A potential method for one-pot synthesis of Schiff base compounds derived from different aldehyde and diamine compounds like substituted aromatic aldehyde and diamines; such as Salicylaldehyde, 3, 4-Tertery butyl 2-Hydroxy Benzaldehyde, Ethylene Diamine, 2-Amino Pyridine, 1, 2-Di-amine Benzene, 1, 3-Diamino Propane by using catalytic amount of $P_2O_5/SiO_2$ have catalyzed the ligand formation in dry media under free-solvent condition at room temperature. This type of excellent method avoids use of hazardous solvents, longer reaction time and tedious work up procedure. Advantage of this efficient method is excellent yield of products in crystalline form, short reaction time, simplicity of work up procedure and no use of any type of hazardous solvents. Simply this reaction is environmentally Proctive (non polluted) and economically attractive method for synthesis of Schiff base compound. All these Schiff base compounds were characterized by means of IR, $^1$H-NMR and their Elemental analysis as (C, H, N, and O) spectral analysis data. Above Schiff base compounds shows inherent new generation of series of pharmaceutically important compounds.

Keywords: Salicylaldehyde, 3, 4-Tertery butyl 2-Hydroxy Benzaldehyde, Ethylene Diamine, 2-Amino Pyridine, 1, 2-Diamino Benzene, 1, 3-Diamino Propane, Dichloro Methane and $P_2O_5/SiO_2$.
are widely applied in enantioselective cyclopropanation of styrene’s\(^3\). Asymmetric addition of cyanide to aldehydes\(^4\). Schiff base compounds containing imines group (-RC=N-) are usually formed by the condensation of primary amine and diamine with an active carbonyl compound in a methanol solvent\(^5\). Some synthesis methods have not been entirely satisfactory owing to a number of drawbacks such as low yields and tedious workup procedures\(^6\). According to the tremendous scope of Schiff bases possesses an inherent imidazopyridine, with a high class of compounds of medicinal importance and oblige. Over the past few decades, significant research has been directed towards the development of new technologies for environmentally benign processes (green chemistry)\(^7\). The dipyridyl can attach two molecules of an alkyl-halide thus forming a bi-quaternary base. The method of preparation consisted in preparing first a quaternary base of pyridine and condensing two molecules of it to a dipyridyl compound by treatment with sodium amalgam and successive oxidation\(^8\). The deep Studies on a new kind of chemotherapeutic Schiff bases are now attracting the attention of biochemists\(^9,10\). According to ligands, the Isoxazole Schiff bases, methyl salicylaldehyde and 4-methoxy salicylaldehyde with 3-amino-5-methyl Isoxazole potentiometrically titrated with their complexes with Cu(II) Ni(II), Co(II), Zn(II)) and VO(IV)\(^11\). The Schiff base ligands have been prepared from carbonyl compounds within a short time, catalyzed by P\(_2\)O\(_5\) under solvent free conditions\(^12\). Considerable interest attached with the chemistry of Schiff bases\(^13\), obtained from heterocyclic aldehyde, also various heterocyclic Schiff bases having O,N and S donor atoms, have been reported by several scientists\(^14,15,16\). Most of the routes involve acylation reaction of a 2-aminomethylpyridine followed by cyclization with phosphorus oxychloride or polyphosphoric acid\(^17\). According to high yielding and environment proactive reactions, there some methods are significant for one pot synthesis of pyridil imidazo [1, 5-a] pyridines catalyzed by K\(_4\)FeCN\(_6\) under free solvent conditions; which is technologically and economically attractive\(^18\). According to applications root from the facts that the Schiff’s base are capable of chelating various metal ions and the resultant complexes possess a wide range of magnetic, photo physical, and electrochemical properties. Thus, the increment of synthetic methodologies for N, N-bidentate ligands is of paramount importance in chemistry. N, N-Bidentate ligands with mixed five- and six-membered heterocyclic are a high class of compounds in the pursuit of structural diversity for property performance. In particular, 1-pyridylimidazo [1, 5-a] pyridines possess a bidentate structural feature with a pyridil unit directly next to a fused imidazo and have emerged as a new class of ligands\(^19,20\).

Reactions:

\[ + \]

\[ + \]

\[ + \]

\[ + \]
**EXPERIMENTAL SECTION**

All the chemicals were purchased from Merck German chemically company in high quality standard and purity. IR spectra were recorded as KBr pellets on SHIMADZU spectrometer. 1H NMR spectra were recorded in CDCl₃ and DMSO with (400 MHZ) spectrometer. Purity of all substances and reaction was monitored by TLC column chromatography using silica gel (60-120 mesh size).

**General Procedure For Preparation of Schiff’s Base Compounds:**

In a detailed discussion of reaction, a mixture of benzaldehyde (2 mmol), amine (2mmol) and \( \text{P}_2\text{O}_5/\text{SiO}_2 \) mixture (0.4 g, 2mol % of \( \text{P}_2\text{O}_5/\text{benzaldehyde} \) was grounded together in a mortar. The resulting mixture was placed in a flask and mechanically stirred for 30-35 minutes. The progress of reaction was monitored on TLC. After completion of reaction ethanol (40-50 ml) was added to reaction mixture, filtered off the solid product and washed with cold methanol. The crude product was further purified and recrystallised in petroleum ether/ diethyl ether. Desired Schiff base compounds are obtained up to 92 % yield²¹.

<table>
<thead>
<tr>
<th>Entry</th>
<th>Substituted Aldehyde</th>
<th>Product (4-a)</th>
<th>Time in (minutes)</th>
<th>Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>salicylaldehyde</td>
<td></td>
<td>16:14</td>
<td>88</td>
</tr>
<tr>
<td>2</td>
<td>salicylaldehyde</td>
<td></td>
<td>26:04</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>salicylaldehyde</td>
<td></td>
<td>15:45</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>3,4-di-tert-butyl-5-hydroxybenzaldehyde</td>
<td></td>
<td>15:20</td>
<td>88</td>
</tr>
</tbody>
</table>
Spectroscopic and Analytical Data for Schiff Base Compounds:

2, 2'-{ethane-1, 2-diylbis [nitrilo (E)] methylylidene]} diphenol No. [4-a]: Colour: bright shine yellow crystals, Melting Point: 134-136 °C. FTIR (KBr pellets): 432.09, 476.40, 648.11, 748.43, 856.45, 977.02, 1019.38, 1042.52, 1149.59, 1200, 1284.60, 1374.30, 1416.71, 1459.18, 1496.84, 1576.89, 1632.83, 1798.70, 1941.44, 2926.13, 3056, 3600.

1H NMR (200.13 MHz CDCl3): 3.90(s, 4H), 6.88(m, 4H), 7.22(m, 4H), 8.32 (s, 2H), 13.20 (bs, 2H)

Anal. Calcd. For C_{16}H_{16}N_{2}O_{2}: C, 71.62; H, 6.01; N, 10.44; O, 11.93.

Found C, 71.18; H, 5.80; N, 10.10; O, 11.15.

2, 2'-(propane-1, 3-diylbis [nitrilo (E)] methylylidene]} diphenol [4-b]: Colour: yellow crystals, Melting Point: 78-81 °C. FTIR (KBr pellets): 462.90, 518.85, 567.13, 642.30, 663.51, 754.17, 777.41, 852.54, 883.41, 976, 1007, 1050, 1147, 1206, 1278, 1415, 1456, 1492, 1579, 1634, 1783, 1900, 2060, 2111, 2441, 2670, 2940, 3002, 3061, 3500.22. 1H NMR (200.13 CDCl3): 2.09(dd, 2H), 3.70(t, 4H), 6.90(m, 4H), 7.29(m, 4H), 8.35(s, 2H), 13.41(bs, 2H). Anal. Calcd. For C_{17}H_{18}N_{2}O_{2}: C, 72.32; H, 6.43; N, 9.92; O, 11.33.

Found C, 72.00; H, 6.05; N, 9.17; O, 10.80.

2,2'-(1,3-phenylenebis[nitrilo(E)methylylidene])diphenol [4-c]: Colour: bright orange crystals, Melting Point: -174-176 °C. FTIR (KBr): 438.80, 500, 581, 642, 758, 810, 858, 906, 1036, 1113, 1153, 1192, 1230, 1277, 1369, 1402, 1452, 1482, 1563, 1612, 1808, 1886, 1950, 1940, 1995, 2052, 2106, 2260, 2662, 2986, 3058, 3400.52 1H NMR (200.13 CDCl3): 6.88-7.40(m, 12H), 8.63(s, 2H), 13.07(bs, 2H). Anal. Calcd. For C_{20}H_{16}N_{2}O_{2}: C, 75.93; H, 5.10; N, 8.86; O, 10.11. Found C, 75.20; H, 4.79; N, 8.14; O, 9.92.

6,6'-(1E,1'E)-(propane-1,3-diylbis(azanylylidene))bis(methanylylidene)bis(2,4-di-tert-butyl phenol) [4-d]: Colour: bright yellow crystals, Melting Point: 184-186 °C. FTIR (KBr): 444.60, 512, 588, 643, 707, 771, 835, 877, 976, 1039, 1131, 1205, 1271, 1318, 1361, 1441, 1469, 1591, 1626, 2867, 2904, 2955, 3500. 1H NMR (200.13 CDCl3): 1.27(s, 18H), 1.41(s, 18H), 3.90(s, 2H), 7.06(s, 2H), 7.36(s, 2H), 8.37(s, 2H), 13.64(bs, 2H). Anal. Calcd. For C_{32}H_{48}N_{2}O_{2}: C, 78.00; H, 9.82; N, 5.69; O, 6.49. Found C, 77.44; H, 9.34; N, 5.11; O, 6.00.

2-[(E)-(pyridin-2-ylimino) methyl] phenol [4-e]: Colour: dark orange crystals, Melting Point: -74-76 °C. FTIR (KBr pellets): 451,502,576,622,675,755,775,845,913,955,996, 1111, 1145, 1186, 1279, 1349, 1411, 1429, 1461, 1497, 1552, 1585, 1606, 1837, 1956, 2056, 2108, 2383, 2432, 2483, 2559, 2596, 2731, 2800, 2861, 2929, 3051, 3205.12 1H NMR (200.13 CDCl3): 7.00(m, 2H), 7.24-7.51(m, 4H),
RESULTS AND DISCUSSION

In a typical reaction substituted aldehyde was treated with different types of amines and di-
amines; such as Salicylaldehyde, 3, 4-Tertiary butyl 2-Hydroxy Benzaldehyde, Ethylene Diamine,
2-Amino Pyridine, 1, 2-Di-amino Benzene, 1, 3-Diamino Propane in the presence of P₂O₅
supported on SiO₂ as catalyst without using any solvent by crushing in a mortar at room
temperature within few minutes. There is no requirement to use any solvent. P₂O₅/SiO₂ was used
as catalyst in solvent-free media. Here we are kindly intrested to report that the reaction of
different substituted aldehyde, amines and di-amines obtained as corresponding Schiff base
compounds in excellent yields, in shorter time under free solvent condition at room tempera-
ture. The desired results are indicated in Table-1, as shown in Table-1, vast and new series of diffren
t Schiff’s base compounds were synthesized using P₂O₅/SiO₂ as catalyst in solvent free media by
crushing in a mortar, at room temperature. In comparison, the reaction of Salicylaldehyde, 3,4-
tertiary butyl 2-hydroxy benzaldehyde with 2-amino pyridine, ethylene diamine in absence of
catalyst as shown at entry no.[8,9] in Table-1, found very low yield of compound and longer
reaction time while to verify detailed study, the progress of this methodology, various diamines
with different substituted aldehyde were treated in the presence of P₂O₅/SiO₂ the desired results
of such studies are mentioned in Table-1Entry(1-7). In Table-1 Entry [5] the salicylaldehyde is
taken as (1 mol) and 2-amino pyridine is (1 mol) while in Entry No. [1, 2, 3 & 4] the molar ratios
of reactions are taken in (2:1) ratio respectively. According to scheme (1 & 2) we may easily
obtain a vast series of excellent high yield products and pharmaceutically important compounds
by using P₂O₅/SiO₂ as catalyst under free solvent condition at room temperature. In scheme (1, 2
& 3) the reaction is formed by using Dichloromethane as solvent at reflux condition.

Table-1: Reactions of different benzaldehyde, Salicylaldehyde, 3, 4-tertiary butyl 2-hydroxy benzaldehyde with
different Di-amins in DCM as solvent at reflux condition.

<table>
<thead>
<tr>
<th>Entry</th>
<th>Amine Substrate (2)</th>
<th>Aldehyde Substrate (3)</th>
<th>Product (4)</th>
<th>Time in (Minute)</th>
<th>Yield in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ethylene Di-amine</td>
<td>Salicylaldehyde</td>
<td>A</td>
<td>16:14 sec.</td>
<td>88</td>
</tr>
<tr>
<td>2</td>
<td>1,3-Diamino Propane</td>
<td>Salicylaldehyde</td>
<td>B</td>
<td>26:04 sec.</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>1,2-Diamino Benzene</td>
<td>Salicylaldehyde</td>
<td>C</td>
<td>15:45 sec.</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>Ethylene Di-amine</td>
<td>3,4-tertiary butyl 2-hydroxy benzaldehyde</td>
<td>D</td>
<td>15:20 sec.</td>
<td>88</td>
</tr>
<tr>
<td>5</td>
<td>2-Amino Pyridine</td>
<td>Salicylaldehyde</td>
<td>E</td>
<td>14:56 sec.</td>
<td>93</td>
</tr>
<tr>
<td>6</td>
<td>2-Amino Pyridine</td>
<td>3,5-tertiary butyl 2-hydroxy benzaldehyde</td>
<td>F</td>
<td>19:30 sec.</td>
<td>92</td>
</tr>
<tr>
<td>7</td>
<td>Ethylene Diamine</td>
<td>Benzilidine</td>
<td>G</td>
<td>13:39 sec.</td>
<td>92</td>
</tr>
<tr>
<td>8</td>
<td>Ethylene Di-amine</td>
<td>3,4-tertiary butyl 2-hydroxy benzaldehyde</td>
<td>D</td>
<td>4 Hours 20 min</td>
<td>72</td>
</tr>
<tr>
<td>9</td>
<td>2-Amino Pyridine</td>
<td>Salicylaldehyde</td>
<td>E</td>
<td>6 hours 34 min</td>
<td>79</td>
</tr>
</tbody>
</table>
The structures of products were assigned by spectroscopic data from Chemdraw Software. In the IR spectra characteristic Schiff base compounds (C= N) stretching frequency and $^1$H NMR may be observed.

CONCLUSION

In a typical reaction mild and significant Schiff base compound have been synthesized from different aldehyde and Diamine compounds using P$_2$O$_5$/SiO$_2$ as catalyst with excellent yield of products within few minutes by crushing in a mortar at room temperature under free solvent condition. In short these types of reactions are environ mentally Proctive, technically and economically attractive. Gives high yield of products, short reaction time without using any type of hazardous solvent. Simply we have shown significant path to synthesize a variety of new series of medicinally important and excellent scientific future based Schiff base compounds.

Acknowledgements
I am very thankful to Dr. Mazhar Farooqui Head-P.G.Research centre chemistry Department and Dr. Maqdoom Farooqui Principal Maulana azad college Aurangabad for their precious guidance and support for research work.

REFERENCES