INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	Ajaz Ahmad Dar
Roll Number	:	10612232
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Thesis Title: Synthesis of Sulfur Containing Organic Compounds Using Multicomponent Reactions (MCRs): Their Biological and Photophysical Studies		
Name of Thesis Supervisor(s)	:	1. Prof. Abu Taleb Khan 2. Prof. Bhisma Kumar Patel
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SHORT ABSTRACT

The synthesis of a wide variety of sulfur containing organic compounds such as highly substituted unsymmetrical sulfides starting from 1,3-dicarbonyl compounds and aromatic aldehydes to form Knoevenagel intermediate and subsequent addition of thiols *via* thia-Michael using piperidine catalyst, through multicomponent reactions (MCRs) and their oxidation in to corresponding sulfones by using *m*-chloroperoxybenzoic acid (*m*-CPBA) to find out effective antileishmanial agents. Next, the synthesis of 4-hydroxy-3-thiomethylcoumarin derivatives was carried out by using one-pot three-component reaction strategy *via* a domino process comprising of a Knoevenagel type condensation between 4-hydroxycoumarin and aldehyde, followed by a thia-Michael addition onto the resulting unsaturated ketone, thereby generation of highly functionalized 4-hydroxy-3-thiomethylcoumarin derivatives. Furthermore, the derivative displays its optical properties as a "turn-off" fluorescence probe towards cobalt and nickel ions in aqueous based media selectively, in presence of commonly coexisting metal ions. These two metal complexes were further distinguished by EDTA induced fluorescence recovery that was only possible towards cobalt (II) complex *via* "turn-on" photoluminescence response. Moreover, the synthesis of unsymmetrical sulfides by trapping 2-naphthoquinone-1-methide intermediates, generated *in situ* from 2-naphthol and aromatic aldehydes, with thiols in the presence of environmentally benign reagent *n*-terabutylammonium tribromide (TBATB) was performed. In addition, the unsymmetrical sulfide was capable of performing detection of mercury ions in aqueous medium at high pH selectively, the utility of this compound as a "turn-on" fluorescence sensor are of practical importance. Later, the synthesis of 3-[(alkyl/arylthio)(aryl)methyl]-1H-indoles at room temperature from indole, aromatic aldehyde and thiol mediated by hydrated ferric sulfate ($Fe_2(SO_4)_3 \cdot xH_2O$) using one-pot three-component reaction. The synthesized indole derivative served as a chemosensor for Hg^{2+} and Cu^{2+} ions. Finally, the synthesis of S-alkyl/aryl benzothiazole-2-carbothioate from thiols, oxalyl chloride and 2-aminothiophenols using *n*-tetrabutylammonium iodide (TBAI) as catalyst in acetonitrile through multicomponent reaction (MCR) strategy. Few of the synthesized derivatives were evaluated for their antimicrobial activity against the protozoan parasite, *Leishmania donovani*, a causative agent of visceral leishmaniasis (VL). Further, *in-silico* docking studies were performed to understand the possible binding site interaction with trypanothione reductase (TryR).