5. Experimental

The experimental part has been discussed under the following two headings:

5.1. Chemical work

5.2. Biological work

5.1. Chemical Work

All reagents and solvents required for syntheses were purified by general laboratory techniques before use. Compounds were purified either by recrystallization or passing them through silica gel purifying columns using mixtures of ethyl acetate and *n*-hexane as eluent. Melting points were determined using a Veego make silicon oil bath-type melting point apparatus and are uncorrected. Purity of the compounds and completion of the reactions were monitored by thin layer chromatography (TLC) on silica gel GF_{254} plates, visualizing with ultraviolet light or iodine vapours. The yields reported here are unoptimized. The IR spectra were recorded using KBr disc method on a Bruker FT-IR spectrophotometer. The ^{1}H NMR and ^{13}C NMR spectra were recorded in either $CDCl_3$ or DMSO-d_6. Microwave reactions were performed in CEM-Discover, USA microwave reactor. Anhydrous sodium sulphate was used for drying of solutions/solvents. All NMR values were considered on the basis of chemical shift (δ ppm).

The phenylacetic acids required for the synthesis of the common intermediates for the process of diarylimidazoles and diaryltriazines were either commercially obtained or synthesized in the laboratory. Therefore, the syntheses of the substituted phenylacetic acids, their respective diaryl-1-ethan-2-ones and diaryl-1,2-diones are also described here.

The chemical work done is discussed under the following heads:

5.1.1. Synthesis of intermediates for diarylimidazoles and diaryltriazines

5.1.1.1. Synthesis of substituted phenylacetic acids **(3, 6, 9, 11)**

5.1.1.2. Synthesis of substituted diaryl-1-ethan-2-ones **(15-32)**

5.1.1.3. Synthesis of substituted diaryl-1,2-diones **(33-50)**

5.1.2. Synthesis of 4,5-diaryl-1*H*-imidazole derivatives

5.1.2.1. Synthesis of 2-(4-chlorophenyl)-4,5-diaryl-1*H*-imidazole derivatives **(52a-68a)**

5.1.2.2. Synthesis of 2-(4-fluorophenyl)-4,5-diaryl-1*H*-imidazole derivatives **(52b-68b)**

5.1.3. Synthesis of *N*-(2-morpholinoethyl)-diaryl-triazin-3-amine derivatives

5.1.3.1. Synthesis of 3-methylthio-5,6-diaryl-1,2,4-triazines (**70-82** and **83-92**)

5.1.3.2. Synthesis of *N*-(2-morpholinoethyl)-diaryl-triazin-3-amines **(94-110)**

5.1.4. Synthesis of 1,3-benzoxazin-4-one derivatives

5.1.4.1. Synthesis of substituted 4*H*-benzo[*d*][1,3]oxazin-4-ones **(127a-141a)**

5.1.4.2. Synthesis of substituted 7-chloro-4*H*-benzo[*d*][1,3]oxazin-4-ones **(127b-141b)**

5.1.5. Synthesis of substituted 4-chlorobenzamide derivatives

5.1.5.1. Synthesis of substituted *N*-amidinobenzamides **(143a-157a)**

5.1.5.2. Synthesis of substituted 4-chloro-*N*-amidinobenzamides **(143b-157b)**

5.1.6. Synthesis of substituted 4-chloro-*N*-pyridin-2-ylbenzamide derivatives (159-173)

5.1.1. Synthesis of intermediates for diaryl imidazoles and diaryl triazines

5.1.1.1. Synthesis of substituted phenylacetic acids (3, 6, 9, 11)

5.1.1.1.1 Synthesis of 4-chlorophenylacetic acid (3)

To a solution of 4-chloroacetophenone (**1**, 20 ml, 0.15 mol) in morpholine (18 ml, 0.2 mol) precipitated sulphur (8.0 g, 0.25 mol) was added and the reaction mixture was refluxed for 18 hr. To this hot solution, warm methanol (10 ml) was added and the mixture was refrigerated for 3 hr to obtain a yellow crystalline thiomorpholide **(2)**. It was filtered and washed with cold methanol. The crude thiomorpholide (22 g) was taken in a 250 ml round-bottomed flask (RBF) and aqueous sodium hydroxide (150 ml, 20 %) was added to it. The reaction mixture was refluxed for 18 hr and poured onto crushed ice (1 kg). The resulting suspension was extracted thrice with small portions of chloroform (3 x 15 ml). The aqueous layer was acidified with conc. HCl to get off-white colored precipitate of 4-chlorophenylacetic acid. Recrystallisation of the crude product from methanol afforded the pure acid, as colourless to white crystals **(3)**.

Anal.:

M.P. **:** 90-92 ^{o}C (Lit[1] 90-91 ^{o}C)

Yield **:** 76 %

TLC **:** R_f 0.5 (Chloroform:Methanol::95:5)

IR (cm^{-1}) **:** 3325, 1705, 1517, 1409, 1240 and 1170

5.1.1.1.2. Synthesis of 4-methylphenylacetic acid (6)

The title compound **(6)** was synthesized as per the method described for compound **(3)** by replacing 4-chloroacetophenone with 4-methylacetophenone (20.0 ml, 0.15 mol). The crude product so obtained was crystallized from hot water to afford the desired 4-methylphenylacetic acid **(6)** as a white crystalline product.

Anal.:

M.P. **:** 90-92 ^{o}C

Yield **:** 77 %

TLC **:** R_f 0.47 (Chloroform:Methanol::90:10)

5.1.1.1.3. Synthesis of 4-nitrophenylacetic acid (9)

A mixture of concentrated nitric acid (20 ml) and an equal volume of concentrated sulphuric acid were placed in a two-necked flask fitted with a thermometer and a dropping funnel. The mixture was cooled to 10 ^{o}C with stirring in ice-bath and benzyl cyanide (**7**, 15 ml, 0.126 mol) was run into it at such a rate (about 30 min) that the temperature was maintained around 10 ^{o}C and did not rise above 20 ^{o}C. The solution was further stirred for 1 hr at room temperature and then poured onto crushed ice. A pasty mass slowly separated containing 4-nitrobenzyl cyanide **(5)** and the oily 2-nitrobenzyl cyanide. Recrystallisation from methanol afforded white needles of compound (**5**, 10.15 g, 50 %), **m.p.** 105-06 ^{o}C (Lit[2] 105-06 ^{o}C).

A solution of sulphuric acid was prepared by adding concentrated sulphuric acid (25 ml) cautiously into water (25 ml). Two thirds of the sulphuric acid was added into an RBF containing 4-nitrobenzylcyanide (**8**, 7.45 g, 0.046 mol) and the nitrile adhering to the walls of the flask was washed down with the remaining quantity of sulphuric acid solution. The mixture was boiled under reflux for 15 min and then diluted with an equal volume of ice-cold water (50 ml). The resulting yellow solid mass was filtered, washed, decolorized and recrystallised from water to yield the acid as off-white to yellowish crystals **(9)**.

Anal.:

M.P. **:** 154-55 ^{o}C (Lit[2] 151-52 ^{o}C)

Yield **:** 96 %

TLC **:** R_f 0.5 (Benzene:Chloroform:: 50:50 + 2 drops of AcOH)

IR (cm^{-1}) **:** 3080, 1705, 1523, 1336, 1252 and 709.

5.1.1.1.4. Synthesis of 3-chlorophenylacetic acid (11)

Into a 500 ml RBF, provided with a reflux condenser, 20 ml of water and 80 ml of conc. sulphuric acid (98 %) were taken. To the contents 3-chlorobenzyl cyanide (**10**, 10 g) was added and the mixture heated under reflux for 45-60 minutes upto completion of hydrolysis. The mixture was poured into 2-3 volumes of water with stirring and the crude acid was filtered at the vacuum pump. The crude material was heated with water and washed thrice with small volumes of hot water. On cooling, it afforded a white crystalline product of 3-chlorophenylacetic acid **(11)**.

Anal.:

M.P. **:** 78-80 ^{o}C (Lit[3] 79-80 ^{o}C)

Yield **:** 84 %

5. Commercially available **phenylacetic acid (12)** and **2-chlorophenylacetic acid (13)** were used for the preparation of the corresponding ethanone derivatives.

5.1.1.2. Synthesis of substituted 1,2-diarylethanones (15-32)

5.1.1.2.1. 2-Phenyl-1-*p*-tolylethanone (15)

Phenylacetic acid (**12**, 1.0 g, 7.35 mmol) was converted to acid chloride by refluxing it for 3 hrs under anhydrous conditions with thionyl chloride (4 ml, 29 mmol). The excess of thionyl chloride was removed by vacuum. In another RBF, dry DCM (15 ml) and anhydrous $AlCl_3$ (0.98 g, 7.35 mmol) were taken and stirred under anhydrous conditions for 10 minutes. To this solution, toluene (0.781 ml, 7.35 mmol) was added dropwise. The acid chloride was added to the contents of the RBF and stirring was continued for 2 hrs maintaining the temperature between -5 to -10 °C. The reaction mixture was poured over crushed ice containing conc. HCl and extracted with successive quantities of chloroform. The pooled organic extract was washed with sodium bicarbonate solution and water. It was dried over anhydrous sodium sulfate, and subjected to solvent recovery. The crude product so obtained was recrystallised from methanol after decolorisation with activated charcoal to afford 2-phenyl-1-*p*-tolylethanone **(15)**, as sharp needle shaped white crystals.

Anal.:

M.P. **:** 108-10 °C (Lit[3] 109-11 ^{o}C)

Yield **:** 67 %

TLC **:** R_f 0.66 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 3026, 2906, 1680, 1602, 1330, 1172

5.1.1.2.2. 1-(4-Bromophenyl)-2-phenylethanone (16)

The title compound **(16)** was synthesized as per the method described for compound **(15)** replacing toluene by bromobenzene (0.77 ml, 7.35 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-bromophenyl)-2-phenylethanone **(16)**, as white crystals.

Anal.:

M.P. **:** 105-06 °C (Lit[3] 106-08 °C)

Yield **:** 61 %

TLC **:** R_f 0.64 (*n*-Hexane:Ethyl acetate :: 80:20)

5.1.1.2.3. 1-(4-Methoxyphenyl)-2-phenylethanone (17)

The title compound **(17)** was synthesized as per the method described for compound **(15)** replacing toluene by anisole (0.87 ml, 7.35 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-methoxyphenyl)-2-phenylethanone **(17)**, as white crystals.

Anal.:

M.P. **:** 128-30 °C (Lit[3] 130-31 °C)

Yield **:** 85 %

TLC **:** R_f 0.64 (*n*-Hexane:Ethyl acetate :: 80:20)

5.1.1.2.4. 1-(4-Fluorophenyl)-2-phenylethanone (18)

The title compound **(18)** was synthesized as per the method described for compound **(15)** replacing toluene by fluorobenzene (0.82 ml, 7.35 mmol).The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-fluorophenyl)-2-phenylethanone **(18)**, as needle shaped greenish crystals.

Anal.:

M.P. **:** 72-74 °C (Lit[3] 71-73 °C)

Yield **:** 57 %

TLC **:** R_f 0.62 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 3036, 1687, 1598, 1500, 1329, 1235, 826 and 727

5.1.1.2.5. 1-(4-Methylthiophenyl)-2-phenylethanone (19)

The title compound **(19)** was synthesized as per the method described for compound **(15)** replacing toluene by thioanisole (1.05 ml, 7.35 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-methylthiophenyl)-2-phenylethanone **(19)**, as creamy white colored sharp needle shaped crystals.

Anal.:

M.P. **:** 102-04 °C (Lit[3] 101-03 °C)

Yield **:** 58 %

TLC **:** R_f 0.61 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 3026, 2906, 1680, 1602, 1330, 1172 and 731

5.1.1.2.6. 2-(4-Chlorophenyl)-1-*p*-tolylethanone (20)

The title compound **(20)** was synthesized as per the method described for compound **(15)** using toluene (1.05 ml,7.35 mmol) and replacing phenylacetic acid by 4-chlorophenylacetic acid (**3**, 1.0 g, 5.8 mmol).The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-1-*p*-tolylethanone **(20)**, as yellowish sharp needle shaped crystals.

Anal.:

M.P. **:** 115-17 °C (Lit[3] 116-18 °C)

Yield **:** 83 %

TLC **:** R_f 0.63 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 3065, 1687, 1597, 1500, 1408, 1329, 1235, 726

5.1.1.2.7. 1-(4-Bromophenyl)-2-(4-chlorophenyl)ethanone (21)

The title compound **(21)** was synthesized as per the method described for compound **(15)** using 4-chlorophenylacetic acid (**3**, 1.0 g, 5.8 mmol) and bromobenzene (0.61 ml, 5.8 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-bromophenyl)-2-(4-chlorophenyl)ethanone **(21)**, as yellowish sharp needle shaped crystals.

Anal.:

M.P. **:** 130-32 °C (Lit[3] 130-32 °C)

Yield **:** 72 %

TLC **:** R_f 0.63 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 3100, 2964, 1695, 1491, 1408, 1338, 1252, 1086 and 807

5.1.1.2.8. 2-(4-Chlorophenyl)-1-(4-fluorophenyl)ethanone (22)

The title compound **(22)** was synthesized as per the method described for compound **(15)** using 4-chlorophenylacetic acid (**3**, 1.0 g, 5.8 mmol) and fluorobenzene (0.56 ml, 5.8 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-1-(4-fluorophenyl)ethanone **(22)**, as yellowish sharp needle shaped crystals.

Anal.:

M.P. **:** 126-28 °C (Lit[3] 124-26 °C)

Yield **:** 78 %

TLC **:** R_f 0.60 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 2911, 1677, 1584, 1333, 1215, 1181, 1091, 816 and 707

5.1.1.2.9. 1,2-Bis(4-chlorophenyl)ethanone (23)

The title compound **(23)** was synthesized as per the method described for compound **(15)** using 4-chlorophenylacetic acid (**3**, 1.0 g, 5.8 mmol) and chlorobenzene (0.63 ml, 5.8 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 1,2-bis(4-chlorophenyl)ethanone **(23)**, as yellowish sharp needle shaped crystals.

Anal.:

M.P. **:** 114-16 °C (Lit[3] 115-17 °C)

Yield **:** 72 %

TLC **:** R_f 0.63 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 3095, 2897, 1738, 1688, 1583, 1487, 1088, 815 and 731

5.1.1.2.10. 2-(4-Chlorophenyl)-1-phenylethanone (24)

The title compound **(24)** was synthesized as per the method described for compound **(15)** using 4-chlorophenylacetic acid (**3**, 1.0 g, 5.8 mmol) and benzene (0.52 ml, 5.8 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-1-phenylethanone **(24)**, as white sharp needle shaped crystals.

Anal.:

M.P. **:** 140-42 °C (Lit[3] 137-39 °C)

Yield **:** 62 %

TLC **:** R_f 0.63 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 3058, 2907, 1682, 1592, 1492, 1330, 1213, 1091 and 685

5.1.1.2.11. 2-(4-Chlorophenyl)-1-(4-methylthiophenyl)ethanone (25)

The title compound **(25)** was synthesized as per the method described for compound **(15)** using 4-chlorophenylacetic acid (**3**, 1 g, 5.8 mmol) and thioanisole (0.68 ml, 5.8 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-1-(4-methylthiophenyl)ethanone **(25)**, as white colored sharp needle shaped crystals.

Anal.:

M.P. **:** 158-60 °C (Lit[3] 160-62 °C)

Yield **:** 70 %

TLC **:** R_f 0.67 (*n*-Hexane:Ethyl acetate :: 80:20)

5.1.1.2.12. 2-(4-Nitrophenyl)-1-*p*-tolylethanone (26)

The title compound **(26)** was synthesized as per the method described for compound **(15)** using 4-nitrophenylacetic acid (**9**, 1.0 g, 5.5 mmol) and toluene (0.58 ml, 5.5 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-nitrophenyl)-1-*p*-tolylethanone **(26)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 112-14 °C (Lit[3] 114-16 °C)

Yield **:** 70 %

TLC **:** R_f 0.69 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 3078, 1681, 1602, 1514, 1342, 1105 and 854

5.1.1.2.13. 2-(4-Nitrophenyl)-1-phenylethanone (27)

The title compound **(27)** was synthesized as per the method described for compound **(15)** using 4-nitrophenylacetic acid (**9**, 1.0 g, 5.5 mmol) and benzene (0.5 ml, 5.5 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-nitrophenyl)-1-phenylethanone **(27)**, as green colored sharp needle shaped crystals.

Anal.:

M.P. **:** 134-36 °C (Lit[3] 135-37 °C)

Yield **:** 90 %

TLC **:** R_f 0.63 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 2920, 1686, 1600, 1515, 1350, 1323, 1211, 1200, 1104, 990

5.1.1.2.14. 1,2-Di-*p*-tolylethanone (28)

The title compound **(28)** was synthesized as per the method described for compound **(15)** using 4-methylphenylacetic acid (**6**, 1.0 g, 6.6 mmol) and toluene (0.7 ml, 6.6 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 1,2-di-*p*-tolylethanone **(28)**, as yellowish colored sharp needle shaped crystals.

Anal.:

M.P. **:** 106-08 °C (Lit[3] 106-09 °C)

Yield **:** 87 %

TLC **:** R_f 0.61 (*n*-Hexane:Ethyl acetate :: 80:20)

IR (cm^{-1}) **:** 2912, 1689, 1585, 1476, 1401, 1327, 1208, 1086, 986

5.1.1.2.15. 2-(2-Chlorophenyl)-1-(4-chlorophenyl)ethanone (29)

The title compound **(29)** was synthesized as per the method described for compound **(15)** using 2-chlorophenylacetic acid (**13**, 1.0 g, 5.8 mmol) and chlorobenzene (0.76 ml, 5.8 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(2-chlorophenyl)-1-(4-chlorophenyl)ethanone **(29)**, as white colored sharp needle shaped crystals.

Anal.:

M.P. **:** 92-94 °C (Lit[3] 93-95 °C)

Yield **:** 72 %

TLC **:** R_f 0.68 (*n*-Hexane:Ethyl acetate :: 80:20)

5.1.1.2.16. 2-(2-Chlorophenyl)-1-(4-methylthiophenyl)ethanone (30)

The title compound **(30)** was synthesized as per the method described for compound **(15)** using 2-chlorophenylacetic acid (**13**, 1.0 g, 5.8 mmol) and thioanisole (0.68 ml, 5.8 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(2-chlorophenyl)-1-(4-methylthiophenyl)ethanone **(30)**, as yellowish colored sharp needle shaped crystals.

Anal.:

M.P. **:** 90-92 °C (Lit[3] 89-92 °C)

Yield **:** 82 %

TLC **:** R_f 0.60 (*n*-Hexane:Ethyl acetate :: 80:20)

5.1.1.2.17. 2-(3-Chlorophenyl)-1-*p*-tolylethanone (31)

The title compound **(31)** was synthesized as per the method described for compound **(15)** using 3-chlorophenylacetic acid (**11**, 1 g, 5.8 mmol) and toluene (0.61 ml, 5.8 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(3-chlorophenyl)-1-*p*-tolylethanone **(31)**, as white colored sharp needle shaped crystals.

Anal.:

M.P. **:** 83-85 °C (Lit[3] 84-85 °C)

Yield **:** 77 %

TLC **:** R_f 0.61 (*n*-Hexane:Ethyl acetate :: 80:20)

5.1.1.2.18. 1,2-diphenylethanone/benzoin (32)

The title compound **(32)** was synthesized as per the method described for compound **(15)** using phenylacetic acid (**12**, 1.0 g, 7.35 mmol) and benzene (0.72 ml, 7.35 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 1,2-diphenylethanone **(32)**, as white colored sharp needle shaped crystals.

Anal.:

M.P. **:** 98-100 °C (Lit[3] 100-02 °C)

Yield **:** 79 %

TLC **:** R_f 0.69 (*n*-Hexane:Ethyl acetate :: 80:20)

5.1.1.3. Synthesis of substituted diaryl-1,2-diones (33-50)

5.1.1.3.1. 1-Phenyl-2-*p*-tolylethane-1,2-dione (33)

Selenium dioxide (0.83 g, 7.5 mmol) was added to a solution of 2-phenyl-1-*p*-tolyl-ethanone (**15**, 1.05 g, 4.9 mmol) in dimethylsulfoxide (21 ml) in a loosely stoppered conical flask and irradiated in a microwave oven for 110 seconds intermittently. The hot mixture was filtered and the filtrate was poured over crushed ice. The 1-phenyl-2-*p*-tolylethane-1,2-dione **(33)** was obtained as a sticky product which could not be recrystallised from any solvent. Hence, it was used directly in the next step.

Anal.:

Yield **:** 89 %

TLC **:** R_f 0.51 (*n*-Hexane:Ethyl acetate :: 95:5)

5.1.1.3.2. 1-(4-Bromophenyl)-2-phenylethane-1,2-dione (34)

The title compound **(34)** was synthesized as per the method described for compound **(33)** using 1-(4-bromophenyl)-2-phenylethanone (**16**, 1.25 g, 4.5 mmol) under microwave for 100 sec. The crude product 1-(4-bromophenyl)-2-phenylethane-1,2-dione **(34)**, was obtained as a sticky material which was used directly in the next step.

Anal.:

Yield **:** 68 %

TLC **:** R_f 0.46 (*n*-Hexane:Ethyl acetate :: 95:5)

5.1.1.3.3. 1-(4-Methoxyphenyl)-2-phenylethane-1,2-dione (35)

The title compound **(35)** was synthesized as per the method described for compound **(33)** using 1-(4-methoxyphenyl)-2-phenylethanone (**17**, 1.05 g, 9.4 mmol) under microwaves for 95 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-methoxyphenyl)-2-phenylethane-1,2-dione **(35)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 50-52 °C (Lit[3] 49-51 °C)

Yield **:** 66 %

TLC **:** R_f 0.55 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3130, 2922, 1668, 1590, 1497, 1186, 765 and 693

5.1.1.3.4. 1-(4-Fluorophenyl)-2-phenylethane-1,2-dione (36)

The title compound **(36)** was synthesized as per the method described for compound **(33)** using 1-(4-fluorophenyl)-2-phenylethanone (**18**, 0.9 g, 4.3 mmol) under microwaves for 90 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-fluorophenyl)-2-phenylethane-1,2-dione **(36)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 65-66 °C (Lit[3] 66-68 °C)

Yield **:** 74 %

TLC **:** R_f 0.51 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3072, 1666, 1593, 1501, 1406, 1236, 1204, 1154, 874 and 755

5.1.1.3.5. 1-(4-Methylthiophenyl)-2-phenylethane-1,2-dione (37)

The title compound **(37)** was synthesized as per the method described for compound **(33)** using 1-(4-methylthiophenyl)-2-phenylethanone (**19**, 1.05 g, 4.3 mmol) under microwaves for 105 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-methylthiophenyl)-2-phenylethane-1,2-dione **(37)**, as yellowish colored sharp needle shaped crystals.

Anal.:

M.P. **:** 60-62 °C (Lit[3] 61-63 °C)

Yield **:** 63 %

TLC **:** R_f 0.52 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3130, 1663, 1585, 1400, 1216, 1177, 1092 and 872

5.1.1.3.6. 1-(4-Chlorophenyl)-2-*p*-tolylethane-1,2-dione (38)

The title compound **(38)** was synthesized as per the method described for compound **(33)** using 2-(2-chlorophenyl)-1-(4-chlorophenyl)ethanone (**20**, 1.2 g, 4.9 mmol) under microwaves for 70 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-chlorophenyl)-2-*p*-tolylethane-1,2-dione **(38)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 118-20 °C (Lit[3] 116-18 °C)

Yield **:** 75 %

TLC **:** R_f 0.49 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3130, 1662, 1602, 1400, 1211, 1173, 879 and 830

5.1.1.3.7. 1-(4-Bromophenyl)-2-(4-chlorophenyl)ethane-1,2-dione (39)

The title compound **(39)** was synthesized as per the method described for compound **(33)** using 1-(4-bromophenyl)-2-(4-chlorophenyl)ethanone (**21**, 1.3 g, 4.2 mmol) under microwaves for 90 sec. The crude product so obtained was crystallized from methanol to afford the desired

compound 1-(4-bromophenyl)-2-(4-chlorophenyl)ethane-1,2-dione **(39)**, as greenish colored sharp needle shaped crystals.

Anal.:

M.P. **:** 204-06 °C (Lit[3] 206-08 °C)

Yield **:** 68 %

TLC **:** R_f 0.47 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3095, 1664, 1581, 1398, 1208, 1171, 878 and 823

5.1.1.3.8. 1-(4-Chlorophenyl)-2-(4-fluorophenyl)ethane-1,2-dione (40)

The title compound **(40)** was synthesized as per the method described for compound **(33)** using 2-(4-chlorophenyl)-1-(4-fluorophenyl)ethanone (**22**, 1.15 g, 4.6 mmol) under microwaves for 100 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-chlorophenyl)-2-(4-fluorophenyl)ethane-1,2-dione **(40)**, as green colored sharp needle shaped crystals.

Anal.:

M.P. **:** 140-42 °C (Lit[3] 144-46 °C)

Yield **:** 86 %

TLC **:** R_f 0.51 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3103, 1664, 1593, 1402, 1231, 1214, 1155, 882, 840 and 744

5.1.1.3.9. 1,2-Bis(4-chlorophenyl)ethane-1,2-dione (41)

The title compound **(41)** was synthesized as per the method described for compound **(33)** using 1,2-bis(4-chlorophenyl)ethanone (**23**, 1.12 g, 4.2 mmol) under microwaves for 105 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1,2-bis(4-chlorophenyl)ethane-1,2-dione **(41)**, as light yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 200-02 °C (Lit[3] 196-98 °C)

Yield **:** 76 %

TLC **:** R_f 0.55 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3095, 1662, 1581, 1399, 1208, 1170, 1088, 877, 833 and 762

5.1.1.3.10. 1-(4-Chlorophenyl)-2-phenylethane-1,2-dione (42)

The title compound **(42)** was synthesized as per the method described for compound **(33)** using 2-(4-chlorophenyl)-1-phenylethanone (**24**, 1.12 g, 4.8 mmol) under microwaves for 60 sec.The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-chlorophenyl)-2-phenylethane-1,2-dione **(42)**, as light green colored sharp needle shaped crystals.

Anal.:

M.P. **:** 76-78 °C (Lit[3] 79-81 °C)

Yield **:** 70 %

TLC **:** R_f 0.53 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3135, 16668, 1580, 1400, 1210, 1171, 875 and 712

5.1.1.3.11. 1-(4-Chlorophenyl)-2-(4-methylthiophenyl)ethane-1,2-dione (43)

The title compound **(43)** was synthesized as per the method described for compound **(33)** using 2-(4-chlorophenyl)-1-(4-methylthiophenyl)ethanone (**25**, 1.15 g, 4.1 mmol) under microwaves for 60 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-chlorophenyl)-2-(4-methylthiophenyl)ethane-1,2-dione **(43)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 130-32 °C (Lit[3] 134-36 °C)

Yield **:** 81.24 %

TLC **:** R_f 0.49 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3130, 1662, 1602, 1400, 1211, 1173, 879 and 735

5.1.1.3.12. 1-(4-Nitrophenyl)-2-*p*-tolylethane-1,2-dione (44)

The title compound **(44)** was synthesized as per the method described for compound **(33)** using 2-(4-nitrophenyl)-1-*p*-tolylethanone (**26**, 1.0 g, 3.9 mmol) under microwaves for 90 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-nitrophenyl)-2-*p*-tolylethane-1,2-dione **(44)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 186-88 °C (Lit[3] 185-86 °C)

Yield **:** 52 %

TLC **:** R_f 0.49 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3107, 1660, 1600, 1521, 1345, 1208, 1175 and 839

5.1.1.3.13. 1-(4-Nitrophenyl)-2-phenylethane-1,2-dione (45)

The title compound **(45)** was synthesized as per the method described for compound **(33)** using 2-(4-nitrophenyl)-1-phenylethanone (**27**, 1.2 g, 4.9 mmol) under microwaves for 100 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(4-nitrophenyl)-2-phenylethane-1,2-dione **(45)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 138-40 °C (Lit[3] 140-41 °C)

Yield **:** 77 %

TLC **:** R_f 0.74 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3112, 1664, 1526, 1347, 1205, 1173 and 885

5.1.1.3.14. 1,2-Di-*p*-tolylethane-1,2-dione (46)

The title compound **(46)** was synthesized as per the method described for compound **(33)** using 1,2-di-*p*-tolylethanone (**28**, 1.3 g, 5.8 mmol) under microwaves for 90 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1,2-di-*p*-tolylethane-1,2-dione **(46)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 102-03 °C (Lit[3] 101-03 °C)

Yield **:** 78 %

TLC **:** R_f 0.51 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3116, 2860, 1669, 1601, 1408, 1325, 1215, 1172 and 882

5.1.1.3.15. 1-(2-Chlorophenyl)-2-(4-chlorophenyl)ethane-1,2-dione (47)

The title compound **(47)** was synthesized as per the method described for compound **(33)** using 2-(2-chlorophenyl)-1-(4-chlorophenyl)ethanone (**29**, 1.12 g, 4.2 mmol) under microwaves for 85 sec. The crude product so obtained was crystallized from methanol to afford the desired

compound 1-(2-chlorophenyl)-2-(4-chlorophenyl)ethane-1,2-dione **(47)**, as green colored sharp needle shaped crystals.

Anal.:

M.P. **:** 102-04 °C (Lit[3] 103-05 °C)

Yield **:** 79 %

TLC **:** R_f 0.48 (*n*-Hexane:Ethyl acetate :: 95:5)

5.1.1.3.16. 1-(2-Chlorophenyl)-2-(4-methylthiophenyl)ethane-1,2-dione (48)

The title compound **(48)** was synthesized as per the method described for compound **(33)** using 2-(2-chlorophenyl)-1-(4-methylthiophenyl)ethanone (**30**, 1.52 g, 5.5 mmol) under microwaves for 120 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(2-chlorophenyl)-2-(4-methylthiophenyl)ethane-1,2-dione **(48)**, as yellow colored sharp needle shaped crystals.

Anal.:

M.P. **:** 100-02 °C (Lit[3] 101-03 °C)

Yield **:** 81 %

TLC **:** R_f 0.49 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3065, 1666, 1604, 1417, 1208, 1168 and 707

5.1.1.3.17. 1-(3-Chlorophenyl)-2-*p*-tolylethane-1,2-dione (49)

The title compound **(49)** was synthesized as per the method described for compound **(33)** using 2-(3-chlorophenyl)-1-*p*-tolylethanone (**31**, 1.12 g, 4.2 mmol) under microwaves for 105 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1-(3-chlorophenyl)-2-*p*-tolylethane-1,2-dione **(49)**, as yellowish colored sharp needle shaped crystals.

Anal.:

M.P. **:** 108-10 °C (Lit[3] 110-12 °C)

Yield **:** 65 %

TLC **:** R_f 0.53 (*n*-Hexane:Ethyl acetate :: 95:5)

IR (cm^{-1}) **:** 3441, 3066, 1663, 1601, 1417, 1205, 1168 and 709

5.1.1.3.18. 1,2-Diphenylethanedione/benzil (50)

The title compound **(50)** was synthesized as per the method described for compound **(33)** using 1,2-diphenylethanone (**32**, 1.10 g, 4.2 mmol) under microwaves for 35 sec. The crude product so obtained was crystallized from methanol to afford the desired compound 1,2-diphenyldione **(50)**, as yellowish colored sharp needle shaped crystals. Commercially available benzil **(48)** was also used in some instances.

Anal.:

M.P. **:** 86-88 °C (Lit[3] 88-90 °C)

Yield **:** 72 %

TLC **:** R_f 0.68 (*n*-Hexane:Ethyl acetate :: 95:5)

5.1.2. Synthesis of 4,5-diaryl 1*H*-imidazole derivatives

I. General method for synthesis of 4,5-diaryl 1*H*-imidazoles (52a-68a and 52b-68b)

Ammonium acetate (0.62 g, 8.0 mmol) was added to a solution of the respective ethane-1,2-diones (**52a-68a**, 0.45 g, 2.0 mmol) in a mixture of DMSO and ionic liquid (1:0.1, 15 ml:1.5 ml). To this solution either 4-chlorobenzaldehyde (**51a**, 0.28 ml, 2.0 mmol) or 4-fluorobenzaldehyde (**51b**, 0.28 ml, 2.0 mmol) and catalytic amounts of molecular iodine (0.079 g, 0.31 mmol) were added. This mixture was heated at 110 °C on an oil bath with constant stirring. The reaction is continuously monitored by TLC. After completion, the reaction mixture was poured over crushed ice with constant stirring. The precipitated solid was filtered off under vacuum filtration and recrystallised from methanol after decolorisation by activated charcoal treatment to afford 4,5-diaryl 1*H*-imidazoles (**52a-68a** and **52b-68b** resp).

5.1.2.1. Synthesis of 2-(4-chlorophenyl)-4,5-diaryl-1*H*-imidazole derivatives (52a-68a)

5.1.2.1.1. 2-(4-Chlorophenyl)-4-phenyl-5-*p*-tolyl-1*H*-imidazole (52a)

Ammonium acetate (0.62 g, 8.0 mmol) was added to a solution of 1-phenyl-2-*p*-tolylethane-1,2-dione (**33**, 0.45 g, 2.0 mmol) in a mixture of DMSO and ionic liquid (1:0.1, 15 ml:1.5 ml). To this solution 4-chlorobenzaldehyde (**51a**, 0.28 ml, 2.0 mmol) and catalytic amounts of molecular iodine (0.08 g, 0.3 mmol) were added. This mixture was heated at 110 °C on an oil bath with constant stirring. The reaction was continuously monitored by TLC. After completion, the reaction mixture was poured over crushed ice with constant stirring. The precipitated solid was filtered off

under vacuum filtration and recrystallised from methanol after decolorisation by activated charcoal treatment to afford 2-(4-chlorophenyl)-4-phenyl-5-*p*-tolyl-1*H*-imidazole **(52a)**, as white crystals.

Anal.:

M.P. **:** 235-36 °C

Yield **:** 88 %

TLC **:** R_f 0.45 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3389, 3126, 1664, 1511, 1430, 1257, 1107 and 820.

^{1}H NMR **:** δ 2.34 (s, 3H), 7.15-7.17 (d, 2H), 7.24-7.28 (t, 1H), 7.31-7.35 (t, 2H), 7.40-7.47 (m, 4H), 7.52-7.54 (d, 2H), 8.08-8.11 (d, 2H), 12.64 (s, 1H)

Elemental **:** Calculated for $C_{22}H_{17}ClN_2$: C, 78.63; H, 4.97; N, 8.12; Found: C, 78.49; H, 5.19; N, 8.23 %

5.1.2.1.2. 4-(4-Bromophenyl)-2-(4-chlorophenyl)-5-phenyl-1*H*-imidazole (53a)

The title compound **(53a)** was synthesized as per the method described for compound **(52a)** using 1-(4-bromophenyl)-2-phenylethane-1,2-dione (**34**, 0.29 g, 1.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(4-bromophenyl)-2-(4-chlorophenyl)-5-phenyl-1*H*-imidazole **(53a)**, as yellow crystals.

Anal.:

M.P. **:** 217-18 °C

Yield **:** 85 %

TLC **:** R_f 0.46 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3449, 3094, 2556, 1680, 1425, 1322, 1295 and 755

^{1}H NMR : δ 7.09-7.11 (t, 1H), 7.24-7.26 (d, 2H), 7.39-7.41 (d, 2H), 7.57-7.60 (m, 2H), 7.82-7.84 (t, 2H), 7.87-7.92 (m, 4H), 3.99 (s, 1H)

MS **:** *m/z* 409.79 (M^+)

5.1.2.1.3. 2-(4-Chlorophenyl)-4-(4-methoxyphenyl)-5-phenyl-1*H*-imidazole (54a)

The title compound **(54a)** was synthesized as per the method described for compound **(52a)** using 1-(4-methoxyphenyl)-2-phenylethane-1,2-dione (**35**, 0.48 g, 2.0 mmol). The crude product

so obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-4-(4-methoxyphenyl)-5-phenyl-1*H*-imidazole **(54a)**, as white crystals.

Anal.:

M.P. **:** 200-01 °C

Yield **:** 84 %

TLC **:** R_f 0.48 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3280, 3127, 1510, 1488, 1250, 1177, 834 and 729

^{1}H NMR **:** δ 3.81 (s, 3H), 6.99-7.01 (d, 2H), 7.18-7.22 (t, 1H), 7.26-7.30 (t, 2H), 7.40-7.45 (m, 2H), 7.47-7.51 (m, 2H), 7.54-7.56 (d, 2H), 8.07-8.09(d, 2H), 12.64 (s, 1H)

Elemental **:** Calculated for $C_{22}H_{17}ClN_2O$: C, 66.45; H, 4.08; N, 7.09; Found: C, 66.60; H, 4.1; N, 7.14 %

5.1.2.1.4. 2-(4-Chlorophenyl)-4-(4-fluorophenyl)-5-phenyl-1*H*-imidazole (55a)

The title compound **(55a)** was synthesized as per the method described for compound **(52a)** using 1-(4-fluorophenyl)-2-phenylethane-1,2-dione (**36**, 0.46 g, 2.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-4-(4-fluorophenyl)-5-phenyl-1*H*-imidazole **(55a)**, as white crystals.

Anal.:

M.P. **:** 177-78 °C

Yield **:** 93 %

TLC **:** R_f 0.43 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3257, 3073, 1537, 1225, 1091, 836 and 731

^{1}H NMR **:** δ 6.96-7.0 (t, 2H), 7.26-7.37 (m, 5H), 7.43-7.47 (t, 4H), 7.85-7.87 (d, 2H).

MS **:** *m/z* 348.06 (M+1), 349 (M+2)

5.1.2.1.5. 2-(4-Chlorophenyl)-4-(4-methylthiophenyl)-5-phenyl-1*H*-imidazole (56a)

The title compound **(56a)** was synthesized as per the method described for compound **(52a)** using 1-(4-methylthiophenyl)-2-phenylethane-1,2-dione (**37**, 0.51 g, 2.0 mmol). The crude product

so obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-4-(4-methylthiophenyl)-5-phenyl-1*H*-imidazole **(56a)**, as white crystals.

Anal.:

M.P. **:** 149-50 °C

Yield **:** 90 %

TLC **:** R_f 0.46 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3412, 3075, 1501, 1320, 1089 and 825

^{1}H NMR **:** δ 2.49 (*s*, 3H), 7.21-7.23 (*d*, 2H), 7.29-7.30 (*t*, 1H), 7.35-7.37 (*t*, 2H), 7.45-7.48 (*m*, 4H), 7.52-7.54 (*d*, 2H), 8.07-8.11 (*d*, 2H), 12.75 (*bs*, 1H)

Elemental **:** Calculated for $C_{22}H_{17}ClN_2S$: C, 70.71; H, 4.55; N, 7.43; Found: C, 69.93; H, 4.55; N, 7.50 %

5.1.2.1.6. 2,5-Bis(4-chlorophenyl)-4-*p*-tolyl-1*H*-imidazole (57a)

The title compound **(57a)** was synthesized as per the method described for compound **(52a)** using 1-(4-chlorophenyl)-2-*p*-tolylethane-1,2-dione (**38**, 0.26 g, 1.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2,5-bis(4-chlorophenyl)-4-*p*-tolyl-1*H*-imidazole **(57a)**, as white crystals.

Anal.:

M.P. **:** 218-19 °C

Yield **:** 79 %

TLC **:** R_f 0.46 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3412, 3085, 1485, 1251, 1091 and 824

^{1}H NMR **:** δ 2.37 (s, 3H), 7.21-7.23 (d, 2H), 7.33-7.35 (d, 2H), 7.41-7.43 (d, 2H), 7.47-7.50 (d, 2H), 7.55-7.57 (d, 2H), 8.08-8.12 (d, 2H)

5.1.2.1.7. 4-(4-Bromophenyl)-2,5-bis(4-chlorophenyl)-1*H*-imidazole (58a)

The title compound **(58a)** was synthesized as per the method described for compound **(52a)** using 1-(4-bromophenyl)-2-(4-chlorophenyl)ethane-1,2-dione (**39**, 0.65 g, 2.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(4-bromophenyl)-2,5-bis(4-chlorophenyl)-1*H*-imidazole **(58a)**, as white crystals.

Anal.:

M.P. **:** 270-71 °C

Yield **:** 56 %

TLC **:** R_f 0.47 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3447, 3129, 1399, 1318, 1125 and 826

^{1}H NMR **:** δ 7.38-7.40 (d, 2H), 7.45-7.55 (m, 8H), 8.14-8.16 (d, 2H).

MS **:** *m/z* 442.23 (M^+), 444.22 (M+2) and 446.12 (M+4)

5.1.2.1.8. 2,5-Bis(4-chlorophenyl)-4-(4-fluorophenyl)-1*H*-imidazole (59a)

The title compound **(59a)** was synthesized as per the method described for compound **(52a)** using 1-(4-chlorophenyl)-2-(4-fluorophenyl)ethane-1,2-dione (**40**, 0.53 g, 2.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2,5-bis(4-chlorophenyl)-4-(4-fluorophenyl)-1*H*-imidazole **(59a)**, as white crystals.

Anal.:

M.P. **:** 232-33 °C

Yield **:** 75 %

TLC **:** R_f 0.46 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3423, 3080, 1535, 1507, 1255, 1128 and 835

^{1}H NMR **:** δ 7.14-7.18 (t, 2H), 7.35-7.37 (d, 2H), 7.46-7.55 (m, 6H), 8.08-8.10 (d, 2H), 13.02 (s, 1H)

5.1.2.1.9. 2,4,5-Tris(4-chlorophenyl)-1*H*-imidazole (60a)

The title compound **(60a)** was synthesized as per the method described for compound **(52a)** using 1,2-bis(4-chlorophenyl)ethane-1,2-dione (**41**, 0.28 g, 1.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2,4,5-*tris*(4-chlorophenyl)-1*H*-imidazole **(60a)**, as white crystals.

Anal.:

M.P. **:** 256-57 °C

Yield **:** 45 %

TLC **:** R_f 0.48 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3448, 3128, 1499, 1259, 1091 and 828

^{1}H NMR **:** δ 7.36-7.38 (d, 4H), 7.46-7.48 (d, 2H), 7.51-7.53 (d, 4H), 8.12-8.14 (d, 2H)

5.1.2.1.10. 2,5-Bis(4-chlorophenyl)-4-phenyl-1*H*-imidazole (61a)

The title compound **(61a)** was synthesized as per the method described for compound **(52a)** using 1-(4-chlorophenyl)-2-phenylethane-1,2-dione (**42**, 0.24 g, 1.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2,5-bis(4-chlorophenyl)-4-phenyl-1*H*-imidazole **(61a)**, as white crystals.

Anal.:

M.P. **:** 225-26 °C

Yield **:** 76 %

TLC **:** R_f 0.43 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3382, 3067, 1500, 1481, 1253, 1089 and 832

^{1}H NMR **:** δ 7.28-7.34 (m, 3H), 7.36-7.43 (m, 4H), 7.52-7.55 (t, 4H), 8.08-8.11 (d, 2H), 12.68 (s, 1H)

5.1.2.1.11. 2,4-Bis(4-chlorophenyl)-5-(4-methylthiophenyl)-1*H*-imidazole (62a)

The title compound **(62a)** was synthesized as per the method described for compound **(52a)** using 1-(4-chlorophenyl)-2-(4-methylthiophenyl)ethane-1,2-dione (**43**, 0.58 g, 2.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2,4-bis(4-chlorophenyl)-5-(4-methylthiophenyl)-1*H*-imidazole **(62a)**, as white crystals.

Anal.:

M.P. **:** 208-09 °C

Yield **:** 81 %

TLC **:** R_f 0.44 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3411, 3076, 1480, 1276, 1091 and 824

^{1}H NMR **:** δ 2.49 (s, 3H), 7.24-7.26 (d, 2H), 7.33-7.36 (t, 2H), 7.44-7.47 (m, 4H), 7.53-7.55 (d, 2H), 8.07-8.09 (d, 2H), 12.75 (s, 1H)

5.1.2.1.12. 2-(4-Chlorophenyl)-4-(4-nitrophenyl)-5-*p*-tolyl-1*H*-imidazole (63a)

The title compound **(63a)** was synthesized as per the method described for compound **(52a)** using 1-(4-nitrophenyl)-2-*p*-tolylethane-1,2-dione (**44**, 1.08 g, 2.0 mmol). The crude product so

obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-4-(4-nitrophenyl)-5-*p*-tolyl-1*H*-imidazole **(63a)**, as white crystals.

Anal.:

M.P. **:** > 278 °C

Yield **:** 84 %

TLC **:** R_f 0.45 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3339, 3131, 1506, 1484 and 1256

^{1}H NMR **:** δ 2.40 (s, 3H), 7.26-7.28 (d, 2H), 7.41-7.43 (d, 2H), 7.46-7.49 (d, 2H), 7.80-7.82 (d, 2H), 8.10-8.14 (t, 4H), 12.98 (s, 1H)

Elemental **:** Calculated for $C_{22}H_{16}ClN_3O_2$: C, 67.78; H, 4.14; N, 10.78; Found: C, 64.10; H, 4.33; N, 9.07 %

5.1.2.1.13. 2-(4-Chlorophenyl)-4-(4-nitrophenyl)-5-phenyl-1*H*-imidazole (64a)

The title compound **(64a)** was synthesized as per the method described for compound **(52a)** using 1-(4-nitrophenyl)-2-phenylethane-1,2-dione (**45**, 0.51 g, 2.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-4-(4-nitrophenyl)-5-phenyl-1*H*-imidazole **(64a)**, as yellow crystals.

Anal.:

M.P. **:** 239-40 °C

Yield **:** 85 %

TLC **:** R_f 0.47 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3351, 3131, 1506, 1328 and 1258

^{1}H NMR **:** δ 7.45-7.51 (m, 5H), 7.53-7.55 (d, 2H), 7.79-7.81 (d, 2H), 8.11-8.16 (t, 4H), 12.98 (s, 1H)

Elemental **:** Calculated for $C_{21}H_{14}ClN_3O_2$: C, 67.12; H, 3.75; N, 11.18; Found: C, 66.96; H, 3.72; N, 11.24 %

5.1.2.1.14. 2-(4-Chlorophenyl)-4,5-di-*p*-tolyl-1*H*-imidazole (65a)

The title compound **(65a)** was synthesized as per the method described for compound **(52a)** using 1,2-di-*p*-tolylethane-1,2-dione (**46**, 0.60 g, 2.0 mmol). The crude product so obtained was

crystallized from methanol to afford the desired compound 2-(4-chlorophenyl)-4,5-di-*p*-tolyl-1*H*-imidazole **(65a)**, as white crystals.

Anal.:

M.P. **:** 250-51 °C

Yield **:** 84 %

TLC **:** R_f 0.42 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3413, 3087, 1517, 1492, 1253, 1088 and 819

H^1 NMR **:** δ 2.33 (s, 6H), 7.14-7.15 (d, 4H), 7.40-7.42 (d, 4H), 7.44-7.47 (d, 2H), 8.07-8.09 (d, 2H), 12.56 (s, 1H)

Elemental **:** Calculated for $C_{23}H_{19}ClN_2$: C, 76.98; H, 5.34; N, 7.81; Found: C, 76.82; H, 5.48; N, 7.69 %

5.1.2.1.15. 4-(2-Chlorophenyl)-2,5-bis(4-chlorophenyl)-1*H*-imidazole (66a)

The title compound **(66a)** was synthesized as per the method described for compound **(52a)** using 1-(2-chlorophenyl)-2-(4-chlorophenyl)ethane-1,2-dione (**47**, 0.56 g, 2.0 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(2-chlorophenyl)-2,5-bis(4-chlorophenyl)-1*H*-imidazole **(66a)**, as white crystals.

Anal.:

M.P. **:** 262-63 °C

Yield **:** 86 %

TLC **:** R_f 0.44 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3421, 3120, 1496, 1259, 1127 and 832

^{1}H NMR **:** δ 7.26-7.28 (d, 2H), 7.44-7.53 (m, 7H), 7.58 (t, 1H), 8.07-8.09 (d, 2H), 12.94 (s, 1H)

Elemental **:** Calculated for $C_{21}H_{11}Cl_3N_2$: C, 62.10; H, 3.28; N, 7.01; Found: C, 62.14; H, 3.35; N, 6.90 %

5.1.2.1.16. 4-(2-Chlorophenyl)-2-(4-chlorophenyl)-5-(4-methylthiophenyl)-1*H*-imidazole (67a)

The title compound **(67a)** was synthesized as per the method described for compound **(52a)** using 1-(2-chlorophenyl)-2-(4-methylthiophenyl)ethane-1,2-dione (**48**, 0.58 g, 2.0 mmol). The

crude product so obtained was crystallized from methanol to afford the desired compound 4-(2-chlorophenyl)-2-(4-chlorophenyl)-5-(4-methylthiophenyl)-1*H*-imidazole **(67a)**, as white crystals.

Anal.:

M.P. **:** 178-79 °C

Yield **:** 93 %

TLC **:** R_f 0.46 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3422, 3071, 1500, 1260, 1091 and 757

^{1}H NMR **:** δ 2.44 (s, 3H), 7.12-7.14 (d, 2H), 7.33-7.36 (d, 2H), 7.42-7.55 (m, 6H), 7.07-7.09 (d, 2H), 12.79 (s, 1H)

5.1.2.1.17. 4-(3-Chlorophenyl)-2-(4-chlorophenyl)-5-*p*-tolyl-1*H*-imidazole (68a)

The title compound **(68a)** was synthesized as per the method described for compound **(52a)** using 1-(3-chlorophenyl)-2-(4-methylphenyl)ethane-1,2-dione (**49**, 0.42 g, 0.3 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(3-chlorophenyl)-2-(4-chlorophenyl)-5-*p*-tolyl-1*H*-imidazole **(68a)**, as white crystals.

Anal.:

M.P. **:** 210-11 °C

Yield **:** 93 %

TLC **:** R_f 0.45 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3424, 3060, 1599, 1463, 1247, 1090 and 823

^{1}H NMR **:** δ 2.37 (s, 3H), 7.20-7.24 (m, 4H), 7.41-7.45 (m, 5H), 7.63 (s, 1H), 8.09-8.11 (d, 2H), 12.87 (s, 1H)

5.1.2.2. Synthesis of 2-(4-fluorophenyl)-4,5-diaryl-1*H*-imidazole derivatives (52b-68b)

5.1.2.2.1. 2-(4-Fluorophenyl)-4-phenyl-5-*p*-tolyl-1*H*-imidazole (52b)

The title compound **(52b)** was synthesized as per the method described for compound **(52a)** using 1-phenyl-2-*p*-tolylethane-1,2-dione (**33**, 0.7 g, 0.31 mmol) and 4-fluorobenzaldehyde (**51b**, 0.299 g, 0.31 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-fluorophenyl)-4-phenyl-5-*p*-tolyl-1*H*-imidazole **(52b)**, as white crystals.

Anal.:

M.P. **:** 227-28 °C

Yield **:** 68 %

TLC **:** R_f 0.41 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3341, 3068, 1606, 1496, 1226 and 841

^{1}H NMR **:** δ 2.38 (s, 3H), 7.00-7.72 (m, 11H), 8.10-8.14 (dd, 2H), 12.47 (s, 1H).

MS **:** *m/z* 328.42 (M^+)

5.1.2.2.2. 5-(4-Bromophenyl)-2-(4-fluorophenyl)-4-phenyl-1*H*-imidazole (53b)

The title compound **(53b)** was synthesized as per the method described for compound **(52b)** using 1-(4-bromophenyl)-2-phenylethane-1,2-dione (**34**, 0.9 g, 0.31 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5-(4-bromophenyl)-2-(4-fluorophenyl)-4-phenyl-1*H*-imidazole **(53b)**, as white crystals.

Anal.:

M.P. **:** 210-11 °C

Yield **:** 73 %

TLC **:** R_f 0.46 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3322, 3080, 1636, 1509, 1229 and 881

^{1}H NMR **:** δ 7.17-7.21 (m, 2H), 7.32-7.38 (m, 3H), 7.46-7.53 (m, 6H), 8.09-8.14 (dd, 2H), 12.68 (s, 1H)

5.1.2.2.3. 2-(4-Fluorophenyl)-5-(4-methoxyphenyl)-4-phenyl-1*H*-imidazole (54b)

The title compound **(54b)** was synthesized as per the method described for compound **(52b)** using 1-(4-methoxyphenyl)-2-phenylethane-1,2-dione (**35**, 1.0 g, 0.41 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-fluorophenyl)-5-(4-methoxyphenyl)-4-phenyl-1*H*-imidazole **(54b)**, as white crystals.

Anal.:

M.P. **:** 172-73 °C

Yield **:** 73 %

TLC **:** R_f 0.46 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3412, 3115, 1601, 1512, 1245, 1030 and 836

^{1}H NMR **:** δ 3.80 (s, 3H), 6.90-6.92 (d, 2H), 7.18-7.26 (tt, 3H), 7.31-7.34 (dd, 2H), 7.43-7.46 (d, 2H), 7.53-7.55 (d, 2H), 8.09-8.13 (dd, 2H), 12.61 (s, 1H)

Elemental **:** Calculated for $C_{22}H_{17}FN_2O$: C, 76.73; H, 4.98; N, 8.13; Found: C, 76.40; H, 4.96; N, 8.44.

5.1.2.2.4. 2,5-Bis(4-fluorophenyl)-4-phenyl-1*H*-imidazole (55b)

The title compound **(55b)** was synthesized as per the method described for compound **(52b)** using 1-(4-fluorophenyl)-2-phenylethane-1,2-dione (**34**, 0.72 g, 0.31 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2,5-bis(4-fluorophenyl)-4-phenyl-1*H*-imidazole **(53b)**, as white crystals.

Anal.:

M.P. **:** 199-200 °C

Yield **:** 93 %

TLC **:** R_f 0.435 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3410, 3127, 1605, 1400, 1226 and 771

^{1}H NMR **:** δ 6.78-7.66 (m, 13H), 12.51 (s, 1H)

MS **:** *m/z* 328.28 (M^+)

5.1.2.2.5. 2-(4-Fluorophenyl)-5-(4-methylthiophenyl)-4-phenyl-1*H*-imidazole (56b)

The title compound **(56b)** was synthesized as per the method described for compound **(52b)** using 1-(4-methylthiophenyl)-2-phenylethane-1,2-dione (**37**, 0.7 g, 0.27 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-fluorophenyl)-5-(4-methylthiophenyl)-4-phenyl-1*H*-imidazole **(56b)**, as white crystals.

Anal.:

M.P. **:** 135-36 °C

Yield **:** 63 %

TLC **:** R_f 0.68 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3380, 3137, 1604, 1492, 1228 and 838

^{1}H NMR **:** δ 2.50 (s, 3H), 7.20-7.34 (m, 9H), 7.45-7.51 (m, 4H), 12.76 (s, 1H)

Elemental **:** Calculated for $C_{22}H_{17}FN_2S$: C, 73.31; H, 4.75; N, 7.77; Found: C, 72.43; H, 4.80; N, 7.52 %

5.1.2.2.6. 4-(4-Chlorophenyl)-2-(4-fluorophenyl)-5-*p*-tolyl-1*H*-imidazole (57b)

The title compound **(57b)** was synthesized as per the method described for compound **(52b)** using 1-(4-chlorophenyl)-2-*p*-tolylethane-1,2-dione (**38**, 0.96 g, 0.37 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(4-chlorophenyl)-2-(4-fluorophenyl)-5-*p*-tolyl-1*H*-imidazole **(57b)**, as white crystals.

Anal.:

M.P. **:** 230-31 °C

Yield **:** 52 %

TLC **:** R_f 0.71 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3420, 3093, 1494, 1230, 1093 and 836

^{1}H NMR **:** δ 2.37 (s, 3H), 7.15-7.20 (dd, 4H), 7.28-7.30 (d, 2H), 7.39-7.41 (d, 2H), 7.53-7.55 (d, 2H), 8.09-8.13 (dd, 2H), 12.61 (s, 1H)

Elemental **:** Calculated for $C_{22}H_{16}ClFN_2$: C, 72.83; H, 4.44; N, 7.31; Found: C, 72.54; H, 4.46; N, 7.50 %

5.1.2.2.7. 5-(4-Bromophenyl)-4-(4-chlorophenyl)-2-(4-fluorophenyl)-1*H*-imidazole (58b)

The title compound **(58b)** was synthesized as per the method described for compound **(52b)** using 1-(4-bromophenyl)-2-(4-chlorophenyl)ethane-1,2-dione (**39**, 0.93 g, 0.28 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5-(4-bromophenyl)-4-(4-chlorophenyl)-2-(4-fluorophenyl)-1*H*-imidazole **(58b)**, as white crystals.

Anal.:

M.P. **:** 262-63 °C

Yield **:** 68 %

TLC **:** R_f 0.74 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3418, 3126, 1638, 1509, 1230 and 839

^{1}H NMR **:** δ 7.01-8.12 (m, 12H), 12.60 (s, 1H)

Elemental **:** Calculated for $C_{21}H_{13}ClBrFN_2$: C, 58.97; H, 3.06; N, 6.55; Found: C, 59.41; H, 3.30; N, 6.47 %

5.1.2.2.8. 4-(4-Chlorophenyl)-2,5-bis(4-fluorophenyl)-1*H*-imidazole (59b)

The title compound **(59b)** was synthesized as per the method described for compound **(52b)** using 1-(4-chlorophenyl)-2-(4-fluorophenyl)ethane-1,2-dione (**40**, 1.05 g, 0.39 mmol). The crude

product so obtained was crystallized from methanol to afford the desired compound 4-(4-chlorophenyl)-2,5-bis(4-fluorophenyl)-1*H*-imidazole **(59b)**, as white crystals.

Anal.:

M.P. **:** 230-31 °C

Yield **:** 90 %

TLC **:** R_f 0.69 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3323, 3086, 1641, 1513, 1228 and 842

^{1}H NMR **:** δ 7.01-7.07 (m, 1H), 7.16-7.20 (dd, 3H), 7.26-7.28 (d, 1H), 7.34-7.44 (m, 1H), 7.47-7.57 (m, 4H), 8.09-8.12 (dd, 2H), 12.61 (s, 1H)

5.1.2.2.9. 4,5-Bis(4-chlorophenyl)-2-(4-fluorophenyl)-1*H*-imidazole (60b)

The title compound **(60b)** was synthesized as per the method described for compound **(52b)** using 1,2-bis(4-chlorophenyl)ethane-1,2-dione (**41**, 0.9 g, 0.32 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4,5-bis(4-chlorophenyl)-2-(4-fluorophenyl)-1*H*-imidazole **(60b)**, as white crystals.

Anal.:

M.P. **:** 264-65 °C

Yield **:** 73 %

TLC **:** R_f 0.74 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3419, 3122, 1637, 1491, 1228 and 837

^{1}H NMR **:** δ 7.17-7.21 (dd, 2H), 7.28-7.30 (d, 2H), 7.41-7.43 (d, 2H), 7.48-7.50 (d, 2H), 7.54-7.56 (d, 2H), 8.08-8.13 (m, 2H), 12.63 (s, 1H)

Elemental **:** Calculated for $C_{21}H_{13}Cl_2FN_2$: C, 64.81; H, 3.81; N, 7.31; Found: C, 64.55; H, 3.74; N, 7.24 %

5.1.2.2.10. 4-(4-Chlorophenyl)-2-(4-fluorophenyl)-5-phenyl-1*H*-imidazole (61b)

The title compound **(61b)** was synthesized as per the method described for compound **(52b)** using 1-(4-chlorophenyl)-2-phenylethane-1,2-dione (**42**, 0.64 g, 0.25 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(4-chlorophenyl)-2-(4-fluorophenyl)-5-phenyl-1*H*-imidazole **(61b)**, as white crystals.

Anal.:

M.P. **:** 220-21 °C

Yield **:** 83 %

TLC **:** R_f 0.60 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3340, 3064, 1604, 1489, 1227 and 836

^{1}H NMR **:** δ 7.15-7.20 (dd, 2H), 7.29-7.31 (m, 3H), 7.36-7.44 (d, 2H), 7.51-7.55 (dd, 4H), 8.08-8.14 (dd, 2H), 12.58 (s, 1H)

5.1.2.2.11. 4-(4-Chlorophenyl)-2-(4-fluorophenyl)-5-(4-methylthiophenyl)-1*H*-imidazole (62b)

The title compound **(62b)** was synthesized as per the method described for compound **(52b)** using 1-(4-chlorophenyl)-2-(4-methylthiophenyl)ethane-1,2-dione (**43**, 0.98 g, 0.32 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(4-chlorophenyl)-2-(4-fluorophenyl)-5-(4-methylthio-phenyl)-1*H*-imidazole **(62b)**, as white crystals.

Anal.:

M.P. **:** 203-04 °C

Yield **:** 96 %

TLC **:** R_f 0.68 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3410, 3117, 1602, 1491, 1231, 1094 and 834

^{1}H NMR **:** δ 2.48 (s, 3H), 7.06-7.10 (dd, 2H), 7.17-7.19 (d, 2H), 7.25-7.27 (d, 2H), 7.32-7.36 (d, 2H), 7.42-7.44 (d, 2H), 7.82-7.85 (dd, 2H), 12.6 (s, 1H)

5.1.2.2.12.2-(4-Fluorophenyl)-4-(4-nitrophenyl)-5-*p*-tolyl-1*H*-imidazole (63b)

The title compound **(63b)** was synthesized as per the method described for compound **(52b)** using 1-(4-nitrophenyl)-2-*p*-tolylethane-1,2-dione (**44**, 0.55 g, 0.20 mmol). The crudeproduct so obtained was crystallized from methanol to afford the desired compound 2-(4-fluorophenyl)-4-(4-nitrophenyl)-5-*p*-tolyl-1*H*-imidazole **(63b)**, as white crystals.

Anal.:

M.P. **:** > 276 °C

Yield **:** 52 %

TLC **:** R_f 0.72 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3376, 3180, 1509, 1335 and 1229

^{1}H NMR **:** δ 2.41 (s, 3H), 7.20-7.30 (m, 4H), 7.41-7.44 (dd, 2H), 7.81-7.83 (d, 2H), 8.12-8.15 (m, 4H), 12.83 (s, 1H)

5.1.2.2.13. 2-(4-Fluorophenyl)-4-(4-nitrophenyl)-5-phenyl-1*H*-imidazole (64b)

The title compound **(64b)** was synthesized as per the method described for compound **(52b)** using 1-(4-nitrophenyl)-2-phenylethane-1,2-dione (**45**, 0.99 g, 0.38 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-fluorophenyl)-4-(4-nitrophenyl)-5-phenyl-1*H*-imidazole **(64b)**, as white crystals.

Anal.:

M.P. **:** 233-34 °C

Yield **:** 52 %

TLC **:** R_f 0.74 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3353, 3177, 1660, 1551, 1329, 1226 and 858

^{1}H NMR **:** δ 7.23-7.27(dd, 2H), 7.43-7.55 (m, 5H), 7.81-7.83 (d, 2H), 8.11-8.24 (m, 4H), 12.91 (s, 1H)

Elemental **:** Calculated for $C_{21}H_{14}FN_3O_2$: C, 70.19; H, 3.93; N, 11.69; Found: C, 70.30; H, 4.05; N, 11.43 %

5.1.2.2.14. 2-(4-Fluorophenyl)-4,5-di-*p*-tolyl-1*H*-imidazole (65b)

The title compound **(65b)** was synthesized as per the method described for compound **(52b)** using 1,2-di-*p*-tolylethane-1,2-dione (**46**, 1.09 g, 0.45 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 2-(4-fluorophenyl)-4,5-di-*p*-tolyl-1*H*-imidazole **(65b)**, as white crystals.

Anal.:

M.P. **:** 243-44 °C

Yield **:** 89 %

TLC **:** R_f 0.48 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3402, 3102, 1608, 1500, 1228 and 839

^{1}H NMR **:** δ 2.30-2.36 (d, 6H), 7.06-7.10 (m, 2H), 7.17-7.21 (m, 4H), 7.35-7.46 (m, 4H), 8.09-8.13 (m, 2H), 12.47 (s, 1H)

Elemental **:** Calculated for $C_{23}H_{19}FN_2$: C, 80.68; H, 5.39; N, 8.18; Found: C, 80.78; H, 5.29; N, 8.23 %

5.1.2.2.15. 4-(2-Chlorophenyl)-5-(4-chlorophenyl)-2-(4-fluorophenyl)-1*H*-imidazole (66b)

The title compound **(66b)** was synthesized as per the method described for compound **(52b)** using 1-(2-chlorophenyl)-2-(4-chlorophenyl)ethane-1,2-dione (**47**, 1.0 g, 0.35 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(2-chlorophenyl)-5-(4-chlorophenyl)-2-(4-fluorophenyl)-1*H*-imidazole **(66b)**, as white crystals.

Anal.:

M.P. **:** 270-71 °C

Yield **:** 59 %

TLC **:** R_f 0.58 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3412, 3121, 1500, 1401, 1230 and 835

^{1}H NMR **:** δ 7.22-7.28 (m, 4H), 7.42-7.58 (m, 6H), 8.09-8.12 (dd, 2H), 12.83 (s, 1H).

Elemental **:** Calculated for $C_{21}H_{13}Cl_2FN_2$: C, 65.81; H, 3.42; N, 7.31; Found: C, 65.91; H, 3.34; N, 7.27 %

5.1.2.2.16. 4-(2-Chlorophenyl)-2-(4-fluorophenyl)-5-(4-methylthiophenyl)-1*H*-imidazole (67b)

The title compound **(67b)** was synthesized as per the method described for compound **(52b)** using 1-(2-chlorophenyl)-2-(4-methylthiophenyl)ethane-1,2-dione (**48**, 1.3 g, 0.44 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(2-chlorophenyl)-2-(4-fluorophenyl)-5-(4-methylthiophenyl)-1*H*-imidazole **(67b)**, as white crystals.

Anal.:

M.P. **:** 198-99 °C

Yield **:** 96 %

TLC **:** R_f 0.45 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3415, 3128, 1504, 1401, 1230 and 831

^{1}H NMR **:** δ 2.44 (s, 3H), 7.13 (bd, 2H), 7.20-7.24 (dd, 2H), 7.40-7.59 (m, 6H), 8.09-8.12 (dd, 2H), 12.73 (s, 1H)

Elemental **:** Calculated for $C_{22}H_{16}ClFN_2S$: C, 66.91; H, 4.08; N, 7.09; Found: C, 66.95; H, 4.05; N, 6.94 %

5.1.2.2.17. 4-(3-Chlorophenyl)-2-(4-fluorophenyl)-5-*p*-tolyl-1*H*-imidazole (68b)

The title compound **(68b)** was synthesized as per the method described for compound **(52b)** using 1-(3-chlorophenyl)-2-*p*-tolylethane-1,2-dione (**49**, 0.86 g, 0.33 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 4-(3-chlorophenyl)-2-(4-fluorophenyl)-5-*p*-tolyl-1*H*-imidazole **(68b)**, as creamy white crystals.

Anal.:

M.P. **:** 192-93 °C

Yield **:** 88 %

TLC **:** R_f 0.66 (*n*-Hexane:Ethyl acetate :: 70:30)

IR (cm^{-1}) **:** 3345, 3098, 1495, 1231 and 893

^{1}H NMR **:** δ 2.38 (s, 3H), 7.15-7.27 (m, 6H), 7.41-7.42 (d, 3H), 7.64 (s, 1H), 8.10-8.14 (m, 2H), 12.69 (s, 1H)

MS **:** *m/z* 362.15 (M^+)

5.1.3. Synthesis of 5,6-diaryl *N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine derivatives

5.1.3.1. Synthesis of 3-methylthio-5,6-diaryl-1,2,4-triazines (70-82 and 83-92)

General procedure for the synthesis of 3-methylthio-1,2,4-triazines (70-82 and 83-92)

A mixture of diketone (**33**, **36-42**, **44-46**, **49** and **50**, 2.0 mmol), thiosemicarbazide (**69**, 2.0 mmol) and methyl iodide (2.4 mmol) in DMSO and $[Bbim]^+Br^-$ in 1:10 (5 g :0.5 g) proportions was stirred at 70 ^oC for appropriate time durations. The progress of the reaction was monitored by TLC using an eluent mixture of *n*-hexane and ethyl acetate (4.5:0.5). After completion, the reaction mixture was added to ice cold water. The precipitated product so obtained was filtered, washed with water and dried. In case of regioisomers, the mixture was subjected to flash chromatographic purification using 5 % ethyl acetate in *n*-hexane as eluent, to obtain first compounds **(70-82)** in the initial fractions and compounds **(83-92)** in subsequent fractions.

5.1.3.1.1. 3-Methylthio-6-phenyl-5-(*p*-tolyl)-1,2,4-triazine (70)

The title compound **(70)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(70)**.

Anal.:

M.P. **:** 105-07 °C

Yield **:** 60 %

TLC **:** R_f 0.66 (*n*-Hexane:Ethyl acetate ::93:7)

IR (cm^{-1}) **:** 3434, 2972, 1636 and 1608

^{1}H NMR **:** δ 2.39 (s, 3H, Ar-C*H*$_3$); 2.78 (s, 3H, SC*H*$_3$); 7.14-7.60 (m, 9H, Ar-*H*)

MS **:** *m/z* 293.01 (M^+)

5.1.3.1.2. 3-Methylthio-5-phenyl-6-(*p*-tolyl)-1,2,4-triazine (83)

The title compound **(83)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(83)**.

Anal.:

M.P. **:** 92-94 °C

Yield **:** 40 %

TLC **:** R_f 0.66 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3434, 2972, 1636 and 1608

^{1}H NMR **:** δ 2.39 (s, 3H, Ar-C*H*$_3$); 2.79 (s, 3H, SC*H*$_3$); 7.15-7.61 (m, 9H, Ar-*H*)

MS **:** *m/z* 293.01 (M^+)

5.1.3.1.3. 5-(4-Fluorophenyl)-3-methylthio-6-phenyl-1,2,4-triazine (71)

The title compound **(71)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(71)**.

Anal.:

M.P. **:** 104-06 °C

Yield **:** 70 %

TLC **:** R_f 0.66 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3116, 3061, 1599 and 698

^{1}H NMR **:** δ 2.77 (s, 3H, SC*H*$_3$); 7.05-7.56 (m, 9H, Ar-*H*)

MS **:** *m/z* 296.96 (M^+)

5.1.3.1.4. 6-(4-Fluorophenyl)-3-methylthio-5-phenyl-1,2,4-triazine (84)

The title compound **(84)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(84)**.

Anal.:

M.P. **:** 95-97 °C

Yield **:** 30 %

TLC **:** R_f 0.66 (*n*-Hexane: Ethyl acetate) (14:1)

IR (cm^{-1}) **:** 3116, 3061, 1599 and 698

^{1}H NMR **:** δ 2.79 (s, 3H, SC*H*$_3$); 7.02-7.61 (m, 9H, Ar-*H*)

MS **:** *m/z* 296.96 (M^+)

5.1.3.1.5. 3-Methylthio-5-(4-methylthiophenyl)-6-phenyl-1,2,4-triazine (72)

The title compound **(72)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(72)**.

Anal.:

M.P. **:** 110-12 °C

Yield **:** 58 %

TLC **:** R_f 0.66 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3426, 3137, 2923 and 1590

^{1}H NMR **:** δ 2.51 (s, 3H, Ar-C*H*$_3$); 2.78 (s, 3H, SC*H*$_3$); 7.16-7.72 (m, 9H, Ar-*H*)

MS **:** *m/z* 324.94 (M^+)

5.1.3.1.6. 3-Methylthio-5-phenyl-6-(4-methylthiophenyl)-1,2,4-triazine (85)

The title compound **(85)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(85)**.

Anal.:

M.P. **:** 93-95 °C

Yield **:** 42 %

TLC **:** R_f 0.66 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3426, 3137, 2923 and 1590

^{1}H NMR **:** δ 2.50 (s, 3H, Ar-C*H*$_3$); 2.77 (s, 3H, SC*H*$_3$); 7.15-7.56 (m, 9H, Ar-*H*)

MS **:** *m/z* 324.94 (M^+)

5.1.3.1.7. 5-(4-Chlorophenyl)-6-(4-methylphenyl)-3-methylthio-1,2,4-triazine (73)

The title compound **(73)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(73)**.

Anal.:

M.P. **:** 179-81 °C

Yield **:** 51 %

TLC **:** R_f 0.30 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3419, 3129, 1599, 1498 and 1185

^{1}H NMR **:** δ 2.32 (s, 3H, Ar-C*H*$_3$); 2.70 (s, 3H, SC*H*$_3$); 7.09-7.52 (m, 8H, Ar-*H*)

MS **:** *m/z* 326.98 (M^+)

5.1.3.1.8. 6-(4-Chlorophenyl)-5-(4-methylphenyl)-3-methylthio-1,2,4-triazine (86)

The title compound **(86)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(86)**.

Anal.:

M.P. **:** 165-168 °C

Yield **:** 49 %

TLC **:** R_f 0.39 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3129, 1599, 1498, 1400, 1368, 1185, 1092 and 834

^{1}H NMR **:** δ 2.41 (s, 3H, Ar-C*H*$_3$); 2.79 (s, 3H, SC*H*$_3$); 7.20-7.56 (m, 8H, Ar-*H*)

MS **:** *m/z* 326.98 (M^+)

5.1.3.1.9. 5-(4-Bromophenyl)-6-(4-chlorophenyl)-3-methylthio-1,2,4-triazine (74)

The title compound **(74)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(74)**.

Anal.:

Yield **:** 74 %

TLC **:** R_f 0.50 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3420, 3132, 1588 and 1494

^{1}H NMR **:** δ 2.69 (s, 3H, SC*H*$_3$); 7.27-7.48 (m, 8H, Ar-*H*)

MS **:** *m/z* 392.83 (M^+)

5.1.3.1.10. 6-(4-Bromophenyl)-5-(4-chlorophenyl)-3-methylthio-1,2,4-triazine (87)

The title compound **(87)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(87)**.

Anal.:

Yield **:** 26 %

TLC **:** R_f 0.43 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3420, 3132, 1588 and 1494

^{1}HNMR **:** δ 2.69 (s, 3H, SC*H*$_3$); 7.27-7.48 (m, 8H, Ar-*H*)

MS **:** *m/z* 392.83 (M^+)

5.1.3.1.11. 6-(4-Chlorophenyl)-5-(4-fluorophenyl)-3-methylthio-1,2,4-triazine (75)

The title compound **(75)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(75)**.

Anal.:

Yield **:** 28 %

TLC **:** R_f 0.36 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3128, 3071, 1596 and 1498

^{1}H NMR **:** δ 2.68 (s, 3H, SC*H*$_3$); 6.96-7.51 (m, 8H, Ar-*H*)

MS **:** *m/z* 330.92 (M^+)

5.1.3.1.12. 5-(4-Chlorophenyl)-6-(4-fluorophenyl)-3-methylthio-1,2,4-triazine (88)

The title compound **(88)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(88)**.

Anal.:

Yield **:** 72 %

TLC **:** R_f 0.35 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3128, 3071, 1596 and 1498

^{1}H NMR **:** δ 2.68 (s, 3H, SC*H*$_3$); 6.96-7.51 (m, 8H, Ar-*H*)

^{13}C NMR **:** 14.03, 123.83, 128.93, 129.80, 130.31, 131.49, 134.44, 141.78, 148.23, 151.65, 155.61, 172.41

MS **:** *m/z* 330.92 (M^+)

5.1.3.1.13. 5,6-Bis-(4-chlorophenyl)-3-methylthio-1,2,4-triazine (76)

The title compound **(76)** was synthesized as per the general method described above. The crude product so obtained as only one isomer and was crystallized from methanol to afford the desired compound **(76)**.

Anal.:

M.P. **:** 137-39 °C

Yield **:** 93 %

TLC **:** R_f 0.3 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3134, 3067, 1661, 1591 and 1497

^{1}H NMR **:** δ 2.78 (s, 3H, SC*H*$_3$); 7.35-7.54 (m, 8H, Ar-*H*)

MS **:** *m/z* 346.93 (M^+)

5.1.3.1.14. 5-(4-Chlorophenyl)-3-methylthio-6-phenyl-1,2,4-triazine (77)

The title compound **(77)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(77)**.

Anal.:

M.P. **:** 118-20 °C

Yield **:** 65 %

TLC **:** R_f 0.39 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3422, 3134, 1591 and 836

^{1}H NMR **:** δ 2.79 (s, 3H, SC*H*$_3$); 7.19-7.49 (m, 9H, Ar-*H*)

MS **:** *m/z* 313.08 (M^+), 315.04 (M+2)

5.1.3.1.15. 6-(4-Chlorophenyl)-3-methylthio-5-phenyl-1,2,4-triazine (89)

The title compound **(89)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(89)**.

Anal.:

M.P. **:** 131-33 °C

Yield **:** 35 %

TLC **:** R_f 0.30 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3422, 3134, 1591 and 836

^{1}H NMR **:** δ 2.79 (s, 3H, SC*H*$_3$); 7.32-7.67 (m, 9H, Ar-*H*)

MS **:** *m/z* 313.08 (M^+), 315.04 (M+2)

5.1.3.1.16. 3-Methylthio-6-(4-nitrophenyl)-5-(*p*-tolyl)-1,2,4-triazine (78)

The title compound **(78)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(78)**.

Anal.:

M.P. **:** 108-10 ^oC

Yield **:** 35 %

TLC **:** R_f 0.30 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3114, 1602, 1523 and 1328

^{1}H NMR **:** δ 2.41 (s, 3H, Ar-C*H*$_3$); 2.79 (s, 3H, SC*H*$_3$); 7.18-8.26 (m, 8H, Ar-*H*)

MS **:** *m/z* 338.08 (M^+)

5.1.3.1.17. 3-Methylthio-5-(4-nitrophenyl)-6-(*p*-tolyl)-1,2,4-triazine (90)

The title compound **(90)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(90)**.

Anal.:

M.P. **:** 148-50 ^oC

Yield **:** 65 %

TLC **:** R_f 0.30 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3114, 1602, 1523 and 1328

^{1}H NMR **:** δ 2.41 (s, 3H, Ar-C*H*$_3$); 2.79 (s, 3H, SC*H*$_3$); 7.18-8.26 (m, 8H, Ar-*H*)

MS **:** *m/z* 338.08 (M^+)

5.1.3.1.18. 3-Methylthio-6-(4-nitrophenyl)-5-phenyl-1,2,4-triazine (79)

The title compound **(79)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(79)**.

Anal.:

M.P. **:** 155-57 ^oC

Yield **:** 99 %

TLC **:** R_f 0.47 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3424, 3127, 1600, 1509 and 1328

^{1}H NMR **:** δ 2.79 (s, 3H, SC*H*$_3$); 7.38-8.25 (m, 9H, Ar-*H*)

MS **:** *m/z* 324.08 (M^+)

5.1.3.1.19. 3-Methylthio-5-(4-nitrophenyl)-6-phenyl-1,2,4-triazine (91)

The title compound **(91)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(91)**.

Anal.:

M.P. **:** 118-20 ^oC

Yield **:** 74 %

TLC **:** R_f 0.47 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3424, 3127, 1600, 1509 and 1328

^{1}H NMR **:** δ 2.80 (s, 3H, SC*H*$_3$); 7.40-8.25 (m, 9H, Ar-*H*)

MS **:** *m/z* 324.08 (M^+)

5.1.3.1.20. 5,6-Bis-(4-methylphenyl)-3-methylthio-1,2,4-triazine (80)

The title compound **(80)** was synthesized as per the general method described above. The crude product so obtained as only one isomer and was crystallized from methanol to afford the desired compound **(80)**.

Anal.:

M.P. **:** 170-72 °C

Yield **:** 73 %

TLC **:** R_f 0.33 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3127, 3032, 1675 and 1607

^{1}H NMR **:** δ 2.38 (s, 3H, Ar-C*H*$_3$); 2.40 (s, 3H, Ar-C*H*$_3$); 2.77 (s, 3H, SC*H*$_3$); 7.14-7.50 (m, 8H, Ar-*H*)

MS **:** *m/z* 307.02 (M^+)

5.1.3.1.21. 5-(3-Chlorophenyl)-3-methylthio-6-(*p*-tolyl)-1,2,4-triazine (81)

The title compound **(81)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(81)**.

Anal.:

M.P. **:** 114-16 °C

Yield **:** 58 %

TLC **:** R_f 0.41 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3446, 1636, 1609, 1567 and 830

^{1}H NMR **:** δ 2.40 (s, 3H, Ar-C*H*$_3$); 2.77 (s, 3H, SC*H*$_3$); 7.17-7.66 (m, 8H, Ar-*H*)

MS **:** *m/z* 326.89 (M^+), 329.01 (M+2)

5.1.3.1.22. 6-(3-Chlorophenyl)-3-methylthio-5-(*p*-tolyl)-1,2,4-triazine (92)

The title compound **(92)** was synthesized as per the general method described above. The crude product so obtained was crystallized from methanol to afford the desired compound **(92)**.

Anal.:

M.P. **:** 88-91 °C

Yield **:** 58 %

TLC **:** R_f 0.41 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3446, 1636, 1609, 1567 and 830

^{1}H NMR **:** δ 2.41 (s, 3H, Ar-C*H*$_3$); 2.79 (s, 3H, SC*H*$_3$); 7.19-7.71 (m, 8H, Ar-*H*)

MS **:** *m/z* 326.89 (M^+), 329.01 (M+2)

5.1.3.1.23. 5,6-Diphenyl-3-methylthio-1,2,4-triazine (82)

The title compound **(82)** was synthesized as per the general method described above. The crude product so obtained as only one isomer and was crystallized from methanol to afford the desired compound **(82)**.

Anal.:

M.P. **:** 110-12 °C

Yield **:** 96 %

TLC **:** R_f 0.37 (*n*-Hexane:Ethyl acetate :: 93:7)

IR (cm^{-1}) **:** 3446, 1636, 1609, 1598 and 830

^{1}H NMR **:** δ 2.80 (s, 3H, SC*H*$_3$); 7.34-7.59 (m, 10H, Ar-*H*)

MS **:** *m/z* 279.1 (M^+)

5.1.3.2. Synthesis of *N*-(2-morpholinoethyl)-1,2,4-triazin-3-amines(94-110)

General method for the synthesis of 5,6-diaryl-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amines

5,6-Diaryl-3-methylthio-1,2,4-triazines (**71**,**73-78**, **80-82**, **84**, **86-90** and **92**; 0.5 g, 0.17 mmol) was added to 4-(2-aminoethyl)morpholine (**93**, 1.17 ml, 0.89 mmol) and the reaction mixture was heated on an oil bath at 100-110°C for 4 hrs. The reaction was monitored by TLC. After completion of the reaction, the reaction mixture was poured on to crushed ice. The solid so obtained was filtered and dried to afford the respective 5,6-diaryl-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amines (**94-110**).

5.1.3.2.1. 5-(4-Fluorophenyl)-*N*-(2-morpholinoethyl)-6-phenyl-1,2,4-triazin-3-amine (94)

The title compound **(94)** was synthesized as per the general method described above using 5-(4-fluorophenyl)-3-methylthio-6-phenyl-1,2,4-triazine (**71**, 0.5 g, 0.16 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5-(4-fluorophenyl)-*N*-(2-morpholinoethyl)-6-phenyl-1,2,4-triazin-3-amine **(94)**, as yellow crystals.

Anal.:

M.P. **:** 128-30 °C

Yield **:** 48 %

TLC **:** R_f 0.58 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3424, 3228, 1602 and 703

^{1}H NMR **:** δ 6.97-7.58 (m, 9H, Ar-*H*), 6.05 (bs, 1H, N*H*), 3.55-3.92 (m, 6H), 2.67-2.70 (t, 2H), 2.54-2.62 (t, 4H)

^{13}C NMR **:** 37.64, 53.46, 57.14, 67.00, 115.55, 115.66, 128.50, 129.20, 129.51, 130.38, 131.05, 131.86, 136.31, 156.70, 161.63, 164.10

MS **:** *m/z* 379.14 (M^+), 380.34 (M+1)

5.1.3.2.2. 6-(4-Chlorophenyl)-*N*-(2-morpholinoethyl)-5-(4-methylphenyl)-1,2,4-triazin-3-amine (95)

The title compound **(95)** was synthesized as per the general method described above using 6-(4-chlorophenyl)-3-methylthio-5-(4-methylphenyl)-1,2,4-triazine (**73**, 0.5 g, 0.15 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 6-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-5-(4-methylphenyl)-1,2,4-triazin-3-amine **(95)**, as yellow crystals.

Anal.:

M.P. **:** 150-53 °C

Yield **:** 22 %

TLC **:** R_f 0.41 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3226, 3082, 1594, 1522 and 1116

^{1}H NMR **:** δ 7.05-7.38 (m, 8H, Ar-*H*), 5.93 (bs, 1H, N*H*), 3.62-3.68 (m, 6H), 2.60-2.63 (t, 2H), 2.45-2.47 (t, 4H), 2.29 (s, 3H)

^{13}C NMR **:** δ 21.35, 37.65, 53.46, 57.15, 67.01, 128.65, 129.05, 129.26, 130.99, 133.19, 135.05, 136.52, 138.48, 149.51, 155.56, 160.34

MS **:** *m/z* 409.6 (M^+), 411.4 (M+2)

5.1.3.2.3. 5-(4-Bromophenyl)-6-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine (96)

The title compound **(96)** was synthesized as per the general method described above using 5-(4-bromophenyl)-6-(4-chlorophenyl)-3-methylthio-1,2,4-triazine (**74**, 0.5 g, 0.13 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5-(4-bromophenyl)-6-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine **(96)**, as yellow crystals.

Anal.:

M.P. **:** 152-54 °C

Yield **:** 52 %

TLC **:** R_f 0.61(Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3441, 3227, 1601, 1114 and 830

^{1}H NMR **:** δ 7.26-7.48 (m, 8H, Ar-*H*), 6.10 (bs, 1H, N*H*), 3.56-3.74 (m, 6H), 2.66-2.69 (t, 2H), 2.50-2.54 (t, 4H)

MS **:** *m/z* 474.04 (M^+), 476.11 (M+2)

5.1.3.2.4. 6-(4-Chlorophenyl)-5-(4-fluorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine (97)

The title compound **(97)** was synthesized as per the general method described above using 6-(4-chlorophenyl)-5-(4-fluorophenyl)-3-methylthio-1,2,4-triazine (**75**, 0.5 g, 0.15 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 6-(4-

chlorophenyl)-5-(4-fluorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine **(97)**, as yellow crystals.

Anal.:

M.P. **:** 149-51 °C

Yield **:** 49 %

TLC **:** R_f 0.64 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3448, 3233, 1598, 1115 and 839

^{1}H NMR **:** δ 7.00-7.50 (m, 8H, Ar-*H*), 6.11 (bs, 1H, N*H*), 3.70-3.75 (m, 6H), 2.67-2.70 (t, 2H), 2.52-2.54 (t, 4H)

^{13}C NMR **:** 37.59, 53.39, 57.05, 66.90, 115.56, 115.68, 128.71, 130.38, 130.89, 131.65, 134.65, 136.67, 148.36, 155.43, 162.77, 165.27

MS **:** *m/z* 413.54 (M^+), 415.54 (M+2)

5.1.3.2.5. 5,6-Bis-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine (98)

The title compound **(98)** was synthesized as per the general method described above using 5,6-bis-(4-chlorophenyl)-3-methylthio-1,2,4-triazine (**76**, 0.5 g, 0.14 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5,6-bis-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine **(98)**, as yellow crystals.

Anal.:

M.P. **:** 160-62 °C

Yield **:** 60 %

TLC **:** R_f 0.59 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3223, 3078, 1595, 1522 and 1088

^{1}H NMR **:** δ 7.21-7.37 (m, 8H, Ar-*H*), 6.03 (bs, 1H, N*H*), 3.60-3.68 (m, 6H), 2.60-2.63 (t, 2H), 2.45-2.47 (t, 4H)

MS **:** *m/z* 429.4 (M^+), 431.5 (M+2)

5.1.3.2.6. 6-(4-Chlorophenyl)-*N*-(2-morpholinoethyl)-5-phenyl-1,2,4-triazin-3-amine (99)

The title compound **(99)** was synthesized as per the general method described above using 6-(4-chlorophenyl)-3-methylthio-5-phenyl-1,2,4-triazine (**77**, 0.5 g, 0.15 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 6-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-5-phenyl-1,2,4-triazin-3-amine **(99)**, as yellow crystals.

Anal.:

M.P. **:** 129-31 °C

Yield **:** 54 %

TLC **:** R_f 0.60 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3441, 3232, 1596, 1115 and 702

^{1}H NMR **:** δ 7.27-7.51 (m, 9H, Ar-*H*), 6.07 (bs, 1H, N*H*), 3.71-3.76 (m, 6H), 2.66-2.69 (t, 2H), 2.52-2.54 (t, 4H)

MS **:** *m/z* 395.01 (M^+), 397.41 (M+2)

5.1.3.2.7. *N*-(2-Morpholinoethyl)-5-(4-nitrophenyl)-6-*p*-tolyl-1,2,4-triazin-3-amine (100)

The title compound **(100)** was synthesized as per the general method described above using 3-methylthio-5-(4-nitrophenyl)-6-*p*-tolyl-1,2,4-triazine (**78**, 0.5 g, 0.14 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound *N*-(2-morpholinoethyl)-5-(4-nitrophenyl)-6-*p*-tolyl-1,2,4-triazin-3-amine **(100)**, as yellow crystals.

Anal.:

M.P. **:** 141-43 °C

Yield **:** 68 %

TLC **:** R_f 0.61 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3440, 3256, 1586, 1516 and 1115

^{1}H NMR **:** δ 7.13-8.17 (m, 8H, Ar-*H*), 6.22 (bs, 1H, N*H*), 3.73-3.75 (m, 6H), 2.67-2.70 (t, 2H), 2.52-2.56 (t, 4H), 2.38 (s, 3H)

MS **:** *m/z* 420.52 (M^+)

5.1.3.2.8. 5,6-Bis-(4-methylphenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine (101)

The title compound **(101)** was synthesized as per the general method described above using 5,6-bis-(4-methylphenyl)-3-methylthio-1,2,4-triazine (**80**, 0.5 g, 0.16 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5,6-bis-(4-methylphenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine **(101)**, as yellow crystals.

Anal.:

M.P. **:** 159-61 °C

Yield **:** 65 %

TLC **:** R_f 0.58 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3221, 3072, 1595, 1523 and 1115

^{1}H NMR **:** δ 7.03-7.32 (m, 8H, Ar-*H*), 5.91 (bs, 1H, N*H*), 3.60-3.67 (m, 6H), 2.58-2.61 (t, 2H), 2.44-2.46 (t, 4H), 2.27 (s, 6H)

^{13}C NMR **:** δ 21.30-21.44, 37.63, 53.43, 57.20, 66.96, 129.01, 129.27, 129.50, 133.67, 138.06, 140.50, 149.62, 156.58, 160.22

MS **:** *m/z* 390.5 (M^+)

5.1.3.2.9. 6-(3-Chlorophenyl)-*N*-(2-morpholinoethyl)-5-*p*-tolyl-1,2,4-triazin-3-amine (102)

The title compound **(102)** was synthesized as per the general method described above using 6-(3-chlorophenyl)-3-methylthio-5-*p*-tolyl-1,2,4-triazine (**81**, 0.5 g, 0.15 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 6-(3-chlorophenyl)-*N*-(2-morpholinoethyl)-5-*p*-tolyl-1,2,4-triazin-3-amine **(102)**, as yellow crystals.

Anal.:

M.P. **:** 138-40 °C

Yield **:** 57 %

TLC **:** R_f 0.61(Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3447, 3233, 1595, 1117 and 697

^{1}H NMR **:** δ 7.12-7.55 (m, 8H, Ar-*H*), 6.09 (bs, 1H, N*H*), 3.70-3.74 (m, 6H), 2.66-2.69 (t, 2H), 2.52-2.54 (t, 4H), 2.36 (s, 3H)

^{13}C NMR **:** 21.45, 37.60, 53.41, 57.11, 66.95, 127.40, 128.28, 129.07, 129.17, 129.39, 129.48, 133.03, 134.31, 138.46, 140.94, 148.27, 156.74, 160.34

MS **:** *m/z* 409.02 (M^+), 411.37 (M+2)

5.1.3.2.10. 5,6-Diphenyl-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine (103)

5,6-Diphenyl-3-methylthio-1,2,4-triazine (**82**, 0.5 g, 0.17 mmol) was added to 4-(2-aminoethyl)morpholine (1.17 ml, 0.89 mmol) and heated on an oil bath at 100-110°C for 4 hrs. The reaction was monitored by TLC. After completion of the reaction, the reaction mixture was poured on to crushed ice. The solid so obtained was filtered and dried to afford 5,6-diphenyl-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine **(103)**, as yellow crystals.

Anal.:

M.P. **:** 150-52 °C

Yield **:** 48 %

TLC **:** R_f 0.53 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3223, 3067, 1580, 1522 and 1114

^{1}H NMR **:** δ 7.20-7.41 (m, 10H, Ar-*H*), 5.97 (bs, 1H, N*H*), 3.58-3.68 (m, 6H), 2.60-2.63 (t, 2H), 2.45-2.47 (t, 4H)

^{13}C NMR **:** δ 37.65, 53.44, 57.16, 66.99, 128.33, 129.22, 129.56, 130.24, 136.37, 136.45, 149.67, 156.79, 160.29

MS **:** *m/z* 362.4 (M^+)

5.1.3.2.11. 6-(4-Fluorophenyl)-*N*-(2-morpholinoethyl)-5-phenyl-1,2,4-triazin-3-amine (104)

The title compound **(104)** was synthesized as per the general method described above using 6-(4-fluorophenyl)-3-methylthio-5-phenyl-1,2,4-triazine (**84**, 0.5 g, 0.16 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 6-(4-fluorophenyl)-*N*-(2-morpholinoethyl)-5-phenyl-1,2,4-triazin-3-amine **(104)** as yellow crystals.

Anal.:

M.P. **:** 121-23 °C

Yield **:** 46 %

TLC **:** R_f 0.60 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3434, 3230, 1602, 1186 and 701

^{1}H NMR **:** δ 6.96-7.56 (m, 9H, Ar-*H*), 6.09 (bs, 1H, N*H*), 3.70-3.74 (m, 6H), 2.66-2.69 (t, 2H), 2.45-2.53 (t, 4H)

^{13}C NMR **:** 37.61, 53.41, 57.10, 66.99, 115.40, 115.61, 128.45, 129.16, 130.33, 130.92, 131.35, 131.73, 136.27, 156.70, 161.63, 164.10

MS **:** *m/z* 379.28 (M^+)

5.1.3.2.12. 5-(4-Chlorophenyl)-6-(4-methylphenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine (105)

The title compound **(105)** was synthesized as per the general method described above using 5-(4-chlorophenyl)-6-(4-methylphenyl)-3-methylthio-1,2,4-triazine (**86**, 0.5 g, 0.15 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5-(4-

chlorophenyl)-*N*-(2-morpholinoethyl)-6-(4-methylphenyl)-1,2,4-triazin-3-amine **(105)**, as yellow crystals.

Anal.:

M.P. **:** 159-62 °C

Yield **:** 52 %

TLC **:** R_f 0.39 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3225, 3080, 1595, 1521 and 1118

^{1}H NMR **:** δ 7.05-7.31 (m, 8H, Ar-*H*), 5.94 (bs, 1H, N*H*), 3.62-3.67 (m, 6H), 2.59-2.62 (t, 2H), 2.44-2.47 (t, 4H), 2.29 (s, 3H)

MS **:** *m/z* 409.7 (M+), 411.7 (M+2)

5.1.3.2.13. 6-(4-Bromophenyl)-5-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine (106)

The title compound **(106)** was synthesized as per the general method described above using 6-(4-bromophenyl)-5-(4-chlorophenyl)-3-methylthio-1,2,4-triazine (**87**, 0.5 g, 0.13 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 6-(4-bromophenyl)-5-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine **(106)**, as yellow crystals.

Anal.:

M.P. **:** 161-63 °C

Yield **:** 51 %

TLC **:** R_f 0.59 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3440, 3228, 1602, 1114 and 830

^{1}H NMR **:** δ 7.26-7.46 (m, 8H, Ar-*H*), 6.11 (bs, 1H, N*H*), 3.57-3.73 (m, 6H), 2.65-2.69 (t, 2H), 2.50-2.54 (t, 4H)

MS **:** *m/z* 473.83 (M^+), 476 (M+2)

5.1.3.2.14. 5-(4-Chlorophenyl)-6-(4-fluorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine (107)

The title compound **(107)** was synthesized as per the general method described above using 5-(4-chlorophenyl)-6-(4-fluorophenyl)-3-methylthio-1,2,4-triazine (**88**, 0.5 g, 0.15 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5-

(4-chlorophenyl)-6-(4-fluorophenyl)-*N*-(2-morpholinoethyl)-1,2,4-triazin-3-amine **(107)**, as yellow crystals.

Anal.:

M.P. **:** 143-45 °C

Yield **:** 51 %

TLC **:** R_f 0.63 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3420, 3236, 1603, 1116 and 841

^{1}H NMR **:** δ 7.00-7.48 (m, 8H, Ar-*H*), 6.09 (bs, 1H, N*H*), 3.68-3.73 (m, 6H), 2.67-2.69 (t, 2H), 2.52-2.54 (t, 4H)

^{13}C NMR **:** 37.58, 53.40, 57.03, 66.94, 115.58, 115.79, 128.71, 130.38, 130.97, 131.65, 132.16, 134.73, 136.70, 148.31, 162.79, 165.30

MS **:** *m/z* 413.37 (M^+), 415.28 (M+2)

5.1.3.2.15. 5-(4-Chlorophenyl)-*N*-(2-morpholinoethyl)-6-phenyl-1,2,4-triazin-3-amine (108)

The title compound **(108)** was synthesized as per the general method described above using 5-(4-chlorophenyl)-3-methylthio-6-phenyl-1,2,4-triazine (**89**, 0.5 g, 0.15 mmol).The crude product so obtained was crystallized from methanol to afford the desired compound 5-(4-chlorophenyl)-*N*-(2-morpholinoethyl)-6-phenyl-1,2,4-triazin-3-amine **(108)**, as yellow crystals.

Anal.:

M.P. **:** 163-65 °C

Yield **:** 56 %

TLC **:** R_f 0.58 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3440, 3232, 1584, 1119 and 705

^{1}H NMR **:** δ 7.26-7.47 (m, 9H, Ar-*H*), 6.08 (bs, 1H, N*H*), 3.55-3.73 (m, 6H), 2.67-2.69 (t, 2H), 2.52-2.54 (t, 4H)

^{13}C NMR **:** 37.60, 53.40, 57.07, 66.96, 128.49, 128.56, 129.44, 130.39, 130.43, 134.41, 134.83, 136.16, 148.53, 156.70, 162.79

MS **:** *m/z* 395.41 (M^+), 397.27 (M+2)

5.1.3.2.16. *N*-(2-Morpholinoethyl)-6-(4-nitrophenyl)-5-*p*-tolyl-1,2,4-triazin-3-amine (109)

The title compound **(109)** was synthesized as per the general method described above using 3-methylthio-6-(4-nitrophenyl)-5-*p*-tolyl-1,2,4-triazine (**90**, 0.5 g, 0.14 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound *N*-(2-morpholinoethyl)-6-(4-nitrophenyl)-5-*p*-tolyl-1,2,4-triazin-3-amine **(109)**, as yellow crystals.

Anal.:

M.P. **:** 150-52 °C

Yield **:** 66 %

TLC **:** R_f 0.60 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3432, 3248, 1585, 1516, 1340 and 1115

^{1}H NMR **:** δ 7.13-8.19 (m, 8H, Ar-*H*), 6.22 (bs, 1H, N-*H*), 3.71-3.76 (m, 6H), 2.68-2.71 (t, 2H), 2.54-2.56 (t, 4H), 2.38 (s, 3H)

^{13}C NMR **:** 21.38, 37.58, 53.39, 57.01, 66.88, 123.53, 129.02, 129.68, 130.62, 132.73, 138.86, 141.37, 143.15, 147.43, 153.54, 160.23

MS **:** *m/z* 420.26 (M^+)

5.1.3.2.17. 5-(3-Chlorophenyl)-*N*-(2-morpholinoethyl)-6-*p*-tolyl-1,2,4-triazin-3-amine (110)

The title compound **(110)** was synthesized as per the general method described above using 5-(3-chlorophenyl)-3-methylthio-6-*p*-tolyl-1,2,4-triazine (**92**, 0.5 g, 0.15 mmol). The crude product so obtained was crystallized from methanol to afford the desired compound 5-(3-chlorophenyl)-*N*-(2-morpholinoethyl)-6-*p*-tolyl-1,2,4-triazin-3-amine **(100)**, as yellow crystals.

Anal.:

M.P. **:** 142-44 °C

Yield **:** 55 %

TLC **:** R_f 0.62 (Chloroform:Methanol :: 93:7)

IR (cm^{-1}) **:** 3450, 3235, 1596, 1117 and 696

^{1}H NMR **:** δ 7.12-7.55 (m, 8H, Ar-*H*), 6.06 (bs, 1H, N*H*), 3.68-3.74 (m, 6H), 2.66-2.69 (t, 2H), 2.52-2.54 (t, 4H), 2.36 (s, 3H)

MS **:** *m/z* 409.56 (M^+), 411.25 (M+2)

5.1.4. Synthesis of 1,3-benzo[*d*]oxazin-4-one derivatives (127a-141a and 127b-141b)

5.1.4.1. Synthesis of 2-substituted-4*H*-benzo[*d*][1,3]oxazin-4-ones (127a-141a)

5.1.4.1.1. 2-Phenyl-4*H*-benzo[*d*][1,3]oxazin-4-one (127a)

Benzoic acid (**112**, 1.4 g, 1.16 mmol) and thionyl chloride (3.2 g, 0.026 mol) were taken in a dry RBF and refluxed for 3-4 hrs. After completion of the reaction, excess of thionyl chloride was removed off. Anthranilic acid (**111a**, 1.32 g, 0.97 mmol) dissolved in dry pyridine (10 ml) was added drop wise to the above reaction mixture at 0-5 °C with continuous stirring. The reaction was monitored by TLC. After completion, the reaction mixture was poured in crushed ice. The precipitated product was filtered and washed thoroughly with saturated $NaHCO_3$ solution. The resulting solid was recrystallized with acetone to afford 2-phenyl-4*H*-benzo[*d*][1,3]oxazin-4-one **(127a)**, as white crystals.

Anal.:

M.P. **:** 192-94 °C (Lit[4] 190-92 °C)

Yield **:** 65 %

TLC **:** R_f 0.72 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2929, 1626, 1575, 1436, 1271, 1088

5.1.4.1.2. 2-*p*-Tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one (128a)

The title compound **(128a)** was synthesized as per the method described for compound **(127a)** using 4-methylbenzoic acid (**113**, 1.57 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-*p*-tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one **(128a)**, as off white crystals.

Anal.:

M.P. **:** 149-51 °C (Lit[4] 150-52 °C)

Yield **:** 72 %

TLC **:** R_f 0.75 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2922, 1759, 1609, 1259 and 1013

^{1}H NMR **:** δ 8.14-8.16 (d, 1H), 8.09-8.11 (dd, 2H), 7.93-7.97 (t, 1H), 7.70-7.72 (d, 1H), 7.59-7.64 (t, 1H), 7.41-7.43 (dd, 2H), 2.42 (s, 3H)

5.1.4.1.3. 2-(4-Chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (129a)

The title compound **(129a)** was synthesized as per the method described for compound **(127a)** using 4-chlorobenzoic acid (**114**, 1.81 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(4-chlorophenyl)-4*H*-benzo-[*d*][1,3]oxazin-4-one **(129a)**, as white crystals.

Anal.:

M.P. **:** 158-60 °C (Lit[4] 160-62 °C)

Yield **:** 93 %

TLC **:** R_f 0.68 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1769, 1603, 1402, 1257, 1004 and 770

5.1.4.1.4. 2-(4-Bromophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (130a)

The title compound **(130a)** was synthesized as per the method described for compound **(127a)** using 4-bromobenzoic acid (**115**, 2.33 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(4-bromophenyl)-4*H*-benzo-[*d*][1,3]oxazin-4-one **(130a)**, as white crystals.

Anal.:

M.P. **:** 155-57 °C (Lit[4] 156-58 °C)

Yield **:** 81 %

TLC **:** R_f 0.59 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1762, 1602, 1397, 1255, 1006 and 773

5.1.4.1.5. 2-(4-Fluorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (131a)

The title compound **(131a)** was synthesized as per the method described for compound **(127a)** using 4-fluorobenzoic acid (**116**, 1.62 g, 1.16 mmol).The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(4-fluorophenyl)-4*H*-benzo-[*d*][1,3]oxazin-4-one **(131a)**, as white crystals.

Anal.:

M.P. **:** 163-65 °C (Lit[4] 162-64 °C)

Yield **:** 70 %

TLC **:** R_f 0.74 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1764, 1594, 1415, 1221, 1007 and 772

5.1.4.1.6. 2-(2-Chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (132a)

The title compound **(132a)** was synthesized as per the method described for compound **(127a)** using 2-chlorobenzoic acid (**117**, 1.81 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(2-chlorophenyl)-4*H*-benzo-[*d*][1,3]oxazin-4-one**(132a)**, as white crystals.

Anal.:

M.P. **:** 122-24 °C (Lit[4] 122-24 °C)

Yield **:** 64 %

TLC **:** R_f 0.58 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1768, 1605, 1474, 1223, 1002 and 762

5.1.4.1.7. 2-(3-Chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (133a)

The title compound **(133a)** was synthesized as per the method described for compound **(127a)** using 3-chlorobenzoic acid (**118**, 1.57 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(3-chlorophenyl)-4*H*-benzo-[*d*][1,3]oxazin-4-one **(133a)**,as white crystals.

Anal.:

M.P. **:** 151-53 °C (Lit[4] 151-52 °C)

Yield **:** 67 %

TLC **:** R_f 0.72 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3175, 1740, 1600, 1405, 1224, 1000 and 777

5.1.4.1.8. 2-(3-Methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (134a)

The title compound **(134a)** was synthesized as per the method described for compound **(127a)** using 3-methoxybenzoic acid (**119**, 1.76 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(3-methoxyphenyl)-4*H*-benzo-[*d*][1,3]oxazin-4-one **(134a)**, as pale yellow crystals.

Anal.:

M.P. **:** 112-14 °C (Lit[4] 110-12 °C)

Yield **:** 82 %

TLC **:** R_f 0.78 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2963, 1734, 1587, 1433, 1229 and 1000

5.1.4.1.9. 2-(4-Methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (135a)

The title compound **(135a)** was synthesized as per the method described for compound **(127a)** using 4-methoxybenzoic acid (**120**, 1.76 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(4-methoxyphenyl)-4*H*-benzo-[*d*][1,3]oxazin-4-one **(135a)**, as pale yellow crystals.

Anal.:

M.P. **:** 178-80 °C (Lit[4] 180-82 °C)

Yield **:** 71 %

TLC **:** R_f 0.70 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2960, 1660, 1594, 1406 and 1272

5.1.4.1.10. 2-(4-Nitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (136a)

The title compound **(136a)** was synthesized as per the method described for compound **(127a)** using 4-nitrobenzoic acid (**121**, 1.93 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(4-nitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(136a)**, as pale yellow crystals.

Anal.:

M.P. **:** 194-96 °C (Lit[4] 190-92 °C)

Yield **:** 69 %

TLC **:** R_f 0.67 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1770, 1594, 1596, 1520, 1355, 1255 and 1003

5.1.4.1.11. 2-(2,4-Dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (137a)

The title compound **(137a)** was synthesized as per the method described for compound **(127a)** using 2,4-dichlorobenzoic acid (**122**, 2.21 g, 1.16 mmol). The crude product so obtained

was recrystallized from acetone to afford the desired compound 2-(2,4-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(137a)**, as yellow crystals.

Anal.:

M.P. **:** 120-22 °C (Lit[4] 120-21 °C)

Yield **:** 92 %

TLC **:** R_f 0.70 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1769, 1603, 1475, 1220, 1003 and 772

5.1.4.1.12. 2-(3,5-Dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (138a)

The title compound **(138a)** was synthesized as per the method described for compound **(127a)** using 3,5-dichlorobenzoic acid (**123**, 2.21 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(3,5-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(138a)**, as yellow crystals.

Anal.:

M.P. **:** 235-37 °C (Lit[4] 239-41 °C)

Yield **:** 69 %

TLC **:** R_f 0.62 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2923, 1776, 1603, 1346, 1219, 1000 and 774

5.1.4.1.13. 2-*o*-Tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one (139a)

The title compound **(139a)** was synthesized as per the method described for compound **(127a)** using 2-methylbenzoic acid (**124**, 1.57 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(2-methylphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(139a)**, as yellow crystals.

Anal.:

M.P. **:** 125-27 °C (Lit[4] 126-28 °C)

Yield **:** 79 %

TLC **:** R_f 0.60 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1756, 1608, 1469, 1211 and 1032

5.1.4.1.14. 2-*m*-tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one (140a)

The title compound **(140a)** was synthesized as per the method described for compound **(127a)** using 3-methylbenzoic acid (**125**, 1.57 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(3-methylphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(140a)**, as yellow crystals.

Anal.:

M.P. **:** 118-20 °C (Lit[4] 120-22 ºC)

Yield **:** 72 %

TLC **:** R_f 0.62 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1756, 102, 1217 and 1010

5.1.4.1.15. 2-(3,5-Dinitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (141a)

The title compound **(141a)** was synthesized as per the method described for compound **(127a)** using 3,5-dinitrobenzoic acid (**126**, 2.46 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(3,5-dinitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(141a)**, as yellow crystals.

Anal.:

M.P. **:** 230-32 °C (Lit[4] 230-32 ºC)

Yield **:** 83 %

TLC **:** R_f 0.55 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 2924, 1776, 1603, 1540, 1346, 1221 and 1000

5.1.4.2. Synthesis of 7-chloro-2-substituted 4*H*-benzo[*d*][1,3]oxazin-4-ones (127b-141b)

5.1.4.2.1. 7-Chloro-2-phenyl-4*H*-benzo[*d*][1,3]oxazin-4-one (127b)

The title compound **(127b)** was synthesized as per the method described for compound **(127a)** using benzoic acid (**112**, 2.46 g, 1.16 mmol) and 4-chloroanthranilic acid (**111b**, 2.0 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-phenyl-4*H*-benzo[*d*][1,3]oxazin-4-one **(127b)**, as yellow crystals.

Anal.:

M.P. **:** 188-90 °C

Yield **:** 35 %

TLC **:** R_f 0.70 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3129, 1756, 1596, 1401, 1237, 1024, 778

^{1}H NMR **:** δ 7.47-7.49 (dd, 1H), 7.51-7.54 (m, 2H), 7.58-7.60 (m, 1H), 7.7108-7.7156 (d, 1H), 8.16-8.18 (d, 1H), 8.29-8.32 (m, 2H)

MS **:** *m/z* 257.41 (M^+), 259.43 (M+2)

5.1.4.2.2. 7-Chloro-2-*p*-tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one (128b)

The title compound **(128b)** was synthesized as per the method described for compound **(127b)** using 4-methylbenzoic acid (**113**, 1.57 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-phenyl-4*H*-benzo[*d*][1,3]oxazin-4-one **(128b)**, as yellow crystals.

Anal.:

M.P. **:** 156-58 °C

Yield **:** 69 %

TLC **:** R_f 0.79 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3131, 1751, 1596, 1401, 1239, 1021, 773

^{1}H NMR **:** δ 2.44 (s, 3H, Ar-CH_3), 7.30-7.32 (d, 2H), 7.43-7.45 (dd, 1H), 7.66-7.67 (d, 1H), 8.13-8.15 (d, 1H), 8.16-8.18 (m, 2H)

MS **:** *m/z* 271.55 (M^+), 273.05 (M+2)

5.1.4.2.3. 7-Chloro-2-(4-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (129b)

The title compound **(129b)** was synthesized as per the method described for compound **(127b)** using 4-chlorobenzoic acid (**114**, 1.81 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(4-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(129b)**, as yellow crystals.

Anal.:

M.P. **:** 148-51 °C

Yield **:** 93 %

TLC **:** R_f 0.74 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3130, 1764, 1595, 1401, 1241, 1011 and 775

^{1}H NMR **:** δ 7.50-7.52 (dd, 1H), 7.68-7.69 (d, 1H), 8.05-8.09 (m, 2H), 8.15-8.17 (d, 1H), 8.22-8.25 (m, 2H)

MS **:** *m/z* 291.50 (M^+), 293.43 (M+2), 295.80 (M+4)

5.1.4.2.4. 2-(4-Bromophenyl)-7-chloro-4*H*-benzo[*d*][1,3]oxazin-4-one (130b)

The title compound **(130b)** was synthesized as per the method described for compound **(127b)** using 4-bromobenzoic acid (**115**, 2.33 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 2-(4-bromophenyl)-7-chloro-4*H*-benzo[*d*][1,3]oxazin-4-one **(130b)**, as yellowish crystals.

Anal.:

M.P. **:** 159-61 °C

Yield **:** 78 %

TLC **:** R_f 0.65 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3125, 1754, 1587, 1400, 1237, 1011, 775 and 757

^{1}H NMR **:** δ 7.40-7.42 (dd, 1H), 7.56-7.60 (m, 2H), 7.6125- 7.6177 (d, 1H), 8.06-8.09 (m, 3H)

MS **:** *m/z* 336.80 (M^+), 338.38 (M+2), 340.15 (M+4)

5.1.4.2.5. 7-Chloro-2-(4-fluorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (131b)

The title compound **(131b)** was synthesized as per the method described for compound **(127b)** using 4-fluorobenzoic acid (**116**, 1.62 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(4-fluorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(131b)**, as yellowish crystals.

Anal.:

M.P. **:** 126-28 °C

Yield **:** 66 %

TLC **:** R_f 0.76 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3144, 1766, 1592, 1400, 1239, 1018, 778 and 757

^{1}H NMR **:** δ 7.17-7.22 (m, 2H), 7.46-7.48 (dd, 1H), 7.6729- 7.6778 (d, 1H), 8.14-8.16 (d, 1H), 8.28-8.33 (m, 2H)

MS **:** *m/z* 275.36 (M^+), 277.60 (M+2)

5.1.4.2.6. 7-Chloro-2-(2-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (132b)

The title compound **(132b)** was synthesized as per the method described for compound **(127b)** using 2-chlorobenzoic acid (**117**, 1.57 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(2-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(132b)**, as yellowish crystals.

Anal.:

M.P. **:** 154-56 °C

Yield **:** 62 %

TLC **:** R_f 0.53 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3130, 1764, 1596, 1400, 1227, 1018, 769

^{1}H NMR **:** δ 7.39-7.43 (m, 1H), 7.46-7.50 (m, 1H), 7.52-7.53 (m, 1H), 7.54-7.55 (d, 1H), 7.7248-7.7298 (d, 1H), 7.90-7.92 (dd, 1H), 8.18-8.20 (d, 1H)

MS **:** *m/z* 291.77 (M^+), 293.92 (M+2), 294.75 (M+4)

5.1.4.2.7. 7-Chloro-2-(3-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (133b)

The title compound **(133b)** was synthesized as per the method described for compound **(127b)** using 3-chlorobenzoic acid (**118**, 1.57 g, 1.16 mmol).The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(3-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(133b)**, as yellowish crystals.

Anal.:

M.P. **:** 144-46 °C

Yield **:** 69 %

TLC **:** R_f 0.75 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3144, 1766, 1600, 1401, 1240, 1024 and 776

^{1}H NMR **:** δ 7.46 (s, 1H), 7.49-7.51 (dd, 1H), 7.55-7.58 (d, 1H), 7.70-7.71 (d, 1H), 8.16-8.19 (m, 2H), 8.29-8.30 (t, 1H)

MS **:** *m/z* 292.89 (M^+), 294.00 (M+2)

5.1.4.2.8. 7-Chloro-2-(3-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (134b)

The title compound **(134b)** was synthesized as per the method described for compound **(127b)** using 3-methoxybenzoic acid (**119**, 1.76 g, 1.16 mmol). The crude product so obtained was

recrystallized from acetone to afford the desired compound 7-chloro-2-(3-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(134b)**, as pale yellow crystals.

Anal.:

M.P. **:** 148-50 °C

Yield **:** 83 %

TLC **:** R_f 0.71 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3129, 1764, 1598, 1402, 1240, 1015 and 778

^{1}H NMR **:** δ 3.90 (s, 3H, OCH_3), 6.99-7.01 (m, 2H), 7.41-7.44 (m, 1H), 7.64-7.65 (d, 1H), 8.12-8.14 (d, 1H), 8.23-8.26 (d, 2H)

MS **:** *m/z* 287.05 (M^+), 289.15 (M+2)

5.1.4.2.9. 7-Chloro-2-(4-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (135b)

The title compound **(135b)** was synthesized as per the method described for compound **(127b)** using 4-methoxybenzoic acid (**120**, 1.76 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(4-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(135b)**, as pale yellow crystals.

Anal.:

M.P. **:** 198-200 °C

Yield **:** 68%

TLC **:** R_f 0.68 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3128, 1758, 1595, 1402, 1232, 1025 and 772

^{1}H NMR **:** δ 6.98-7.01 (m, 2H), 7.41-7.43 (dd, 1H), 7.6411-7.6460 (d, 1H), 8.12-8.14 (d, 1H), 8.22-8.26 (m, 2H)

MS **:** *m/z* 287.18 (M^+), 289.79 (M+2)

5.1.4.2.10. 7-Chloro-2-(4-nitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (136b)

The title compound **(136b)** was synthesized as per the method described for compound **(127b)** using 4-nitrobenzoic acid (**121**, 1.93 g, 1.16 mmol). The crude product so obtained was

recrystallized from acetone to afford the desired compound 7-chloro-2-(4-nitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(136b)**, as pale yellow crystals.

Anal.:

M.P. **:** 198-201 °C

Yield **:** 69 %

TLC **:** R_f 0.37 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3117, 1765, 1594, 1526, 1405, 1349, 1008 and 777

^{1}H NMR **:** δ 7.54-7.57 (dd, 1H), 7.7522-7.7571 (d, 1H), 8.19-8.21 (d, 1H), 8.35-8.38 (m, 2H), 8.47-8.50 (m, 2H)

MS **:** *m/z* 302.42 (M^+), 304.00 (M+2)

5.1.4.2.11. 7-Chloro-2-(2,4-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (137b)

The title compound **(137b)** was synthesized as per the method described for compound **(127b)** using 2,4-dichlorobenzoic acid (**122**, 2.21 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(2,4-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(137b)**, as pale yellow crystals.

Anal.:

M.P. **:** 129-31 °C

Yield **:** 95 %

TLC **:** R_f 0.73 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3125, 1775, 1584, 1401, 1245, 1026 and 776

^{1}H NMR **:** δ 7.38-7.41 (dd, 1H), 7.52-7.56 (m, 2H), 7.7114-7.7160 (d, 1H), 7.89-7.91 (d, 1H), 8.17-8.19 (m, 1H)

MS **:** *m/z* 326.13 (M^+), 328.42 (M+2)

5.1.4.2.12. 7-Chloro-2-(3,5-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (138b)

The title compound **(138b)** was synthesized as per the method described for compound **(127b)** using 3,5-dichlorobenzoic acid (**123**, 2.21 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(3,5-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(138b)**, as pale yellow crystals.

Anal.:

M.P. **:** 230-32 °C

Yield **:** 68 %

TLC **:** R_f 0.43 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3097, 1771, 1595, 1401, 1247, 1009 and 775

^{1}H NMR **:** δ 7.36-7.42 (dd, 1H), 7.52-7.56 (m, 2H), 7.7135-7.7183 (d, 1H), 7.89-7.91 (d, 1H), 8.17-8.19 (d, 1H)

MS **:** *m/z* 324.27 (M^+), 326.73 (M+2)

5.1.4.2.13. 7-Chloro-2-*o*-tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one (139b)

The title compound **(139b)** was synthesized as per the method described for compound **(127b)** using 2-methylbenzoic acid (**124**, 1.57 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(2-methylphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(139b)**, as pale yellow crystals.

Anal.:

M.P. **:** 150-52 °C

Yield **:** 79 %

TLC **:** R_f 0.59 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3129, 1754, 1596, 1403, 1227, 1025 and 771

^{1}H NMR **:** δ 2.72 (s, 3H, Ar-CH_3), 7.31-7.35 (m, 2H), 7.41-7.46 (m, 1H), 7.47-7.50 (d, 1H), 7.68-7.69 (d, 1H), 8.03-8.05 (m, 1H), 8.16-8.18 (d, 1H)

MS **:** *m/z* 271.32 (M^+), 273.08 (M+2)

5.1.4.2.14. 7-Chloro-2-*m*-tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one (140b)

The title compound **(140b)** was synthesized as per the method described for compound **(127b)** using 3-methylbenzoic acid (**125**, 1.57 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(3-methylphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(140b)**, as pale yellow crystals.

Anal.:

M.P. **:** 157-59 °C

Yield **:** 73 %

TLC **:** R_f 0.58 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3130, 1759, 1599, 1401, 1241, 1022 and 779

^{1}H NMR **:** δ 2.45 (s, 3H, Ar-CH_3), 7.39-7.40 (m, 2H), 7.45-7.47 (dd, 1H), 7.68-7.69 (d, 1H), 8.08-8.11 (m, 2H), 8.14-8.16 (d, 2H)

MS **:** *m/z* 270.42 (M^+), 271.84 (M+2)

5.1.4.2.15. 7-Chloro-2-(3,5-dinitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (141b)

The title compound **(141b)** was synthesized as per the method described for compound **(127b)** using 3,5-dinitrobenzoic acid (**126**, 2.46 g, 1.16 mmol). The crude product so obtained was recrystallized from acetone to afford the desired compound 7-chloro-2-(3,5-dinitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one **(141b)**, as pale yellow crystals.

Anal.:

M.P. **:** 254-56 °C

Yield **:** 89 %

TLC **:** R_f 0.50 (*n*-Hexane:Ethyl acetate :: 92:8)

IR (cm^{-1}) **:** 3097, 1769, 1595, 1539, 1401, 1346, 1247, 1008 and 775

^{1}H NMR **:** δ 7.25-7.27 (dd, 1H), 8.07-8.09 (d, 1H), 8.77-8.78 (d, 1H), 9.11-9.13 (m, 2H), 9.24-9.25 (d, 1H)

MS **:** *m/z* 347.62 (M^+), 349.14 (M+2)

5.1.5. Synthesis of *N*-substituted benzamide derivatives (143a-157a and 143b-157b)

5.1.5.1. Synthesis of 2-substituted *N*-amidinobenzamides (143a-157a)

5.1.5.1.1. *N*-Amidino-2-benzoylaminobenzamide (143a)

Guanidine hydrochloride (**142**, 0.29 g, 0.3 mmol) was taken in a RBF containing a mixture of triethylamine (0.2 ml), ionic liquid ($Bbim^+$)Br^-:DMSO (0.2 g:2.0 g). After stirring for 5 min, 2-phenyl-4*H*-benzo[*d*][1,3]oxazin-4-one (**127a**, 0.8 g, 0.3 mmol) was added at RT and continued the stirring for another 30-60 min. Reaction was monitored by TLC. After completion, crushed ice was added to the reaction mixture. Product was filtered off and washed thoroughly with water. The solid obtained was recrystallized from methanol to afford desired product *N*-amidino-2-benzoylaminobenzamide **(143a)**, as white crystals.

Anal.:

M.P. **:** 217-18 °C

Yield **:** 68 %

TLC **:** R_f 0.50 (*n*-Hexane:Ethyl acetate:: 85:15)

IR (cm^{-1}) **:** 3417, 3368, 3234, 1650, 1586, 1355

^{1}H NMR **:** δ 13.70 (bs, 1H, N*H*), 8.69-8.71 (d, 1H), 8.23-8.25 (d, 1H), 8.01-8.04 (dd, 2H), 7.75 (bs, 2H, NH_2), 7.50-7.58 (m, 3H), 7.40-7.43 (t, 1H), 7.20 (bs, 1H, N*H*), 7.04-7.08 (t, 1H), 6.90 (bs, 1H, N*H*)

MS **:** *m/z* 283.2 (M+1)

5.1.5.1.2. *N*-Amidino-2-(4-methylbenzoylamino)benzamide (144a)

The title compound **(144a)** was synthesized as per the method described for compound **(143a)** using 2-*p*-tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one (**128a**, 1.0 g, 0.36 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(4-methylbenzoylamino)benzamide **(144a)**, as shiny white crystals.

Anal.:

M.P. **:** 220-21 °C

Yield **:** 70 %

TLC **:** R_f 0.48 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3405, 3364, 3233, 2924, 1653, 1597, 1586 and 1352

^{1}H NMR **:** δ 13.59 (bs, 1H, N*H*), 8.66-8.68 (d, 1H), 8.22-8.23 (d, 1H), 7.90-7.92 (dd, 2H), 7.70 (bs, 2H, NH_2), 7.39-7.42 (t, 1H), 7.31-7.33 (dd, 2H), 7.20 (bs, 1H, N*H*), 7.03-7.07 (t, 1H), 6.89 (bs, 1H, N*H*), 2.41 (s, 3H)

MS **:** *m/z* 297.2 (M+1)

5.1.5.1.3. *N*-Amidino-2-(4-chlorobenzoylamino)benzamide (145a)

The title compound **(145a)** was synthesized as per the method described for compound **(143a)** using 2-(4-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**129a**, 1.0 g, 0.34 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(4-chlorobenzoylamino)benzamide **(145a)**, as shinny white crystals.

Anal.:

M.P. **:** 211-12 °C

Yield **:** 69 %

TLC **:** R_f 0.56 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3420, 3238, 2924, 2853, 1654, 1587, 1353 and 760

^{1}H NMR **:** δ 13.70 (bs, 1H, N*H*), 8.6411-8.6423 (d, 1H), 8.19-8.21 (d, 1H), 7.97-8.02 (dd, 2H), 7.71 (bs, 2H, NH_2), 7.54-7.57 (dd, 2H), 7.41-7.46 (t, 1H), 7.21 (bs, 1H, N*H*), 7.07-7.14 (t, 1H), 7.03 (bs, 1H, N*H*)

MS **:** *m/z* 316.33 (M^+), 318.66 (M+2)

5.1.5.1.4. *N*-Amidino-2-(4-bromobenzoylamino)benzamide (146a)

The title compound **(146a)** was synthesized as per the method described for compound **(143a)** using 2-(4-bromophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**130a**, 1.0 g, 0.29 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(4-bromobenzoylamino)benzamide **(146a)**, as white crystals.

Anal.:

M.P. **:** 207-08 °C

Yield **:** 72 %

TLC **:** R_f 0.53 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3372, 2925, 1650, 1588, 1501, 1352 and 760

^{1}H NMR **:** δ 13.66 (bs, 1H, N*H*), 8.54-8.56 (d, 1H), 8.23 (bs, 1H, N*H*), 8.11-8.14 (d, 1H), 7.85-7.88 (dd, 2H), 7.62-7.64 (dd, 2H), 7.50 (bs, 1H, N*H*), 7.34-7.38 (t, 1H), 7.09 (bs, 2H, NH_2), 6.98-7.03 (t, 1H)

MS **:** *m/z* 361.1 (M^+), 363.0 (M+2)

5.1.5.1.5. *N*-Amidino-2-(4-fluorobenzoylamino)benzamide (147a)

The title compound **(147a)** was synthesized as per the method described for compound **(143a)** using 2-(4-fluorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**131a**, 0.9 g, 0.32 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(4-fluorobenzoylamino)benzamide **(147a)**, as white crystals.

Anal.:

M.P. **:** 232-33 °C

Yield **:** 69 %

TLC **:** R_f 0.15 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3421, 3382, 3255, 2924, 1653, 1587, 1355 and 758

^{1}H NMR **:** δ 13.68 (bs, 1H, N*H*), 8.63-8.65 (d, 1H), 8.20-8.22 (d, 1H), 8.05-8.08 (dd, 2H), 7.86 (bs, 2H, NH_2), 7.41-7.45 (t, 1H), 7.28-7.32 (dd, 2H), 7.19 (bs, 1H, N*H*), 7.06-7.10 (t, 1H), 6.93 (bs, 1H, N*H*)

MS **:** *m/z* 300.12 (M^+), 302.35 (M+2)

5.1.5.1.6. *N*-Amidino-2-(2-Chlorobenzoylamino)benzamide (148a)

The title compound **(148a)** was synthesized as per the method described for compound **(143a)** using 2-(2-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**132a**, 0.9 g, 0.30 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(2-chlorobenzoylamino)benzamide **(148a)**, as white crystals.

Anal.:

M.P. **:** 211-12 °C

Yield **:** 70 %

TLC **:** R_f 0.18 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3400, 3282, 3155, 2924, 1660, 1605, 1498, 1343 and 765

^{1}H NMR **:** δ 13.38 (bs, 1H, N*H*), 8.62-8.64 (d, 1H), 8.22-8.25 (d, 1H), 7.70-7.80 (bs, 1H, N*H*), 7.67-7.69 (d, 1H), 7.52-7.55 (t, 1H), 7.42-7.51 (m, 3H), 7.50 (bs, 1H, N*H*), 7.09-7.13 (t, 1H), 7.03 (bs, 2H, NH_2)

MS **:** *m/z* 316.10 (M^+), 318.12 (M+2)

5.1.5.1.7. *N*-Amidino-2-(3-chlorobenzoylamino)benzamide (149a)

The title compound **(149a)** was synthesized as per the method described for compound **(143a)** using 2-(3-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**133**, 1.0 g, 0.34 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(3-chlorobenzoylamino)benzamide **(149a)**, as white crystals.

Anal.:

M.P. **:** 230-32 °C

Yield **:** 79 %

TLC **:** R_f 0.18 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3414, 3238, 2927, 1654, 1586, 1502, 1351 and 766

^{1}H NMR **:** δ 13.77 (bs, 1H), 8.63-8.65 (d, 1H), 8.20-8.22 (d, 1H), 7.94-7.96 (dd, 2H), 7.77 (bs, 2H, N*H*$_2$), 7.59-7.61 (d, 1H), 7.52-7.56 (t, 1H), 7.42-7.46 (t, 1H), 7.20 (bs, 1H, N*H*), 7.08-7.12 (t, 1H), 6.95 (bs, 1H, N*H*)

MS **:** *m/z* 316.32 (M^+), 318.66 (M+2)

5.1.5.1.8. *N*-Amidino-2-(3-Methoxybenzoylamino)benzamide (150a)

The title compound **(150a)** was synthesized as per the method described for compound **(143a)** using 2-(3-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**134a**, 0.75 g, 0.25 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(3-methoxybenzoylamino)benzamide **(150a)**, as white crystals.

Anal.:

M.P. **:** 215-16 °C

Yield **:** 59 %

TLC **:** R_f 0.15 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3416, 3369, 2928, 1653, 1588 and 1354

^{1}H NMR **:** δ 13.64 (bs, 1H, N*H*), 8.67-8.69 (d, 1H), 8.24-8.26 (d, 1H), 7.90 (bs, 2H, N*H*$_2$), 7.59-7.61 (d, 1H), 7.51 (s, 1H), 7.43-7.47 (m, 2H), 7.35 (bs, 1H, N*H*), 7.13-7.15 (d, 1H), 7.07-7.11 (t, 1H), 6.95 (bs, 1H, N*H*), 3.85 (s, 3H)

MS **:** *m/z* 312.96 (M^+)

5.1.5.1.9. *N*-Amidino-2-(4-methoxybenzoylamino)benzamide (151a)

The title compound **(151a)** was synthesized as per the method described for compound **(143a)** using 2-(4-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**135a**, 0.65 g, 0.22 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(4-methoxybenzoylamino)benzamide **(151a)**, as white crystals.

Anal.:

M.P. **:** 240 °C (d)

Yield **:** 62 %

TLC **:** R_f 0.40 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3418, 2924, 2854, 1657, 1605, 1587 and 1452

^{1}H NMR **:** δ 13.52 (bs, 1H, N*H*), 8.77-8.79 (d, 1H), 8.20-8.22 (d, 1H), 7.93-8.01 (dd, 2H), 7.70 (bs, 2H, NH_2), 7.29-7.49 (dd, 2H), 7.17 (bs, 1H, N*H*), 7.00-7.12 (m, 2H), 6.69 (bs, 1H, N*H*), 3.85 (s, 3H)

MS **:** *m/z* 312.22 (M^+)

5.1.5.1.10. *N*-Amidino-2-(4-nitrobenzoylamino)benzamide (152a)

The title compound **(152a)** was synthesized as per the method described for compound **(143a)** using 2-(4-nitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**136a**, 1.0 g, 0.32 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(4-nitrobenzoylamino)benzamide **(152a)**, as white crystals.

Anal.:

M.P. **:** 237-39 °C

Yield **:** 72 %

TLC **:** R_f 0.12 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3393, 3103, 2925, 1665, 1591, 1539, 1343

^{1}H NMR **:** δ 13.95 (bs, 1H, N*H*), 8.60-8.62 (d, 1H), 8.33-8.36 (dd, 2H), 8.21-8.24 (dd, 2H), 8.18-8.21 (d, 1H), 7.94 (bs, 2H, NH_2), 7.44-7.48 (t, 1H), 7.30 (bs, 1H, N*H*), 7.10-7.14 (t, 1H), 6.99 (bs, 1H, N*H*)

MS **:** *m/z* 327.33 (M^+)

5.1.5.1.11. *N*-Amidino-2-(2,4-dichlorobenzoylamino)benzamide (153a)

The title compound **(153a)** was synthesized as per the method described for compound **(143a)** using 2-(2,4-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**137a**, 1.0 g, 0.30 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(2,4-dichlorobenzoylamino)benzamide **(153a)**, as white crystals.

Anal.:

M.P. **:** 220-21 °C

Yield **:** 73 %

TLC **:** R_f 0.51 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3484, 3372, 2923, 1658, 1630, 1589, 1498, 1342 and 759

^{1}H NMR **:** δ 13.53 (bs, 1H, N*H*), 8.60-8.62 (d, 1H), 8.20-8.22 (d, 1H), 7.70-7.72 (d, 1H), 7.6436-7.6484 (d, 1H), 7.48-7.51 (d, 1H), 7.38-7.42 (t, 1H), 7.38 (bs, 1H, N*H*), 7.19 (bs, 1H, N*H*), 7.09-7.12 (t, 1H), 6.95 (bs, 2H, NH_2)

MS **:** *m/z* 351.07 (M^+), 353.73 (M+2), 355.31 (M+4)

5.1.5.1.12. *N*-Amidino-2-(3,5-dichlorobenzoylamino)benzamide (154a)

The title compound **(154a)** was synthesized as per the method described for compound **(143a)** using 2-(3,5-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**138a**, 0.75 g, 0.22 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(3,5-dichlorobenzoylamino)benzamide **(154a)**, as white crystals.

Anal.:

M.P. **:** 245-46 °C

Yield **:** 69 %

TLC **:** R_f 0.18 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3393, 3102, 2926, 1665, 1591, 1540, 1344, 768

^{1}H NMR **:** δ 14.31 (bs, 1H, N*H*), 9.1101-9.1150 (d, 1H), 9.01-9.03 (d, 2H), 8.62-8.64 (d, 1H), 8.16-8.18 (d, 1H), 8.05-8.07 (bs, 2H, NH_2), 7.46-7.51 (t, 1H), 7.20 (bs, 1H, N*H*), 7.15-7.18 (t, 1H), 6.95 (bs, 1H, N*H*)

MS **:** *m/z* 352.40 (M^+)

5.1.5.1.13. *N*-Amidino-2-(2-methylbenzoylamino)benzamide (155a)

The title compound **(155a)** was synthesized as per the method described for compound **(143a)** using 2-(2-methylphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**139a**, 1.0 g, 0.36 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(2-methylbenzoylamino)benzamide **(155a)**, as white crystals.

Anal.:

M.P. **:** 191-92 °C

Yield **:** 65 %

TLC **:** R_f 0.42 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3394, 3099, 2924, 1667, 1601, 1500, 1346 and 760

^{1}H NMR **:** δ 13.33 (bs, 1H, N*H*), 8.67-8.69 (d, 1H), 8.23-8.26 (d, 1H), 7.61-7.63 (d, 1H), 7.50 (bs, 1H, N*H*), 7.41- 7.46 (t, 1H), 7.36-7.40 (t, 1H), 7.28-7.32 (m, 2H), 7.20 (bs, 1H, N*H*), 7.05-7.09 (t, 1H), 6.95 (bs, 1H, NH_2), 2.48 (s, 3H)

MS **:** *m/z* 296.11 (M^+)

5.1.5.1.14. *N*-Amidino-2-(3-methylbenzoylamino)benzamide (156a)

The title compound **(156a)** was synthesized as per the method described for compound **(143a)** using 2-(3-methylphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**140a**, 0.75 g, 0.75 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(3-methylbenzoylamino)benzamide **(156a)**, as white crystals.

Anal.:

M.P. **:** 211-12 ^oC

Yield **:** 64 %

TLC **:** R_f 0.29 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3394, 3229, 2995, 1651, 1586, 1501 and 1352

^{1}H NMR **:** δ 13.59 (bs, 1H, N*H*), 8.65-8.67 (d, 1H), 8.17-8.19 (d, 1H), 8.00 (bs, 1H, N*H*), 7.80-7.81 (dd, 2H), 7.60 (bs, 1H, N*H*), 7.44-7.46 (d, 1H), 7.39-7.42 (m, 2H), 7.07-7.11 (t, 1H), 7.01 (bs, 1H, NH_2), 2.41 (s, 3H)

MS **:** *m/z* 296.32 (M^+)

5.1.5.1.15. *N*-Amidino-2-(3,5-dinitrobenzoylamino)benzamide (157a)

The title compound **(157a)** was synthesized as per the method described for compound **(143a)** using 2-(3,5-dinitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**141a**, 1.0 g, 0.28 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(3,5-dinitrobenzoylamino)benzamide **(157a)**, as white crystals.

Anal.:

M.P. **:** 244 ^oC (d)

Yield **:** 74 %

TLC **:** R_f 0.30 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3502, 3392, 3095, 2926, 1668, 1593, 1539 and 1344

^{1}H NMR **:** δ 14.27 (bs, 1H, N*H*), 9.0732-9.0779 (d, 1H), 9.01 (s, 1H), 8.9711-8.9758 (d, 1H), 8.61-8.63 (d, 1H), 8.15-8.17 (d, 1H), 8.04 (bs, 2H, NH_2), 70-.47-7.52 (t, 1H), 7.45 (bs, 1H, N*H*), 7.15-7.19 (t, 1H), 7.03 (bs, 1H, N*H* at 12)

MS **:** *m/z* 371.53 (M^+)

5.1.5.2. Synthesis of 4-chloro-2-substituted *N*-amidinobenzamides (143b-157b)

5.1.5.2.1. *N*-Amidino-2-benzoylamino-4-chlorobenzamide (143b)

The title compound **(143b)** was synthesized as per the method described for compound **(143a)** using 7-chloro-2-phenyl-4*H*-benzo[*d*][1,3]oxazin-4-one (**127b**, 0.8 g, 0.30 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-benzoylamino-4-chlorobenzamide **(143b)**, as white crystals.

Anal.:

M.P. **:** 234-36 °C

Yield **:** 60 %

TLC **:** R_f 0.35 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3556, 3507, 3354, 2854, 1658, 1641, 1586, 1534, 1339 and 715

^{1}H NMR **:** δ 13.84 (bs, 1H, N*H*), 8.7960-8.8011 (d, 1H), 8.23-8.26 (d, 1H), 8.00-8.01 (dd, 2H), 7.84 (bs, 2H, NH_2), 7.52-7.62 (m, 3H), 7.25 (bs, 1H, N*H*), 7.09- 7.12 (d, 1H), 6.98 (bs, 1H, N*H*)

MS **:** *m/z* 315.99 (M^+), 317.49 (M+2)

5.1.5.2.2. *N*-Amidino-4-chloro-2-(4-methylbenzoylamino)benzamide (144b)

The title compound **(144b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-*p*-tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one (**128b**, 1.0 g, 0.36 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(4-methylbenzoylamino)benzamide **(144b)**, as white crystals.

Anal.:

M.P. **:** 225-27 °C

Yield **:** 69 %

TLC **:** R_f 0.38 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3511, 3409, 3379, 2920, 1659, 1584, 1495, 1340 and 743

^{1}H NMR **:** δ 13.70 (bs, 1H, N*H*), 8.7700-8.7742 (d, 1H), 8.21-8.24 (d, 1H), 7.88-7.90 (dd, 2H), 7.68-8.07 (bs, 2H, NH_2), 7.33-7.35 (dd, 2H), 7.11-7.14 (d, 1H), 6.98 (bs, 1H, N*H*), 3.40 (bs, 1H, N*H*), 2.39 (s, 3H)

MS **:** *m/z* 330.44 (M^+), 333.01 (M+2)

5.1.5.2.3. *N*-Amidino-4-Chloro-2-(4-chlorobenzoylamino)benzamide (145b)

The title compound **(145b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(4-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**129b**, 1.0 g, 0.34 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(4-chlorobenzoylamino)benzamide **(145b)**, as white crystals.

Anal.:

M.P. **:** 227 °C (d)

Yield **:** 70 %

TLC **:** R_f 0.48 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3421, 2924, 2854, 1660, 1588, 1506, 1254 and 760

^{1}H NMR **:** δ 13.55 (bs, 1H, N*H*), 8.64 (s, 1H), 8.15-8.17 (d, 1H), 7.98-8.00 (d, 1H), 7.92-7.94 (d, 1H), 7.79 (bs, 2H, NH_2), 7.67 (bs, 1H, N*H*), 7.56-7.60 (dd, 2H), 7.27-7.35 (bs, 1H, N*H*), 7.13-7.15 (d, 1H)

MS **:** *m/z* 350.35 (M^+), 352.61 (M+2)

5.1.5.2.4. *N*-Amidino-2-(4-bromobenzoylamino)-4-chlorobenzamide (146b)

The title compound **(146b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(4-bromophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**130b**, 1.0 g, 0.29 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-2-(4-bromobenzoylamino)-4-chlorobenzamide **(146b)**, as white crystals.

Anal.:

M.P. **:** 229-31 °C (d)

Yield **:** 69 %

TLC **:** R_f 0.51 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3418, 3099, 2925, 1664, 1591, 1502, 1349, 746

^{1}H NMR **:** δ 13.91 (bs, 1H, N*H*), 8.73 (s, 1H), 8.19-8.21 (d, 1H), 7.88-7.91 (d, 1H), 7.69-7.71 (d, 1H), 7.29-8.06 (bs, 4H, N*H* & NH_2), 7.05-7.11 (dd, 2H), 6.79-6.82 (d, 1H)

MS **:** *m/z* 393.99 (M^+)

5.1.5.2.5. *N*-Amidino-4-chloro-2-(4-fluorobenzoylamino)benzamide (147b)

The title compound **(147b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(4-fluorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**131b**, 0.9 g, 0.32 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(4-fluorobenzoylamino)benzamide **(147b)**, as white crystals.

Anal.:

M.P. **:** 225 °C (d)

Yield **:** 69 %

TLC **:** R_f 0.15 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3427, 3112, 2926, 1662, 1597, 1500, 1349, 755

^{1}H NMR **:** δ 13.86 (bs, 1H, N*H*), 8.7542-8.7592 (d, 1H), 8.22-8.24 (d, 1H), 8.04-8.07 (dd, 2H), 7.87-8.95 (bs, 2H, NH_2), 7.30-7.34 (dd, 2H), 7.10-7.13 (d, 1H), 7.03 (bs, 1H, N*H*), 6.81 (bs, 1H, N*H*)

MS **:** *m/z* 334.74 (M^+), 336.22 (M+2)

5.1.5.2.6. *N*-Amidino-4-chloro-2-(2-chlorobenzoylamino)benzamide (148b)

The title compound **(148b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(2-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**132b**, 0.9 g, 0.30 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(2-chlorobenzoylamino)benzamide **(148b)**, as white crystals.

Anal.:

M.P. **:** 217-18 °C

Yield **:** 69 %

TLC **:** R_f 0.48 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3517, 3429, 3365, 2922, 1667, 1582, 1535, 1355 and 745

^{1}H NMR **:** δ 13.55 (bs, 1H, N*H*), 8.7214-8.7260 (d, 1H), 8.23-8.25 (d, 1H), 7.68-7.70 (d, 1H), 7.54-7.57 (d, 1H), 7.49-7.53 (t, 1H), 7.44-7.48 (t, 1H), 7.14-7.17 (d, 1H), 7.33-7.62 (bs, 2H, NH_2), 6.81-6.95 (bs, 2H, N*H*)

MS **:** *m/z* 351.05 (M^+), 352.94 (M+2)

5.1.5.2.7. *N*-Amidino-4-chloro-2-(3-chlorobenzoylamino)benzamide (149b)

The title compound **(149b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(3-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**133b**, 1.0 g, 0.34 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(3-chlorobenzoylamino)benzamide **(149b)**, as white crystals.

Anal.:

M.P. **:** 220 °C (d)

Yield **:** 70 %

TLC **:** R_f 0.42 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3503, 3416, 3335, 2924, 1641, 1584, 1499, 1331 and 734

^{1}H NMR **:** δ 13.97 (bs, 1H, N*H*), 8.74-8.97 (m, 2H), 8.48-8.52 (d, 1H), 7.93 (s, 1H), 7.12-6.60 (m, 3H), 6.78-8.97 (bs, 4H, N*H* & NH_2)

MS **:** *m/z* 351.33 (M^+), 353.47 (M+2)

5.1.5.2.8. *N*-Amidino-4-chloro-2-(3-methoxybenzoylamino)benzamide (150b)

The title compound **(150b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(3-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**134b**, 0.75 g, 0.25 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(3-methoxybenzoylamino)benzamide **(150b)**, as white crystals.

Anal.:

M.P. **:** 211-12 °C

Yield **:** 63 %

TLC **:** R_f 0.38 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3428, 2924, 2854, 1662, 1645, 1585, 1500 and 740

^{1}H NMR **:** δ 13.82 (bs, 1H, N*H*), 8.7909-8.7960 (d, 1H), 8.25-8.27 (d, 1H), 7.80-7.90 (bs, 2H, NH_2), 7.56-7.58 (d, 1H), 7.48 (s, 1H), 7.44-7.48 (t, 1H), 7.30-

7.40 (bs, 1H, N*H*), 7.15-7.18 (d, 1H), 7.11-7.14 (d, 1H), 6.99 (bs, 1H, N*H*), 3.85 (s, 3H)

MS **:** *m/z* 345.35 (M^+), 347.11 (M+2)

5.1.5.2.9. *N*-Amidino4-chloro-2-(4-methoxybenzoylamino)benzamide (151b)

The title compound **(151b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(4-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**135b**, 0.65 g, 0.22 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(4-methoxybenzoylamino)benzamide **(151b)**, as white crystals.

Anal.:

M.P. **:** 195-96 °C

Yield **:** 70 %

TLC **:** R_f 0.24 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3380, 2924, 2853, 1690, 1644, 1582, 1498 and 760

^{1}H NMR **:** δ 13.63 (bs, 1H, N*H*), 8.66-8.67 (d, 1H), 8.17-8.20 (d, 1H), 7.95-8.00 (bs, 2H, NH_2), 7.20-7.60 (bs, 1H, N*H*), 7.13 (bs, 1H, N*H*), 7.03-7.11 (m, 2H), 6.81-6.84 (m, 2H), 6.57-6.59 (d, 1H), 3.85 (s, 3H)

MS **:** *m/z* 343.47 (M-2), 351.47 (M+4)

5.1.5.2.10. *N*-Amidino-4-chloro-2-(4-nitrobenzoylamino)benzamide (152b)

The title compound **(152b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(4-nitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**136b**, 1.0 g, 0.32 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(4-nitrobenzoylamino)benzamide **(152b)**, as white crystals.

Anal.:

M.P. **:** 257 °C (d)

Yield **:** 72 %

TLC **:** R_f 0.12 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3393, 3105, 2925, 1666, 1631, 1591, 1538, 1343 and 769

^{1}H NMR **:** δ 14.10 (bs, 1H, N*H*), 8.7100-8.7154 (d, 1H), 8.34-8.37 (dd, 2H), 8.18-8.22 (m, 3H), 7.88 (bs, 2H, NH_2), 7.20-7.35 (bs, 1H, N*H*), 7.14-7.17 (d, 1H), 6.79 (bs, 1H, N*H*)

MS **:** *m/z* 361.08 (M+), 363.57 (M+2)

5.1.5.2.11. *N*-Amidino-4-chloro-2-(2,4-dichlorobenzoylamino)benzamide (153b)

The title compound **(153b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(2,4-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**137b**, 1.0 g, 0.30 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(2,4-dichlorobenzoylamino)benzamide **(153b)**, as white crystals.

Anal.:

M.P. **:** 239-40 °C

Yield **:** 70 %

TLC **:** R_f 0.50 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3497, 3438, 3353, 2922, 1665, 1635, 1582, 1359 and 754

^{1}H NMR **:** δ 13.58 (bs, 1H, N*H*), 8.66-8.67 (d, 1H), 8.18-8.20 (d, 1H), 7.48-7.75 (bs, 2H, NH_2), 7.70-7.72 (d, 1H), 7.6413-7.6462 (d, 1H), 7.49-7.51 (d, 1H), 7.13-7.16 (d, 1H), 7.00-7.10 (bs, 1H, N*H*), 6.70-6.80 (bs, 1H, N*H*)

MS **:** *m/z* 385.76 (M^+), 387.01 (M+2)

5.1.5.2.12. *N*-Amidino-4-chloro-2-(3,5-dichlorobenzoylamino)benzamide (154b)

The title compound **(154b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(3,5-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**138b**, 0.75 g, 0.22mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(3,5-dichlorobenzoylamino)benzamide **(154b)**, as white crystals.

Anal.:

M.P. **:** 251-52 °C

Yield **:** 69 %

TLC **:** R_f 0.50 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3570, 3397, 3095, 2923, 1672, 1627, 1600, 1547, 1354 and 712

^{1}H NMR **:** δ 14.61 (bs, 1H, N*H*), 9.03 (s, 1H), 9.0345 (s, 1H), 9.0444 (s, 1H), 8.77 (s, 1H), 8.18-8.21 (d, 1H), 7.98-8.01 (bs, 2H, NH_2), 7.15-7.17 (d, 1H), 7.07-7.08 (bs, 2H, N*H*)

MS **:** *m/z* 384.22 (M^+), 386.94 (M+2)

5.1.5.2.13. *N*-Amidino-4-chloro-2-(2-methylbenzoylamino)benzamide (155b)

The title compound **(155b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(2-*o*-tolyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**139b**, 1.0 g, 0.36 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(2-methylbenzoylamino)benzamide **(155b)**, as white crystals.

Anal.:

M.P. **:** 235-36 °C

Yield **:** 67 %

TLC **:** R_f 0.42 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3405, 3321, 3124, 2921, 1665, 1585, 1535, 1348 and 730

^{1}H NMR **:** δ 13.77 (bs, 1H, N*H*), 8.78-8.79 (d, 1H), 8.20-8.22 (d, 1H), 7.95-7.99 (bs, 2H, NH_2), 7.78-7.85 (dd, 2H), 7.39-7.45 (dd, 2H), 7.10-7.13 (d, 1H), 7.05 (bs, 1H, N*H*), 6.81 (bs, 1H, N*H*), 2.42 (s, 3H)

MS **:** *m/z* 330.92 (M^+), 332.75 (M+2)

5.1.5.2.14. *N*-Amidino-4-chloro-2-(3-methylbenzoylamino)benzamide (156b)

The title compound **(156b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(2-*m*-tolyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**140b**, 0.75 g, 0.75 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(3-methylbenzoylamino)benzamide **(156b)**, as white crystals.

Anal.:

M.P. **:** 205-06 °C

Yield **:** 64 %

TLC **:** R_f 0.41 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3493, 3387, 3336, 2922, 1653, 1631, 1584, 1497, 1329 and 738

^{1}H NMR **:** δ 13.47 (bs, 1H, N*H*), 8.77-8.78 (d, 1H), 8.23-8.25 (d, 1H), 7.61-7.64 (d, 1H), 7.50-7.70 (bs, 1H, NH_2), 7.38-7.43 (t, 1H), 7.33 (s, 1H), 7.30-7.32 (d, 1H), 7.10-7.13 (d, 1H), 6.85-7.07 (bs, 1H, N*H*), 6.81 (bs, 1H, N*H*), 2.48 (s, 3H)

MS **:** *m/z* 330.51 (M^+), 332.50 (M+2)

5.1.5.2.15. *N*-Amidino-4-chloro-2-(3,5-dinitrobenzoylamino)benzamide (157b)

The title compound **(157b)** was synthesized as per the method described for compound **(143b)** using 7-chloro-2-(3,5-dinitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**141b**, 1.05 g, 0.28 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound *N*-amidino-4-chloro-2-(3,5-dinitrobenzoylamino)benzamide **(157b)**, as white crystals.

Anal.:

M.P. **:** 251-53 °C

Yield **:** 72 %

TLC **:** R_f 0.41 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3502, 3399, 3096, 2922, 1673, 1584, 1546, 1354 and 730

^{1}H NMR **:** δ 14.61 (bs, 1H, N*H*), 9.04 (s, 1H), 9.03 (s, 1H), 8.99 (s, 1H), 8.73-8.74 (d, 1H), 8.17-8.19 (d, 1H), 7.95-8.10 (bs, 2H, NH_2), 7.16-7.19 (d, 1H), 6.90-7.10 (bs, 2H, N*H*)

MS **:** *m/z* 407.81 (M^+), 408.67 (M+2)

5.1.6. Synthesis of 2-substituted-4-chloro-*N*-pyridin-2-ylbenzamides (159-173)

5.1.6.1. 2-Benzoylamino-4-chloro-*N*-pyridin-2-ylbenzamide (159)

7-Chloro-2-phenyl-4*H*-benzo[*d*][1,3]oxazin-4-one (**127b**, 0.8 g, 0.30 mmol) and 2-aminopyridine (**158**, 0.43 g, 0.46 mmol) were taken in a dry RBF and stirred at 60-80 °C for 3-4 hrs. Reaction was monitored by TLC. After completion, reaction mixture was added to crushed ice. The precipitated product was filtered out and washed thoroughly with water. The crude product so obtained was recrystallized from methanol to afford the desired compound 2-benzoylamino-4-chloro-*N*-pyridin-2-ylbenzamide **(159)**, as pale yellow crystals.

Anal.:

M.P. **:** 196-98 °C

Yield **:** 58 %

TLC **:** R_f 0.41 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3323, 3133, 1650, 1600, 1404 and 783

^{1}H NMR **:** δ 12.04 (bs, 1H, N*H*), 11.05 (bs, 1H, N*H*), 8.7328-8.7382 (d, 1H), 8.38-8.40 (d, 1H), 8.14-8.16 (d, 1H), 8.06-8.08 (d, 1H), 7.94-7.96 (m, 2H), 7.80-7.85 (t, 1H), 7.53-7.61 (m, 3H), 7.21-7.24 (dd, 1H), 7.15-7.18 (t, 1H)

MS **:** *m/z* 352.2 (M^+), 354.2 (M+2)

5.1.6.2. 4-Chloro-2-(4-methylbenzoylamino)-*N*-pyridin-2-ylbenzamide (160)

The title compound **(160)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-*p*-tolyl-4*H*-benzo[*d*][1,3]oxazin-4-one(**128b**, 0.51 g, 0.55 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(4-methylbenzoylamino)-*N*-pyridin-2-ylbenzamide **(160)**, as yellow crystals.

Anal.:

M.P. **:** 204-06 °C

Yield **:** 67 %

TLC **:** R_f 0.21 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3322, 2923, 1652, 1597, 1405 and 784

^{1}H NMR **:** δ 12.02 (bs, 1H, N*H*), 11.02 (bs, 1H, N*H*), 8.74-8.75 (d, 1H), 8.38-8.40 (d, 1H), 8.14-8.16 (d, 1H), 8.06-8.08 (d, 1H), 7.80-7.85 (m, 3H), 7.33-7.35 (d, 2H), 7.19-7.21 (dd, 1H), 7.15-7.18 (t, 1H), 2.41 (s, 3H)

MS **:** *m/z* 366.2 (M^+), 368.2 (M+2)

5.1.6.3. 4-Chloro-2-(4-chlorobenzoylamino)-*N*-pyridin-2-ylbenzamide (161)

The title compound **(161)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(4-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**129b**, 0.48 g, 0.51 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(4-chlorobenzoylamino)-*N*-pyridin-2-ylbenzamide **(161)**, as yellow crystals.

Anal.:

M.P. **:** 216-17 °C

Yield **:** 67 %

TLC **:** R_f 0.33 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3335, 3130, 1654, 1599, 1402 and 784

^{1}H NMR **:** δ 11.89 (bs, 1H, N*H*), 11.08 (bs, 1H, N*H*), 8.59-8.60 (d, 1H), 8.38-8.40 (d, 1H), 8.10-8.12 (d, 1H), 8.03-8.05 (d, 1H), 7.91-7.95 (d, 2H), 7.81-7.86-5 (t, 1H), 7.58-7.62 (d, 2H), 7.25-7.28 (dd, 1H), 7.16-7.19 (t, 1H)

MS **:** *m/z* 386.2 (M^+), 388.1 (M+2)

5.1.6.4. 2-(4-Bromobenzoylamino)-4-chloro-*N*-pyridin-2-ylbenzamide (162)

The title compound **(162)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(4-bromophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**130b**, 0.41 g, 0.44 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 2-(4-bromobenzoylamino)-4-chloro-*N*-pyridin-2-ylbenzamide **(162)**, as yellowish crystals.

Anal.:

M.P. **:** 174-76 °C

Yield **:** 67 %

TLC **:** R_f 0.30 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3350, 3127, 1652, 1576, 1405 and 783

^{1}H NMR **:** δ 12.04 (bs, 1H, N*H*), 11.05 (bs, 1H, N*H*), 8.6643-8.6683 (d, 1H), 8.38-8.39 (d, 1H), 8.06-8.15 (d, 2H), 7.92- 7.94 (d, 1H), 7.85-7.87 (d, 1H), 7.69-7.74 (d, 2H), 7.22-7.24 (dd, 2H), 7.15-7.18 (t, 1H)

MS **:** *m/z* 430.34 (M^+), 432.29 (M+2)

5.1.6.5. 4-Chloro-2-(4-fluorobenzoylamino)-*N*-pyridin-2-ylbenzamide (163)

The title compound **(163)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(4-fluorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**131b**, 0.45 g, 0.48 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(4-fluorobenzoylamino)-*N*-pyridin-2-ylbenzamide **(163)**, as white crystals.

Anal.:

M.P. **:** 186-88 °C

Yield **:** 66 %

TLC **:** R_f 0.30 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3350, 3127, 1659, 1599, 1402, 782 and 755

^{1}H NMR **:** δ 13.58 (bs, 1H, N*H*), 11.99 (bs, 1H, N*H*), 8.82-8.83 (d, 1H), 8.08-8.10 (d, 1H), 8.04-8.06 (d, 2H), 7.88-7.89 (d, 1H), 7.54-7.58 (t, 1H), 7.29-7.35 (m, 2H), 7.11-7.13 (dd, 1H), 6.68-6.70 (d, 1H), 6.60-6.63 (t, 1H)

MS **:** *m/z* 368.1 (M^+), 370.0 (M+2)

5.1.6.6. 4-Chloro-2-(2-chlorobenzoylamino)-*N*-pyridin-2-ylbenzamide (164)

The title compound **(164)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(2-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**132b**, 0.43 g, 0.46 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(2-chlorobenzoylamino)-*N*-pyridin-2-ylbenzamide **(164)**, as off white crystals.

Anal.:

M.P. **:** 160-62 °C

Yield **:** 68 %

TLC **:** R_f 0.18 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3420, 3131, 1663, 1598, 1401 and 781

^{1}H NMR **:** δ 11.37 (bs, 1H, N*H*), 10.91 (bs, 1H, N*H*), 8.52 (s, 1H), 8.32-8.33 (d, 1H), 8.02-8.04 (d, 1H), 7.95-7.97 (d, 1H), 7.70-7.74 (t, 1H), 7.61-7.63 (d, 1H), 7.38-7.49 (m, 3H), 7.21-7.23 (dd, 1H), 7.07-7.10 (t, 1H)

MS **:** *m/z* 386.2 (M^+), 388.2 (M+2)

5.1.6.7. 4-Chloro-2-(3-chlorobenzoylamino)-*N*-pyridin-2-ylbenzamide (165)

The title compound **(165)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(3-chlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**133b**, 0.48 g, 0.51 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(3-chlorobenzoylamino)-*N*-pyridin-2-ylbenzamide **(165)**, as off white crystals.

Anal.:

M.P. **:** 147-50 °C

Yield **:** 84 %

TLC **:** R_f 0.18 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3120, 2854, 1669, 1582, 1403 and 728

^{1}H NMR **:** δ 13.78 (bs, 1H, N*H*), 11.05 (bs, 1H, N*H*), 8.8226-8.8279 (d, 1H), 8.6632-8.6686 (d, 1H), 8.37-8.39 (d, 1H), 8.14-8.16 (d, 1H), 8.12-8.13 (d, 1H), 7.84-7.87 (m, 2H), 7.79-7.83 (t, 1H), 7.62-7.66 (t, 1H), 7.21-7.23 (dd, 1H), 7.14-7.17 (t, 1H), 7.09-7.11 (dd, 1H)

MS **:** *m/z* 386.19 (M^+), 388.30 (M+2)

5.1.6.8. 4-Chloro-2-(3-methoxybenzoylamino)-*N*-pyridin-2-ylbenzamide (166)

The title compound **(166)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(3-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**134b**, 0.75 g, 0.25 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(3-methoxybenzoylamino)-*N*-pyridin-2-ylbenzamide **(166)**, as off white crystals.

Anal.:

M.P. **:** 217-20 °C

Yield **:** 60 %

TLC **:** R_f 0.15 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3118, 2924, 1642, 1575, 1457, 1409 and 774

^{1}H NMR **:** δ 12.12 (bs, 1H, N*H*), 11.17 (bs, 1H, N*H*), 8.79-8.80 (d, 1H), 8.48-8.49 (d, 1H), 8.35-8.37 (d, 1H), 8.08-8.10 (d, 1H), 8.03-8.05 (d, 1H), 7.92-7.94 (d, 1H), 7.47-7.53 (m, 2H), 7.40-7.44 (t, 1H), 7.27-7.29 (dd, 1H), 7.15-7.19 (t, 1H), 3.87 (s, 3H)

MS **:** *m/z* 381.21 (M^+), 383.00 (M+2)

5.1.6.9. 4-Chloro-2-(4-methoxybenzoylamino)-*N*-pyridin-2-ylbenzamide (167)

The title compound **(165)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(4-methoxyphenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**135b**, 0.65 g, 0.22 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(4-methoxybenzoylamino)-*N*-pyridin-2-ylbenzamide **(167)**, as white crystals.

Anal.:

M.P. **:** 185-87 °C

Yield **:** 63 %

TLC **:** R_f 0.15 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3332, 3115, 1652, 1605, 1575, 1425, 1412 and 780

^{1}H NMR **:** δ 12.00 (bs, 1H, N*H*), 11.01 (bs, 1H, N*H*), 8.7526-8.7580 (d, 1H), 8.38-8.40 (d, 1H), 8.15-8.17 (d, 1H), 8.05-8.07 (d, 1H), 7.90-7.93 (dd, 2H), 7.81-7.85 (d, 1H), 7.18-7.20 (dd, 1H), 7.15-7.17 (t, 1H), 7.04-7.06 (dd, 1H), 3.86 (s, 3H)

5.1.6.10. 4-Chloro-2-(4-nitrobenzoylamino)-*N*-pyridin-2-ylbenzamide (168)

The title compound **(168)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(4-nitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**136b**, 1.0 g, 0.32 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(4-nitrobenzoylamino)-*N*-pyridin-2-ylbenzamide **(168)**, as white crystals.

Anal.:

M.P. **:** 239-41 °C

Yield **:** 77 %

TLC **:** R_f 0.12 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3350, 3145, 1658, 1576, 1517, 1404 and 782

^{1}H NMR **:** δ 12.11 (bs, 1H, N*H*), 11.09 (bs, 1H, N*H*), 8.5829-8.5882 (d, 1H), 8.35-8.37 (d, 1H), 8.34-8.35 (dd, 2H), 8.13-8.16 (dd, 2H), 8.09-8.12 (dd, 2H), 8.04-8.06 (d, 1H), 7.78-7.83 (t, 1H), 7.23-7.26 (dd, 1H), 7.13-7.17 (t, 1H)

MS **:** *m/z* 397.2 (M^+), 399.3 (M+2)

5.1.6.11. 4-Chloro-2-(2,4-dichlorobenzoylamino)-*N*-pyridin-2-ylbenzamide (169)

The title compound **(169)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(2,4-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**137b**, 0.43 g, 0.45 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(2,4-dichlorobenzoylamino)-*N*-pyridin-2-ylbenzamide **(169)**, as white crystals.

Anal.:

M.P. **:** 225-27 °C

Yield **:** 71 %

TLC **:** R_f 0.23 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3328, 3207, 1675, 1654, 1575, 1403 and 783

^{1}H NMR **:** δ 11.45 (bs, 1H, N*H*), 10.90 (bs, 1H, N*H*), 8.5221-8.5265 (d, 1H), 8.31-8.33 (d, 1H), 8.01-8.03 (d, 1H), 7.95-7.99 (dd, 2H), 7.70-7.74 (t, 1H), 7.61-7.63 (d, 1H), 7.5137-7.5185 (d, 1H), 7.39-7.42 (dd, 1H), 7.18-7.21 (dd, 1H), 7.07-7.10 (t, 1H)

MS **:** *m/z* 420.1 (M^+), 422.0 (M+2)

5.1.6.12. 4-Chloro-2-(3,5-dichlorobenzoylamino)-*N*-pyridin-2-ylbenzamide (170)

The title compound **(170)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(3,5-dichlorophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**138b**, 0.43 g, 0.45 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(3,5-dichlorobenzoylamino)-*N*-pyridin-2-ylbenzamide **(170)**, as white crystals.

Anal.:

M.P. **:** 232-33 °C

Yield **:** 65 %

TLC **:** R_f 0.18 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3408, 3108, 1680, 1419 and 779

^{1}H NMR **:** δ 12.11 (bs, 1H, N*H*), 11.00 (bs, 1H, N*H*), 9.1246-9.1294 (d, 2H), 9.0829-9.0878 (t, 1H), 8.35-8.36 (d, 1H), 8.34-8.35 (d, 1H), 8.17-8.19 (d, 2H), 8.02-8.04 (d, 1H), 7.77-7.82 (t, 1H), 7.30-7.33 (dd, 1H), 7.12-7.15 (t, 1H)

MS **:** *m/z* 420.3 (M^+), 422.1 (M+2), 424.2 (M+4)

5.1.6.13. 4-Chloro-2-(2-methylbenzoylamino)-*N*-pyridin-2-ylbenzamide (171)

The title compound **(171)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(2-*o*-tolyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**139b**, 1.0 g, 0.36 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(2-methylbenzoylamino)-*N*-pyridin-2-ylbenzamide **(171)**, as white crystals.

Anal.:

M.P. **:** 196-98 °C

Yield **:** 68 %

TLC **:** R_f 0.31 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3320, 3218, 1653, 1574, 1405 and 781

^{1}H NMR **:** δ 11.41 (bs, 1H, N*H*), 10.88 (bs, 1H, N*H*), 8.6616-8.6667 (d, 1H), 8.35-8.37 (d, 1H), 8.06-8.08 (d, 1H), 8.00-8.02 (d, 1H), 7.73-7.76 (t, 1H), 7.56-7.58 (d, 1H), 7.37-7.41 (t, 1H), 7.27-7.31 (t, 2H), 7.19-7.22 (dd, 1H), 7.10-7.13 (t, 1H), 2.48 (s, 3H)

MS **:** *m/z* 366.2 (M^+), 368.2 (M+2)

5.1.6.14. 4-Chloro-2-(3-methylbenzoylamino)-*N*-pyridin-2-ylbenzamide (172)

The title compound **(172)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(2-*m*-tolyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**140b**, 0.75 g, 0.75 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(3-methylbenzoylamino)-*N*-pyridin-2-ylbenzamide **(172)**, as white crystals.

Anal.:

M.P. **:** 140-42 °C

Yield **:** 54 %

TLC **:** R_f 0.29 (*n*-Hexane:Ethyl acetate :: 85:15)

IR (cm^{-1}) **:** 3363, 3221, 1651, 1574, 1425 and 778

^{1}H NMR **:** δ 12.04 (bs, 1H, N*H*), 10.92 (bs, 1H, N*H*), 8.76-8.77 (d, 1H), 8.37-8.38 (d, 1H), 8.16-8.18 (d, 1H), 8.06-8.08 (d, 1H), 7.78-7.83 (t, 1H), 7.77 (s, 1H), 7.72-7.74 (d, 1H), 7.42-7.44 (d, 1H), 7.38-7.42 (t, 1H), 7.17-7.20 (dd, 1H), 7.13-7.16 (t, 1H), 2.43 (s, 3H)

MS **:** *m/z* 366.2 (M^+), 368.2 (M+2)

5.1.6.15. 4-Chloro-2-(3,5-dinitrobenzoylamino)-*N*-pyridin-2-ylbenzamide (173)

The title compound **(173)** was synthesized as per the method described for compound **(159)** using 7-chloro-2-(3,5-dinitrophenyl)-4*H*-benzo[*d*][1,3]oxazin-4-one (**141b**, 1.0 g, 0.28 mmol). The crude product so obtained was recrystallized from methanol to afford the desired compound 4-chloro-2-(3,5-dinitrobenzoylamino)-*N*-pyridin-2-ylbenzamide **(173)**, as white crystals.

Anal.:

M.P. **:** 239-40 °C

Yield **:** 79 %

TLC **:** R_f 0.31 (Ethyl acetate: *n*-Hexane :: 15:85)

IR (cm^{-1}) **:** 3408, 3109, 1679, 1585, 1521, 1417 and 778

^{1}H NMR **:** δ 12.32 (bs, 1H, N*H*), 10.95 (bs, 1H, N*H*), 9.15-9.16 (d, 2H), 8.4705-8.4756 (d, 1H), 8.36-8.37 (d, 1H), 8.20-8.22 (d, 1H), 8.06-8.08 (d, 1H), 7.97 (s, 1H), 7.78-7.82 (t, 1H), 7.28-7.31 (dd, 1H), 7.12-7.15 (t, 1H)

MS **:** *m/z* 442.2 (M^+), 444.2 (M+2)

5.2. Biological work

5.2.1. *In vitro* platelet aggregation assay

The newly synthesized compounds were studied for their *in vitro* platelet aggregation inhibitory activity on whole human blood as previously reported by us.

The study was performed using Whole Blood Aggregometer, Chronolog Corporation, Haverton, PA, USA. The inhibitory activity of compounds was measured and compared with inhibition induced by standard drug Aspirin (10 μg/ml). Each assay was performed three times, taking control and aspirin as a standard for comparative assay each time. Whole blood aggregometer measures inhibition of platelet aggregation induced by ADP (10 μM) in ohms which is the resistance produced by accumulation of aggregates on the electrode. The control or normal platelet aggregation was found to be having a reading of 12.2 ± 1.92 Ω and for aspirin (10 μg/ml) the reading was 7.5 ± 1.21 Ω (38.52 % inhibition of aggregation). The standard range of readings for inhibition of ADP (10 μM) induced aggregation for aspirin is 6-24 Ω.

5.2.2. *Ex vivo* antiplatelet study

The suspensions of the test compounds were triturated with minimum quantity of gum acacia (0.9 % w/v). Test compounds were orally administered (10 mg/kg) and the first blood sample was withdrawn after 2 h *via* the retro-orbital puncture. All samples were collected into *vaccue* tubes containing 1/10 volume of heparin (100 IU/ml) and kept at room temperature until further experimentation, for a period ranging from 5 min to 1 h. Diluted whole blood (490 μl) with isotonic saline (500 μl) was transferred to an aggregometer cuvette placed in the thermostated (37 ^{o}C) cuvette holder of the whole-blood aggregometer (Model 592, Chrono-Log Corp., Hawertown, PA, USA). Siliconized stirring bar and electrode were dipped inside and the system was allowed to come to equilibrium. Ten microliters of ADP (10 μM, Chrono-Log Corp.) was added and the change in impedance, which reflected platelet aggregation around the electrodes, is recorded until the maximum extent of aggregation was reached. Each blood sample was tested thrice and the mean was calculated for each group.

Maximal reading (mean ± SEM) of platelet aggregation in whole blood induced by 10 μM ADP was determined without the test sample (Blank *i.e.* Maximum Aggregation) and a given concentration of each test sample. The percentage inhibition was calculated considering the blank reading as 100% by the formula as given below:

$$\text{Percentage Inhibition} = \frac{\text{Blank}-\text{Sample}}{\text{Sample}} \text{x } 100 \qquad (1)$$

5.2.3. *In vivo* antithrombotic study

a) Ferric chloride induced thrombosis

Rats weighing between 250 and 300 g were anaesthetized with ketamine (100 mg/kg) and a polyethylene catheter (PE-205) was inserted into the trachea *via* tracheotomy to facilitate breathing. Catheters were also placed in the femoral artery for blood samples and measurement of arterial blood pressure and in the jugular vein for administration of test samples. The right carotid artery was isolated and a small piece of Parafilm "M" was placed under the vessel to isolate it from surrounding tissues throughout the experiment. The test sample was administered by an intravenous injection at a defined time prior to initiation of thrombus formation. Thrombus formation was induced by the application of filter paper (2 x 5 mm), saturated with $FeCl_3$ solution, to the carotid artery. Concentration of $FeCl_3$ solution that caused consistent thrombus formation was determined under our experimental conditions and it was found out to be 42.30 % w/v. The paper was allowed to remain on the vessel for 10 min before removal. The temperature probe (SS6L, BIOPAC Inc., CA, USA) was placed distal to the filter paper piece towards the cephalic end to measure any changes in temperature during the experiment. The experiment was continued for 60 min after the induction of thrombosis. At that time, the thrombus was removed and weighed. The percentage inhibition of thrombosis was calculated using following formula:

$$\text{Percentage Inhibition of thrombosis} = \frac{\text{A}-\text{A1}}{\text{A}} \text{x } 100 \qquad (2)$$

where, A = thrombus weight of control and A_1 = thrombus weight after treatment with the test sample or standard.

b) AV shunt model for thrombosis

Rats were anaesthetized and fixed in supine position on a temperature-controlled (37 ^{o}C) heating plate to maintain body temperature. The left carotid artery and the right jugular vein were catheterized with short polyethylene catheters. The catheters were filled with isotonic saline solution and clamped. The two ends of the catheters were connected with a 2 cm glass capillary with an internal diameter of 1 mm. At a defined time after administration of the test sample (**105**), the clamps which were occluding the AV-shunt, were opened. If the blood started flowing, then the

temperature would rise from room temperature to body temperature. In contrast, decrease in temperature indicated the formation of an occluding thrombus. The temperature was measured continuously (*as mentioned in the procedure for $FeCl_3$ model*) over 30 min after opening of the shunt.

c) Bleeding time

The rats were given per oral dose of 10 mg/kg body weight of test sample and anesthetized after 2 hrs. Then they were fixed in supine position on a temperature-controlled (37 °C) heating-table. Catheterization of a carotid artery (for measurement of blood pressure) and a jugular vein was performed. After a defined latency period, the tail of the rat was transected with a razor blade at a distance of 4 mm from the tip of the tail. Immediately after transection, the tail was immersed into a bath filled with isotonic saline solution at 37 °C. The amount of time elapsed from tail transection to cessation of bleeding was measured upto 30 min and was assigned as the bleeding time.[41]

d) Gastric ulceration

Female Wistar rats (150–170 g) were fasted for 48 h having access to drinking water *ad libitum*. Test compounds and standard drug aspirin were orally administered to groups of five rats 5 h before autopsy. The stomachs were macroscopically inspected and the number of ulcers is noted and the severity recorded with the following scores: 0 = no ulcer; 1 = superficial ulcers; 2 = deep ulcers; 3 = perforation.

5.3. References

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