Colorado State University

CHEM 372
Physical Chemistry Laboratory

Notes for
Time Domain Fluorescence Kinetics
of Aqueous Quinine With Halide Quenching

The following is a set of short notes to outline the experiment in question and to provide helpful guidance to those executing the experiment.

A. The nitrogen laser emits invisible and dangerous ultraviolet light at 350 nm. Always use suitable eye protection while the laser is actively emitting light. Simple colorless eye goggles are adequate for this task. Use a UV-Visible spectrophotometer to demonstrate why this is true. Collect a UV-Visible spectrum of standard laboratory goggles for inclusion in your report.

B. Prepare a solution approximately 50 μM quinine in 50 mM sulfuric acid to determine the optimal (that which gives an absorbance of between 0.1 and 0.2 at 350 nm) concentration of quinine experimentally. Again use a UV-Visible spectrophotometer. Use your experimental data and experience from the previously performed Steady-State Fluorescence Measurement experiment to guide you.

C. The time-dependent fluorescence of quinine that occurs following excitation by a short burst of UV light follows a first-order exponential decay. This decay is characterized by two parameters: an initial intensity and a time constant. Measure, collect, transfer and analyze (in Igor Pro) the light profile using the experimental fluorescence apparatus in the laboratory of your selected concentration of quinine in sulfuric acid. Determine values for the two parameters for this solution.

D. Titrate the quinine solution with sodium chloride. For each concentration measure the light profile, collect, transfer and analyze each light profile as noted above. Use only a single Igor Pro experiment for this analysis process. Transfer the experimental light profiles from the digital storage oscilloscope over the laboratory network using a web browser.

E. Decide, based on your determinations, whether it is a change in the time constant of the fluorescence decay or the initial intensity of the fluorescence or a combination of the two that is responsible for the well-known quenching effect of quinine fluorescence by aqueous chloride.

F. Document clearly the experimental apparatus used to perform this experiment using suitable pictures and drawings.