

TABLE OF CONTENTS

| | Page No. |
|--|-----------------|
| Abstract (4 pages) | i-iv |
| Preface (1 page) | v |
| List of Tables (1 page) | xiii |
| List of Schemes (2 pages) | xv-xvii |
| List of Figures (2 pages) | xix-xxi |
| List of Appendices (1 page) | xxiii |
| Appendix A: List of Research Publications (1 page) | xxv |
| Appendix B: Poster Presentations (1 page) | xxvii |
| Abbreviation (2 pages) | xxix-xxx |

Chapter I

A brief review on the carbocyclic compounds and the transformative reactions of carbocyclic compounds

| | |
|---|---|
| I.A.1. Introduction to carbocyclic compounds | 3 |
| I.A.2. Carbocyclic compounds and natural products | 3 |
| I.B. Transformation reactions of carbocyclic compounds | 5 |
| I.B.1. Carbon-Carbon bond transformation reactions | 5 |
| I.B.2. Sonogashira coupling reaction | 5 |
| I.B.3. Suzuki coupling reaction | 6 |
| I.B.4. Heck coupling reaction | 6 |
| I.B.5. Stille coupling reaction | 6 |
| I.B.6. Direct synthesis of arylketones | 7 |
| I.C. Carbon-hetero bond transformation reactions | 7 |
| I.C.1. C-O bond formation reaction | 7 |
| I.C.2. C-N bond formation reaction | 7 |
| I.C.3. C-S bond formation reaction | 8 |
| I.C.4. Water mediated β -cyclodextrinin catalysed three-component reaction for the synthesis of pyrimido[4, 5- <i>b</i>]quinoline-diones | 8 |
| I.C.5. One-pot synthesis of propargylamines by three-component A^3 -coupling of aldehydes, amines and alkynes | 9 |

| | |
|--|----|
| I.C.6. Synthesis of chromeno[4,3-b]quinolin-6-one derivatives | 9 |
| I.C.7. Synthesis of pyrido[2,3- <i>d</i>]pyrimidin-4(3 <i>H</i>)-ones | 9 |
| I.C.8. Synthesis of 2-phenylquinazolin-4-amines | 10 |
| I.C.9. Carbocyclic transformative reaction of 5 α - androstane-3,17-dione | 10 |
| I.C.10. Carbocyclic transformative reaction of cholesterol | 11 |
| I.D. Conclusion | 11 |
| I.E. References | 11 |

Chapter II

A greener and sustainable approach towards the synthesis of propargylamine using multi-component A³-coupling reaction

| | |
|---|----|
| II.A. Introduction | 15 |
| II.B. Backgrounds and Objectives | 15 |
| II.B.1. Classical method for synthesis of propargylamines | 15 |
| II.B.2. Modern methods of synthesis of propargylamines | 16 |
| II.C. Present Work | 21 |
| II.C.1. Result and discussion | 21 |
| II.C.2. Mechanism | 21 |
| II.D. Conclusion | 25 |
| II.E. Experimental | 26 |
| II.E.1. Material Apparatus | 26 |
| II.E.2. Preparation and characterization of catalyst | 26 |
| II.E.3. General procedure for the synthesis of propargylamine | 28 |
| II.E.4. Physical properties and spectroscopy data of synthesized propargylamines derivatives | 29 |
| II.E.5. Scanned copy of ¹ H and ¹³ C NMR spectra of various propargylamines derivatives | 37 |
| II. F. References | 42 |

Chapter III

Environmentally benign approach towards C-S cross coupling reaction by organo - copper(II) complex

| | |
|-----------------------------------|----|
| III.A. Introduction | 45 |
| III.B. Backgrounds and Objectives | 45 |

| | |
|--|----|
| III.B.1. Modern methods for the C-S cross coupling | 45 |
| III.C. Present work | 50 |
| III.C.1. Result and discussion | 51 |
| III.D. Conclusion | 54 |
| III.E. Experimental | 55 |
| III.E.1. Material apparatus | 55 |
| III.E.2. Preparation and characterization of catalyst | 55 |
| III.E.3. General procedure for the synthesis of the C-S coupled compounds | 56 |
| III.E.4. Physical properties and spectroscopy data of synthesized C-S coupled compounds | 57 |
| III.E.5. Scanned copies of ¹ H and ¹³ C NMR spectra of various synthesized C-S coupled compounds | 63 |
| III.F. References | 72 |

Chapter IV

Graphene oxide catalysed one pot synthesis of pyrimido[4,5-*b*]quinolinone-2,4-diones and their biological evaluation

| | |
|--|----|
| IV.A. Introduction | 75 |
| IV.B. Background and Objectives | 75 |
| IV.B.1. Conventional procedure for synthesis of pyrimido[4,5- <i>b</i>]quinolinone-2,4-diones | 75 |
| IV.B.2. Modern methods for the synthesis of pyrimido[4,5- <i>b</i>]quinolinone-2,4-diones | 76 |
| IV.C. Present work | 78 |
| IV.C.1. Result and Discussion | 79 |
| IV.C.2. Mechanism | 84 |
| IV.C.3. Antimicrobial activity analysis of some synthesized compounds | 85 |
| IV.C.4. Materials and methods | 85 |
| IV.C.5. Result and discussion | 86 |
| IV.C.6. Conclusion | 88 |
| IV.D. Experimental section | 88 |
| IV.D.1. General Information | 88 |
| IV.D.2. General procedure for the synthesis of pyrimido[4,5- <i>b</i>]quinolinone-2,4-diones | 88 |

| | |
|--|-----|
| IV.D.3. Physical properties and Spectral data of the synthesized pyrimido[4,5- <i>b</i>] quinoline-diones derivatives | 88 |
| IV.E. Scanned copies of ¹ H NMR and ¹³ C NMR of the synthesized compounds | 98 |
| IV. F. References | 101 |

Chapter V

One-pot three-component tandem annulation of 4-hydroxycumarine with aldehyde and aromatic amines using Graphene oxide as an efficient catalyst

| | |
|---|-----|
| V.A. Introduction | 105 |
| V.B. Backgrounds and objectives | 105 |
| V.B.1. Modern methods of synthesis of chromeno[4,3- <i>b</i>]quinolin-6-ones | 105 |
| V. B.2. Friedlander annulation type synthesis of chromeno[4,3- <i>b</i>]quinolin-6-ones | 107 |
| V. C. Graphene oxide catalysed organic synthesis | 107 |
| V.C.1. Graphene oxide catalysed synthesis of isoindolo[2,1- <i>a</i>]quinazoline-5,11-diones | 107 |
| V.C.2. Graphene oxide catalysed synthesis of 3-substituted quinazolinones | 108 |
| V.C.3. Carbocatalyst direct synthesis of amides through the amidation of carboxylic acids with amines | 108 |
| V.D. Present Work | 108 |
| V.D.1. Result and discussion | 109 |
| V.D.2. Mechanism | 112 |
| V.D.3. Conclusion | 113 |
| V.E. Experimental | 114 |
| V.E.1. General Information | 114 |
| V.E.2. General procedure for the preparation of GO by modified Hummer's method | 114 |
| V.E.3. General procedure for the synthesis of chromeno[4,3- <i>b</i>]quinolin-6-ones | 114 |
| V.E.4. Physical properties and spectroscopy data of synthesized Chromeno[4,3- <i>b</i>]quinolin-6-ones | 115 |
| V. F. Scanned copies of ¹ H NMR and ¹³ C NMR of the synthesized compounds | 121 |
| V.G. References | 128 |

Chapter VI

Transformative reaction on triterpenoids: Action of hydrogen peroxide in presence of selenium dioxide on the oxime derivative of taraxerone and antimicrobial activity of the isolated compounds

| | |
|---|-----|
| VI.A. Introduction | 131 |
| VI.B. Backgrounds and Objectives | 131 |
| VI.B.1. Pentacyclic triterpenoids | 131 |
| VI.B.2. Different groups of pentacyclic triterpenoids | 131 |
| VI.B.3. Modern transformative reactions on pentacyclic triterpenoids | 132 |
| VI.B.4. A short review on the action of selenium dioxide as a reagent for organic syntheses and some of it application | 134 |
| VI.C. Present Work | 134 |
| VI.C.1. Materials and methods | 135 |
| VI.C.2. Isolation of taraxerone from <i>sapium baccatum</i> ROXB | 136 |
| VI.C.3. Preparation of oxime derivative of taraxerone | 136 |
| VI.C.4. Structure elucidation of compound A | 137 |
| VI.C.5. Structure elucidation of compound B | 137 |
| VI.C.6. Structure elucidation of Compound C | 138 |
| VI.C.7. Structure elucidation of Compound D | 139 |
| VI.D. Biocidal activity of the isolated compounds | 139 |
| VI.E. Conclusion | 140 |
| VI.F. Scanned copies of ^1H NMR and ^{13}C NMR of the synthesized compounds | 141 |
| VI.G. References | 151 |

Bibliographic References

| | |
|----------------------------|---------|
| References for Chapter I | 153-154 |
| References for Chapter II | 154-156 |
| References for Chapter III | 156-157 |
| References for Chapter IV | 157-159 |
| References for Chapter V | 159-160 |
| References for Chapter VI | 160-161 |

| | |
|--------------|---------|
| Index | 163-164 |
|--------------|---------|