Introduction:
Heterocyclic chemistry is a very important branch of organic chemistry accounting for rich sources of diverse physical, chemical & biological properties. They may be cyclic or non-cyclic in nature possessing a wide range of applications. They are predominantly used in pharmaceuticals, agrochemicals and as veterinary products. They also find applications as sanitizers, developers, antioxidants, corrosion inhibitors, copolymers, dye stuff. Heterocyclic moieties are present in a wide variety of drugs, vitamins, natural products, biomolecules which possess biologically activity. The rate at which heterocyclic compounds continue to be invented testifies to the strength and vitality of this area of organic chemistry. The challenges of discovering new heterocyclic systems and of understanding their properties also continue to stimulate research in the area.

1.1. Oxadiazoles

Vinay Sahu & D.Y. Kamla\textsuperscript{[1]} studied the synthesis of Oxadiazole & its antimicrobial activity (1).

\[
\begin{array}{c}
\text{R}_1=\text{Me,Ph,CH}_2\text{CH}_3 \\
\text{R}_2=\text{Halo group}
\end{array}
\]

(1)

M. M. Burbuliene, V. Jakubkiene, \textsuperscript{[2]} reported the synthesis and applications of Oxadiazoles (2)
Synthesis and antimicrobial activity of (3) was achieved by M. Akhter & Mohd Ajmal\(^3\)

Ahmed S. Aboraia and Mahmoud A\(^4\) synthesis and anticancer activity of (4)
Vijay Dabholkar and Rahul Gavande\textsuperscript{[5]} synthesis and biological eval (5).

\begin{center}
\begin{figure}
\centering
\includegraphics[width=0.8\textwidth]{compound_5.png}
\caption{(5)}
\end{figure}
\end{center}

Compound\textsuperscript{(6)} was reported by M. Kidwaia and R. Mohana\textsuperscript{[6]}

\begin{center}
\begin{figure}
\centering
\includegraphics[width=0.8\textwidth]{compound_6.png}
\caption{(6)}
\end{figure}
\end{center}

V. Padmavathia & G. Reddy\textsuperscript{[7]} synthesized compound (7).

\begin{center}
\begin{figure}
\centering
\includegraphics[width=0.8\textwidth]{compound_7.png}
\caption{(7)}
\end{figure}
\end{center}

Compound (8) was achieved by Santosh Pardeshia, and Vivek Bobade\textsuperscript{[8]}
Michel Lagrenée\textsuperscript{(9)} one step synthesis of compound (9)

\textbf{1.2. PYRAZOLE}

N. Panda, A. K. Jena\textsuperscript{(10)} synthesis of compound (10)
S. T. Heller and S. R. Natarajan\textsuperscript{[11]} studied the synthesis of pyrazoles (11) from 1, 3-Diketones.

\[
\begin{align*}
\text{R}_1\text{C}=\text{O} & \quad \xrightarrow{\text{R}_2\text{COCl}} \quad \text{R}_2\text{C}=\text{O} \quad \xrightarrow{\text{NH}_2\text{NH}_2} \quad \text{R}_1\text{N}=\text{N}\text{H} \\
\text{THF} & \quad \text{EtOH}
\end{align*}
\]

(11)

C. Ma and G. Huang\textsuperscript{[12]} reported copper-catalyzed the synthesis of poly-substituted pyrazoles from phenyl-hydrazones and dialkyl ethylene dicarboxylates (12)

\[
\text{R}=\text{Me/Ph}
\]

(12)

Compound (13) were achieved by B. C. Wray & J. P. Stambuli\textsuperscript{[13]}

13

\textit{1.3.4. Oxadiazole}

Compound (14) were synthesized by Divyanshu Sharma and Devender Pathak\textsuperscript{[14]}
Rakesh Saini and Awani K Rai\textsuperscript{[15]} reported compound (15).

\begin{center}
\includegraphics[width=0.3\textwidth]{comp_15.png}
\end{center}

15

Compound (16) was reported by Vijay V Dabholkar and Rahul P Gavande\textsuperscript{[16]}

\begin{center}
\includegraphics[width=0.3\textwidth]{comp_16.png}
\end{center}

16

Xin Revanasiddappa BC and Kalsi Jasmine\textsuperscript{[17]} reported compound (17)

.
Compound (18) were reported by Dinesh Rishipathak and Prabhakar Shirodkar\cite{18}.

Kantham Srinivas and Shyamkumar Immadi\cite{19} carried out the synthesis of compound (19).

Compound (20) was achieved by Sadaf J. Gilani and Suroor A. Khan\cite{20}.
Manav Malhitra and Mohit Sanduja\textsuperscript{[21]} studied the synthesis of compound (21).

Compound (22) was studied by Yogesh Murti and Vaibhav Mehrotra\textsuperscript{[22]}

Compound (23) was performed by Jian Wu and et al\textsuperscript{[23]}.
Compound (24a, 24b, 24c) was studied by Ali Almasirad and Zahra Mousavi \cite{24}.

Compound (25) was reported by Aziz-ur-rehman and Siddiqi S.Z. \cite{25}.
Anil N. Mayekar and co-worker\textsuperscript{[26]} gave brief account of compound (26).

![Chemical Structure of Compound 26]

Asif Husain and Mohammad Ajmal\textsuperscript{[27]} developed a new compound (27).

![Chemical Structure of Compound 27]

Compound (28) was studied by Biswa Mohan Sahoo and Subas Chandra Dinda\textsuperscript{[28]}.
1.4. Pyrimidines:

O.A Fathalla and M.E. Haiba\textsuperscript{[29]} studied the synthesis of compound (29).

\[
\begin{array}{c}
\text{O} \quad \text{C}
\end{array}
\]

compound (30) was carried out by M. Movassaghi and M. D. Hill\textsuperscript{[30]}.

\[
\begin{array}{c}
\text{N} \quad \text{N} \\
\text{R}_1 \quad \text{R}_2 \\
\text{R}_3
\end{array}
\]

B. Ramesh and T. Sumana\textsuperscript{[31]} synthesized new pyrimidine derivatives (31)
Vijay Dabholkar and Dilip Tripathi\textsuperscript{[32]} studied the synthesis of compound (32)

Synthesis of (33) was carried out by I. Yildirim and Y. Akcamur\textsuperscript{[33]}. 
A. Chowdhury and Y. Shibata\textsuperscript{[34]} synthesized fused pyrimidines (34)

Compound (35) was reported by C. Kappe and G. Uray\textsuperscript{[35]}. 
V. Nadaraj, S. Selvi and T. Thangadurai\textsuperscript{[36]} studied the microwave synthesis of (36).

\begin{equation}
\text{(36)}
\end{equation}

Vijay Dabholkar and Sagir Ahmed\textsuperscript{[37]} reported the microwave induced synthesis of (37).

\begin{equation}
\text{(37)}
\end{equation}

Synthesis and antimicrobial activity of 4-[5-chloro-3-methyl-1-phenyl-1H-pyrazol-4-yl]-3,4-dihydropyrimidin-2-ones (38) was studied by R. Kumar and S. Malik\textsuperscript{[38]}. 
1.5. Oxazoles:

J. C. Lee and Y.C. Lee\cite{ref39} reported the synthesis of (39)

\[
\begin{array}{c}
\text{R1} \quad \text{Ar} \\
\text{R2} \quad \text{NH2}
\end{array}
\]

M.Kaspady and M.Raju\cite{ref40} studied the synthesis of compound (40)

\[
\begin{array}{c}
\text{R}\quad \text{O} \\
\text{R1} \quad \text{Ar}
\end{array}
\]
Synthesis of bicyclic fused oxazoles (41) was studied by A.R. Katritzky and S.K. Singh\cite{41}.

\[
\begin{array}{c}
\text{Br} \\
\text{H} \\
\text{O} \\
\text{R} \\
\text{O} \\
\text{N} \\
\text{O} \\
\text{R}
\end{array}
\xrightarrow{R \text{R}_1}
\begin{array}{c}
\text{O} \\
\text{N}
\end{array}
\]

Vijay V Dabholkar and Sagir Ahmed\cite{42}, studied the synthesis of (42a) and (42b).

\[
\begin{array}{c}
\text{O} \\
\text{N} \\
\text{N} \\
\text{O} \\
\text{R}
\end{array}
\quad
\begin{array}{c}
\text{O}
\end{array}
\]

Compound (43) was reported by D. S. Donawade and A. V. Raghu\cite{43}.
R. Blasco and J. Piera\cite{44} synthesized a library of oxazole compounds (44)

\[\begin{align*}
\text{Dehydration} \\
\text{R. Blasco and J. Piera}^{[44]} \\
\end{align*}\]

C. Wang and J. Zhang\cite{45} studied compound (45).

\[\begin{align*}
\text{BuOOH, DMF} \\
\text{C. Wang and J. Zhang}^{[45]} \\
\end{align*}\]

Vijay Dabholkar and Nitin Bhusari\cite{46} synthesized compound (46)

\[\begin{align*}
\text{Vijay Dabholkar and Nitin Bhusari}^{[46]} \\
\end{align*}\]
A.Y. Shaw and H. Han\cite{47} reported the characterization of novel compound (47)

\begin{center}
\includegraphics[width=0.3\textwidth]{figure47.png}
\end{center}

1.6. Pyridine

Compound (48) for anticonvulsant activity was carried by S. Pattan and S. Purohit\cite{48}.

\begin{center}
\includegraphics[width=0.3\textwidth]{figure48.png}
\end{center}

V. Sridharan and P. Perumal\cite{49} carried out compound (49).

\begin{center}
\includegraphics[width=0.3\textwidth]{figure49.png}
\end{center}
Vijay Dabholkar and Faisal Ansari\cite{50} synthesized of compound (50).

Compound (51) was synthesized by V. Sridharan and J.C. Menendez\cite{51}, in a good yield.
M. Arslan and C. Faydali \cite{52} reported the efficient one pot synthesis of compound (52).

Mithlesh and P. Pareek \cite{53} studied the synthesis of (53).
Compound (54) was achieved by M. Zolfigol and M. Mokhlesi\textsuperscript{[54]}.

\[ \text{54} \]

Vijay Dabholkar and Mihir Wadkar\textsuperscript{[55]} synthesized a series of compound (55).

\[ \text{55} \]

Synthesis of compound (56) were reported by R. Kumar and A. Idhayadhulla\textsuperscript{[56]}.  

\[ \text{56} \]
Synthesis of (57) was carried by M. Kantam and K. Mahendar[57].

The literature survey carried out reveals that the majority of derivative containing Oxadiazoles, pyrimidine, pyrazoles and pyridine moiety have been found to possess excellent pharmacological properties. Keeping in view the wide range of therapeutic value of surveyed ring system, it was considered worthwhile to synthesize fused heterocycles. Chemistry of the same has been described in forthcoming chapters.

1.7. References:

9. Michel Lagrenee, JHC, 2007, 1573


17. Revana siddhappa et al. J. of Pharm., 02(05), 2013, 112.