CHAPTER –I

GENERAL INTRODUCTION
INTRODUCTION:

The synthesis of heterocyclic compounds has always drawn the attention of researchers over the years mainly because of their important biological properties. Among these the N-heterocyclic play a very important role as most of the drugs used for the treatment of different diseases are mainly N-heterocycles. Considering the importance of this class of compounds it is planned to synthesise azetidin-2-ones, triazoles and its several derivatives, pyrazolines and oxadiazoles. It is evident that the certain structural groups present in natural products were also present in other compounds having the same biological activity; this observation is the guiding thought in exploring the synthesis of above said compounds with a desire to obtain highly potent, more specific and less toxic agents. The search for the newer drugs and modification in the existing drug moieties for better therapeutic agents is a continuous and endless effort. The molecular manipulation of promising lead compound is still a major line of approach for the discovery of new drugs. By making gradual changes in the structure of the compounds result gradual changes in physicochemical properties of drugs and thus the biological activity of the compounds. Several five membered aromatic systems having three heteroatoms at symmetrical positions have been extensively studied because of their interesting
physiological studies. This prompted us to undertake the synthesis of triazoles, oxadiazoles and thiazolidinones. The related five membered compounds like pyrazolines were also planned to synthesize.

Considering therapeutic applications of symmetrical mercapto triazoles. It is also planned to synthesize several of its derivatives like triazolo Schiff bases by exploiting the amino group at 4\textsuperscript{th} position of the ring. The replacement of mercapto group by bioactive moieties containing amino groups is also attempted to get several compounds of this type.

Since it is an established fact that the fusion of two or more heterocyclic moieties together into one general group may yield the products with enhanced activity. Hence it is also planned to synthesize triazolothiadiazole derivatives. The Schiff bases derived from 4-aminotriazoles are utilized in the synthesis of triazolothiadiazoles as the utility of 4-thiazolidinones as chemical agents and industrial intermediates is well established.

As β-lactams are still serve as one of the largest segments in the pharmaceutical market, and the discovery of nonclassical β-lactam antibiotics have attracted considerable attention of the synthesis of organic chemists to explore and develop new mild and better yielding routes. It is proposed in the light of these findings to carry out the synthesis of some novel azetidinone derivatives.
Considering all the above facts the following types of the compounds were synthesized and characterized by analytical and spectral studies

**A. Schiff base and azetidinone derivatives:**

![Schiff base and azetidinone derivatives](image)

R=H, -OH, -CH$_3$, -Br, -Cl, -F, -NO$_2$, -NH$_2$, -OCH$_3$

**B. Triazoles:**

(i) Mercapto triazoles:  
(ii) Triazolo Schiff bases

![Triazoles](image)

R=H, -CH$_3$, -Br, -Cl, -F, -NO$_2$, -NH$_2$, -OCH$_3$
(iii) Triazolothiazolidin-4-ones: 

(iv) Triazolo Schiff bases bearing Benzothiazole moiety:

R = -H, -OH, -CH3, -Br, -Cl, -F, -NO2, -NH2, -OCH3.

(v) Mercaptotriazoles:

(vi) Triazolothiadiazoles:

R = -H, -CH3, -Br, -Cl, -F, -NO2, -NH2, -OCH3
C. Chalcones and Pyrazoline derivatives:

\[
\begin{align*}
\text{NH}_2\text{CONHNH}_2 \\
\text{O} & \hspace{1cm} \text{CH} \hspace{1cm} \text{CO} \\
\text{N} & \hspace{1cm} \text{NH} \\
\text{R} & \hspace{1cm} \text{NH} \\
\text{O} & \hspace{1cm} \text{N} \\
\text{CH} \hspace{1cm} \text{CO} \\
\text{N} & \hspace{1cm} \text{R} \\
\end{align*}
\]

\[R, R_1 = -\text{H}, -\text{Br}, -\text{Cl}, -\text{F}, -\text{CH}_3, -\text{OCH}_3, -\text{NH}_2,\]

D. Oxadiazoles:

\[
\begin{align*}
\text{NH}_2\text{NHCOCH}_2\text{O} & \hspace{1cm} \text{R} \\
\text{O} & \hspace{1cm} \text{N} \\
\text{SCH}_2 & \hspace{1cm} \text{CH}_2\text{O} \\
\text{R} & \hspace{1cm} \text{R} \\
\end{align*}
\]

\[R = -\text{H}, -\text{OH}, -\text{CH}_3, -\text{Br}, -\text{Cl}, -\text{F}, -\text{NO}_2, -\text{NH}_2, -\text{OCH}_3\]

A. The above compounds are planned for screening antibacterial activity against gram+ve and gram –ve pathogenic organisms and comparing the activity with the standard drug.

B. Screening the compounds for antifungal activity against different fungi and comparing the activity with the standard antifungal agent.

C. As the literature survey reveals several moieties of the said type show anticancer activity, it is also planned to screen some of the representative moieties for anticancer activity against the different cell lines and establish the possible SAR.
D. It is also intended to screen the compounds for anti-inflammatory activity and study their potency in comparison with standard antiinflammatory agent.

E. Since the compounds, which exhibit antiinflammatory activity, are generally associated with analgesic activity, it is also planned to screen the representative compounds of the series for analgesic activity by comparing their effect with the standard analgesic agent.

F. To review the activities of all the types of the synthesized compounds and bring a correlation with respect to their structures.