DATA

Melting point:

Melting points are in degree centigrade and were determined in open capillaries and are uncorrected.

IR Spectra

IR spectra were recorded on Nicolet Impact FT-IR-5700 spectrophotometer using KBr pellets.

NMR Spectra:

$^1$H NMR and $^{13}$C NMR spectra were recorded on Bruker AC-300F 300MHz spectrometer. CDCl$_3$ (TMS), DMSO-$d_6$ and TFA were used as solvents.

Mass spectra:

Finnigan MAT 8230 Mass spectrometers were used to record the mass spectra.

CHN Analysis:

Heraus CHN rapid analyzer is used for elemental analysis.

Nomenclature:

Nomenclatures for all the compounds were done with ChemSketch / Chemdraw Software.
Chemistry of heterocycles is one of the most complex branches of organic chemistry. Because of the diversity in the synthetic procedures, physiological and industrial significance, heterocyclic chemistry has been and continues to be one of the most active areas of organic chemistry.

Amongst the heterocyclic compounds the five and six membered heterocycles containing sulfur and nitrogen have attracted maximum attention because of their biological and industrial applications. Thiadiazole is one of the most important member of this family. The development of new synthetic methods for novel thiadiazole derivatives increased the knowledge of thiadiazole chemistry and the compounds were proved to be potent bioactive molecules.

During the last few decades numerous publications on thiadiazole and imidazothiadiazoles covering synthesis, reactivity and biological activity have been reported. Further, thiadiazole nucleus is bioisosteric with thiazole present in Tetramisole which is a broad spectrum anthelmintic. As a result, attempts to synthesize structural analogues of Tetramisole replacing thiazole nucleus by thiadiazole resulted in the production of several pharmacologically important molecules. Thiadiazole and its fused derivatives are reported to possess a wide range of pharmacological activities viz., antibacterial, antifungal, anticonvulsant, antiviral, antitubercular, anticancer, antiulcer, as well as herbicidal, and insecticidal activities.

Our present investigation is centered around synthesis, structural elucidation, reactivity and pharmacological evaluation of sulfide sulfone derivatives of thiazole/2-amino thiadiazoles and imidazothiadiazoles, thiazolidine-2,4-dione derivatives having pharmacophoric substituents.

The work carried out during present investigation is discussed in separate chapters, which encompasses relevant literature survey, present work, details of experimental procedures and results obtained in terms of their chemical and spectral properties.

The thesis is divided into 7 chapters.

The first chapter describes the chemistry of 1,3-thiazoles, 1,3,4-thiadiazoles and imidazo[2,1-b][1,3,4]thiadiazoles, wherein a brief theoretical account on structure, synthetic pathways, chemical reactivity and spectroscopic properties of these heterocycles are summarized.
In the second chapter, synthesis & reactions of imidazo[2,1-b][1,3,4]thiadiazoles are described. This chapter is divided into two parts, part A & Part B. Part A deals with synthesis of novel imidazothiadiazoles (scheme-Ia). While part-B deals with mannich bases of various imidazo[2,1-b][1,3,4]thiadiazoles (scheme-Ib).


In the fourth chapter, synthesis of biologically active Sulfide & Sulfone derivatives of 2-chloro-4-fluorophenyl substituted 2-aminothiazole as well as 2-acetamidothiazole have been discussed (Scheme-III).

In the fifth chapter, synthesis of substituted acetamide derivatives which are potent as local anaesthetic agents with reference to standard drug Lidocaine are discussed. A brief description of importance and the structure activity relationship (SAR) studies of newly synthesized acetamide derivatives coupled with various secondary amines with different pharmacophoric groups are discussed using rat Sciatic nerve block method. (Scheme IV).

The sixth chapter deals with the synthesis of thiazolidinedione derivatives as potent antidiabetic agents (Scheme V&VI). A brief description of importance and the structure activity relationship (SAR) studies of newly synthesized thiazolidine derivatives with standard drugs such as Rosiglitazone, Ciglitazone, Englitazone and Pioglitazone are discussed.

The structures of all the newly synthesized compounds have been characterized by elemental analysis, IR, $^1$H NMR, $^{13}$C NMR and mass spectral data.

The seventh chapter describes the biological screening of some of the newly synthesized compounds from each class. Antimicrobial activity (against bacterial and fungal stains) screening have been carried out for the synthesized compounds. Screening for Local anaesthetic activity by Rat sciatic nerve model was carried out for few selected derivatives which are analogues of Lidocaine. DNA Cleavage studies by Agarose gel electrophoresis method, revealed that few compounds exhibit good to moderate activity and deserve further investigations.