7.1 SUMMARY

Heterocyclic compounds play an important role in the field of organic chemistry. This summary addresses some important Oxazolone, Imidazolone, and s-Triazine heterocyclic compounds. These class of heterocyclic compounds has been used in several fields like agriculture, medicine, and industry. Oxazolone is significant intermediate for the production on several compounds and used in like an electrophotographic photoreceptor. Some Oxazolone has shown a vast range of pharmaceutical properties. Oxazolone is possessed C=C, C=N, C=O bonds and it reacts. These involve in so many replacement reactions, cycloaddition and dimerization reaction toward to make several heterocyclic compounds. The azlactones possess Oxazolone moiety and its vital play role for its drug characteristics. The oxazole moiety is generally stable and found in nature. Naturally occurring oxazole such as pimprinine possess antibiotic and phenoxane possess antimicrobial properties. The oxazolone ring possesses several reactive sites permitting for the vastly different type of conversion.

Imidazolone, aromatic heterocycles, is found in the bioactive natural product. Imidazolones derivatives showed several pharmaceutical activities such as anti microbial, anticancer, CNS depressant activity, etc. Benzylidene derivatives showed anti convulsant and MAO inhibitory activity. Shawn et al. have reported that certain 5-imidazolones act as cardiotonic agents. The buildup of these heterocyclic compounds by various synthetic methodologies is significance in the combinatorial organic synthesis and medicinal chemistry. Imidazole moiety is present in many important bioactive compounds. Histididine one of the important amino acid and imidazole moiety is present in histidine. The triazines are significance classes of nitrogen heterocyclic compounds and a unique structural moiety in bioactive compounds. Medicinal chemistry set up systematically methods to speed up drug discovery, such as combinatorial chemistry, microwave-assisted organic synthesis, and high throughput purification.
Synthesis and Characterization of s-Triazine and Imidazole Heterocycles

The difficulty and complexity of drug research have increased in the past few decades. Oxazolone and Imidazolone synthesis mechanism.

Here -R₁ for Oxazolone and Imidazolone compounds =

<table>
<thead>
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<th>Sr. No</th>
<th>4a</th>
<th>4b</th>
<th>4c</th>
<th>4d</th>
<th>4e</th>
<th>4f</th>
<th>4g</th>
<th>4h</th>
<th>4i</th>
<th>4j</th>
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<tr>
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<td>-H</td>
<td>2-NO₂</td>
<td>2-Cl</td>
<td>4-</td>
<td>4-</td>
<td>3, 4-</td>
<td>2-</td>
<td>4-</td>
<td>3-</td>
<td>3,4,5-</td>
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<td></td>
<td></td>
<td>Cl</td>
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<td>(OCH₃)₂</td>
<td>methoxy</td>
<td>Me</td>
<td>Br</td>
<td>(OCH₃)₃</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Preparation of Oxazole-5-one’s derivatives [4a-j, 7a-j]:

Substituted hippuric acid (3a-b), substituted benzaldehyde, acetic anhydride and sodium acetate was taken to the round bottom flask. The reaction mixture was heated while stirring at 50-60 °C to liquefying and heated to 110 °C for couple of hours. Then ethanol was added slowly while cooling and allowed to stand for 10 to 20 hours. The product collected by filtration and purify in ethanol or toluene or chloroform: hexane (4a-j, 7a-j). The product characterized by analytical techniques.
7.1.1 Oxazolone 4a to 4j:

4-(substitutedbenzylidene)-2-(3-methylphenyl)-1,3-oxazol-5(4H)-ones (4a-j):

**Figure 1**: 1H NMR of Oxazolone compounds from 4a to 4j

The 1H NMR of the oxazolone compounds 4a-j showed characteristics peaks in NMR graph.

In oxazolone compound m- Me group in 2-phenyl ring exhibits characteristic peak at 2.47 ppm, 2.47 ppm, 2.50 ppm, 2.41 ppm, 2.36 ppm, 2.44 pm, 2.34 ppm, 2.30 ppm, 2.48 ppm, 2.36 ppm in respectively 4a-j compounds. One proton for -C=CH and phenyl rings proton observed at 7.25-8.22, 7.28-8.67 ppm, 7.28-8.95 ppm, 7.10-8.10 ppm, 7.10-8.10 ppm, 6.96-8.15 ppm, 6.82-8.76 ppm, 6.82-8.76 ppm, 7.11-8.401 ppm, 6.96-8.15 ppm in respectively in respectively 4a-j compounds. Singlet at 3.80 ppm for the p-methoxy group, singlet at 3.98 ppm for the o-methoxy group and 4.05 ppm for the p-methoxy group,
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singlet at 3.81 ppm for the \( o \)-methoxy group, singlet at 2.37 ppm for the \( p \)-Me group, peak at 3.90 ppm for the methoxy group (9H) observed respectively 4e, 4f, 4g, 4h and 4j compounds.

\(^{13}\)C NMR of Oxazolone 4a to 4j (CDCl\(_3\)):

![Figure 2: 13C NMR of Oxazolone compounds from 4a to 4j](image)

The \(^{13}\)C NMR of the oxazolone compounds 4a-j showed characteristics peaks in NMR graph. In oxazolone compound \( m \)-Me group in 2-phenyl ring exhibits a characteristic peak at 21 ppm in 4a-j compounds.

\(^{13}\)C NMR(CDCl\(_3\)) \( \delta \) (ppm) 4a: 21.37, 125.47, 125.67, 128.61, 128.82, 128.87, 128.93, 131.17, 131.57, 132.46, 133.36, 133.58, 134.29, 138.85, 163.74, 167.73 ppm

IR Spectra of 4a: 3020 (-CH stretch, aromatic), 1800 (>C=O stretch, cyclic ring), 1650 (>C=N stretch, oxazole ring), 1580 (>C=C<, aromatic), 1320 (-C=O stretching

The mass spectra of 4a display the molecular ion peaks at 263.2(M\(^+\)), 234.1, 207, 119.2, 91.1, 65.1 and 39.1
7.1.2 Oxazolone 7a to 7j:

1H NMR of Oxazolone 7a to 7j (CDCl₃):

Figure 3: 1H NMR of Oxazolone compounds from 7a to 7j

1H NMR of Oxazolone compounds from 7a to 7j: The 1H NMR of the oxazolone compounds 7a-j showed characteristic peaks in NMR graph. In 7a-j oxazolone compound m- Me group in 4-phenylbenzylidene ring exhibits a characteristic peak at 2.35ppm for methyl group for 7h. One proton for -C=CH and phenyl rings proton observed at 7.20-8.11, 7.27-8.62 ppm, 7.19-8.81 ppm, 7.14-8.06 ppm, 6.94-8.10 ppm, 6.87-8.02 ppm, 6.98-8.84 ppm, 7.13-8.0 ppm, 7.07-8.32 ppm, 7.07-7.95 ppm in respectively 7a-j compounds. Singlet at 3.81ppm for the o-methoxy group, 3.88 ppm for the p-methoxy group, singlet at 3.93ppm for the o-methoxy group, peak at 3.89ppm for the methoxy group (9H) observed respectively 7e, 7f, 7g, and 7j compounds.
Figure 4: 13C NMR of Oxazoline compounds from 7a to 7j

13C NMR of 7a: 124.09, 128.98, 129.43, 129.60, 131.42, 132.35, 132.54, 133.03, 133.42, 139.83, 162.68 and 167.38.

IR Spectra of 7a: 3050 (-CH stretch, aromatic), 1800 (>C=O stretch, cyclic ring), 1640 (>C=N stretch, oxazole ring), 1500 (>C=C<, aromatic), 1310 (-C-O stretching), 750 (-C-Cl).

GCMS: Fragmentation of mass spectra m/z of 7a: 283.1(M+), 207.1, 139.1, 111.1, 75.1, 39.1
7.1.3 Preparation of Imidazole-5-one’s derivatives [5a-j, 6a-j, 8a-j, 9a-j]:

Oxazole-5-one compound, alkyl aniline and acetic acid were taken in the round bottom flask and refluxed at 120 °C gently for 6-12 hr. The reaction mixture poured over crushed ice and the precipitate of imidazole-5-one on completion of reaction. The solid compound filtered on funnel and the solid purified in ethanol.

TLC aluminum sheet silica gel 60 F245 was used for monitor reaction progress and using mobile phase toluene: Ethylacetate (7.5:2.5) solvent mixture.

4-(substitutedbenzylidene)-2-(3-Mephenyl)-1-(substitutedphenyl)-4H-imidazol-5-ones. (5a-j, 6a-j)

4-(substitutedbenzylidene)-2-(4-chlorophenyl)-1-(substitutedphenyl)-4H-imidazol-5-ones. (8a-j, 9a-j)
7.1.4 Imidazolone 5a to 5j: 4-(substitutedbenzylidene)-2-(3-Mephenyl)-1-(4- Mephenyl)-4H-imidazol-5-ones. (5a-j)

The \(^1\)H NMR of the imidazolone compounds 5a-j showed characteristics peaks in NMR graph. In imidazolone compound \(m\) Me group in 2-phenyl ring exhibits characteristic peak at 2.25ppm, 2.23ppm, 2.25ppm, 2.25ppm, 2.24ppm, 2.21ppm, 2.23ppm, 2.24ppm, 2.23ppm, 2.20ppm in respectively 5a-j compounds. In imidazolone compound \(p\) Me group in N-phenyl ring exhibits characteristic peak at 2.25ppm, 2.31ppm, 2.31ppm, 2.31ppm, 2.30ppm, 2.30ppm, 2.30ppm, 2.30ppm, 2.31ppm in respectively 5a-j compounds. One proton for -C=CH and phenyl rings proton observed at 6.97-8.22, 6.99-8.65 ppm, 6.99-8.95 ppm, 6.96-8.14 ppm, 6.90-8.20 ppm, 6.87-8.21 ppm, 6.84-8.90 ppm, 6.98-8.10 ppm, 6.96-8.36 ppm, 6.99-7.59 ppm in
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respectively in respectively 5a-j compounds. Singlet at 3.79ppm for the $p$-methoxy group, singlet at 3.87ppm for the $p$-methoxy group and 3.93 ppm for the $o$-methoxy group, singlet at 3.82ppm for the $o$-methoxy group, singlet at 2.33 ppm for the $p$-Me group, peak at 3.85ppm for the $p$-methoxy group (3H) and singlet at 3.87ppm for the $p$-methoxy group(6H) observed respectively 5e, 5f, 5g, 5h and 5j compounds.

$^{13}$C NMR of Imidazolone 5a to 5j (CDCl$_3$):

![13C NMR of Imidazolone compounds from 5a to 5j](image)

**Figure 6 : 13C NMR of Imidazolone compounds from 5a to 5j**

$^{13}$C NMR(CDCl$_3$) δ(ppm) 5a: 21.25, 21.41,126.42, 127.13, 128.05, 128.80, 129.03, 129.89, 130.40, 132.11, 132.19, 132.60, 134.45, 138.25, 138.34, 138.69, 160.96 and 170.80

IR Spectra of 5a:
3000 $-CH$ stretch, aromatic, 1720 $>C=O$ stretch, cyclic ring
1620 $>C=N$ stretch, imidazole ring, 1510 $>C=C<$, aromatic
1250 $-C-N$ tertiary amine

GCMS: Fragmentation of mass spectra m/z of 5a:
352.2 ($M^+$), 261.1, 208.1, 165.1, 119.1, 91.1, 65.1, 39.1
7.1.5 Imidazolone 6a to 6j:

4-(substitutedbenzylidene)-2-(3- Mephenyl)-1-(3,4,5-trimethylphenyl)-4H- imidazol-5-ones (6a to 6j)

$^1$H NMR of Imidazolone 6a to 6j (CDCl$_3$):

$^1$H NMR of Imidazolone compounds from 6a to 6j (CDC$_3$): The $^1$H NMR of the imidazolone compounds 6a-j showed characteristics peaks in NMR graph. In imidazolone compound $m$- Me group in 2-phenyl ring exhibits characteristic peak at 2.25ppm, 2.27ppm, 2.25ppm, 2.25ppm, 2.25ppm, 2.25ppm, 2.27ppm, 2.25ppm, 2.25ppm, 2.26ppm in respectively 6a-j compounds. In imidazolone compound $m$- Me group $p$- Me group and in N-phenyl ring exhibits characteristic peak at 1.98 and 2.22ppm, 1.99ppm and 2.2ppm, 1.98 ppm and 2.20ppm, 1.97ppm and 2.22ppm, 1.98ppm and 2.22ppm, 1.99ppm and 2.19ppm, 1.97ppm and 2.21ppm, 1.98ppm and 2.23ppm, 1.97ppm and 2.22ppm, 1.98ppm and 2.19ppm in respectively 6a-j compounds.
One proton for -C=CH and phenyl rings proton observed at 6.88-8.25, 6.9-8.77 ppm, 6.88-9.02ppm, 6.88-8.18ppm, 6.88-8.24ppm, 6.9-8.32ppm, 6.89-8.96ppm, 6.88-8.12ppm, 6.89-8.44ppm, 6.91-7.62ppm in respectively in respectively 6a-j compounds. Singlet at 3.81ppm for the p-methoxy group, singlet at 3.90ppm for the p-methoxy group and 3.97 ppm for the o-methoxy group, singlet at 3.83ppm for the o-methoxy group, singlet at 2.34 ppm for the p- Me group, peak at 3.86ppm for the p-methoxy group (3H) and singlet at 3.91ppm for the p-methoxy group(6H) observed respectively 6e, 6f, 6g, 6h and 6j compounds.

$^{13}$C NMR of Imidazolone 6a to 6j (CDCl$_3$):

![Figure 8: 13C NMR of Imidazolone compounds from 6a to 6j](image)

$^{13}$C NMR(CDCl$_3$) δ(ppm) of 6a: 18.12, 18.39, 21.2, 21.47, 124.97, 128.34, 128.75, 128.84, 128.92, 129.07, 129.63, 130.41, 130.67, 132.55, 132.62, 134.48, 135.48, 135.34, 135.97, 138.35, 138.62, 139.22, 160.74 and 170.75

IR spectra:
2880  -CH stretch, aromatic, 1720 >C=O stretch, cyclic ring
1620  >C=N stretch, imidazole ring, 1500 >C=C<, aromatic
1250  -C-N tertiary amine

GCMS: Fragmentation of mass spectra m/z: 380.3(M$^+$), 281.1, 236.2, 207.1, 177, 147.1, 119.1, 91.1, 65.1, 39.1
7.1.6 Imidazolone 8a to 8j: 4-(substitutedbenzyldene)-2-(4-chlorophenyl)-1-(4- Mephenyl)-4H-imidazol-5-ones (8a to 8j):

\[ \text{Figure 9: } 1^H \text{ NMR of Imidazolone compounds from 8a to 8j} \]

$^1H$ NMR of Imidazolone compounds from 8a to 8j:

The $^1H$ NMR of the imidazolone compounds 8a-j showed characteristics peaks in NMR graph.

In imidazolone compound $p$- Me group in N-phenyl ring exhibits characteristic peak at 2.32ppm, 2.32ppm, 2.05ppm, 2.31ppm, 2.31ppm, 2.32ppm, 2.32ppm, 2.33ppm, 2.31ppm in respectively 8a-j compounds. One proton for $-\text{C=CH}$ and phenyl rings proton observed at 6.99-8.19, 7.28-8.62ppm, 6.76-9.49ppm, 6.98-8.12ppm, 6.89-8.19ppm, 6.87-8.18ppm, 6.86-8.88ppm, 6.96-8.09ppm, 6.98-8.40ppm, 6.87-8.18ppm in respectively in respectively 8a-j compounds.
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Singlet at 3.80ppm for the \( p \)-methoxy group, singlet at 3.88ppm for the \( p \)-methoxy group and 3.92 ppm for the \( o \)-methoxy group, singlet at 3.83ppm for the \( o \)-methoxy group, singlet at 2.34 ppm for the \( p \)-Me group, singlet peak at 3.85ppm for the -methoxy group (9H) observed respectively 8e, 8f, 8g, 8h and 8j compounds.

\(^{13}\)C NMR of Imidazolone 8a to 8j (CDCl\(_3\)):

![Figure 10: 13C NMR of Imidazolone compounds from 8a to 8j](image)

\(^{13}\)C NMR(CDCl\(_3\)) (δ ppm) of 8a: 21.27, 119.78, 127.13, 127.34, 128.71, 128.84, 129.64, 129.80, 130.28, 130.55, 130.61, 131.84, 132.66, 134.33, 137.70, 138.44, 138.72, 159.57 and 170.61

IR Spectra of 8a:

- 2922 -CH stretch, aromatic
- 1720 >C=O stretch, cyclic ring
- 1638 >C=N stretch, imidazole ring
- 1514 >C=C<, aromatic
- 1293 -C-N tertiary amine
- 757 -C-Cl

GCMS: Fragmentation of mass spectra m/z of 8a:

- 372.2(M\(^+\)), 281.1, 207.1, 177.0, 139.0, 91.1, 65.1, 39.1
7.1.7 Imidazolone 9a to 9j: 4-(substitutedbenzyldiene)-2-(4-chlorophenyl)-1-(3,4,5-trimethylphenyl)-4H-imidazol-5-ones (9a to 9j):

\[ \text{Figure 11: 1H NMR of Imidazolone compounds from 9a to 9j} \]

The \(^1\)H NMR of the imidazolone compounds 9a-j showed characteristics peaks in NMR graph.

In imidazolone compound \(m\)- Me group \(p\)- Me group and in N-phenyl ring exhibits characteristic peak at 1.97 ppm and 2.64 ppm, 2.02 ppm and 2.29 ppm, 1.99 ppm and 2.27 ppm, 1.97 ppm and 2.27 ppm, 1.96 ppm and 2.2 ppm, 1.98 ppm and 2.27 ppm, 1.97 ppm and 2.26 ppm, 1.97 ppm and 2.29 ppm, 1.96 ppm and 2.26 ppm, 1.96 ppm and 2.26 ppm, 1.98 ppm and 2.27 ppm in respectively 9a-j compounds.
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One proton for -C=CH and phenyl rings proton observed at 6.90-8.23ppm, 6.92-8.71ppm, 6.91-9.0ppm, 6.91-8.18ppm, 6.9-8.2ppm, 6.87-8.25ppm, 6.87-8.93ppm, 6.91-8.11ppm, 6.91-8.47ppm, 6.91-7.59ppm in respectively in respectively 9a-j compounds. Singlet at 3.81ppm for the p-methoxy group, singlet at 3.90ppm for the p-methoxy group and 3.94 ppm for the o-methoxy group, singlet at 3.83ppm for the o-methoxy group, singlet at 2.38 ppm for the p-Me group, peak at 3.89ppm for the p-methoxy group (3H) and singlet at 3.89ppm for the o-methoxy group(6H) observed respectively 9e, 9f, 9g, 9h and 9j compounds.

$^{13}$C NMR of Imidazolone 9a to 9j (CDCl$_3$):

Figure 12 : 13C NMR of Imidazolone compounds from 9a to 9j

$^{13}$C NMR(CDCl$_3$) (δ ppm) 9a: 18.08, 18.32, 21.21, 127.61, 128.87, 128.96, 129.34, 129.38, 129.83, 130.35, 130.62, 132.68, 134.34, 135.94, 138.05, 138.35, 139.54, 159.37 and 170.51

IR Spectra:

2880 -CH stretch, aromatic, 1720 >C=O stretch, cyclic ring,
1640 >C=N stretch, imidazole ring, 1510 >C=C<, aromatic,
1300 -C-N tertiary amine, 780 -C-Cl

GCMS: Fragmentation of mass spectra m/z:

400.3 (M$^+$), 350.2, 309.2, 282.2, 256.2, 207.1, 179.1, 139.1, 91.2, 41.2
7.1.8 Synthesis of s-TRIAZINE compounds

\[ \text{X} \cdot \text{NH}_2 + \text{S}^+ \cdot \text{K}^+ + \text{CH}_3\text{COOH} \xrightarrow{\text{Bromine}} \text{H}_2\text{N} \]

(1)

\[ \text{X} \cdot \text{N}^2, \text{N}^4\text{-bis(6-bromobenz[d]thiazol-2-yl)-N6-ph-1,3,5-triazine-2,4,6-triamine (IV)}} \]

\[ \text{X} \cdot \text{NH}_2 + 2 \cdot \text{H}_2\text{N} \xrightarrow{\text{Acetone}} \text{Heat} \]

(2)

\[ \text{R-CH}_2 \cdot \text{Br} \rightarrow \text{Br} \rightarrow \text{Cl} \rightarrow \text{Cl} \rightarrow \text{N}\text{-HCl} \]

(3)

Where R: -C_6H_5, -3-Cl-C_6H_5, -4-Cl-C_6H_5, -3-NO_2-C_6H_5, -4-NO_2-C_6H_5, -4-Br-C_6H_5, -4-F-C_6H_4-2-C_6H_4N_2, -4-C_6H_4N_2, -N-C_6H_4-2-C_6H_4, -4-CH_2-C_6H_4, -4-CH_2-C_6H_4, -4-OH-C_6H_4

Where X: Both -Br or Both -Cl

N^2, N^4-bis(6-bromobenzo[d]thiazol-2-yl)-N6-ph-1,3,5-triazine-2,4,6-triamine (IV) synthesis method:

1, 4 dioxane and compound (III) were taken into RBF and add substituted Aniline portion wised at room temperature. The reaction mixture pH set to 6.5-7.0 by 10% NaOH in water solution followed by stirred at 65-70 °C for four hours. The reaction mixture was added slowly into crushed ice while stirring followed by set acidified from pH 7 to pH 6.5 with diluted hydrochloric acid and cooled at 0 to 5°C. The product recovers by filtration followed by cold water washing and purify in methanol. Purity checked by NMR, IR and elemental analysis. Yield: 65 %. Compound Br_1 to Br_12 and Cl_1 to Cl_12 was synthesized by an above similar method.
Synthesis and Characterization of \(N_2, N_4\)-bis(6-bromobenzo[d]thiazol-2-yl)-N6-phenyl-1,3,5-triazine-2,4,6-triamine -{Br1}:

\[
\begin{align*}
\text{1H NMR (DMSO) } & \delta(\text{ppm}): 11.2\text{ppm (s, 2H, }-\text{NH), 10.9ppm (s, 1H, }-\text{NH), 7 ppm to 9 ppm (m, 11H, Ar-H).} \\
\text{13C NMR (DMSO) } & \delta(\text{ppm}): 30.9, 113.9, 116, 118, 120, 121, 123, 124, 125, 128, 129, 130, 132, 150 and 168.89 ppm. \\
\text{IR spectra: } & 3500 \text{ (-NH stretch, sec. amine), 3083 (-C-H stretch, aromatic), 1048 (-C-N stretch, s-triazine), 1593 (-C=N stretch, s-triazine), 813 (-C-N, s-triazine), 658 (C-S-C, Stretch, thiazolo), 1048 (Ar-Br, stretch, bromide).}
\end{align*}
\]

7.1.10 CHARACTERIZATION OF \(N_2, N_4\)-bis(6-chlorobenzo[d]thiazol-2-yl)-N6-phenyl-1,3,5-triazine-2,4,6-triamine -{Cl1}:

\[
\begin{align*}
\text{1H NMR (DMSO) } & \delta(\text{ppm}): 11.2\text{ppm (s, 2H, }-\text{NH), 10.9ppm (s, 1H, }-\text{NH), 6.5 ppm to 8 ppm (m, 11H, Ar-H).} \\
\text{13C NMR of Cl 1(DMSO) } & \delta(\text{ppm}): 30, 34, 07, 117, 118, 120, 121, 122, 123, 124, 126, 127, 128, 129, 130, 131, 137, 142, 150, 168 \\
\text{IR spectra: } & 3300 \text{ (-NH stretch, sec. amine), 3060 (-C-H stretch, aromatic), 1518 (-C=N stretch, s-triazine), 1100 (-C-N stretch, s-triazine), 766 (Ar-Cl, stretch), 811 (-C-N, s-triazine), 692 (C-S-C, Stretch, thiazolo).}
\end{align*}
\]
7.1.11: 1,2,4-TRIAZINE compounds

7.3.1 5-(substitutedbenzylidene)-2-phenyl-3-substitutedphenyl-1,2-dihydro-1,2,4-triazin-6(5H)-one:

1,2,4-Triazine derivatives synthesis [10E, 10F, 10J, 11E, 11F, 11J]:

Oxazole-5-one I, phenylhydrazine, potassium acetate and acetic acid were taken to the round bottom flask followed by refluxed at 120 °C for 5-12 hr. The mixture poured over crushed ice after completion of reaction measured by TLC and the precipitate of 1,2,4-Triazine. The precipitate of compound recovered by filtration and followed by cold ethanol and cold water washing. The crude material crystallized from ethanol.

The compounds characterized by analytical methods. $^1$H NMR (CDCl$_3$) of the compound 10f signals were observed at singlet at 1.99ppm (-methoxy), singlet at 2.10ppm (- Me) and multiplet at 6.0-7.7 ppm (Ar-CH and - C= CH). The $^{13}$C NMR signals were observed at 19.5, 20.96, 112.24, 113.72, 121.52, 128.99, 146.87, 147.52, 170.26, and 176.92ppm.
7.1.12 ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY

Broth dilution method was used for measure minimum inhibitory concentration (MIC) and is widely used as nonautomated *in vitro* microbial susceptibility test. Oxazolone compounds, Imidazolone compounds and s-Triazine compounds exhibited biological activity:

- ➢ The synthesized compounds 4c, 4d, 4h, 4i, 7d, 7f, 7g, 5e, 5g, 5h, 6b, 8a, 8c, 8h, 8j, 9b, 9e, 9f, 9g, 9h, 9j, Br₁, Br₂, Br₃, Br₄, Br₅, Br₆, Br₇, Br₈, Br₉, Br₁₁, Cl₄, Cl₇, Cl₈, Cl₁₀, Cl₁₁ exhibited moderate antibacterial activity.

- ➢ The synthesized compounds 4j, 7a, 7c, 7j, 5f, 6f, 6g, 8g, 9e, Br₁₂, Cl₂, Cl₃ exhibited good antibacterial activity.

- ➢ The synthesized compounds 4g, 4f, 4h, 7e, 7g, 5c, 5d, 5i, 5j, 6d, 6i, 8d, 8g, 9c, 9e, 5c, 5d, 5i, 5j, 6d, 6i, 8d, 8g, 9c, 9e exhibited moderate antifungal activity.

- ➢ The synthesized compounds 4d, 4g, 4j, 7b, 7i, 5b, 5g, 6c, 6h, 8i, 9j, Br₁₂, Cl₄, Cl₆, Cl₁₁ exhibited good antifungal activity.

**Acknowledgment:**
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7.1.13 CONCLUSION

Oxazolone, Imidazolone, and s-triazine moiety compounds possess historically bioactivity. Several synthesized compounds structure confirmed by IR, NMR and GCMS spectroscopy and the microbiological activity performed. A work towards produce facile, effective and eco-friendly methodology and several bioactive compounds. s-triazine compounds should be purified and remain unsolved to get the pure compound.

Several synthesized compounds microbiological activity performed but anticancer, tuberculosis, anti- HIV, anti-inflammatory and other bioactivity remain to do so.
7.2 RECOMMENDATIONS:

It has been observed based on the experiments that some of the synthesized compounds exhibits bioactivity against some of the strains. Furthermore, in those compounds adding electron windrowing group can promote to more bioactivity.

- Synthesized compounds could be examined for other pharmaceutical application.
- Some compound exhibits color and can be tested for textile dyeing.
- This nature of heterocyclic compounds can be synthesized by solvent-free microwave techniques and its environmentally friendly.
- Oxazole and Imidazolone heterocycles compound can be evaluated for antioxidant activity.
- 1,2,4-Triazine compounds could be examined for microbial activity.
7.3 FUTURE SCOPE OF RESEARCH WORK:

This research focused on various derivatives of heterocycles compounds, mainly oxazole, imidazole, and s-triazines moiety compounds. Those compounds historically exhibit biological activity. Due to limitation for the compound synthesis, there is a wide range of more research scope in this area.

❖ Bioactivity for various disease could be test.
❖ synthesized compounds could be test for dyes application.
❖ Some compound exhibits color and can be tested for textile dye.
Synthesis and Characterization of s-Triazine and Imidazole Heterocycles

7.4 LIMITATIONS OF RESEARCH WORK:

Thousands of heterocycle compounds have been synthesized and studied. Research is never an ending process and has its own limitations.

- This research has been conducted for selected moiety compound and different derivatives may exhibit stimulating properties of interest.
- Oxazolone, Imidazolone, and s-Triazine compound are synthesized and to get high purity of the product is challengeable.
- The spectroscopy study was limited to NMR, IR, GCMS.
- Synthesized compounds study limited to antibacterial and antifungal activity.
- Different methodology for production could be explored to develop a process for commercial production.