

## 5.33 Laser Lab Grading Guidelines

Your grade for the experiment is determined by your performance on three components: the preliminary report, the final written report, and laboratory technique. Our expectations and point summaries are given below.

### ***Preliminary Report (3 points):***

Briefly describe the theory behind each of the four (spectral overlap, steady-state fluorescence, transient fluorescence, and fluorescence depolarization) experiments (approximately one or two pages total). Then, using the expressions given in the lab manual and your absorption and fluorescence data, calculate  $R_0$  and  $C_0$  for Rhodamine 6G / Nile Blue and for Rhodamine 6G / Malachite Green. Using the values of  $C_0$  you calculate, describe how you will prepare ten solutions for each acceptor with  $[\text{Acceptor}] = 0.02 \cdot C_0$  to  $2.0 \cdot C_0$  and  $[\text{Donor}] = 0.100$  mM starting from stock solutions of 9.585 mM Nile blue, 4.437 mM Malachite Green, and 2.872 mM Rhodamine 6G in ethanol. Seven of the ten solutions should have  $[\text{Acceptor}] < C_0$ . You will also need a solution with no acceptor (only donor). You will need to prepare approximately 5 mL of each solution.

**Note:** you will only use one of the two dyes (Nile Blue **or** Malachite Green) in your transient and steady state fluorescence measurements. **Please choose one.**

The preliminary report must be submitted prior to your second day of work in the laser lab.

### ***Written Report (25 points):***

Your grade on the written report depends on your understanding of the material, the quality and accuracy of your analysis, and your ability to communicate your results. Demonstrate not only your grasp of the phenomena you are investigating but also your understanding of how they fit into the greater contexts of energy transfer in chemistry and biology. Demonstrate your ability to critically analyze data. This includes analyzing data correctly as well as understanding sources of error and reasons for any possible failures. If something went wrong in the lab, how did it impact your analysis? If something did not work, why not? (see “Laboratory Technique” below) Finally, while we regard writing style largely as a matter of your own taste, we recommend at least loosely following the recommendations of Chapter 8 of Sime’s Physical Chemistry text (on reserve in the Science Library). What is important is that your report conveys the material clearly and that the style is not distracting.

Finally, while we encourage collaboration and discussion among group members, it is each student’s responsibility to perform their own data analysis. Please include all data, code, and some sample calculations in tables or as an appendix (as appropriate) in your written report.

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***Laboratory Technique (2 points):***

Your grade on laboratory technique is based on your ability to effectively, efficiently, and safely work in the lab. Keep good records of your work in the lab; if difficulties arise in the analysis because something went wrong in the experiment, you will need to understand what happened and how you would go about correcting it.

If a mistake is made in the lab and the impact of this mistake is not clear until the analysis of the resulting data is complete, we will deduct points from your laboratory technique score. If you are able to deduce and understand the mistake that you made in the lab and this is well-argued in your written report, we will not deduct points from your written report. If, however, your lab technique is poor **and** you were not able to rationalize what went wrong, we will deduct points from **both** your laboratory technique score and your written report. Of course, if you don't make any mistakes in the lab and therefore have none to explain in the report, you're all set!

Also, please note that *you must participate in the laboratory work. If you do not participate in lab, you will receive NO CREDIT for the experiment. That's a 0/30!*