

## List of Contents

<b>1.</b>	<b>General introduction .....</b>	<b>3</b>
1.1.	Introduction.....	3
1.2.	Amide complexes for catalysis .....	4
1.3.	Hydroamination .....	5
1.3.1.	Regioisomer in hydroamination .....	8
1.3.2.	Activation mechanism.....	8
1.3.2.1.	Activation of C-C double bond.....	8
1.3.2.2.	Activation of N-H bond.....	10
1.3.2.3.	Amine activation by oxidative addition .....	10
1.3.3.	Hydroamination and oxidative amination of alkenes.....	11
1. 3.3.1.	Organolanthanide-catalyzed hydroamination .....	11
1.3.3.2	Palladium catalyzed hydroamination .....	14
1.3.3.3.	Group IV catalyzed hydroamination.....	18
1.3.3.4.	Zn based catalyzed hydroamination .....	21
1.4.	Hydrosilylation .....	22
1.4.1	Mechanism of transition metal-catalyzed hydrosilylation of the olefins.....	22
1.4.2.	Organolanthanide catalyzed hydrosilylation .....	23
1.5.	Tishchenko reaction .....	25
<b>2.</b>	<b>Aim of the work.....</b>	<b>29</b>
<b>3.</b>	<b>Results and discussion .....</b>	<b>31</b>
3.1.	Zn based catalyzed hydroamination .....	31
3.1.1.	[[('Pr) <sub>2</sub> ATI]ZnMe] complex .....	32
3.1.2.	Catalytic hydroamination/cyclization using achiral ATI ligand based Zn complex [[('Pr) <sub>2</sub> ATI]ZnMe] .....	33
3.1.3.	Effect of spectator ligand on catalytic activity for hydroamination.....	37
3.1.4.	Effect of leaving group ligand on catalytic activity for hydroamination .....	39

3.2.	Chiral-bridged aminotroponimate complex as catalyst for the asymmetric hydroamination .....	41
3.2.1.	Zn based catalysts .....	41
3.2.2.	In-situ Lu based catalyst .....	43
3.3.	Bis(phosphinimino)methanide based lanthanide complexes for hydroamination .....	45
3.3.1.	Leaving group absence of bis(phosphinimino)methanide lanthanide complexes as catalyst for hydroamination .....	45
3.3.2.	Iodide as additional ligand in bis(phosphinimino)methanide based lanthanide complex for hydroamination .....	51
3.3.3.	Amide as leaving group ligand in bis(phosphinimino)methanide based lanthanide complexes for hydroamination .....	54
3.4.	Catalytic hydrosilylation and sequential hydroamination/ hydrosilylation .	61
3.4.1.	BIPM based lanthanide complex .....	61
3.4.2	Chiral diphenyl bridge aminotropoiminato Zn complex (Cat. XI).....	66
3.5.	Magnesium complexes for inter- and intramolecular hydroamination .....	68
3.6.	Tishchenko reaction of lanthanide <i>N,N</i> -bis(aryl)formamidinate complexes .....	73
<b>4.</b>	<b>Experimental section .....</b>	<b>79</b>
4.1.	General considerations .....	79
4.2.	General procedure for catalytic reaction .....	79
4.3.	Substrate synthesis .....	81
4.4.	NMR spectra of products .....	84
<b>5.</b>	<b>Summary/Zusammenfassung .....</b>	<b>89</b>
5.1	Summary .....	89
5.2	Zusammenfassung .....	91
<b>6.</b>	<b>List of abbreviations .....</b>	<b>95</b>
<b>7.</b>	<b>Literature .....</b>	<b>97</b>