

Introduction to Assignments #8 & #9: Writing a Scientific Paper

Science at its very core is “data-based, rational analysis” and the overwhelming majority of scientific papers contain original data. Aspects related to the acquisition of the original data are described in the “Materials and Methods” section and the original data are documented either in the paper or in an appendix. An authentic exercise in scientific writing must be concerned with the rational analysis of original data. Yet, there are obvious limits to original data generation in a writing class and the question is “How to write a scientific paper without original data?” To resolve this conundrum, we will create a near-authentic experience by pretending that we have synthesized and characterized one new molecular fluorescent probe (MFP).

Everybody will write a paper on *Molecular Fluorescent Probes for Biomaterials*, either alone or together with another student, and this commonality makes the assignment manageable and guarantees well-educated peer review. And yet, the papers will vary greatly because of the students’ selections of their specific selection of MFPs. This cast selection is the very first step of working on A08 and A09 and time spent on careful thoughts in the early stages of the project will pay off later. Some changes can be made later, of course, if need be.

Guidelines for the Selection of “the Cast”

[1] Select your “new” molecular fluorescent probe from “The Molecular Probes Handbook”, available online at <http://www.invitrogen.com/site/us/en/home/References/Molecular-Probes-The-Handbook.html>

[2] Synthetic details and data for the spectroscopic characterization of the “new” MFP will be relegated to “Supporting Information” with exception of [3].

[3] Experimental details of luminescence measurements will be given in the M&M section and luminescence spectra (absorption & emission) are to be reported in the paper.

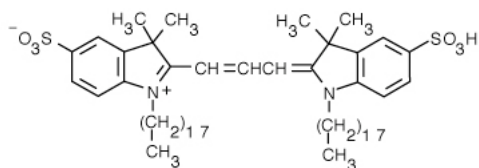
[4] In your discussion, you should compare the characteristic features of the “new” molecular fluorescent probe you selected to the respective features of two other prominent molecular fluorescent probes of the same type (i.e., all three are probes for lipids and membranes).

You may find information about these two other MFPs also in “The Molecular Probes Handbook”, but the probes need not be included there. You could compare your new MFP to some MFPs offered by a competitor. Or you might compare your new MFP to an MFP that is only just emerging in the research literature and not available commercially as yet. (This sort of comparison is very much a part of authentic research planning.)

[5] The three molecular fluorescent probes must be pure compounds with well-defined structures and the mechanisms must be known of the recognition events (i.e., the chemistry that turns the non-fluorescing MFP into the fluorescing MFP).

[6] While you choose the three MFPs featured in your paper, you should create a rough outline of the introduction to your paper (mind-maps, list of keywords, sketches & cartoons of basic concepts). What makes a molecule a MFP? Why are molecular fluorescent probes important? How do molecular fluorescent probes work? Which chemical and / or physical properties are / are not desired in molecular fluorescent probes and why?

[7] Select your cast in the week of March 21, 2011. In the computer lab on Friday, 03/25/11, the instructor will check in with you to briefly review your selections. We want to ensure that you are on the right track or, as needed, consider possible modifications to get you going in the right direction.



The orange fluorescent, lipophilic carbocyanine **DiIC₁₈(3)-DS**

Assignment #8: Material, Methods and Appendix

Assignments #8 & #9 request the writing of an original scientific paper on *Molecular Fluorescent Probes for Biomaterials*. This paper will have two sections: The paper itself and its appendix. The appendix often is provided as a separate file. For our purposes, we will think of paper and appendix as two separate entities, but we will keep them together in one file for convenience. In Assignment #8 you will organize the outline of the paper, write the “Materials and Methods” section of the paper and tabulate your data, assemble the appendix, and provide all necessary bridges between paper and appendix. Your work on A08 will be evaluated by rubric-based peer-review. Your work on Assignments #9 - #11 will build on A08 but the MMA section will not be evaluated again.

(a) Organize the Outline of Paper and Appendix. Open a Word file, set all margins to 1.25 inches, type the entire document in Times New Roman, 12 pt, with a line spacing of “at least 24 pt”. On page 1 and in separate lines, type the title in bold, provide the author line, and provide affiliation information. Starting on top of page 2, type the first-level headlines of your paper in bold (Introduction, Materials and Methods, Results and Discussion, Conclusion, References). References should be cited at the end of this first section. Create a section-break, start the second section on a new page, and restart page numbering in this section: the appendix goes in this second section.

(b) Materials and Methods. Provide an overview of the synthesis of the “new” molecular fluorescent probe, provide a detailed description of the method(s) you used to measure the luminescence properties of the new molecular fluorescent probe, and create a data table that contains the pertinent luminescence data for the new probe and for the comparable probes.

Search the literature for syntheses of the “new” molecular fluorescent probe, pick the synthesis of your choice (if you find many), and “adopt” this synthesis as your own. Search the literature for the publications that originally reported the luminescence measurements of the “new” MFP and of the comparable probes. Collect the data in you data table (i.e., Table 1).

(c) Appendix. On p. 1 of the appendix, write “Supporting Information”, and then provide on separate lines the title of the paper, its author line, and the author affiliation information. On p. 2 of the appendix, provide a “Table of Contents” for the appendix. On pages 3ff, provide a detailed description of the synthesis and the results of the comprehensive spectroscopic characterization of the new molecular fluorescent probe. Show spectra as images as much as possible (i.e., as with Assignment #5).

(d) Sources of Information about the “new” MFP. Obviously, we only *pretend* that the “new” MFP is new and that its discovery is ours. Hence, it is requested that you provide all source information about the “new” MFP as a bibliography (in the text, not as end- or footnotes) on the very last page of the appendix.

(e) Bridges. Page 1 of the Appendix provides the bridge from appendix to paper. The bridge from paper to appendix comprises several items: After “Conclusions” and before “References”, insert a one-paragraph statement that begins with “**Supplemental Material Available:** The appendix contains...” to inform the reader that the paper comes with an appendix, to describe very briefly what type of information are contained in the appendix, and to guide the reader to the source of the appendix. In the “Materials and Methods” section, at the most logical place(s), add a statement that guides the detail-seeking reader to the appendix.

Submission & Target Dates: The assignment must be completed using MS Word with *JOC* formatting. Submit one Word file “A08_’your name’.docx” by Tuesday, 04/05/11, midnight. Bring one hardcopy to class on Wednesday, 04/06/11, for peer-review.

Assignment #9: Manuscript Preparation and Submission

Assignments #8 & #9 request the writing of an original scientific paper on *Molecular Fluorescent Probes for Biomaterials*. In Assignment #8 you organized the outline of the paper, wrote the “Materials and Methods” section, created your main data table, created the appendix, and you provided all necessary bridges between paper and appendix. Feel free to make minor adjustments to the “Materials and Methods” section as you write the paper. Now, in Assignment #9 it is your task to write/complete all other parts of the paper and these are: Final Title, Abstract, Introduction, Results and Discussion, Conclusion, and References.

(a) Introduction. Write a three-paragraph introduction to explain the concept of molecular fluorescent probes, to discuss their significance in general, and to state and explain the importance of your specific aim. The third paragraph must start with “Here we report the results of” and it is in this paragraph where you state your hypothesis (i.e., expectation) and where you justify your effort (i.e., importance, significance, impact).

Much of the thinking that goes into “Introduction” occurred or should have occurred at the time you selected your cast. You might add one or two schemes to “Introduction”. Refine and revise the introduction as the analysis of your data progresses.

(b) Results and Discussion. Use as many paragraphs as you see fit, but there should be three recognizable parts to “R&D” and they should appear in the standard sequence “RRD” (New Results, Reference Data, Discussion).

Provide an overview of what you actually did to obtain the new MFP and the measured data listed in your main data table. Describe what existing data you will use in your analysis, provide/discuss the sources of these reference data, and add the most pertinent reference data to your main data table. The discussion consists in the analysis of the new data in the context of the reference data. Use as many Schemes and Figures as you see fit.

Your analysis will include discussions of relative benefits and disadvantages to a variety of appropriate criteria (availability, cost, range of applicability, ease of handling, stability,...). Your discussion section must include a comparative discussion of the fluorescent-enabling recognition event of the three MFPs, and this will likely require one or more schemes. It is desirable that your discussion includes an attempt to correlate the geometries / electronic structures of the MFPs to their respective luminescence properties.

(c) Conclusion. Write two paragraphs. Summarize your accomplishments in the first paragraph, i.e., the work you did and that facts that you claim to have established beyond any reasonable doubt. In the second paragraph, explain the meaning and the significance of the new results and describe consequences that flow from your insights.

(d) Final Title & Abstract. “*Molecular Fluorescent Probes for Biomaterials*” is the theme for all papers. Once you selected your cast, the working title of your paper might be “*Sulfonated DiI and DiO Derivatives: Improved Carbocyanine Membrane Probes*”. And you should refine the title as you work on your analysis. The final title should reflect as much as possible the central issues of your paper and your title might change to “*Sulfophenyl Derivatives of DiI and DiO Derivatives: Anionic Carbocyanine Membrane Probes*”. When all parts of the paper are complete and in final form, then write the abstract.

Submission & Target Dates: The assignment must be completed using MS Word with *JOC* formatting. Submit one Word file “A09_’your name’.docx” by Tuesday, 04/12/11, midnight. Dr. Glaser will review your submissions and provide feedback in class on Wednesday, 04/13/11, so that you can update your assignment before it enters peer review. Bring three hardcopies to class on Friday, 04/15/11, for peer-review. The peer-review of A09 submissions will be writing assignment A10.