Public Abstract
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THE SYNTHESIS AND CHARACTERIZATION OF
1,1-DISUBSTITUTED FERROCENE IMINE SCHIFF BASE LIGAND
SYSTEMS FOR USE AS POTENTIAL ENVIRONMENTAL HEAVY METAL CATIONIC SENSORS

Heavy metals in the environment such as cadmium, mercury and lead are very toxic to most living things. There exists a strong interest in the scientific community to invent better methods that can detect these toxins at lower and lower levels as time passes on. Multiple detection modes would be a possible way to decrease the detection limit down to parts per billion (ppb) or to even lower levels out in the field.

Ferrocene derivatives hold promise as a possible route to this type of sensor. By changing the functional groups on the ferrocene derivative, the selectivity of the ligand system can be modified towards a particular heavy metal. One reported and two unreported 1,1 disubstituted ferrocene systems have been tested with eight metals to form a database of their respective complexes. This information can be used to determine the products formed during the selectivity experiments with each system. During this research project, one system was found to be very selective for chelating Hg^{2+} in the presence of other commonly found metal cations and could be detected from other complexes in the database through three means: proton nuclear magnetic resonance (^1H NMR), ultraviolet-visible spectroscopy (UV-Vis) and cyclic voltammetry (CV). While a working universal heavy metal sensor was not achieved during this research project, it advanced the progress towards the formation of one.