

## TABLE OF CONTENTS

Abstract	i-iii
Preface	iv-v
List of Tables	x
List of Figures	xi-xii
List of Appendices	xiii-xiv
Appendix A: List of Publications	xiii
Appendix B: List of Poster Presentations	xiv
Abbreviations	xv-xvi

### **CHAPTER I. Solid-supported organic reactions with special emphasis on Silica and Graphene oxide (GO)**

	1-29
I.A. General Introduction	2-8
I.A.1. Traditional concept of organic reactions: Disadvantages of homogeneous synthesis	3
I.A.2. Green chemistry	4
I.A.3. E-factor for waste in chemical reactions	5
I.A.4. Atom economy	5
I.A.5. Introduction to solid-phase	5
I.A.6. Advantages of Solid-phase organic synthesis (SPOS)	5-6
I.A.7. Different polymeric materials used as solid-supports	6-8
I.A.7.a. Inorganic supports	7
I.A.7.b. Organic supports	7-8
I.A.7.c. Inorganic-organic hybrid polymeric supports	8
I.B. Silica	9
I.B.1. Silica: A brief introduction	9-11
I.B.2. Research motivation with silica	11-12
I.B.3. Reactions promoted on silica-surface	12-22
I.B.3.a. Unmodified silica-promoted reactions	12-14
I.B.3.b. Modified silica-mediated reactions	14-22
I.B.4. Scope	22-23

I.C. Graphene oxide (GO)	24-29
I.C.1. Developing interest towards newly introduced polyfunctional graphene oxide (GO)	24-26
I.C.2. Applications of GO as carbocatalyst: Brief background	26-28
I.C.3. Scope	28-29
I.D. References	29

**CHAPTER II. Graphene oxide (GO)-catalyzed selective synthesis of Imidazo[1,2-a]pyridines and further one-pot three-component reaction to 3-Sulfenylimidazo[1,2-a]pyridines** 30-57

II.A. Introduction	31-32
II.B. Background and objectives	32-39
II.C. Results and discussion	39-46
II.D. Conclusion	46-47
II.E. Experimental section	47-57
II.E.1. General information	47
II.E.2. Preparation of graphene oxide (GO)	47-48
II.E.3. General procedure for the synthesis of imidazo[1,2-a]pyridines (Table 2, 5a-5i)	48
II.E.4. General procedure for the multi-component synthesis of 3-sulfenylimidazo[1,2-a]pyridines (Table 3, 8a-8r)	48-49
II.E.5. Spectral data	49-57
II.F. References	57

**CHAPTER III. Graphene oxide (GO)-mediated one-pot sequential dehydration-hydrothiolation of *sec.* aryl alcohols** 58-72

III.A. Introduction	59
III.B. Background and objectives	59-61
III.C. Results and discussion	61-65
III.D. Conclusion	66
III.E. Experimental section	66-72
III.E.1. General information	66
III.E.2. Preparation of graphene oxide (GO)	66
III.E.3. General procedure for one-pot sequential dehydration-hydrothiolation	66-67

III.E.4. Characterization of GO	67
III.E.5. Spectral data	68-72
III.F. References	72

**CHAPTER IV. Highly regioselective one-pot synthesis of 1,2- & 1,3-dithioethers from the reactions of allyl halides with thiols over silica** 73-96

IV.A. Introduction	74-75
IV.B. Background and objectives	75-82
IV.C. Results and discussion	82-88
IV.D. Conclusion	89
IV.E. Experimental section	89-96
IV.E.1. General information	89
IV.E.2. General procedure for Table 2 (Route A or B)	89
IV.E.3. Procedure for the reaction using a mixture of silica and sodium silicate under condition [A] (Table 2, entry 20)	90
IV.E.4. Spectral data; Table 2 (Entries 1-19)	90-96
IV.F. References	96

**CHAPTER V. Unprecedented amidation of ‘transient’ aryl thioaldehydes by *N,N*-dimethylformamide under basic conditions** 97-115

V.A. Introduction	98-102
V.B. Background and objectives	102-104
V.C. Results and discussion	104-109
V.D. Conclusion	109-110
V.E. Experimental section	110-115
V.E.1. General information	110
V.E.2. General procedure for the synthesis of 4a–4i	110
V.E.3. X-ray analysis data and ortep diagram for compounds 4a & 4d	110-112
V.E.3.a. X-ray analysis data for compounds 4a and 4d	110-111
V.E.3.b. Ortep diagrams for compounds 4a and 4d	112
V.E.4. Spectral data	112-115
V.F. References	115

<b>CHAPTER VI. Synthesis of some pharmaceutically important heterocyclic scaffolds and further functionalization via C-C coupling reactions</b>	116-124
VI.A. Introduction	117-118
VI.B. Background and objectives	118-121
VI.C. Results and discussion	121-122
VI.D. Future plan of work	122-123
VI.E. Experimental section	123-124
VI.E.1. General information	123
VI.E.2. Procedure for preparation of benzimidazole derivatives in scheme VI.7	123
VI.E.3. Procedure for preparation of quinoxaline derivatives in scheme VI.8	123
VI.E.4. Spectral data	123-124
VI.E. References	124
<b>BIBLIOGRAPHY</b>	125-151
References for Chapter I	125-133
References for Chapter II	134-138
References for Chapter III	139-140
References for Chapter IV	141-144
References for Chapter V	145-148
References for Chapter VI	149-151
<b>INDEX</b>	152-154