



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Jennifer Dong	Project Number S0503
Project Title Photooxidation of Cobalt-Bound Thiolato Ligands	
Abstract Objectives/Goals The goal of this project was to determine how reaction rate of the complex bis(ethylenediamine)-(-2-amino propane thiolato - N,S)cobalt(III)chloride differs when photooxidized in varying solvents. Methods/Materials The complex was diluted with three different solvents: Dimethylformamine (DMF), water, and methanol. A sensitizer, Methylene Blue was also added to the mixture. A strong light lamp was shined at the mixture while oxygen was bubbled into the mixture through a hypodermic needle from above. The light excited the sensitizer, which then was able to transfer the acquired energy to the oxygen being bubbled in. The excited oxygen, now called singlet oxygen, was able to react with the complex in the mixture. Each solvent mixture was photooxidized for different intervals of seconds. After each time period of photooxidation, some of the mixture was quickly transferred to a Cary 300 Bio UV Visible Spectrometer, which plotted the mixture's absorbance wavelength. The reaction was then continued. This procedure was repeated for each solvent mixture. Results From the absorbance wavelengths taken from the UV-Vis, Oxidation product of the complex dissolved in Dimethylformamine had highest absorbance after only 45 seconds of photooxidation. The oxidation product of the complex reacted in water had the highest absorbance at 15 minutes of photooxidation. The oxidation product of the complex reacted in methanol had the highest absorbance after 8 minutes of photooxidation. Conclusions/Discussion From the results, it can be concluded that oxidation product was able to form more quickly when the complex was dissolved in Dimethylformamine than when the complex was dissolved in water or in methanol. Water's highly polar structure is probably the reason for this; water was probably able to bond to the complex and stabilize the intermediates, inhibiting the reaction to occur quickly to full completion. Water also displays protic behavior. DMF, on the other hand, is also polar but displays aprotic behavior and does not form bonds to other things as readily as water does. Methanol is also protic, like water, but doesn't behave like water does to that extreme; therefore, it accumulates the most oxidation product at a time period between the time DMF and water accumulate the most of their oxidation product.	
Summary Statement A comparison of reaction rates during photooxidation of the complex cobalt cystamine in varying solvents	
Help Received Used lab equipment at the California State University of Los Angeles under the supervision of Dr. Matthias Selke; received help from lab mentor Cesar Galvez to understand the chemical phenomena involved.	