure. The proposal will be due on August 3 in class.

### General Guidelines

- Typed, double spaced, 12 point font
- Use ChemDraw for all chemical figures
- All references should be American Chemical Society format
- Front page with title, name, S343, and date

### List of sections

1. Abstract
2. Rationale for proposal
3. Evaluation of three retrosyntheses
4. Synthetic background
5. Proposed procedure
6. Budget and safety considerations

### Details of each section

Abstract: Approximately 5-7 sentences summarizing the proposal. The abstract should be written in third person, passive tense. (It should probably be the last section written.)

Rational for the proposal: This section will be 2-3 paragraphs. First, present the problem by summarizing and referencing the work of Ruddle and Smyth found in Volume 5, pages 160-168 in *Organic and Biomolecular Chemistry* (2007) as it pertains to the problem. A well written paper will show that you have read the pertinent portions of the paper and are able to incorporate your knowledge of the paper into the problem you are addressing. Second, present the purpose of the proposal: the development of methodology for the synthesis of unsaturated aryl sulfonate esters using a model compound. (You will be given a unique model compound, and should be able to name it.)

Evaluation of three retrosyntheses: In this section, you will present three distinct ways to construct a double bond in the context of an aryl sulfonate ester. Each method should have about one paragraph explaining the chemistry of this method. This section will contain at least 2 different references to secondary literature as well as a ChemDraw scheme for each of the methods you have proposed.

After you have proposed three retrosyntheses, you will have 1-2 paragraphs evaluate them against each other based on your perceived likelihood of success of each method and then present the method you have chosen.

Synthetic background This section will be a minimum of one page and a maximum of two pages in which you cite at least 3 primary literature sources. Within the section, you will:

- State how (if) this method has been successfully employed in the synthesis of unsaturated sulfonate esters previously
- State limitations of this method and why it failed
- State how previous literature procedures could be altered to be more successful. (Reference analogous literature.)

**Proposed procedure:** In this section, you will write a detailed procedure designed to synthesize 0.015 moles of your target compound. Include all reaction conditions, including times, temperatures, and solvents. (You don't have to propose a purification technique.) After the proposal, give the predicted IR,  $^1\text{H}$  NMR, and  $^{13}\text{C}$  NMR for the target compound in the format used in *Journal of Organic Chemistry*.

**Budget and safety considerations:** Using year 2009 catalogs of chemical companies, list the prices of all fine chemicals you need to buy based on the amounts you have in your proposed procedure. You can assume that you already have all necessary equipment and solvents. Also write out all major safety concerns for the chemicals you are using. Attach the front page of the MSDS sheets of one solvent and one other chemical to the end of your proposal. Include a reference to the chemical supplier you are using and where you accessed the MSDS sheets.

**Basic Grade guidelines:** Your grading will be based on the narratives below. Your paper will be assigned one of these broad categories for its base-grade, then the grade will be adjusted up or down. For instance your paper might be in the "B-level" but have especially good references and get a grade of  $85+3=88$  or it might be a "B-level" paper with many grammatical problems and get a grade of  $85-4=81$ .

**A-level (95):** Every section done with excellence. Writing style is excellent. Understanding of problem is demonstrated. Appropriate retrosyntheses and thorough procedure. Shows higher level thinking based on the synthesis of many literature reports into a cohesive procedure. Probably has more than the minimum number of quality references.

**B-level (85):** Similar to above, but lacks higher level solution to addressing synthesis problem OR many minor mistakes throughout. May have the minimum number of quality references.

**C-level (75):** Well written, but perhaps some lack of understanding of problem and how to address it. Some of the references cited may not be of the highest quality, but are appropriate. Perhaps a mid-level mistake in retrosynthesis or procedure sections.

**D-level (65):** similar to C-level, but may have many mid-level or critical mistakes in the retrosynthesis section and/or the procedure section.

**F-level (50):** Lacks any understanding of rationale of proposal OR has many critical errors in procedure and retrosynthesis sections OR makes inappropriate use of references throughout proposal