

Table of Contents

1. Introduction.....	2
1.1. Five-Membered Heterocyclic Compound.....	2
1.2 Six-Membered Heterocyclic Compounds.....	3
1.3 Fused Heterocyclic Compounds.....	3
1.4 3,3'-Diindolylmethane (DIM).....	4
1.4.1 Synthesis of DIMs: Challenges and Advances.....	5
1.4.2 Green Synthesis Approaches.....	6
1.4.3 Light-Mediated Approaches.....	6
1.4.4 Ongoing Research and Future Directions.....	6
1.5 Imidazo[1,2-a]pyridine.....	7
1.5.1 Multicomponent Approach.....	10
1.5.2 Cascade reaction.....	11
1.5.3 Aminooxygenation.....	11
1.5.4 Hydroamination.....	12
1.5.5 Oxidative Process.....	12
1.5.6 Condensation Reaction.....	13
1.6 Coumarin.....	14
1.6.1 Wittig Reaction.....	17
1.6.2 Perkin reaction.....	17
1.6.3 Baylis-Hillmann Reaction.....	18
1.6.4 Pechmann Condensation.....	19
1.6.5 Knoevenagel condensation.....	20
1.7 Objectives of Thesis Work.....	22
2. Persulfate Mediated Synthesis of Diindolylmethanes from Coupling of Alcohols with Indoles.....	40
2.1 Introduction.....	40
2.2 Results and discussion.....	42
2.3 Control experiments.....	47

2.4 Conclusion.....	49
2.5 General procedure for the synthesis of 1a-3f.....	49
2.6 Gram Scale procedure for the synthesis.....	50
2.6.1 Synthesis for the compound 4a.....	50
2.6.2 Synthesis for the compound 4b.....	50
2.7. Control experiment procedure.....	50
2.7.1 TEMPO addition in general procedure.....	50
2.7.2 BHT addition in general procedure.....	51
2.8 Analytical Data of Compounds.....	51
2.9 Spectral Data of Synthesized Products.....	55
3. Persulfate Mediated Synthesis of Diindolylmethanes from Coupling of Arylacetic Acids with Indoles.....	65
3.1 Introduction.....	65
3.2 Results and discussion.....	67
3.3 Conclusion.....	73
3.4 Experimental Section.....	74
3.4.1 General procedure for the synthesis of bisindolylmethanes 1a-1n.....	74
3.4.2 Gram-scale procedure for the synthesis of compound 2a.....	74
3.4.3. Gram-scale procedure for the synthesis of compound 2b.....	74
3.4.4. Control experiments.....	75
3.5. Analytical Data of synthesized compounds.....	75
3.6. Spectral Data of Synthesized Products.....	81
4. Persulfate Mediated C-3 Formylation of Imidazopyridines Using Glyoxylic Acid.....	91
4.1 Introduction.....	91
4.2 Results and Discussion.....	93
4.3 Conclusion.....	99
4.4 Experimental section.....	100
4.4.1 General procedure for the synthesis of imidazopyridines (1a-1p).....	100
4.4.2 General procedure for the synthesis of 3-formylated imidazopyridines 3a-3n.....	100

4.4.3 Gram-scale procedure for the synthesis of compound 3a.....	100
4.4.4 Control experiments.....	101
4.5 Analytical Data of synthesized compounds (3a-3p).....	101
4.6 Spectral Data of Synthesized Products.....	109
5. Transition-Metal-Free C–N Cross-Coupling of Coumarins Enabled by a Multifunctional Reagent.....	117
5.1 Introduction.....	117
5.2 Results and Discussion.....	119
5.3 Conclusion.....	125
5.4 Experimental section.....	125
5.4.1 General procedure for synthesis of 7-aminocoumarins (4a-4e and 6a-6l).....	125
5.4.2 Gram-scale procedure for the synthesis of compound 6j.....	126
5.5 Analytical Data of Synthesized Compounds.....	127
5.6 Spectral data of synthesised compounds.....	135
6. tert-Butyl Nitrite Mediated Conversion of Alcohols to Amides: Application in Synthesis of Anti-Alzheimer Compounds.....	141
6.1 Introduction.....	141
6.2 Results and Discussion.....	143
6.3 Conclusion.....	148
6.4 Experimental section.....	149
6.4.1 Extraction and isolation of vasicine from <i>Adhatoda vasica</i>	149
6.4.2. Procedure for synthesis of VA.....	150
6.4.3 General procedure for the one pot synthesis of amides.....	150
6.4.5 Gram-scale procedure for the synthesis of compound 4a.....	150
6.5 Control experiments.....	151
6.5.1 TEMPO addition in the general procedure.....	151
6.5.2 BHT addition in the general procedure.....	151
6.6 Analytical Data of synthesized compounds.....	151
6.7 Spectral Data of Synthesized Products.....	160

7. Summary and Future Prospects.....	167
List of Publications.....	170