



University
of Victoria

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Doctor of Philosophy

of

CHRISTOPHER FRAZEE

BSc (University of New Brunswick, 2014)

“Coordination Chemistry of Sb (III) and Sb (V) Cations”

Department of Chemistry

Wednesday, August 8, 2018

12:00 P.M.

Clearihue Building

Room B007

Supervisory Committee:

Dr. Neil Burford, Department of Chemistry, University of Victoria (Supervisor)

Dr. Robin Hicks, Department of Chemistry, UVic (Member)

Dr. David Berg, Department of Chemistry, Uvic, (Member)

Dr. Christopher Bose, Department of Mathematics and Statistics, UVic (Outside Member)

External Examiner:

Dr. Eric Rivard, Department of Chemistry, University of Alberta

Chair of Oral Examination:

Dr. Monica Prendergast, Department of Curriculum and Instruction, UVic

Dr. Stephen Evans, Acting Dean, Faculty of Graduate Studies

Abstract

The coordination chemistry of antimony(III) and antimony(V) have been investigated to reveal fundamental structural and electronic features. The limited scope of known cationic antimony(V) complexes was greatly expanded, including the first examples of pnictogen(V) trications. The systematic nature of these investigations led to the observation of redox chemistry, determined to be the result of reductive elimination of chlorobenzene and diphenyl from an antimony center. The reactivity of $[\text{Ph}_2\text{Sb}(\text{OPyrMe})_4][\text{OTf}]_3$ was investigated and it was found that the OPyrMe ligands are sufficiently labile to perform ligand substitution chemistry. However, when exposed to phosphines, ligand-centered reactivity prevails and phosphoniums of the form $[\text{R}_3\text{P}(2\text{-}4\text{-methylpyridine})][\text{OTf}]$ which may be useful reagents in the field of medicinal chemistry and drug design. While attempts were made to synthesise antimony(V) tetra- and penta- cations have been unsuccessful, the methodologies reported here will serve as a foundation to future endeavors.