Colorado State University

CHEM 372
Physical Chemistry Laboratory

Notes for
Steady-State Fluorescence of Quinine and Quenching by Aqueous Halide

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. In this experiment the intensity of the fluorescence of aqueous quinine in acidic solution is measured as a function of the concentration of chloride ion. This permits the so-called Stern-Volmer coefficient to be determined.

B. Determine the UV-Vis absorbance maxima of ~50 μM quinine in 50 mM H_2SO_4. Prepare no more than 100 mL of this solution. (Prepare no more than 100 mL of a suitable blank solution, if necessary.) (Is it really necessary to write: record this spectrum and transfer it to a data visualization and analysis program?)

C. Prepare no more than 100 mL of a quinine solution in 50 mM H_2SO_4 of a concentration that provides an absorbance between 0.1 and 0.2 at the absorbance maximum. Report the concentration of quinine in molarity only. It is not necessary to collect a spectrum of this solution as we are confident in the applicability of the Beer-Lambert Law.

D. Collect a fluorescence emission spectrum (use the "scan" method on the fluorimeter) of the final concentration of quinine in 50 mM H_2SO_4. Use the previously selected absorbance maximum wavelength as the excitation wavelength. Determine the fluorescence emission maximum wavelength.

E. Prepare no more than 100mL of a solution of 100 mM NaCl plus the concentration of quinine selected above in 50 mM H_2SO_4. Take every (quantitative analysis) precaution to ensure that the concentration of quinine and sulfuric are identical between this stock solution containing chloride and the other stock solution containing no chloride.

F. Titrate quinine with NaCl while measuring the fluorescence intensity (use the "read" method on the fluorimeter not the "scan" method) using your selected excitation and emission wavelengths. Perform this titration by mixing small volumes of the two stock solutions previously prepared.

G. Analyze the resulting data with two separate graphical and curve fitting procedures: (1) using a Stern-Volmer plot and (2) also directly without algebraic conversion (write your own curve fitting equation).