

Faculty Research Grant 2015

Final Report

Reaction of 1,4-Dithioerythritol with $\text{Fe}_3(\text{CO})_{12}$

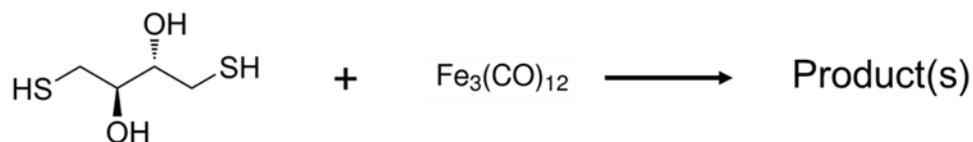
Principal Investigator

CHARLES A. MEBI

Department of Physical Sciences

Statement of Problem

This project was aimed at studying the reaction of 1,4-dithioerythritol with triirondodecacarbonyl (scheme 1). The expected product(s), iron-carbonyl cluster(s), are of interest as catalysts for the production of hydrogen, an environmentally benign alternative to fossil fuels. The development of efficient catalysts for hydrogen generation is an important step towards achieving the hydrogen economy.



Scheme 1: Reaction of 1,4-Dithioerythritol with Triirondodecacarbonyl

Brief Review of Research Procedure Utilized.

The proposed reaction was conducted under nitrogen atmosphere using Schlenk line techniques. A mixture of 1,4-dithioerythritol (1.00 g, 6.48 mMol) and triirondodecacarbonyl (2.28 g, 4.32 mMol) was treated with THF solvent and the resultant solution refluxed for 30 minutes. A color change from green to red was observed. Removal of solvent followed by column chromatographic separation afforded a black oily substance. The product was characterized using infrared spectroscopy. The infrared spectrum contained peaks between 1900 and 2100 cm⁻¹, assigned to the presence of terminal metal carbonyls. The oily product was insoluble in most organic solvents and could not be further characterized.

Summary of Findings

The reaction of 1,4-dithioerythritol with triirondodecacarbonyl afforded a black oily product which may was insoluble in most common organic solvents.

Conclusions and Recommendations

We plan to conduct further characterization of the oily product from the reaction of 4-dithioerythritol and triirondodecacarbonyl. The principal investigator gratefully acknowledge support for this project from ATU Faculty Research Grant. Part of the grant funds were used to attend a workshop on renewable energy at Beloit College, Wisconsin (June 19-24, 2016). The workshop is an NSF-sponsored program organized by the Chemistry Collaborations, Workshops and Communities of Scholars (cCWCS).