

Dedicated
To
My Beloved Parents
& my brother

DECLARATION

I declare that the thesis entitled "EXPLORATIVE STUDIES TOWARDS THE SYNTHESIS OF BIOLOGICALLY ACTIVE CARBOCYCLIC AND HETEROCYCLIC SYSTEMS", has been prepared by me under the guidance of Prof. Pranab Ghosh, Professor of Chemistry, University of North Bengal. No element of this thesis has formed the origin for the award of any degree or fellowship earlier.

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I certify that Ms. Tandra Kundu has prepared the thesis entitled "EXPLORATIVE STUDIES TOWARDS THE SYNTHESIS OF BIOLOGICALLY ACTIVE CARBOCYCLIC AND HETEROCYCLIC SYSTEMS" for the award of Ph.D. degree of the University of North Bengal, under my supervision. She has carried out the research work at the Department of Chemistry, University of North Bengal. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

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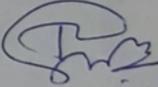
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I would also take this opportunity to express my sincere apologies for any mistake on my part or any word or behaviour of mine that may have hurt anyone working with me.

Finally, despite best of my efforts and sincerity I might have committed some unintentional errors and mistakes in my thesis. Suggestions and criticisms from learned professors will be thankfully accepted.

Thank you.

Tandra Kundu
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PREFACE

Carbocyclic and heterocyclic systems have extensively been used in the designing of various pharmaceutically significant compounds. These molecules also have their significant influence in the field of agrochemical industries as well. Apart from this, they are considered to be powerful building blocks for the construction of naturally occurring biological active compounds like pentacyclic triterpenes, wide range of heterocyclic compounds etc.

The present work describes methodologies for construction of carbocyclic and heterocyclic systems. The thesis starts with Chapter I, deals with a brief review on transformation reactions on carbocyclic and heterocyclic compounds. These systems have been extensively used in the designing of various pharmaceutically significant compounds. Chapter II deals with the synthesis of verities of unsymmetrical azobenzenes by using ethyl lactate as an eco-benign media. Chapter III deals with the synthesis of diverse array of 2,3-dihydroquinazolin-4(1*H*)-ones and isoxazolone derivatives by utilizing eucalyptol as a green reaction media. Chapter IV describes a facile one-pot three-component synthesis of 1-amidoalkyl-2-naphthol and 1-thioamidoalkyl-2-naphthol derivatives by using humic acid under mild conditions. Finally, Chapter V describes the synthesis of bis-lawsone derivatives using boric acid as an efficient catalyst.

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APPENDIX A

List of Research Publications

APPENDIX B

Poster & Oral Presentations

APPENDIX A

List of Research Publications

1. “Eucalyptol: An efficient, unexplored, green media for transition metal free synthesis of 2,3-dihydroquinazolin-4(1*H*)-one derivatives and isoxazolone derivatives” **Tandra Kundu**, Bijeta Mitra, Pranab Ghosh*, Communicated to *Synthetic Communications*, LSYC-2022-16143.
2. “Humic Acid catalyzed synthesis of 1-Amidoalkyl-2-naphthols and 1-Thioamidoalkyl-2-naphthols through one-pot multi-component system” **Tandra Kundu**, Bijeta Mitra, Pranab Ghosh*, Communicated to *ChemistrySelect*.
3. “Ethyl lactate: An Efficient Green Mediator for Transition Metal Free Synthesis of Symmetric and Unsymmetric Azobenzenes” Gyan Chandra Pariyar, **Tandra Kundu**, Bijeta Mitra, Suvodip Mukherjee, Pranab Ghosh*, *ChemistrySelect*, **2020**, 5, 9781–9786.
4. “Boric acid catalyzed synthesis of Bis-lawsone derivatives” **Tandra Kundu**, Bijeta Mitra, Pranab Ghosh*, manuscript under preparation.

APPENDIX B

Poster & Oral Presentations

1. "METAL FREE SYNTHESIS OF 5-SUBSTITUTED-1*H*-TETRAZOLE: AN APPROACH TOWARDS THE ECO SUSTAINABILITY" by **Tandra Kundu**, Gyan Chandra Pariyar, Pranab Ghosh* in the International Seminar on "Frontiers in Chemistry 2019" organized by DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NORTH BENGAL, India, May, 2019.

2. "ETHYL LACTATE ASSISTED TRANSITION METAL FREE SYNTHESIS OF UNSYMMETRICAL AZOBENZENES" by **Tandra Kundu** and Pranab Ghosh* in the three day International Webinar on organized by DEPARTMENT OF CHEMISTRY AND PHYSICS COOCH BEHAR PANCHANAN BARMA UNIVERSITY, COOCH BEHAR-736101, Aug, 2021.

ABBREVIATION

acac	Acetylacetonate
AcOH	Acetic acid
BDMS	Bromodimethylsulfonium bromide
BiNPs	Bismuth nanoparticles
br	Broad
cm	Centimeter
Cy	Cyclohexyl
d	Doublet
DCE	1,2-Dichloroethane
DHQ	2,3-dihydroquinazolin-4(1 <i>H</i>)-one
DMAP	4-Dimethylaminopyridine
DME	1,2-Dimethoxyethane
DMEDA	1,2-Dimethylethylenediamine
DMF	<i>N, N</i> -Dimethylformamide
DMSO	Dimethyl sulfoxide
Dppe	1,2-Bis(diphenylphosphino)ethane
Dppf	1,1'-Bis(diphenylphosphino)ferrocene
EFSA	European food safety authority
EL	Ethyl lactate
EQUIV	Equivalent
EtOH	Ethanol
g	gram/grams
GAAS	Gluconic acid aqueous medium
GO	Graphene oxide
h	hour/hours
LDA	Lithium diisopropylamide
m	Multiplet
MHz	Mega hertz
min	minute/minutes
mL	millilitre
mmol	millimole

mol%	mole percent
MS	Molecular sieve
MW	microwave
NBS	<i>N</i> -Bromosuccinimide
NHPI	<i>N</i> -Hydrophthalimide
NMR	Nuclear magnetic resonance
°C	Degree Celsius
OAc	Acetate
PEG	Polyethylene glycol
Phen	Phenyl
PMHS	Polymethylhydrosiloxane
PPI	Potassium pthalimide
RT	Room temperature
s	Singlet
SASA	Saccharin sulfonic acid
SSA	Silica sulfuric acid
t	Triplet
TBAF	Tetra- <i>n</i> -butylammonium fluoride
TBAI	Tetrabutylammonium iodide
TBHP	<i>tert</i> -Butyl hydroperoxide
TBT	Tributyltin
<i>t</i> -BuOCl	<i>tert</i> -butyl hypochlorite
TFE	Trifluoroethanol
TfOH	Triflic acid
THF	Tetrahydrofuran
TLC	Thin-layer chromatography
TMEDA	<i>N,N,N',N'</i> -Tetramethylethylenediamine
UV	Ultra violet
WEMFSA	Water extract of muskmelon fruit shell ash