General Intro	duction	1-50
Part A: Ion E	xchange Method	51-160
Chapter 1:	PdNPs Stabilized by Zirconia Supported TPA:	55-120
	Synthesis, Characterization and Applications to C-	
	C coupling and Hydrogenation	
	Experimental	63-67
	Materials	
	<ul> <li>Synthesis of Zirconia Supported 12-</li> </ul>	
	tungstophosphoric Acid (TPA/ZrO <sub>2</sub> )	
	<ul> <li>Synthesis of Catalyst (Pd-TPA/ZrO<sub>2</sub>)</li> </ul>	
	Results and Discussion	68-114
	Catalyst Characterization	68-75
	Elemental Analysis	
	Thermal Analysis	
	Fourier Transform Infrared Spectroscopy	
	X-ray Photoelectron Spectroscopy	
	Transmission Electron Microscopy	
	High Resolution Transmission Electron	
	Microscopy	
	Scanning Transmission Electron Microscopy	
	BET Measurement	
	Powder X-ray Diffraction	
	Catalytic Activity	75-114
	<ul> <li>C-C Coupling (SM and Heck)</li> </ul>	
	Hydrogenation	
	Characterization Regenerated Catalyst	
	Viability of Catalyst	
	Comparison with Reported Catalysts	
Conclusion		115
References		116-119

Chapter 2:	PdNPs Stabilized by Zirconia Supported LTPA:	<b>121-160</b>
	Synthesis, Characterization and Applications to C-C	
	coupling and Hydrogenation	
	Experimental	124-126
	• Materials	
	Synthesis of Zirconia Supported Mono	
	Lacunary Tungstophosphoric Acid	
	$(LTPA/ZrO_2)$	
	• Synthesis of Catalyst (Pd-LTPA/ZrO <sub>2</sub> )	
	Results and Discussion	126-156
	Catalyst Characterization	126-133
	• Elemental Analysis	
	Thermal Analysis	
	• Fourier Transform Infrared Spectroscopy	
	BET Measurement	
	X-ray Photoelectron Spectroscopy	
	Transmission Electron Microscopy	
	High Resolution Transmission Electron	
	Microscopy	
	Scanning Transmission Electron Microscopy	
	Catalytic Activity	134-156
	<ul> <li>C-C Coupling (SM and Heck)</li> </ul>	
	Hydrogenation	
	Characterization Regenerated Catalyst	
	Viability of Catalyst	
	Comparison with Reported Catalysts	
	Effect of Addenda Atom	
Conclusion		157
References		158-159

Part B : Salt Method	
Chapter 1: Stabilized PdNCLs by TPA: Synthesis,	
Characterization and Applications to C-C coupling	
and Hydrogenation	
Experimental	168-169
Materials	
<ul> <li>Catalyst Synthesis (PdTPA)</li> </ul>	
Catalytic Evaluation	
Results and Discussion	169-177
Catalyst Characterization	<b>171-17</b> 6
• Elemental Analysis	
Thermal Analysis	
Fourier Transform Infrared Spectroscopy	
• 31P MAS NMR Spectroscopy	
Powder X-ray Diffraction	
X-ray Photoelectron Spectroscopy	
Transmission Electron Microscopy	
Catalytic Activity	176-177
<ul> <li>C-C Coupling (SM and Heck)</li> </ul>	
Hydrogenation	
Conclusion	178
References	179-181

Chapter 2:	Zirconia Supported Stabilized PdNCLs by TPA:	183-222
	Synthesis, Characterization and Applications to C-	
	C coupling and Hydrogenation	
	Experimental	185-188
	• Materials	
	<ul> <li>Synthesis of Catalyst (PdTPA/ZrO<sub>2</sub>)</li> </ul>	
	Catalytic Evaluation	
	Results and Discussion	189-219
	Catalyst Characterization	189-197
	• Elemental Analysis	
	Thermal Analysis	
	• Fourier Transform Infrared Spectroscopy	
	• <sup>31</sup> P MAS NMR Spectroscopy	
	Powder X-ray Diffraction	
	BET Measurement	
	X-ray Photoelectron Spectroscopy	
	Transmission Electron Microscopy	
	High Resolution Transmission Electron	
	Microscopy	
	Scanning Transmission Electron Microscopy	
	Catalytic Activity	198-219
	• C-C Coupling (SM and Heck)	
	Hydrogenation	
	Characterization of Regenerated Catalyst	
	Viability of Catalyst	
	Comparison with Reported Catalysts	
Conclusion		220
References		221-222

Chapter 3:	Zirconia Supported Stabilized PdNCLs by LTPA:	223-258
	Synthesis, Characterization and Applications to C-C	
	coupling and Hydrogenation	
	Experimental	225-228
	• Materials	
	<ul> <li>Synthesis of Catalyst (PdLTPA/ZrO<sub>2</sub>)</li> </ul>	
	Catalytic Evaluation	
	Results and Discussion	228-254
	Catalyst Characterization	228-235
	Elemental Analysis	
	Thermal Analysis	
	• Fourier Transform Infrared Spectroscopy	
	BET Measurement	
	Powder X-ray Diffraction	
	X-ray Photoelectron Spectroscopy	
	High Resolution Transmission Electron	
	Microscopy	
	Catalytic Activity	235-254
	• C-C Coupling (SM and Heck)	
	Hydrogenation	
	Characterization Regenerated Catalyst	
	Viability of Catalyst	
	Comparison with Reported Catalysts	
	Effect of Addenda Atom	
Conclusion		255
References		256-257
Overall Com	parison	259-264
Main Conclu	asion	265

Annexure : Silica Encapsulated Stabilized PdNCLs by TPA:	267-314
Synthesis, Characterization and Applications to C-C	
coupling and Hydrogenation	
Experimental	275-276
• Materials	
<ul> <li>Synthesis of Catalyst (PdTPA/SiO<sub>2</sub>)</li> </ul>	
Catalytic Evaluation	
Results and Discussion	277-310
Catalyst Characterization	277-285
Elemental Analysis	
Thermal Analysis	
BET Measurement	
<ul> <li>Fourier Transform Infrared Spectroscopy</li> </ul>	
<ul> <li><sup>31</sup>P MAS NMR Spectroscopy</li> </ul>	
Powder X-ray Diffraction	
X-ray Photoelectron Spectroscopy	
Transmission Electron Microscopy	
High Resolution Transmission Electron	
Microscopy	
Scanning Transmission Electron Microscopy	
Catalytic Activity	286-310
<ul> <li>C-C Coupling (SM and Heck)</li> </ul>	
<ul> <li>Hydrogenation</li> </ul>	
Characterization Regenerated Catalyst	
Viability of Catalyst	
Effect of Support	
Conclusion	311
References	312-314
Publications  Page 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	315-318
Paper Presented & Seminar Attended  *********************************	319-320