Nucleophilic and electrophilic platinum compounds for C-H bond activation
Duin, M.A.

Citation for published version (APA):
Duin, M. A. (2004). Nucleophilic and electrophilic platinum compounds for C-H bond activation

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
# Table of Contents

## Chapter 1  General Introduction

1.1 Organometallic Chemistry  
1.2 C-H Bond Activation of Hydrocarbons  
1.2.1 C-H bond activation of hydrocarbons in homogeneous media  
1.2.2 C-H bond activation of hydrocarbons by Pt(0)-systems  
1.2.3 C-H activation by cationic platinum(II) species  
1.3 Ligands Systems used in this Study  
1.3.1 Imine ligands  
1.3.2 N-Heterocyclic Carbene ligands  
1.4 Aim, Scope and Outline of this Thesis  
1.5 References  

## Chapter 2, Part A  Synthesis of new (η²-N,N'-Diazadiene)(η²-alkene) platinum(0) compounds

2.1 Introduction  
2.2 Results and Discussion  
2.2.1 Synthesis  
2.2.2 Analysis  
2.3 Conclusions  
2.4 Experimental Section  
2.4.1 General  
2.4.2 Synthesis of R-DAB ligands  
2.4.3 Synthesis of [Pt⁰(R-DAB)(η²-alkene)] compounds  
2.5 References  

## Chapter 2, Part B  Protonolysis of (diimine) platinum(0) alkene Compounds: A Route to (Cationic) Alkyl Platinum(II) Complexes?  

2.6 Introduction  
2.6.1 Hydrogen transfer from transition metal hydrides  
2.6.2 Synthesis of cationic Pt(II) complexes
# Table of Contents

2.7 Results and Discussion 38
2.8 Conclusions 41
2.9 Experimental Section 41
   2.9.1 General 41
   2.9.2 Addition of Brønsted acids to Pt(0)(NN)-complexes 42
2.10 References 42

## Chapter 3 Synthesis of Zerovalent Electron-rich Platinum Centers: Platinum(carbene)(alkene)$_2$ Complexes

3.1 Introduction 45
3.2 Results and Discussion 46
   3.2.1 Synthesis of zerovalent platinum(carbene)(alkene)$_2$ complexes 46
   3.2.2 Reactivity of platinum(carbene)(alkene)$_2$ towards H$_2$ 54
3.3 Conclusions 57
3.4 Experimental Section 58
   3.4.1 General 58
   3.4.2 Synthesis 58
   3.4.3 Crystal structure determination of 1a 62
   3.4.4 Reactions with dihydrogen 63
3.5 References 63

## Chapter 4, Part A C-H Activation of Imidazolium Salts by Pt(0) Complexes at Ambient Temperature: Synthesis of Hydrido Platinum Bis(carbene) Compounds

4.1 Introduction 67
4.2 Results and Discussion 69
   4.2.1 C-H Activation of imidazolium salts by Pt(0) using Whitesides’ method 69
   4.2.2 C-H activation of imidazolium salts using Pt(0) carbene complexes 70
4.3 Conclusions 79
4.4 Experimental Section 80
   4.4.1 General 80
   4.4.2 Synthesis 80
   4.4.3 In situ preparation of hydrido platinum bis(carbene) compounds 86
   4.4.4 Crystal structure determination of 6a 87
Chapter 4, Part B  

**In Situ Generated Cationic Platinum(II) Complex for C-H Activation of Hydrocarbons**

4.6 Introduction  
4.7 Results and Discussion  
  4.7.1 C-H activation of aromatic and aliphatic C-H bonds  
  4.7.2 Oxidation reactions  
4.8 Conclusions  
4.9 Experimental Section  
  4.9.1 General  
  4.9.2 NMR experiments  
4.10 References  

Chapter 5  

**Platinum(II) (NN) and Platinum(II) (NNO) Complexes for C-H Activation**

5.1 Introduction  
5.2 Results and Discussion  
  5.2.1 (NNO)-Ligand Synthesis  
  5.2.2 PtMe₂(NNO) complexes with didentate N,N'-coordinated NNO ligands  
  5.2.3 Platinum(methyl) complexes with tridentate NNO-ligands  
5.3 Conclusions  
5.4 Experimental Section  
  5.4.1 General  
  5.4.2 Synthesis  
  5.4.3 C-H bond activation experiments  
5.5 References  

Summary  

Samenvatting  

Dankwoord