



**NHC-supported mixed
halohydrides of aluminium
and related studies**

A thesis submitted towards the degree of Doctor of Philosophy

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Abstract

Chapter 1. General introduction

This chapter comprises a comprehensive overview of group 13 chemistry, including the elements of group 13, the trihydrides of aluminium and gallium and their Lewis base adducts, and a brief overview of aluminium and gallium trihalides and their respective Lewis base adducts.

Chapter 2. Lewis base adducts of group 13 mixed halide-hydrides

This chapter consists of an overview of the existing mixed halohydrides of aluminium and gallium, and an introduction to carbenes, including NHCs. The synthesis and discussion of numerous new mixed halohydrides of aluminium and gallium is presented.

Chapter 3. Selected reductions with mixed halohydride reagents

This chapter discusses the application of compounds from Chapter 2 as organic reducing agents and comparison with literature concerning hydrometallation with trihydride congeners.

Chapter 4. Triazenide complexes of alane and gallane

This chapter includes the synthesis of several new triazene species and their precursors, and their application as support ligands for aluminium and gallium mono- and dihydrides.

Chapter 5.

This chapter includes the synthesis of several “super-bulky” NHCs, their precursor diazabutadienes and terphenyls, and preliminary use in coordination chemistry.

Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to me and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Like many things in my life, these acknowledgements probably don't follow any established trend. I figured I'd run through a few relevant times in my life and point out the people that have been influential. Basically, if you're mentioned below, you have my thanks.

Probably my earliest major influence was Robert Peck, my grade 6/7 primary school teacher. He taught me something about being a man, even as a kid. He taught me about courage, integrity and taking your medicine sometimes. After I left school I ended up working on a farm for year or so, where the farmer's wife Dianne Freebairn sent me to a career psychologist and encouraged me to go to uni. Due to financial difficulty I only spent one year there but this laid the path for my eventual return. In the 12 years between first and second year uni I was privileged to have Hayley and Annie Davis along with Stan and Vicki Manners as major influences in my life. Also during that period Mark Tilbrook put me on the path to getting my mechanic's trade, and taught me much about having pride in one's work. He taught me what tradesmanship is.

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It's been fun ☺