



# CONTENTS

	<b>Page No.</b>
<b>Chapter 1 Introduction</b>	
1.1 Introduction	1
1.2 Concepts in catalysis	3
1.3 Catalyst characterization	5
1.4 Classification of catalysts	8
1.5 Present trends in catalysis	11
1.6 About tetravalent metal acid salts	18
1.7 Present objectives	25
1.8 Literature survey on catalytic aspects of TMA salts	26
1.9 Aim and scope of the present work	27
References	30
<b>Chapter 2 Synthesis and characterization of M(IV) phosphates, M(IV) tungstates and Ruthenium exchanged phases of M(IV) phosphates and M(IV) tungstates</b>	
2.1 Introduction	35
2.2 Sol-gel process	36
2.3 Ion exchange	39
2.4 Synthetic route for M(IV) phosphates and tungstates	40
2.5 Experimental	41
2.6 Catalyst characterization methods	43
References	90
<b>Applicability of M(IV) phosphates and M(IV) tungstates as solid acid catalysts</b>	
<b>Chapter 3 Esterification</b>	
3.1 Introduction	91
3.2 Synthetic routes to esterification	92
3.3 Monoesters	93
3.4 Literature survey in the current area of study	94
3.5 Experimental	96
3.6 Results and discussion	96
3.7 Diesters	103
3.8 Literature survey in the current area of study	104
3.9 Experimental	106
3.10 Results and discussion	107
References	113

## **Chapter 4 Pechmann condensation**

4.1	Introduction	116
4.2	Synthetic routes to coumarins	116
4.3	Literature survey in the current area of study	121
4.4	Experimental	124
4.5	Results and discussion	125
	References	131

## **Chapter 5 Friedel Crafts acylation and alkylation**

5.1	Introduction	133
5.2	Literature survey in the current area of study	137
5.3	Experimental	142
5.4	Results and discussion	143
	References	149

## **M(IV) phosphates and M(IV) tungstates as supports in heterogenised homogeneous catalysis**

## **Chapter 6 Ruthenium supported catalysts for oxidation and hydrogenation**

6.1	Introduction	151
6.2	Selective catalytic oxidation	151
6.3	Literature survey in the current area of study	152
6.4	Experimental	154
6.5	Results and discussion	155
6.6	Selective catalytic hydrogenation	157
6.7	Literature survey in the current area of study	157
6.8	Experimental	159
6.9	Results and discussion	160
	References	164

## **Summary**

## **Publications**