## **CONTENTS**

	List o List o List o List o List o	owledgements  f Titles  f Schemes  f Figures  f Tables  f Abbreviations  cal Experimental Considerations	Page No. vi viii xi xiii xv xvi xx
		LIST OF TITLES	
Titles		CHAPTER-1 Introduction	Page No.
1.1	Multic	component Reactions	1
1.2	Nitrog	gen-Containing Organic Compound	4
	1.2.1	Nitrogen-containing five-membered cyclic compounds	5
		1.2.1.1 Pyrrole	5
		1.2.1.2 Triazoles	7
	1.2.2	Nitrogen-containing six-membered cyclic compounds	9
	1.2.3	1.2.2.1 Pyridine Nitrogen-containing seven-membered cyclic compounds	9 11
	1.2.3	1.2.3.1 Azepines	11
	1.2.4	Nitrogen-containing fused heterocyclic compounds	13
		1.2.4.1 Benzimidazole	13
		1.2.4.2 Benzothiazole	15
		1.2.4.3 Benzoxazole	17
1.2	N (C. 14)	1.2.4.4 Indole	19
1.3		component Synthesis of N-containing Compounds	21
	1.3.1 1.3.2	Microwave-Assisted Reaction Ultrasound-Assisted Reactions	21 23
	1.3.2	Mechanochemical Synthesis of N-Heterocyclic Compounds	25
	1.3.4	Visible Light-Mediated Synthesis of N-Heterocyclic Compounds	28
		<ul><li>1.3.4.1 Catalyst-free Multicomponent Synthesis under Visible</li><li>Light</li><li>1.3.4.2 Visible-light Photo-redox Catalyzed Organic Synthesis</li></ul>	29 31
		1.5.1.2 Thirde light I how redox Catalyzed Organic Synthesis	91

	1.3.5 Transition metal Catalyzed Synthesis of N-Heterocyclic	33
	Compounds 1.3.6 Nanoparticle Catalyzed Synthesis of N-Heterocyclic Compounds	35
1.4	References	38
	CHAPTER-2	
Eo	sin Y-Catalyzed Synthesis of 3-Aminoimidazo[1,2-a]Pyridines via the I Process under Visible Light through Formation of the C-N Bond	TAT
2.1	Introduction	50
2.2	Results and Discussion	54 61
2.3	Control Experiment 2.3.1 UV-Vis absorption experiment	63
2.4	Proposed Mechanism	64
2.5	Conclusion	65
2.6	Experimental Procedures	66
2.0	2.6.1 General procedure for the preparation of compound 4a-4t	66
2.7	Characterization of products	67
2.8	Spectral Data of Product 4a	76
2.9	FT-IR Spectra	79
2.10	References	80
	CHAPTED 2	
Vicib	CHAPTER-3  ole-Light-Promoted Synthesis of Fused Imidazoheterocycle by Eosin Y	under
V 1511	Metal-Free and Solvent-Free Conditions	unuci
3.1	Introduction	86
3.2	Results and Discussion	88
3.3	Control Experiment	95
	3.3.1 ON/OFF Experiments	97
3.4	Proposed Mechanism	98
3.5	Conclusion	99
3.6	Experimental Procedures	100
	3.6.1 General Procedure for Synthesis of 3-Aminoimidazo-fused Heterocycles	100
3.7	Characterization of products	100
3.8	Spectral Data of Few Products	114
3.9	References	116
	CHAPTER-4	
Gree	en Synthesis of Pyrimido[4,5-b]Quinolines and Pyrido [2,3-d] Pyrimidin	nes via
J. 00	mechanochemical approach	
4.1	Introduction	121
4.2	Results and Discussion	125

4.3	Proposed Mechanism	
4.4	Conclusion	
4.5	Experimental Procedures	137
	4.5.1 General procedure for the preparation of compound 4a-4w &	137
16	5a-5q Characterization of products	138
4.6 4.7	*	158
4.7	Spectral Data of few products	162
4.8	HRMS Spectra References	164
4.2	References	104
TC	CHAPTER-5	2 тт
1 r	ransition metal-free Synthesis of Pyrido[2,3-d]pyrimidines via Csp <sup>3</sup> /Cs	рн
5.1	functionalization using K <sub>2</sub> S <sub>2</sub> O <sub>8</sub> as Oxidant Introduction	169
5.2 5.3	Results and Discussion	172 178
5.4	Control Experiment Proposed Mechanism	181
5.5	Conclusions	182
5.6		183
5.0	Experimental Procedures	
	5.5.1 General procedure for the preparation of compound 4a-4zf	183
5.7	Characterization of the products.	183
5.8	Spectral Data of few Products	199
5.9	HRMS spectra	201
5.10	References	205
	CHAPTER-6	
	Summary and Conclusion	
6.1	Summary and conclusion	208
	List of research publications	

## **List of Schemes**

Scheme		Page No.
1.1	Multicomponent synthesis of purine	4
1.2	Synthesis of pyrrole and its derivatives.	7
1.3	Synthesis of Triazole and its derivatives	9
1.4	Synthesis of pyridine and its derivatives	11
1.5	Synthesis of azepines and its derivatives	13
1.6	Synthesis of benzimidazole and its derivatives	15
1.7	Synthesis of benzothiazole and its derivatives	17
1.8	Synthesis of Benzoxazoles and their Derivatives	19
1.9	Synthesis of Indole and its derivatives	21
1.10	Synthesis of phenanthrene-fused tetrahydrodibenzoacridinones	22
1.11	Synthesis of Pyridines derivatives	22
1.12	Synthesis of Pyrazolo pyrimidine derivatives	23
1.13	Synthesis of polysubstituted pyrroles	24
1.14	Synthesis of pyrazolo quinolone	24
1.15	Synthesis of benzodiazepine	25
1.16	Synthesis of indoloindolpyrimidine	26
1.17	Mechanochemical multicomponent synthesis of	27
	Pyrrolo[2,1a]isoquinolines	
1.18	Synthesis of pyrimidine derivatives	27
1.19	Machenochemical synthesis of indolizines	28
1.20	Synthesis of phenanthridines	30
1.21	Synthesis of 5-substituted indole chromeno[2,3-b]pyridines	31
1.22	Synthesis of 4-oxo-tetrahydroindoles	31
1.23	Synthesis of pyrimidoindazole	32
1.24	Synthesized 3- aminoimidazo[1,2-a]pyridines	32
1.25	Synthesis of 3-aminoimidazoheterocycles	32
1.26	Multicomponent synthesis of fused N-heterocycles	34
1.27	Three-component synthesis of 3-(diarylmethylene)oxindoles	34
1.28	Three-component synthesis of quinolines	35
1.29	Multicomponent synthesis of 2-aminoimidazoles and 2-iminoimidazoles	35
1.30	One-pot synthesis of 1, 4-dihydropyridine derivatives	36
1.31	Synthesis of 1,4-dihydropyridin	36
1.32	Synthesis of 1,2,4,5-tetrasubstituted imidazoles	37
2.1	Synthesis of 3-aminoimidazo[1,2-a]pyridines via one-pot	54
	multicomponent reaction	
2.2	Control experiments	61
2.3	Control experiments	62
2.4	Plausible mechanism	65
3.1	Synthesis of 3-Aminoimidazo[1,2-a]pyrimidines via One-Pot Multicomponent Reaction	88

3.2	Control reaction experiments	95
3.3	Control experiments	96
3.4	Plausible mechanism	99
4.1	Solution-Phase and Mechanochemical Solvent-free Approaches	124
	towards Pyrimido [4,5-b]quinolones and Pyrido [2,3-d] pyrimidines	
4.2	Plausible mechanism	136
4.3	Stepwise reaction for the synthesis of 4a	137
5.1	Various Procedures for Synthesis of Pyrido[2,3-d]pyrimidine	172
5.2	The gram-scale reaction	178
5.3	Control experiment for mechanistic investigation	180
5.4	Plausible mechanism	182