

Quarterly Report October 12, 2016

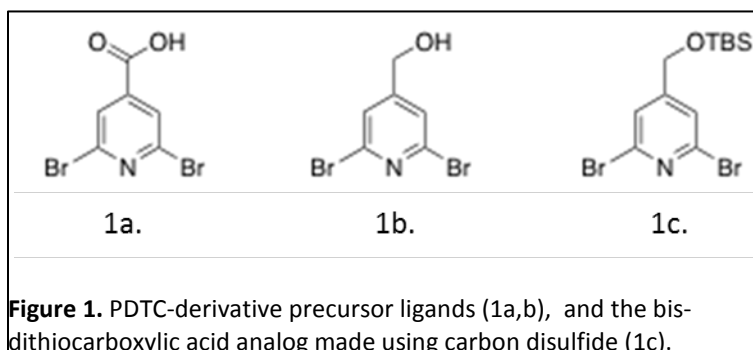
MUS Research Initiative Project 51060-MUSRI2015-01: Remediation Technology for Chlorinated Pollutants Based on Natural Product from Soil Bacteria

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This project's objectives address the programmatic goal of growing important research sectors that increase the diversity of Montana's economy and lies within the 'Materials' category. The work is aimed at deriving improved materials for chlorinated pollutant remediation and is based on an effective process for carbon tetrachloride (CT) destruction in contaminated water. Progress toward specific goals to date are given below.

Objective 1: Have verified, chemically pure PDTC sulfonate, polymer-linked PDTC, and their copper complexes: December 10, 2017

- **Progress Towards Objective:** The experimental procedure for producing pure PDTC from 2, 6 – dibromopyridine has been optimized. The experimental procedure for producing 2, 6 – Dibromocitrazinc acid (Figure 1a) and (2,6 – dibromopyridin-4-yl)methanol (Figure 1b), both PDTC-derivative precursor ligands, has also been optimized. The (2,6 – dibromopyridin-4-yl)methanol will be protected as in Figure 1c for the dilithiation and direct addition to carbonyl sulfide using the now optimized procedure for production of PDTC.



Objective 2: Have data regarding solubility and dechlorination rates for new derivatives of PDTC: April 1, 2017

- **Progress Towards Objective:** We are re-evaluating our Cu:PDTC solubility characteristics taking note of newly discovered scattering issues due to unknown precipitate/aquo Cu:PDTC, Figure 2. The precipitate is hypothesized to be a Cu:PDTC

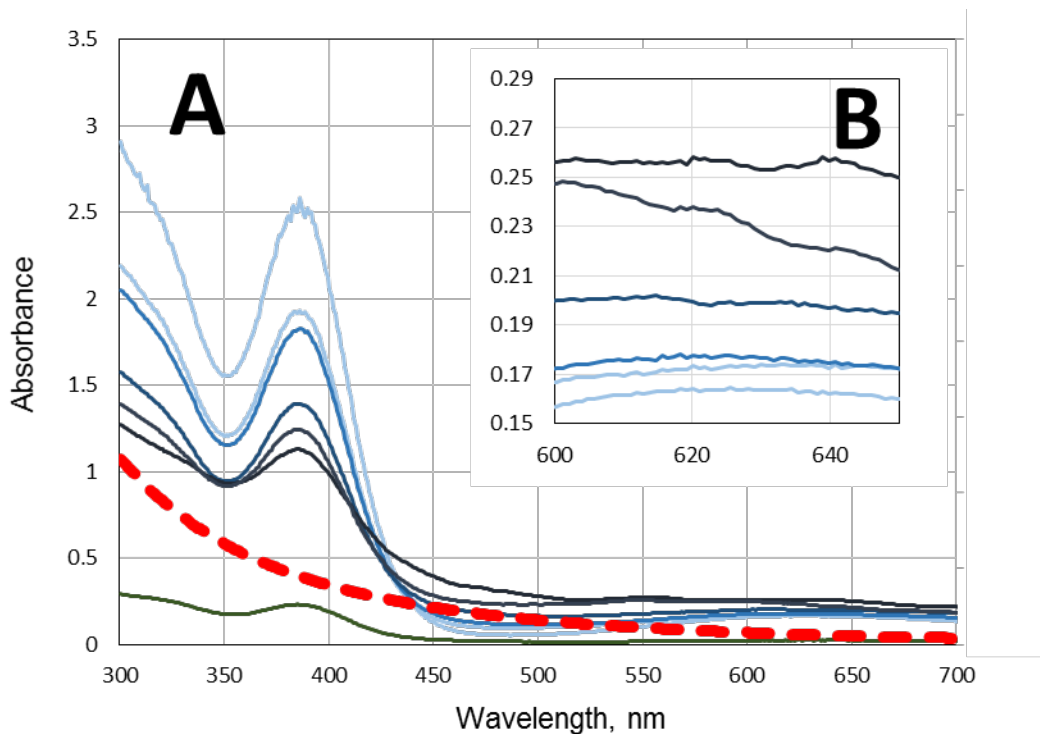


Figure 2 A Spectra showing decreased absorption at 375nm (Blue lines) as precipitation increases. This decrease in absorptions takes place on a background of Rayleigh Scattering (calculated background red line). B Shows increase in scattering at non-resonant frequencies as precipitation increases.

where the fourth coordination site is occupied by a water. Experiments are underway to evaluate this hypothesis.

Objective 3: Have initial toxicology assessment of simulated remediation mixtures, refined dechlorination data to include other solvents, effects of aquifer solids: July 1, 2017

- **Progress Towards Objective:** work on this objective will await deliverables of Objective 1.

Expenditures to Date

Category	Budget Total	As of 09/30/2016
Salaries	148,405	71,967.72
Equipment	35,000	36,022.61
Supplies (MSUB)	5,000	7,273.37
Subcontracts (MSU)	71,940	23,772.20
Travel, other	1,600	1,576.71