

Synthesis of a Water-Soluble Phosphate-Substituted Dithiolene Ligand and Its Metal Complexes for Medical Imaging

Advisor: James P. Donahue

Campus Address: Tulane Dept. of Chemistry, 6400 Freret St., New Orleans, 70118

Phone: 504-862-3562, **Email:** donahue@tulane.edu

Objective: Synthesis of a Phosphate-Substituted (-P(O)(OH)₂) Dithiolene Ligand, and Metal complexes Thereof for Application in Imaging of Bone Tissue.

Overview: The purpose of this work is to synthesize a dithiolene ligand (i.e., S-C(R)=C(R)-S^-) that is water soluble such that its complexes with transition metal ions are similarly water soluble. A phosphate (-P(O)(OH)₂) or dimethylphosphate (-P(O)(OMe)₂) group appended to the dithiolene ligand might produce metal complexes that would have a chemical basis for selectively interacting with bone tissue, thus providing an alternative to the use of X-ray radiation for imaging. Bone tissue is a phosphate mineral, so the premise is that a phosphate-substituted (-P(O)(OH)₂) dithiolene ligand would satisfy this requirement and would, because of the presence of -OH groups, be soluble in water as well. Ultimately, the objective is to prepare a technetium (Element 43) complex with the phosphate-substituted ligand. Since technetium is radioactive, its presence is easily detected in very low concentrations. For the purposes of this project, rhenium (which is not radioactive) will be used as a substitute for technetium because of the close chemical similarity between these elements. The scheme below illustrates the proposed syntheses.

Prerequisites: General Chemistry, Organic Chemistry

