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Graphical Abstract

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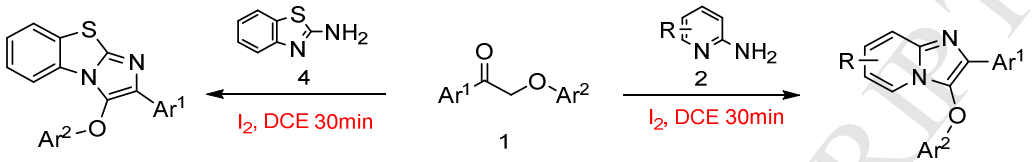

- No metallic catalyst
- Green, efficient synthetic route
- Readily available reagents
- Mild condition, simple procedure
- Wide substrate scope

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ABSTRACT

An I_2-mediated protocol was proposed for the synthesis of 3-phenoxy imidazo heterocycles from aromatic ketones and 2-aminopyridines or 2-aminobenzothiazole . This direct, efficient and operationally simple method provided a fundamentally novel and rapid approach for the synthesis of 3-phenoxy imidazo heterocycles with good to excellent yields, and it avoided the requirement of any metal, base and extra oxidant.

1. Introduction

Imidazo[*1,2-a*]pyridine is a privileged structural motif that is recognized as a "drug prejudice" scaffold in medicinal chemistry notably from its easy access and its great stability.[1] Suitable functionalization led to compounds that act at numerous targets including enzymes, receptors and infectious agents.[2] Among them, structures related to imidazo[*1,2-a*]pyridine-3-ol with 2-substituents are biologically active with both antifungal and anthelmintic activity.[3] Consequently, there is continuous effort towards the development of new methods for the synthesis of imidazo[*1,2-a*]pyridine derivatives with a variety of substituents at the 2 and 3-positions of this moiety, and there are many routes employing different strategies to construct imidazo [*1,2-a*]pyridines, such as condensation, multicomponent reactions, oxidative coupling, tandem reactions, aminooxygenation, and hydroamination reactions.[4] However, there are relatively few C-3 oxo-substituted imidazo[*1,2-a*]pyridines involved. Recently, a catalytic oxidative cyclization of 2-aminopyridines or 2-aminobenzothiazole with 2-phenoxyacetophenones with assistance of CuI and O_2 was developed, efficiently providing 3-phenoxy imidazo[*1,2-a*]-pyridines or 3-phenoxy benzo[*d*]imidazo[*2,1-b*]thiazoles by Zhang's group.[5] And afterwards, Zhang's group optimized this method for preparation of C-3 oxo-substituted imidazo[*1,2-a*]pyridines and benzo[*d*] imidazo[*2,1-b*]thiazoles with the assistance of I_2/TBHP. [6] Although these two methods can result in moderate to good yields, they fail in synthesis of imidazo[*1,2-a*]pyridine derivatives with a substituent at the 5-positions, and that these reactions take an extraordinarily long time, 14-16 hours. More recently, Hajra's group developed a direct C-3 alkoxylation of imidazopyridines using visible light organophotoredox catalysis at ambient temperature.[7]But due to the limitation of reactants and reaction conditions, the adaptability of this reaction is not extensive. Despite these achievements, the development of further diverse methods to construct various imidazo[*1,2-a*]pyridines is still desirable. Moreover, like imidazo[*1,2-a*]pyridines, benzo[*d*]imidazo[*2,1-b*]-thiazole is one of the important fused bicyclic sulfur containing heterocycles and also an important chemical building block in synthetic organic and biological chemistry. Various benzo[*d*]imidazo[*2,1-b*]thiazoles have been used as antitumor agents, antimicrobial agents, antibacterial agents, and antiallergic agents.[8] So, we intend to explore a novel and green methodology for the synthesis of special and valuable 3-O-substituted imidazo heterocycles, including imidazo[*1,2-a*]pyridines organisation of the template and benzo[*d*]imidazo [*2,1-b*]thiazoles.

To the best of our knowledge, molecular iodine plays an important role in organic synthesis, owing to its commercial availability, low cost, and low toxicity.[9] A variety of studies in relation to iodine-catalyzed carbon–heteroatom bond formation have been reported.[10] Inspired by these advances, we sought to investigate the application of iodine in imidazo[*1,2-a*]pyridines and benzo[*d*]imidazo [*2,1-b*]thiazoles synthesis.

2. Results and Discussion

To investigate the role of molecular iodine in the cyclization reaction between 2-phenoxyacetophenones (**1**) and 2-aminopyridine (**2**), we initially tested the reaction in the presence of CuI, $CoCl_2$ or I_2, and the results were summarized in **Table1** (**entries 1−5**). To our delight, in the presence of I_2 (1.0 equiv), the desired product was obtained in 89% isolated yield when the reaction was conducted in DCE at 100 °C for 1 h and

the molar ratio of **1** and **2** was fixed on 1:3. Next, a survey of the amount of I_2 was investigated (**Table1**, **entries 6**–**9**) and 2.0 equiv was found to be the best (**Table1**, **entry 9**). And, more remarkable, the reaction was hard to convert in the absence of I_2 (**Table 1**, **entry 6**), this result revealed that I_2 is necessary for the cyclization between 2-phenoxyacetophenones (**1**) and 2-aminopyridine (**2**). Then we decreased the amount of

Table 1. Optimization of reaction conditions [a]

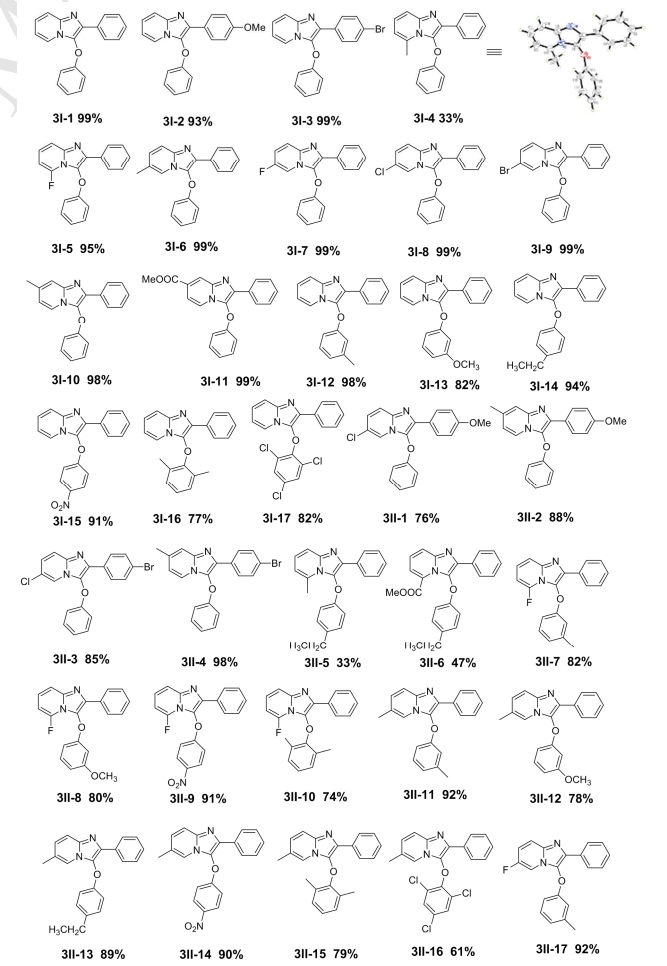
entry	2 (equiv)	catalyst	additive (equiv)	solvent	temp (°C)	time (h)	Yield [b] (%)
1	3	CuI		DCE	100	1	10
2	3	$CoCl_2$		DCE	100	1	n.d.[c]
3	3	CuI	I_2(1)	DCE	100	1	80
4	3	$CoCl_2$	I_2(1)	DCE	100	1	78
5	3		I_2(1)	DCE	100	1	89
6	3		I_2(0)	DCE	100	1	n.d.[c]
7	3		I_2(0.2)	DCE	100	1	23
8	3		I_2(0.5)	DCE	100	1	65
9	3		I_2(2)	DCE	100	1	99
10	1		I_2(2)	DCE	100	1	51
11	2		I_2(2)	DCE	100	1	84
12	3		I_2(2)	EtOH	100	1	49
13	3		I_2(2)	MeCN	100	1	52
14	3		I_2(2)	DMF	100	1	20
15	3		I_2(2)	THF	100	1	10
16	3		I_2(2)	Hex [d]	100	1	86
17	3		I_2(2)	CYH [d]	100	1	82
18	3		I_2(2)	CH_2Cl_2	100	1	80
19	3		I_2(2)	$CHCl_3$	100	1	86
20	3		I_2(2)	CCl_4	100	1	84
21	**3**		**I_2(2)**	**DCE**	**100**	**0.5**	**99**
22	3		I_2(2)	DCE	100	2	99
23	3		I_2(2)	DCE	70	0.5	94
24	3		I_2(2)	DCE	84	0.5	96
25	3		I_2(2)	DCE	90	0.5	95

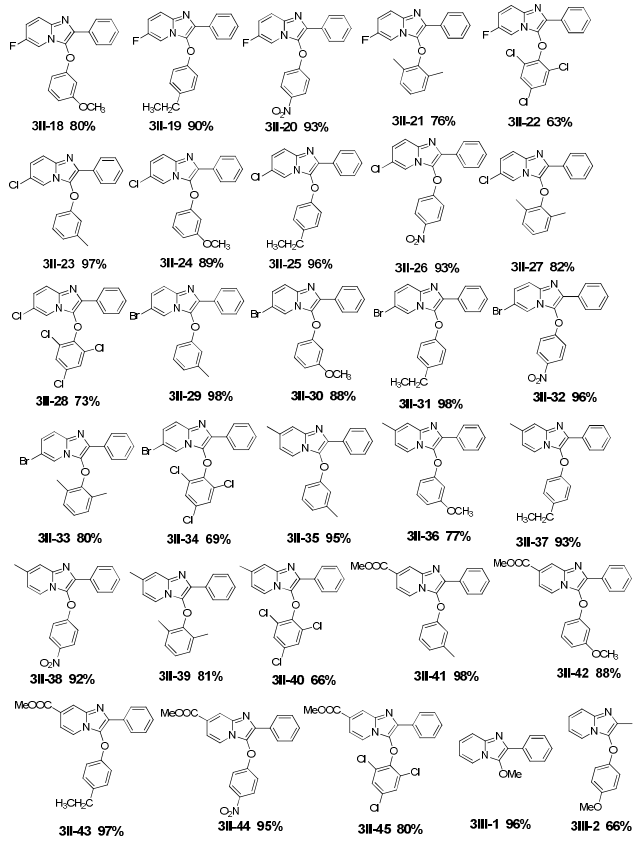
[a] Reaction conditions : **1** (0.5 mmol, 1.0 equiv) , **2** (1.0-3.0 equiv), catalyst (5 % mmol), additive (0.1-2.0 equiv), in 10 mL of solvent. [b] Isolated yield . [c] Not detected. [d] Hex: n-hexane, CYH : cyclohexane.

2-aminopyridine resulting in incomplete conversion affording **3** in 51% and 84% yield (**entries 10**–**11**). A series of representative solvents was examined (**Table 1**, **entries 12**–**20**), and the results demonstrated that the desired reaction could proceed in many solvents, which included dichloromethane (DCM), chloroform, tetrachloromethane, dichloroethane (DCE) (**Table 1**, **entries 18**–**20 and 9**). Among the solvents tested, DCE was found to be the best choice. Further extended or shortened the reaction time (**Table 1**, **entries 21**–**22**) and reduction of temperature (**Table 1**, **entries 23**–**25**) could not enhance the yield. Carefully monitoring of the reaction showed that the reaction was completed within 30 min at 100 °C in DCE (10 mL) and the molar ratio of **1** , **2** and **I_2** was on **1:3:2** (**entry 21**, yield 99 %) .

Having identified the effective reaction conditions, we next investigated the scope and generality of this catalyst-free reaction. As shown in Scheme **1**, a series of 2-phenoxyacetophenones (**1**) and 2-aminopyridines (**2**) bearing a variety of substituent were examined. This reaction appeared to be insensitive to the electronic but sensitive to steric effect of the substituent. Substrates bearing electron-donating and electron-withdrawing groups in the para positions of C-terminus phenyl ring provided the corresponding imidazo-[*1,2-a*]pyridine in excellent yields (93%–99% yields, **Scheme 1**, **3I-2**,**3I-3**). In addition, 2-amino pyridines with substitutions at 4-, 5- positions also could react with 2-phenoxyacetophenones to provide the target compounds in excellent yields (98%–99% yields, **Scheme 1**, **3I-6**–**3I-11**). However, when 2-amino-6-methyl pyridine was used, due to its steric hindrance, the product yield decreased to only 33% (**Scheme 1, 3I-4**). The structure and relative configuration of **3I-4** were unambiguously determined by X-ray diffraction, and the relative configurations of other products were assigned by analogy. But since fluorine has a much smaller radius than methyl, when 2-amino-6-fluoro pyridine was used, the product yield increased to 95% (**Scheme 1, 3I-5**). Furthermore, substrates with substitutions at various positions of O-terminus phenyl ring also afforded the target compounds in good to excellent yields (77%–98% yields, **Scheme 1**, **3I-12**–**3I-17**).

Scheme 1. Substrate Scope of Synthesis of Imidazo[*1,2-a*]pyridines [a,b]





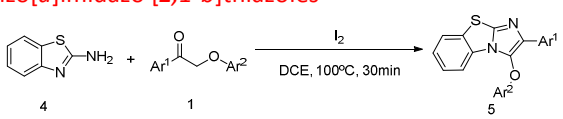
[a] Standard reaction conditions: **1** (0.5 mmol, 1.0 equiv), **2** (1.5 mmol, 3.0 equiv), I_2 (1 mmol, 2.0 equiv), DCE (10 mL), 100 ℃, 30 min. [b] Isolated yield.

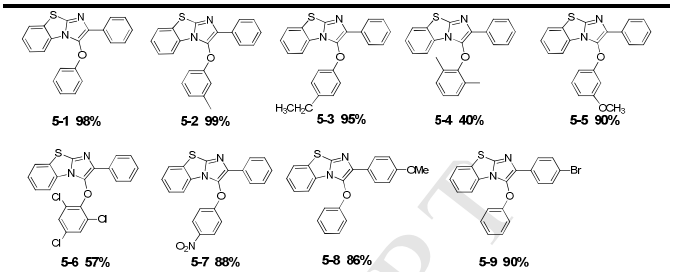
Then combinations of different 2-aminopyridines with substituted ketones (**1**) at different position were then explored in an effort to access unprecedented structural motifs. 2-aminopyridines bearing different groups such as Me, F, Cl, Br, COOMe were well-tolerated, meanwhile, introduction of substituent such as Me, Et, OMe, Cl, Br, NO_2 to O- and C-terminus phenyl ring resulted in the desired imidazo[1,2-a]pyridines in good to excellent yields (**Scheme 1, 3II-1–3II-45**) regardless of electron-donating or electron-withdrawing properties. As expected, due to the steric hindrance, 2-amino-6-methyl pyridine and 2-amino-6-methoxycarbonyl pyridine showed lower reactivity to afford the corresponding products in 33% and 47% yields (**3II-5** and **3II-6**). Even though, much to our satisfaction, substituted 2-aminopyridines and ketones all proceeded smoothly to give the desired products, which provided a convenient platform for further elaboration.

Meanwhile, alkyl or alkoxy substituted substrates, such as 2-methoxyacetophenone and 1-(4-methoxyphenoxy)propan-2-one , could also react smoothly with 2-aminopyridine (**2**) to give the corresponding products **3III-1, 3III-2** in 96 % and 66 % yields.

Considering the wide utilizations of benzo[*d*]imidazo[*2,1-b*]thiazoles, we turned to examine the reaction of 2-aminobenzothiazole (**4**) with ketones (**1**), employing the optimized reaction conditions (**Scheme 2**). Satisfactorily, ketones (**1**) bearing electron-donating as well as electron-withdrawing substituents reacted well and afforded the corresponding benzo[*d*]-imidazo[*2,1-b*]thiazoles with excellent yields (**Scheme 2, 5-1−5-9**). It was worth mentioning that, steric hindrance

Scheme 2. Substrate Scope of Synthesis of Benzo[*d*]imidazo [*2,1-b*]thiazoles [a,b]

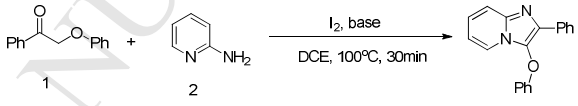




[a] Standard reaction conditions: **1** (0.5 mmol, 1.0 equiv), **4** (1.5 mmol, 3.0 equiv), I_2 (1 mmol, 2.0 equiv), DCE (10 mL), 100 ℃, 30 min. [b] Isolated yield.

substrate ketones (**1**), such as 2-(2,6-dimethylphenoxy)-1-phenylethanone and 1-phenyl-2-(2,4,6-trichlorophenoxy) ethanone were also tolerant to this reaction to afford the desired product **5-4** in 40%, **5-6** in 57% yield.

Table 2. Control Experiments [a]



entry	**1** (mmol)	**2** (mmol)	base	base (mmol)	Yield [b] (%)
1	0.5	0.5	/	/	37
2	0.5	0.5	2-aminopyridine	1	99
3	0.5	0.5	$NaHCO_3$	1	44
4	0.5	0.5	CH_3COONa	1	45
5	0.5	0.5	Et_3N	1	32
6	0.5	0.5	DBU	1	16
7	0.5	0.5	pyridine	1	10

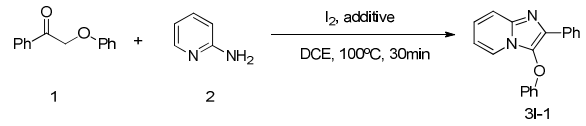
[a] Reaction conditions : **1** (0.5 mmol, 1.0 equiv) , **2** (0.5 mmol, 1.0 equiv), I_2 (1 mmol, 2.0 equiv), base (1 mmol, 2.0 equiv), DCE (10 ml), 100 ℃, 30 min, [b] Isolated yield.

To demonstrate the synthetic potential of this transformation, a gram-scale reaction was carried out. Under the standard reaction conditions, the product **3I-1** was facilely prepared in 10.0 g-scale with 98.4% isolated yield.

To gain insights into the possible mechanism of this process, some control experiments were performed, as presented in **Table 2, 3** and **4**. Firstly, the controlling reactions of **1** and **2** (**1**:**2**=1:1) with different amount of base were conducted under standard conditions, but none of them were found to be effective for the reaction (**Table 2**). The results showed that excess 2-aminopyridine promoted the reaction, whereas other base didn't. We have noticed that during the last few decades molecular iodine has emerged as the key reagent in numerous oxidative dehydrogenation transformations due to its easy handling, commercial availability, low toxicity and versatility. Particularly, the combination of I_2 and an oxidant (such as O_2[11], H_2O_2 [12], TBHP [6,13]and DMSO[14] or just only I_2[15], has been proven as a promising reagent for the construction of biologically significant scaffolds through oxidative dehydrogenation reaction. Inspired by this strategy, we supposed molecular I_2 could facilitate the oxidative dehydrogenation condensation process as an oxidant. To

examine it, we carried out the reaction of **1** (0.5 mmol, 1.0 equiv) and **2** (3.0 equiv) with I_2 (1.0 equiv), in 10 mL DCE at 100 °C under nitrogen or oxygen atmospheres (**Table 3**). But, neither the addition of co-oxidant O_2 nor inactive gas N_2 made any difference to the reaction efficiency, proving that the whole reaction route indeed promoted only by I_2.

Table 3. Control Experiments [a]



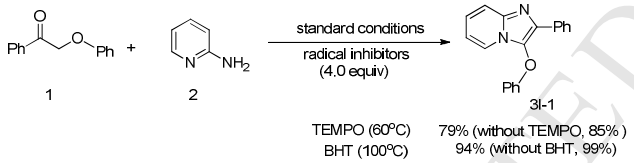
1 2 3I-1

entry	**1** (mmol)	**2** (mmol)	additive	I_2 (mmol)	Yield [b] (%)
1	0.5	1.5	O_2 (1 atm)	0.5	88
2	0.5	1.5	Air	0.5	89
3	0.5	1.5	N_2 (1 atm)	0.5	90

[a] Reaction conditions : **1** (0.5 mmol, 1.0 equiv) , **2** (1.5 mmol, 3.0 equiv), I_2 (0.5 mmol, 1.0 equiv), DCE (10 mL), 100 °C, 30 min, [b] Isolated yield.

In addition, a radical-trapping experiment was carried out to confirm whether this reaction went through a radical reaction pathway. As shown in **Table 4**, at 60°C, the conversion efficiency has hardly any decrease when 2,2,6,6- tetramethyl-1-piperidinyloxy (TEMPO), as a radical scavenger, was added to the reaction under the standard conditions. Another radical inhibitor 2,6-di-tert-butyl-4-methylphenol (BHT) was also employed, and product 3I-1 was isolated in excellent yield similar to that without BHT. This meant that a radical pathway might not be involved in this reaction.

Table 4. Control Experiments [a]

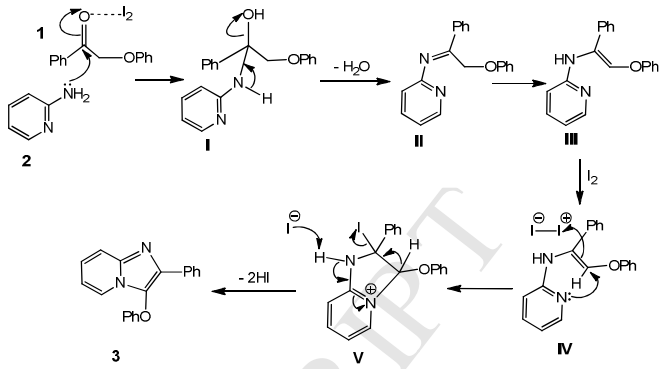


1 2 3I-1

[a] Reaction conditions : **1** (0.5 mmol, 1.0 equiv) , **2** (1.5 mmol, 3.0 equiv), I_2 (0.5 mmol, 1.0 equiv), DCE (10 mL), 30 min.

In this oxidative dehydrogenation condensation process, the reaction mechanism of ketone (**1**) with 2-aminopyridine or 2-aminobenzothiazole (**2** or **4**) are similar. So, we take ketone with 2-aminopyridine as an example to illustrate. On the basis of the results obtained above and previous reports,[16] the mechanism of the oxidative dehydrogenation condensation reaction between the ketone and 2-aminopyridine is described as in **Scheme 3**. Initially, the amino group of 2-aminopyridine attacks the carbonyl group of the ketone, which was activated beforehand by a molecule of polarized I_2,[16] affording the imine **II** with the elimination of H_2O. The imine **II** then rearranges to the enamine **III** immediately. After that the newly formed C=C double bond tends to form a π-complex with $I^{\delta+}$ to give up part of its electron density, that facilitates the intramolecular nucleophilic attack of the pyridine N to the C=C double bond. Consequently, the cyclization takes place accompanying the elimination of two molecules of HI. The existence of I^-, verified by the precipitate of AgI, indicates the presence of HI, which may be captured by the excess of alkaline substrates. Moreover, it is obvious that I_2 molecules take the key role in driving and assisting the reaction by increasing not only the electrophilicity of the C=O but also the enamine C=C double bond.

Scheme 3. Proposed Mechanism



3. Conclusions

In summary, we have successfully developed a facile and highly efficient protocol for the synthesis of 3-phenoxy imidazo heterocycles from readily available 2-phenoxyacetophenone with 2-aminopyridine or 2-aminobenzothiazole by employing stoichiometric molecular iodine, which allows for the rapid synthesis of a wide range of 3-phenoxy imidazo heterocycles under mild conditions. Some notable hallmarks of our protocol include high yields, operational simplicity, mild reaction conditions, and metal catalyst-free. In addition to demonstrating a wide substrate scope with a range of 2-phenoxyacetophenones and 2-aminopyridines or 2-aminobenzothiazoles, we also report a high degree of scalability. This novel strategy provides practical access to biologically valuable imidazo[*1,2-a*]pyridines and benzo[*d*]-imidazo[*2,1-b*]thiazoles and shows great potential in drug discovery. Further investigations aimed at the application of this new reaction in synthetic organic chemistry are currently underway.

4. Experimental section

All commercially available reagents for the reactions were obtained from Energy Chemical Reagent (Shanghai, China). Solvents were freshly distilled from respective drying agents before use. ^{1}H NMR and ^{13}C NMR spectra were recorded with a Bruker Avance 400 MHz spectrometer operating at 400.13 MHz and 100.61 MHz. ^{1}H and ^{13}C chemical shifts are quoted in parts per million downfield from TMS. High resolution mass spectra (HRMS) were obtained with a Waters Micromass Q-TOF Micro instrument and Thermo Q-Exactive Micro instrument. X-ray analysis was performed with a single-crystal X-ray diffractometer.

*4.1 General Procedure for the Synthesis of **3** or **5**.*

A dried glass reaction tube equipped with a magnetic stir bar was charged with **1** (106 mg, 0.5 mmol), **2** or **4** (141.2 mg, or 207 mg, 1.5 mmol), **I_2** (254 mg, 1 mmol) in DCE (10 mL); stirred at 100 ℃ for 30 min. The solvent was evaporated under vacuum, and washed with saturated sodium thiosulfate solution, water, brine. The organic layer was dried over anhydrous Na_2SO_4, filtered, and concentrated to give the crude product, which was

purified through flash column chromatography (ethyl acetate in petroleum ether) to give the desired product.

*4.2 Analytical Data for Compounds **3**.*

*3-Phenoxy-2-phenyl Imidazo-[1,2-a]pyridine (**3I-1**)*[5]. white solid (143 mg, 99% yield) , mp: 142-143 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.96 (d, J = 7.2 Hz, 2H), 7.63 (d, J = 6.8 Hz, 1H), 7.54 (d, J = 9.2 Hz, 1H), 7.29 (t, J = 7.6 Hz, 2H), 7.24- 7.14 (m, 3H), 7.10-7.03 (m, 1H), 7.00 (t, J = 7.4 Hz, 1H), 6.86 (d, J = 8.7 Hz, 2H), 6.63 (t, J = 6.8 Hz, 1H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 156.09 , 139.88 , 132.50 , 131.15 , 130.19 , 128.65 , 127.73 , 126.49 , 124.33 , 123.69 , 121.60 , 117.88 , 115.01 , 112.3; HRMS: calculated for $C_{19}H_{14}N_2O$ $[M+H]^+$: 287.1185, found: 287.1179.

3-Phenoxy-2-(4-methoxyphenyl) Imidazo[1,2-a]pyridine (***3I-2***)[5]**.** brown solid (147 mg, 93 % yield), mp: 152-154 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.96-7.87 (m, 2H), 7.71-7.62 (m, 2H), 7.27-7.11 (m, 3H), 7.07-6.98 (m, 1H), 6.91-6.80 (m, 4H), 6.72 (td, J = 6.8, 0.9 Hz, 1H), 3.72 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 159.58 , 155.92 , 139.18 , 130.27 , 130.14 , 129.11 , 127.97 , 125.26 , 123.92 , 123.88 , 121.59 , 117.09 , 114.96 , 114.24 , 112.91 , 55.26; HRMS: calculated for $C_{20}H_{16}N_2O_2$ $[M+H]^+$: 317.1292, found:317.1285.

2-*(4-bromophenyl)-3-phenoxyimidazo[1,2-a]pyridine **(3I-3).*** white solid (180 mg, 99 % yield), mp: 173-174 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.95-7.87 (m, 2H), 7.79-7.69 (m, 2H), 7.53-7.45 (m, 2H), 7.34-7.21 (m, 3H), 7.15-7.05 (m, 1H), 6.95-6.87 (m, 2H), 6.81 (td, J = 6.8, 1.1 Hz, 1H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.67 , 139.36 , 131.95 , 130.37 , 130.27 , 130.07 , 129.08 , 128.09 , 125.83 , 124.13 , 122.27 , 121.78 , 117.37 , 114.89 , 113.27; HRMS: calculated for $C_{19}H_{13}BrN_2O$ $[M+H]^+$: 365.0286, found:365.0284.

*5-methyl-3-phenoxy-2-phenylimidazo[1,2-a]pyridine **(3I-4)*.** yellow oil (50 mg, 33 % yield); ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.97 – 7.90 (m, 2H), 7.52 (d, J = 9.0 Hz, 1H), 7.33 – 7.16 (m, 5H), 7.05 (dd, J = 9.1, 6.9 Hz, 1H), 6.98 (t, J = 7.4 Hz, 1H), 6.78 (dd, J = 7.7, 1.6 Hz, 2H), 6.42 (d, J = 6.8 Hz, 1H), 2.55 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 158.19 , 140.97 , 134.95 , 131.47 , 131.32 , 130.62 , 130.25 , 128.64 , 127.92 , 126.63 , 125.79 , 123.43 , 115.27 , 115.05 , 113.81 , 18.90; HRMS: calculated for $C_{20}H_{16}N_2O$ $[M+H]^+$: 301.1343, found: 301.1335.

*5-fluoro-3-phenoxy-2-phenylimidazo[1,2-a]pyridine(**3I-5**)*.yellow oil (144 mg, 95 % yield),^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.08-8.01 (m, 2H), 7.49-7.35 (m, 3H), 7.33-7.24 (m, 3H), 7.19-7.04 (m, 2H), 6.99-6.89 (m, 2H), 6.33 (ddd, *J* = 7.1, 6.0, 0.8 Hz, 1H).^{13}C NMR ($CDCl_3$, 400 MHz) δ: 157.65 , 147.68 , 142.12 , 132.19 , 131.82 , 129.99 , 129.59 (d, *J* = 4.6 Hz), 128.70 , 128.12 , 126.69 , 125.34 (d, *J* = 6.0 Hz), 123.48 , 115.19 , 113.63 , 113.58 , 93.41 (d, *J* = 16.4 Hz).HRMS(ESI): calculated for $C_{19}H_{13}FN_2O$ $[M+H]^+$: 305.1088, found:305.1085.

6-*methyl-3-phenoxy-2-phenylimidazo[1,2-a]pyridine(**3I-6**)*.white solid (149 mg, 99 % yield), mp: 185-186 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.05-7.99 (m, 2H), 7.57-7.47 (m, 2H), 7.36 (dd, *J* = 8.4, 7.0 Hz, 2H), 7.33-7.21 (m, 3H), 7.13-7.05 (m, 1H), 7.02 (dd, *J* = 9.2, 1.7 Hz, 1H), 6.98-6.91 (m, 2H), 2.24 (d, *J* = 1.1 Hz, 3H).^{13}C NMR (CDCl3, 101 MHz) δ: 156.18 , 138.98 , 132.57 , 130.87 , 130.18 , 129.77 , 128.62 , 127.71 , 127.57 , 126.36 , 123.61 , 122.20 , 119.08 , 117.17 , 114.99 , 18.31 .HRMS(ESI): calculated for $C_{20}H_{16}N_2O$ $[M+H]^+$: 301.1339, found: 301.1335.

*6-fluoro-3-phenoxy-2-phenylimidazo[1,2-a]pyridine(**3I-7**)*.white solid (150 mg, 99 % yield), mp: 114-116 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.98-7.91 (m, 2H), 7.63-7.51 (m, 2H), 7.31 (dd, *J* = 8.4, 6.9 Hz, 2H), 7.28-7.16 (m, 4H), 7.09-6.98 (m, 2H), 6.91-6.84 (m, 2H).^{13}C NMR (CDCl3, 101 MHz) δ: 155.67 , 154.55 , 152.18 , 137.32 , 132.67 , 132.00 , 131.11 , 130.31 , 128.72 , 128.02 , 126.42 , 123.99 , 118.46 (d, *J* = 8.9 Hz), 116.63 (d, *J* = 25.8 Hz), 114.96 , 108.36 (d, *J* = 41.5 Hz).HRMS(ESI): calculated for $C_{19}H_{13}FN_2O$ $[M+H]^+$: 305.1088, found:305.1085.

6-*chloro-3-phenoxy-2-phenylimidazo[1,2-a]pyridine(**3I-8**)*.white solid (158 mg, 99 % yield), mp: 144-146 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.05-7.98 (m, 2H), 7.77 (d, *J* = 1.8 Hz, 1H), 7.58 (d, *J* = 9.6 Hz, 1H), 7.42-7.23 (m, 5H), 7.18-7.07 (m, 2H), 6.98-6.91 (m, 2H).^{13}C NMR (CDCl3, 101 MHz) δ: 155.78 , 138.09 , 132.27 , 131.91 , 130.33 , 128.73 , 128.08 , 126.50 , 125.90 , 124.00 , 120.91 , 119.38 , 118.28 , 114.95 .HRMS(ESI): calculated for $C_{19}H_{13}ClN_2O$ $[M+H]^+$: 321.0794, found:321.0789.

*6-bromo-3-phenoxy-2-phenylimidazo[1,2-a]pyridine(**3I-9**)*[5].white solid (180 mg, 99 % yield), mp: 165-167 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.05-7.97 (m, 2H), 7.88 (d, *J* = 1.8 Hz, 1H), 7.54 (d, *J* = 9.5 Hz, 1H), 7.42-7.20 (m, 6H), 7.17-7.07 (m, 1H), 6.98-6.90 (m, 2H).^{13}C NMR ($CDCl_3$, 400 MHz)δ: 155.78 , 131.97 , 130.34 , 128.74 , 128.12 , 128.02 , 126.53 , 124.01 , 121.57 , 118.48 , 114.93 , 107.39 .HRMS(ESI): calculated for $C_{19}H_{13}BrN_2O$ $[M+H]^+$: 365.0286, found:365.0284.

*7-methyl-3-phenoxy-2-phenylimidazo[1,2-a]pyridine(**3I-10**)*[5].white solid (147 mg, 98 % yield), mp: 161-163 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.06-7.98 (m, 2H,), 7.60 (d, *J* = 6.9 Hz, 1H), 7.42-7.21 (m, 6H), 7.08 (t, *J* = 7.4 Hz, 1H), 6.98-6.90 (m, 2H), 6.57 (dd, *J* = 7.0, 1.5 Hz, 1H), 2.39 (s, 3H).^{13}C NMR ($CDCl_3$, 101 MHz)δ: 156.20 , 140.28 , 135.56 , 132.47 , 130.43 , 130.17 , 129.72 , 128.62 , 127.59 , 126.40 , 123.63 , 120.87 , 116.10 , 115.04 (d, *J* = 8.4 Hz), 21.45 .HRMS(ESI): calculated for $C_{20}H_{16}N_2O$ $[M+H]^+$: 301.1344, found: 301.1335.

*methyl 3-phenoxy-2-phenylimidazo[1,2-a]pyridine-7-carboxylate(**3I-11**)*[5].yellow solid (170 mg, 99 % yield), mp: 125-127 °C, ^{1}H NMR (CDCl3, 400 MHz)δ: 8.35-8.36 (dd, J = 0.8 Hz, J = 1.6 Hz, 1H), 8.03-8.05 (m, 2H), 7.73-7.75 (dd, J = 0.8 Hz, J = 7.2 Hz, 1H), 7.25-7.40 (m, 6H), 7.08-7.12 (td, J = 8.0 Hz, J = 0.8 Hz, 1H), 6.90-6.93 (m, 2H), 3.94 (s, 3H).^{13}C NMR (CDCl3, 101 MHz) δ: 165.45 , 155.66 , 138.32 , 133.52 , 131.31 , 130.36 , 128.82 , 128.50 , 126.70 , 126.20 , 124.12 , 121.17 , 120.21 , 114.97 , 112.11 , 52.68 .HRMS(ESI): calculated for $C_{21}H_{16}N_2O_3$ $[M+H]^+$: 345.1236, found: 345.1234.

*2-phenyl-3-(m-tolyloxy)imidazo[1,2-a]pyridine (**3I-12**)*. white solid (147 mg, 98 % yield), mp: 107-109 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.04-7.97 (m, 2H), 7.78-7.67 (m, 2H), 7.33 (dd, J = 8.3, 6.9 Hz, 2H), 7.27-7.16 (m, 2H), 7.11 (t, J = 7.8 Hz, 1H), 6.89-6.81 (m, 1H), 6.77 (td, J = 6.8, 1.1 Hz, 1H), 6.73- 6.62 (m, 2H), 2.21 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.80 , 140.74 , 139.10 , 130.00 , 129.68 , 128.83 , 128.27 , 126.60 , 125.87 , 124.85 , 121.83 , 117.17 , 115.49 , 113.27 , 111.91 , 21.47; HRMS: calculated for $C_{20}H_{16}N_2O$ $[M+H]^+$: 301.1339, found: 301.1335.

3-*(3-methoxyphenoxy)-2-phenylimidazo[1,2-a]pyridine* (***3I-13***)**.** yellow solid (130 mg, 82 % yield), mp: 138-139 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.09-8.00 (m, 2H), 7.73 (d, J = 6.8 Hz, 1H), 7.66-7.60 (m, 1H), 7.38 (dd, J = 8.4, 7.0 Hz, 2H), 7.33-7.23 (m, 1H), 7.17 (dd, J = 9.2, 7.2 Hz, 2H), 6.74 (td, J = 6.8, 1.1 Hz, 1H), 6.64 (dd, J = 8.2, 2.4 Hz, 1H), 6.55 (t, J = 2.4 Hz, 1H), 6.49 (dd, J = 8.2, 2.4 Hz, 1H), 3.73 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 161.28 , 157.24 , 139.82 , 132.35 , 131.05 , 130.69 , 129.95 , 128.67 , 127.79 , 126.52 , 124.49 , 121.65 , 117.81 , 112.41 , 109.13 , 107.02 , 101.62 , 55.44; HRMS: calculated for $C_{20}H_{16}N_2O_2$ $[M+H]^+$: 317.1287, found: 317.1285.

*3-(4-ethylphenoxy)-2-phenylimidazo[1,2-a]pyridine (**3I-14**)***.** yellow solid (148 mg, 94 % yield), mp: 98-100 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.09-8.02 (m, 2H), 7.73 (dt, J = 6.8, 1.2 Hz, 1H), 7.62 (dt, J = 9.2, 1.1 Hz, 1H), 7.42-7.34 (m, 2H), 7.29-7.25 (m, 1H), 7.21-7.07 (m, 3H), 6.89-6.82 (m, 2H), 6.73 (td, J = 6.8, 1.1 Hz, 1H), 2.59 (q, J = 7.6 Hz, 2H), 1.19 (t, J = 7.6 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 154.12 , 139.81 , 139.56 , 132.55 , 131.05 , 130.36 , 129.42 , 128.64 , 127.68 , 126.48 , 124.29 , 121.70 , 117.84 , 114.82 , 112.25 , 28.02 , 15.63; HRMS: calculated for $C_{21}H_{18}N_2O[M+H]^+$: 315.1498, found: 315.1492.

*3-(4-nitrophenoxy)-2-phenylimidazo[1,2-a]pyridine (**3I-15**)***.** yellow solid (151 mg, 91 % yield), mp: 142-143 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.16-8.07 (m, 2H), 7.92-7.85 (m, 2H), 7.69-7.61 (m, 2H), 7.35-7.26 (m, 2H), 7.26-7.15 (m, 2H), 7.03-6.94 (m, 2H), 6.82-6.74 (m, 1H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 160.60 , 144.02 , 139.83 , 131.19 , 130.81 , 128.89 , 128.72 , 128.45 , 126.53 , 126.49 , 125.58 , 121.21 , 117.84 , 115.58 , 113.37; HRMS: calculated for $C_{19}H_{13}N_3O_3$ $[M+H]^+$: 332.1037, found: 332.1030.

3-*(2,6-dimethylphenoxy)-2-phenylimidazo[1,2-a]pyridine* (***3I-16***). brown solid (121 mg, 77 % yield), mp: 113-115 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.95 (dd, J = 8.3, 1.3 Hz, 2H), 7.60-7.50 (m, 2H), 7.35 (dd, J = 8.4, 7.0 Hz, 2H), 7.25 (t, J = 7.4 Hz, 1H), 7.07 (ddd, J = 9.2, 6.7, 1.3 Hz, 1H), 7.03-6.93 (m, 3H), 6.65 (td, J = 6.8, 1.1 Hz, 1H), 2.09 (s, 6H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 152.01 , 138.38 , 133.22 , 132.95 , 129.96 , 128.32 , 128.30 , 128.12 , 127.31 , 127.03 , 124.57 , 123.16 , 121.29 , 117.91 , 112.28 , 16.84; HRMS: calculated for $C_{21}H_{18}N_2O$ $[M+H]^+$: 315.1495, found: 315.1492.

2-phenyl-3-(2,4,6-trichlorophenoxy)imidazo[1,2-a]pyridine (***3I-17***). brown solid (159 mg, 82 % yield), mp: 161-162 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.95-7.88 (m, 1H), 7.71 (dt, J = 6.1, 1.4 Hz, 2H), 7.60 (d, J = 9.1 Hz, 1H), 7.34-7.13 (m, 6H), 6.85 (td, J = 6.8, 1.1 Hz, 1H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 146.57 , 138.75 , 132.16 , 131.37 , 129.96 , 129.40 , 129.00 , 128.16 , 127.78 , 127.57 , 126.88 , 123.93 , 121.53 , 117.79 , 112.54;HRMS:calculated for $C_{19}H_{11}Cl_3N_2O$ $[M+H]^+$:389.0010, found: 389.0010.

*6-chloro-2-(4-methoxyphenyl)-3-phenoxyimidazo[1,2-a] pyridine (**3II-1**)***.** white solid (133 mg, 76 % yield), mp: 142-144 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.95-7.86 (m, 2H), 7.73 (dd, J = 2.0, 0.9 Hz, 1H), 7.63 (dd, J = 9.5, 0.9 Hz, 1H), 7.32-7.18 (m, 2H), 7.14 (dd, J = 9.5, 2.0 Hz, 1H), 7.11 -7.03 (m, 1H), 6.93-6.83 (m, 4H), 3.74 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 159.83 , 155.62 , 137.43 , 131.32 , 130.40 , 129.25 , 128.02 , 126.67 , 124.17 , 123.37 , 121.49 , 119.35 , 117.48 , 114.90 , 114.31 , 55.28; HRMS: calculated for $C_{20}H_{15}ClN_2O_2$ $[M+H]^+$: 351.0894, found: 351.0895.

2-*(4-methoxyphenyl)-7-methyl-3-phenoxyimidazo[1,2-a] pyridine (**3II-2**)*. brown solid (146 mg, 88 % yield), mp: 128-130 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.93-7.85 (m, 2H), 7.54 (dd, J = 6.9, 1.0 Hz, 1H), 7.41 (d, J = 1.3 Hz, 1H), 7.26-7.16 (m, 2H), 7.06-6.97 (m, 1H), 6.89- 6.80 (m, 4H), 6.54 (dd, J = 7.0, 1.6 Hz, 1H), 3.72 (s, 3H), 2.32 (d, J = 1.1 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 159.43 , 156.06 , 139.63 , 136.60 , 130.23 , 129.50 , 128.78 , 127.85 , 124.06 , 123.79 , 120.85 , 115.54 , 115.44 , 114.95 , 114.20 , 55.26 , 21.47; HRMS: calculated for $C_{21}H_{18}N_2O_2[M+H]^+$: 331.1449, found: 331.1441.

2-*(4-bromophenyl)-6-chloro-3-phenoxyimidazo[1,2-a] pyridine (**3II-3**)***.** yellow solid (169 mg, 85 % yield), mp: 184-185 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.84-7.76 (m, 2H), 7.70 (dd, J = 2.0, 0.9 Hz, 1H), 7.54 (dd, J = 9.5, 0.9 Hz, 1H), 7.46-7.37 (m, 2H), 7.29-7.16 (m, 2H), 7.11 (dd, J = 9.6, 2.0 Hz, 1H), 7.09-7.02 (m, 1H), 6.88-6.80 (m, 2H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.48 , 137.86 , 131.96 , 130.69 , 130.46 , 130.32 , 130.24 , 128.05 , 126.77 , 124.30 , 122.42 , 121.53 , 119.47 , 118.02 , 114.84; HRMS: calculated for $C_{19}H_{12}BrClN_2O$ $[M+H]^+$: 398.9893, found: 398.9894.

2-*(4-bromophenyl)-7-methyl-3-phenoxyimidazo[1,2-a] pyridine (**3II-4**)***.** pink solid (185 mg, 98 % yield), mp: 183-184 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.87-7.79 (m, 2H), 7.56 (d, J = 6.9 Hz, 1H), 7.45-7.38 (m, 3H), 7.27-7.16 (m, 2H), 7.03 (t, J = 7.4 Hz, 1H), 6.88-6.80 (m, 2H), 6.57 (dd, J = 7.0, 1.5 Hz, 1H), 2.34 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.81 , 139.84 , 137.15 , 131.88 , 130.46 , 130.33 , 129.76 , 128.51 , 127.99 , 124.03 , 122.01 , 121.00 , 115.90 , 115.66 , 114.89 , 21.52; HRMS: calculated for $C_{20}H_{15}BrN_2O$ $[M+H]^+$: 379.0450, found: 379.0441.

3-*(4-ethylphenoxy)-5-methyl-2-phenylimidazo[1,2-a] pyridine (**3II-5**)***.** yellow oil (54 mg, 33 % yield), ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.40 (d, J = 7.7 Hz, 1H), 8.08 (d, J = 7.6 Hz, 2H), 7.56 (s, 1H), 7.38 (t, J = 7.4 Hz, 2H), 7.35 – 7.28 (m, 1H), 7.10 (d, J = 7.5 Hz, 2H), 6.89 (s, 1H), 6.72 (d, J = 7.9 Hz, 1H), 2.72 (s, 3H),

2.54 (q, J = 7.5 Hz, 2H), 1.13 (t, J = 7.6 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 154.23 , 139.43 , 138.95 , 132.66 , 130.82 , 130.09 , 129.40 , 128.60 , 127.62 , 127.50 , 126.35 , 122.09 , 119.16 , 117.15 , 114.79 , 28.01 , 18.32 , 15.61; HRMS: calculated for $C_{22}H_{20}N_2O$ $[M+H]^+$: 329.1655, found: 329.1648.

*methyl 3-(4-ethylphenoxy)-2-phenylimidazo[1,2-a]pyridine-5-carboxylate (**3II-6**)***.*** green oil (88 mg, 47 % yield), ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.01 – 7.93 (m, 2H), 7.76 (dd, J = 8.9, 1.3 Hz, 1H), 7.29 (d, J = 7.3 Hz, 2H), 7.22 – 7.16 (m, 1H), 7.13 (dd, J = 8.9, 7.0 Hz, 1H), 7.06 (dd, J = 7.0, 1.3 Hz, 1H), 7.00 – 6.93 (m, 2H), 6.64 – 6.57 (m, 2H), 3.57 (s, 3H), 2.47 (q, J = 7.6 Hz, 2H), 1.07 (t, J = 7.6 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 162.00 , 153.79 , 139.98 , 139.43 , 131.88 , 131.48 , 129.19 , 128.84 , 128.63 , 128.16 , 127.78 , 126.90 , 123.23 , 120.70 , 116.30 , 114.66 , 52.96 , 27.97 , 15.62; HRMS: calculated for $C_{23}H_{20}N_2O_3$ $[M+H]^+$: 373.1554, found: 373.1547.

*5-fluoro-2-phenyl-3-(m-tolyloxy)imidazo[1,2-a]pyridine (**3II-7**)***.*** brown oil (131 mg, 82 % yield); ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.04 (dd, J = 8.4, 1.3 Hz, 2H), 7.46-7.34 (m, 3H), 7.34-7.23 (m, 2H), 7.21-7.09 (m, 2H), 6.90 (d, J = 7.5 Hz, 1H), 6.77 (t, J = 1.9 Hz, 1H), 6.72 (dd, J = 8.3, 2.6 Hz, 1H), 6.36-6.28 (m, 1H), 2.29 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 157.69 , 150.38 , 147.69 , 142.13 , 140.31 , 132.13 , 131.89 , 129.67 , 128.70 , 128.07 , 126.69 , 125.32 , 124.33 , 115.75 , 113.59 (d, J = 5.3 Hz), 112.09 , 93.38 (d, J = 16.3 Hz), 21.49; HRMS: calculated for$C_{20}H_{15}FN_2O[M+H]^+$: 319.1247, found: 319.1241.

*5-fluoro-3-(3-methoxyphenoxy)-2-phenylimidazo[1,2-a] pyridine (**3II-8**)***.*** yellow oil (134 mg, 80 % yield); ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.96 (dd, J = 8.4, 1.3 Hz, 2H), 7.75 (dd, J = 9.9, 4.8 Hz, 1H), 7.69-7.62 (m, 1H), 7.38-7.29 (m, 2H), 7.29-7.22 (m, 1H), 7.22-7.09 (m, 2H), 6.61 (ddd, J = 8.4, 2.4, 0.8 Hz, 1H), 6.48 (t, J = 2.4 Hz, 1H), 6.41 (ddd, J = 8.3, 2.5, 0.8 Hz, 1H), 3.69 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 161.42 , 156.50 , 152.56 , 136.50 , 131.23 , 130.93 , 130.36 , 128.93 , 128.65 , 126.60 , 118.28 , 118.03 , 117.89 , 117.80 , 109.63 , 108.95 , 108.53 , 106.80 , 101.65 , 55.51; HRMS: calculated for $C_{20}H_{15}FN_2O_2[M+H]^+$:335.1191, found:335.1190.

*5-fluoro-3-(4-nitrophenoxy)-2-phenylimidazo[1,2-a] pyridine (**3II-9**).* yellow solid (159 mg, 91 % yield), mp: 144-146 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.17-8.08 (m, 2H), 7.92-7.84 (m, 2H), 7.39 (d, J = 9.1 Hz, 1H), 7.30 (dd, J = 8.3, 6.7 Hz, 2H), 7.27-7.19 (m, 1H), 7.13 (ddd, J = 9.1, 7.5, 6.1 Hz, 1H), 7.03-6.94 (m, 2H), 6.36-6.28 (m, 1H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 161.97 , 150.04 , 147.36 , 143.85 , 142.27 (d, J = 3.9 Hz), 132.44 , 131.09 , 128.89 , 128.64 , 128.15 (d, J = 1.8 Hz), 126.67 , 126.33 , 126.10 (d, J = 6.0 Hz), 115.77 , 113.78 (d, J = 5.1 Hz), 94.00 (d, J = 16.2 Hz); HRMS: calculated for $C_{19}H_{12}FN_3O_3$ $[M+H]^+$: 350.0941, found: 350.0935.

3-*(2,6-dimethylphenoxy)-5-fluoro-2-phenylimidazo[1,2-a] pyridine(**3II-10**)***.*** yellow oil (123 mg, 74 % yield); ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.76 – 7.66 (m, 3H), 7.31 – 7.17 (m, 4H), 6.92 – 6.81 (m, 3H), 6.48 (t, J = 6.8 Hz, 1H), 1.99 (s, 6H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 153.29 , 150.26 , 147.55 , 139.25 , 132.97 (d, J = 3.4 Hz), 130.11 , 129.13 , 128.78 , 128.58 , 127.66 , 127.34 , 126.51 , 124.47 , 112.42 (d, J = 5.4 Hz), 95.53 (d, J = 16.5 Hz), 16.90; HRMS: calculated for $C_{21}H_{17}FN_2O$ $[M+H]^+$: 333.1403, found:333.1398.

*6-methyl-2-phenyl-3-(m-tolyloxy)imidazo[1,2-a]pyridine (**3II-11**)***.*** yellow solid (145 mg, 92 % yield), mp: 124-126 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.98-7.91 (m, 2H), 7.49-7.39 (m, 2H), 7.29 (dd, J = 8.4, 7.0 Hz, 2H), 7.17 (tt, J = 6.7, 1.3 Hz, 1H), 7.09 (t, J = 7.9 Hz, 1H), 6.94 (dd, J = 9.2, 1.7 Hz, 1H), 6.86-6.79 (m, 1H), 6.72-6.61 (m, 2H), 2.21 (s, 3H), 2.17 (d, J = 1.1 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 156.21 , 140.52 , 139.01 , 132.68 , 130.88 , 129.86 , 129.83 , 128.61 , 127.63 , 127.51 , 126.33 , 124.44 , 122.10 , 119.12 , 117.16 , 115.54 , 111.92 , 21.49 , 18.31; HRMS: calculated for $C_{21}H_{18}N_2O$ $[M+H]^+$: 315.1501, found: 315.1492.

3-*(3-methoxyphenoxy)-6-methyl-2-phenylimidazo[1,2-a] pyridine (**3II-12**)***.*** white solid (129 mg, 78 % yield), mp: 163-165 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.01 (dd, J = 8.3, 1.3 Hz, 2H), 7.55-7.47 (m, 2H), 7.37 (dd, J = 8.4, 7.0 Hz, 2H), 7.25 (t, J = 7.4 Hz, 1H), 7.18 (t, J = 8.2 Hz, 1H), 7.01 (dd, J = 9.2, 1.8 Hz, 1H), 6.64 (dd, J = 8.0, 2.4 Hz, 1H), 6.55 (t, J = 2.4 Hz, 1H), 6.51-6.46 (m, 1H), 3.74 (s, 3H), 2.25 (d, J = 1.1 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 161.27 , 157.37 , 139.01 , 132.61 , 130.94 , 130.66 , 129.68 , 128.63 , 127.69 , 127.57 , 126.37 , 122.18 , 119.10 , 117.18 , 109.00 , 107.03 , 101.60 , 55.44 , 18.32; HRMS: calculated for $C_{21}H_{18}N_2O_2$ $[M+H]^+$: 331.1445, found: 331.1441.

*3-(4-ethylphenoxy)-6-methyl-2-phenylimidazo[1,2-a]pyridine(**3II-13**)*.white solid (146 mg, 89 % yield), mp: 98-99 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.06-7.99 (m, 2H), 7.56-7.48 (m, 2H), 7.36 (t, *J* = 7.7 Hz, 2H), 7.29-7.21 (m, 1H), 7.11 (d, *J* = 8.6 Hz, 2H), 7.01 (dd, *J* = 9.1, 1.8 Hz, 1H), 6.92-6.82 (m, 2H), 2.60 (q, *J* = 7.6 Hz, 2H), 2.25 (d, *J* = 1.1 Hz, 3H), 1.20 (t, *J* = 7.6 Hz, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 154.23 , 139.43 , 138.95 , 132.66 , 130.82 , 130.09 , 129.40 , 128.60 , 127.62 , 127.50 , 126.35 , 122.09 , 119.16 , 117.15 , 114.79 , 28.01 , 18.32 , 15.61 .HRMS: calculated for $C_{22}H_{20}N_2O[M+H]^+$:329.1655, found:329.1648.

*6-methyl-3-(4-nitrophenoxy)-2-phenylimidazo[1,2-a]pyridine(**3II-14**)*.yellow solid (155 mg, 90 % yield), mp: 145-147 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.19-8.10 (m, 2H), 7.92-7.84 (m, 2H), 7.65 (d, *J* = 9.2 Hz, 1H), 7.45 (s, 1H), 7.31 (t, *J* = 7.5 Hz, 2H), 7.27-7.17 (m, 1H), 7.11 (dd, *J* = 9.3, 1.7 Hz, 1H), 7.05-6.96 (m, 2H), 2.24 (d, *J* = 1.1 Hz, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 160.92 , 144.13 , 143.00 , 132.29 , 132.03 , 131.30 , 130.01 , 128.90 , 127.89 , 126.65 , 126.12 , 125.61 , 125.52 , 124.41 , 115.84 , 115.68 , 113.02 .HRMS: calculated for $C_{20}H_{15}N_3O_3$ $[M+H]^+$: 346.1194, found: 346.1186.

*3-(2,6-dimethylphenoxy)-6-methyl-2-phenylimidazo[1,2-a]pyridine(**3II-15**)*.yellow solid (130 mg, 79 % yield), mp: 143-145 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.81-7.74 (m, 2H,ArH), 7.58 (d, *J* = 9.2 Hz, 1H,ArH), 7.39-7.34 (m, 1H,ArH), 7.29-7.21 (m, 2H,ArH), 7.21-7.12 (m, 1H,ArH), 6.98 (dd, *J* = 9.2, 1.6 Hz, 1H,ArH), 6.94-6.86 (m, 3H,ArH), 2.18 (d, *J* = 1.1 Hz, 3H,CH_3), 2.00 (s, 6H,CH_3,CH_3); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 151.91 ,

136.83 , 132.76 , 131.45 , 129.96 , 128.34 , 128.17 , 127.99 , 127.66 , 127.15 , 126.37 , 124.74 , 123.06 , 118.96 , 116.50 , 18.51 , 16.78; HRMS: calculated for $C_{22}H_{20}N_2O$ $[M+H]^+$: 329.1652, found: 329.1648.

*6-methyl-2-phenyl-3-(2,4,6-trichlorophenoxy)imidazo[1,2-a]pyridine(**3II-16**)*.yellow solid (123 mg, 61 % yield), mp: 162-164 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.72 (d, *J* = 1.3 Hz, 1H), 7.60 (dt, *J* = 8.7, 1.9 Hz, 3H), 7.24-7.16 (m, 3H), 7.14 (s, 2H), 7.07 (dd, *J* = 9.3, 1.7 Hz, 1H), 2.31 (d, *J* = 1.1 Hz, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 146.35 , 137.19 , 130.96 , 130.71 , 130.16 , 129.43 , 128.63 , 128.26 , 128.15 , 127.60 , 127.27 , 126.75 , 123.36 , 119.21 , 116.44 , 18.49 .HRMS: calculated for $C_{20}H_{13}Cl_3N_2O$ $[M+H]^+$: 403.0168, found: 403.0166.

*6-fluoro-2-phenyl-3-(m-tolyloxy)imidazo[1,2-a]pyridine (**3II-17**)***.*** yellow solid (146 mg, 92 % yield), mp: 94-96 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.95 (dd, J = 8.4, 1.3 Hz, 2H), 7.57 (td, J = 5.3, 3.2 Hz, 2H), 7.30 (t, J = 7.6 Hz, 2H), 7.24-7.15 (m, 1H), 7.09 (t, J = 7.9 Hz, 1H), 7.02 (ddd, J = 10.1, 8.0, 2.3 Hz, 1H), 6.87-6.80 (m, 1H), 6.70-6.59 (m, 2H), 2.20 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.61 , 154.61 , 152.23 , 140.76 , 137.11 , 132.28 , 131.70 , 131.15 , 130.02 , 128.77 , 128.12 , 126.44 , 124.90 , 118.27 (d, J = 9.0 Hz), 116.93 (d, J = 26.0 Hz), 115.51 , 111.88 , 108.47 (d, J = 41.5 Hz), 21.47; HRMS: calculated for$C_{20}H_{15}FN_2O[M+H]^+$: 319.1246, found: 319.1241.

*6-fluoro-3-(3-methoxyphenoxy)-2-phenylimidazo[1,2-a] pyridine (**3II-18**)***.*** yellow solid (134 mg, 80 % yield), mp: 138-139 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ:8.05-7.97 (m, 2H), 7.66 (ddd, J = 3.4, 2.4, 0.8 Hz, 1H), 7.60 (ddd, J = 9.9, 4.9, 0.8 Hz, 1H), 7.39 (t, J = 7.6 Hz, 2H), 7.31-7.26 (m, 1H), 7.19 (t, J = 8.3 Hz, 1H), 7.09 (ddd, J = 10.1, 8.1, 2.4 Hz, 1H), 6.66 (ddd, J = 8.3, 2.4, 0.8 Hz, 1H), 6.54 (t, J = 2.4 Hz, 1H), 6.48 (ddd, J = 8.3, 2.5, 0.8 Hz, 1H), 3.75 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 161.33 , 156.85 , 154.52 , 152.15 , 137.39 , 132.82 , 132.14 , 130.78 , 128.71 , 127.98 , 126.43 , 118.49 (d, J = 9.1 Hz), 116.52 (d, J = 26.1 Hz), 109.29 , 108.36 (d, J = 41.5 Hz), 106.95 , 101.64 , 55.46; HRMS: calculated for $C_{20}H_{15}FN_2O_2$ $[M+H]^+$: 335.1194, found: 335.1190.

*3-(4-ethylphenoxy)-6-fluoro-2-phenylimidazo[1,2-a]pyridine(**3II-19**)*.white solid (149 mg, 90 % yield), mp: 86-87 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.06-7.99 (m, 2H), 7.66 (ddd, *J* = 3.4, 2.4, 0.8 Hz, 1H), 7.59 (ddd, *J* = 9.8, 4.9, 0.8 Hz, 1H), 7.38 (dd, *J* = 8.3, 7.0 Hz, 2H), 7.32-7.26 (m, 1H), 7.16-7.04 (m, 3H), 6.89-6.81 (m, 2H), 2.60 (q, *J* = 7.6 Hz, 2H), 1.20 (t, *J* = 7.6 Hz, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 153.73 , 139.85 , 137.35 , 132.75 , 132.26 , 131.45 , 129.52 , 128.70 , 127.90 , 126.41 , 118.46 (d, *J* = 9.0 Hz), 116.40 (d, *J* = 25.9 Hz), 114.78 , 108.39 (d, *J* = 41.4 Hz), 28.02 , 15.60 .HRMS: calculated for $C_{21}H_{17}FN_2O[M+H]^+$:333.1404, found:333.1398.

*6-fluoro-3-(4-nitrophenoxy)-2-phenylimidazo[1,2-a] pyridine (**3II-20**)***.*** yellow solid (163 mg, 93 % yield), mp: 144-146 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.15 (d, J = 8.5 Hz, 2H), 7.89-7.82 (m, 2H), 7.62 (dt, J = 13.4, 3.6 Hz, 2H), 7.31 (t, J = 7.5 Hz, 2H), 7.22 (d, J = 7.3 Hz, 1H), 7.17-7.06 (m, 1H), 7.00 (d, J = 8.7 Hz, 2H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 160.19 , 154.97 , 152.58 , 144.20 , 137.42 , 132.51 , 130.94 , 129.77 , 128.97 , 128.68 , 126.53 (d, J = 9.8 Hz), 118.65 (d, J = 8.9 Hz), 117.70 (d, J = 25.7 Hz), 115.58 , 108.14 (d, J = 41.7 Hz); HRMS: calculated for $C_{19}H_{12}FN_3O_3$ $[M+H]^+$: 350.0933, found: 350.0935.

*3-(2,6-dimethylphenoxy)-6-fluoro-2-phenylimidazo[1,2-a]pyridine(**3II-21**)*.yellow solid (126 mg, 76 % yield), mp: 137-138 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.73 (d, *J* = 7.5 Hz, 2H), 7.62 (d, *J* = 9.5 Hz, 2H), 7.2 -7.16 (m, 3H), 7.12-.04 (m, 1H), 6.92 (s, 3H), 2.00 (s, 6H).^{13}C NMR ($CDCl_3$, 101 MHz)δ: 151.43 , 150.32 , 130.20 , 130.07 , 130.02 , 129.43 , 129.33 , 128.58 , 128.53 , 128.27 , 127.53 , 125.48 , 121.64 , 117.27 , 109.00 , 26.67;HRMS: calculated for $C_{21}H_{17}ClN_2O$ $[M+H]^+$:333.1401, found: 333.1398.

*6-fluoro-2-phenyl-3-(2,4,6-trichlorophenoxy)imidazo[1,2-a]pyridine(**3II-22**)*.brown solid (128 mg, 63 % yield), mp: 184-186 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.87-7.81 (m, 1H), 7.65-7.54 (m, 3H), 7.27-7.15 (m, 3H), 7.14 (s, 2H), 7.09 (ddd, *J* = 10.1, 8.0, 2.4 Hz, 1H). ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 154.84 , 152.46 , 146.15 , 135.92 , 132.34 , 130.99 , 130.44 , 129.78 , 129.45 , 128.28 , 127.61 , 126.86 , 118.16 (d, *J* = 9.0 Hz), 116.83 (d, *J* = 25.7 Hz), 108.47 (d, *J* = 42.0 Hz).HRMS: calculated for $C_{19}H_{10}Cl_3FN_2O$ $[M+H]^+$: 406.9915, found: 406.9916.

*6-chloro-2-phenyl-3-(m-tolyloxy)imidazo[1,2-a]pyridine(**3II-23**)*.yellow solid (162 mg, 97 % yield), mp: 114-116 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.05-7.98 (m, 2H), 7.76 (dd, *J* = 2.0, 0.9 Hz, 1H), 7.56 (dd, *J* = 9.6, 0.9 Hz, 1H), 7.38 (dd, *J* = 8.3, 6.9 Hz, 2H), 7.33-7.23 (m, 1H), 7.18 (t, *J* = 7.9 Hz, 1H), 7.12 (dd, *J* = 9.6, 2.0 Hz, 1H), 6.96-6.89 (m, 1H), 6.76 (t, *J* = 1.9 Hz, 1H), 6.72 (dd, *J* = 8.2, 2.7 Hz, 1H), 2.29 (s, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.81 , 140.73 , 138.11 , 132.31 , 132.06 , 130.29 , 130.00 , 128.72 , 128.02 , 126.49 , 125.79 , 124.83 , 120.80 , 119.42 , 118.27 , 115.52 , 111.85 , 21.50 .HRMS: calculated for $C_{20}H_{15}ClN_2O[M+H]^+$: 335.0949, found:335.0946.

*6-chloro-3-(3-methoxyphenoxy)-2-phenylimidazo[1,2-a]pyridine(**3II-24**)*.white solid (156 mg, 89 % yield), mp: 114-115 °C,^{1}H NMR (400 MHz, $CDCl_3$) δ: 7.91 (dd, *J* = 8.4, 1.3 Hz, 2H), 7.67 (dd, *J* = 2.0, 0.9 Hz, 1H), 7.46 (dd, *J* = 9.5, 0.9 Hz, 1H), 7.29 (t, *J* = 7.6 Hz, 2H), 7.22 − 7.15 (m, 1H), 7.09 (t, *J* = 8.2 Hz, 1H), 7.02 (dd, *J* = 9.6, 2.0 Hz, 1H), 6.56 (ddd, *J* = 8.4, 2.4, 0.8 Hz, 1H), 6.45 (t, *J* = 2.4 Hz, 1H), 6.38 (ddd, *J* = 8.2, 2.4, 0.8 Hz, 1H), 3.64 (s, 3H).^{13}C NMR (101 MHz, $CDCl_3$) δ: 161.32 , 156.92 , 138.13 , 132.32 , 131.96 , 130.81 ,130.12, 128.74 , 128.09 , 126.52 , 125.89 , 120.89 , 119.39 , 118.23 , 109.30 , 106.87 , 101.63 , 55.47 .HRMS: calculated for $C_{20}H_{15}ClN_2O_2[M+H]^+$: 351.0897, found:351.0895.

*6-chloro-3-(4-ethylphenoxy)-2-phenylimidazo[1,2-a]pyridine(**3II-25**)*.yellow solid (167 mg, 96 % yield), mp: 96-97 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.05-7.95 (m, 3H), 7.84 (d, *J* = 1.7 Hz, 1H), 7.40-7.24 (m, 4H), 7.09 (d, *J* = 8.4 Hz, 2H), 6.84-6.77 (m, 2H), 2.55 (q, *J* = 7.6 Hz, 2H), 1.14 (t, *J* = 7.6 Hz, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 153.17 , 140.78 , 136.28 , 130.07 , 129.86 , 129.51 , 129.43 , 129.17 , 128.74 , 126.87 ,

123.47 , 119.87 , 116.64 , 114.65 , 28.02 , 15.54 .HRMS: calculated for $C_{21}H_{17}ClN_2O[M+H]^+$:349.1103, found:349.1102.

*6-chloro-3-(4-nitrophenoxy)-2-phenylimidazo[1,2-a]pyridine(**3II-26**).* yellow solid (170 mg, 93 % yield), mp: 149-150 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.17 (d, *J* = 8.7 Hz, 2H), 7.90-7.83 (m, 2H), 7.74 (d, *J* = 1.7 Hz, 1H), 7.68 (d, *J* = 9.5 Hz, 1H), 7.32 (dd, *J* = 8.2, 6.5 Hz, 2H), 7.29-7.20 (m, 2H), 7.02 (d, *J* = 8.8 Hz, 2H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 160.07 , 144.32 , 137.85 , 131.41 , 130.08 , 129.06 , 129.02 , 128.80 , 127.71 , 126.64 , 126.61 , 122.44 , 119.10 , 117.99 , 115.59 .HRMS: calculated for $C_{19}H_{12}ClN_3O_3$ $[M+H]^+$: 366.0644, found: 366.0640.

*6-chloro-3-(2,6-dimethylphenoxy)-2-phenylimidazo[1,2-a]pyridine(**3II-27**)*.white solid (143 mg, 82 % yield), mp: 117-119 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.73 (d, *J* = 7.5 Hz, 2H), 7.62 (d, *J* = 9.5 Hz, 2H), 7.27-7.16 (m, 3H), 7.12-7.04 (m, 1H), 6.92 (s, 3H), 2.00 (s, 6H).^{13}C NMR ($CDCl_3$, 101 MHz)δ: 152.12 , 138.89 , 134.09 , 133.09 , 132.93 , 129.94 , 128.30 , 128.26 , 127.51 , 127.11 , 126.90 , 124.47 , 120.57 , 116.15 , 114.97 , 16.76.HRMS: calculated for $C_{21}H_{17}ClN_2O$ $[M+H]^+$:349.1110, found: 349.1102.

*6-chloro-2-phenyl-3-(2,4,6-trichlorophenoxy)imidazo[1,2-a] pyridine (**3II-28**)***.*** brown solid (154 mg, 73 % yield), mp: 176-178 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.00 (dd, J = 1.9, 0.8 Hz, 1H), 7.65 – 7.52 (m, 3H), 7.26 – 7.12 (m, 6H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 146.08 , 136.49 , 131.43 , 130.53 , 130.44 , 129.44 , 128.84 , 128.47 , 128.31 , 127.71 , 126.83 , 126.51 , 121.79 , 119.52 , 117.72; HRMS: calculated for $C_{19}H_{10}Cl_4N_2O$ $[M+H]^+$: 422.9619, found: 422.9620.

*6-bromo-2-phenyl-3-(m-tolyloxy)imidazo[1,2-a]pyridine (**3II-29**)***.*** brown solid (185 mg, 98 % yield), mp: 104-107 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.97-7.91 (m, 2H), 7.81 (dd, J = 1.9, 0.8 Hz, 1H), 7.50 (dd, J = 9.5, 0.9 Hz, 1H), 7.35-7.28 (m, 2H), 7.25- 7.15 (m, 2H), 7.11 (t, J = 7.9 Hz, 1H), 6.89-6.84 (m, 1H), 6.72-6.61 (m, 2H), 2.23 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.73 , 143.30 , 140.79 , 137.96 , 131.60 , 131.49 , 130.03 , 128.78 , 128.37 , 128.22 , 126.54 , 124.93 , 121.65 , 118.25 , 115.48 , 111.80 , 107.60 , 21.49; HRMS: calculated for $C_{20}H_{15}BrN_2O$ $[M+H]^+$: 379.0442, found: 379.0441.

*6-bromo-3-(3-methoxyphenoxy)-2-phenylimidazo[1,2-a]pyridine(**3II-30**).*brown solid (183 mg, 88 % yield), mp: 119-120 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.03-7.96 (m, 2H), 7.88 (dd, *J* = 1.9, 0.9 Hz, 1H), 7.51 (dd, *J* = 9.5, 0.9 Hz, 1H), 7.38 (t, *J* = 7.6 Hz, 2H), 7.33-7.15 (m, 4H), 6.66 (ddd, *J* = 8.3, 2.4, 0.8 Hz, 1H), 6.54 (t, *J* = 2.4 Hz, 1H), 6.52-6.44 (m, 1H), 3.76 (s, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 161.33 , 156.95 , 138.21 , 132.09 , 131.87 , 130.81 , 129.94 , 128.74 , 128.11 , 127.98 , 126.55 , 121.59 , 118.47 , 109.31 , 107.36 , 106.88 , 101.64 , 55.48 .HRMS: calculated for $C_{20}H_{15}BrN_2O_2[M+Na]^+$: 417.0207, found:395.0390.

*6-bromo-3-(4-ethylphenoxy)-2-phenylimidazo[1,2-a] pyridine (**3II-31**)***.*** yellow solid (192 mg, 98 % yield), mp:101-102 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.06 – 7.98 (m, 2H), 7.88 (dd, J = 1.9, 0.9 Hz, 1H), 7.51 (dd, J = 9.5, 0.8 Hz, 1H), 7.38 (dd, J = 8.4, 6.9 Hz, 2H), 7.31 – 7.27 (m, 1H), 7.22 (dd, J = 9.5, 1.9 Hz, 1H), 7.16 – 7.09 (m, 2H), 6.89 – 6.81 (m, 2H), 2.61 (q, J = 7.6 Hz, 2H), 1.21 (t, J = 7.6 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 153.86 , 139.85 , 138.15 , 137.05 , 132.03 , 130.36 , 129.55 , 128.71 , 128.01 , 127.81 , 126.52 , 121.63 , 118.50 , 114.74 , 107.22 , 28.03 , 15.59 ; HRMS: calculated for $C_{21}H_{17}BrN_2O$ $[M+H]^+$: 393.0595, found: 393.0597.

*6-bromo-3-(4-nitrophenoxy)-2-phenylimidazo[1,2-a]pyridine(**3II-32**)*.yellow solid (196 mg, 96 % yield), mp: 168-169 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.16 (d, *J* = 9.1 Hz, 2H), 7.90-7.80 (m, 3H), 7.61 (d, *J* = 9.5 Hz, 1H), 7.36-7.17 (m, 4H,ArH), 7.02 (d, *J* = 9.0 Hz, 2H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 160.15 , 144.28 , 138.07 , 131.48 , 130.34 , 129.45 , 129.17 , 129.02 , 128.92 , 128.63 , 126.62 , 121.21 , 118.35 , 115.57 , 108.60 .HRMS: calculated for $C_{19}H_{12}BrN_3O_3$ $[M+H]^+$: 410.0134, found: 410.0135.

*6-bromo-3-(2,6-dimethylphenoxy)-2-phenylimidazo[1,2-a] pyridine (**3II-33**)***.*** yellow solid (157 mg, 80 % yield), mp: 140-141 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.84 (s, 1H), 7.77 (d, J = 9.5 Hz, 1H), 7.70 (d, J = 7.4 Hz, 2H), 7.34 – 7.27 (m, 1H), 7.22 (d, J = 17.9 Hz, 3H), 6.93 (s, 3H), 2.01 (s, 6H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 151.43 , 150.32 , 130.20 , 130.07 , 130.02 , 129.43 , 129.33 , 128.58 , 128.53 , 128.27 , 127.53 , 125.48 , 121.64 , 117.27 , 109.00 , 16.67; HRMS: calculated for $C_{21}H_{17}BrN_2O[M+H]^+$: 393.0595, found: 393.0597.

*6-bromo-2-phenyl-3-(2,4,6-trichlorophenoxy)imidazo[1,2-a]pyridine(**3II-34**)***.***brown solid (322 mg, 69 % yield),mp: 179-180 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.11 (dd, J = 1.8, 0.8 Hz, 1H), 7.61-7.52 (m, 3H), 7.30-7.17 (m, 4H), 7.14 (s, 2H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 146.09 , 136.56 , 131.23 , 130.52 , 130.38 , 129.44 , 128.57 , 128.49 , 128.31 , 127.72 , 127.37 , 126.81 , 121.72 , 117.93 , 108.19 .HRMS: calculated for $C_{19}H_{10}BrCl_3N_2O$ $[M+H]^+$: 466.9116, found:466.9115.

*7-methyl-2-phenyl-3-(m-tolyloxy)imidazo[1,2-a]pyridine (**3II-35**)***.*** yellow solid (149 mg, 95 % yield), mp: 111-112 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.97 (dd, J = 8.4, 1.3 Hz, 2H), 7.57 (d, J = 6.9 Hz, 1H), 7.50-7.45 (m, 1H), 7.31 (dd, J = 8.4, 7.0 Hz, 2H), 7.25-7.16 (m, 1H), 7.10 (t, J = 7.8 Hz, 1H), 6.88-6.80 (m, 1H), 6.71-6.62 (m, 2H), 6.58 (dd, J = 6.9, 1.4 Hz, 1H), 2.34 (d, J = 1.0 Hz, 3H), 2.21 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.95 , 140.68 , 139.59 , 137.19 , 131.17 , 129.96 , 129.65 , 129.13 , 128.77 , 128.03 , 126.49 , 124.74 , 121.06 , 115.87 , 115.51 , 115.48 , 111.92 , 21.51 , 21.46; HRMS: calculated for $C_{21}H_{18}N_2O[M+H]^+$: 315.1500, found: 315.1492.

*3-(3-methoxyphenoxy)-7-methyl-2-phenylimidazo[1,2-a]pyridine(**3II-36**)*.brown solid (127 mg, 77 % yield), mp: 100-101 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.05-7.98 (m, 2H), 7.60 (dd, *J* = 6.9, 0.9 Hz, 1H), 7.41-7.33 (m, 3H), 7.27-7.24 (m, 1H), 7.16 (t, *J* = 8.2 Hz, 1H), 6.67- 6.44 (m, 4H), 3.73 (s, 3H), 2.38 (d, *J* = 1.1 Hz, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 161.26 , 157.39 , 140.32 , 135.49 , 132.54 , 130.64 , 130.51 , 129.64 , 128.62 , 127.58 , 126.41 , 120.89 , 116.10 , 115.05 , 109.06 ,

107.03 , 101.58 , 55.43 , 21.45 .HRMS: calculated for $C_{21}H_{18}N_2O_2[M+H]^+$: 331.1444, found:331.1441.

*3-(4-ethylphenoxy)-7-methyl-2-phenylimidazo[1,2-a]pyridine(**3II-37**).*yellow solid (153 mg, 93 % yield), mp: 104-105 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.07-7.99 (m, 2H,ArH), 7.61 (dd, *J* = 6.9, 0.9 Hz, 1H,ArH), 7.41-7.32 (m, 3H,ArH), 7.30-7.20 (m, 2H,ArH), 7.10 (d, *J* = 8.6 Hz, 2H,ArH), 6.89-6.82 (m, 2H,ArH), 6.56 (dd, *J* = 7.0, 1.5 Hz, 1H,ArH), 2.59 (q, *J* = 7.6 Hz, 2H,CH_2), 2.39 (d, *J* = 1.0 Hz, 3H,CH_3), 1.19 (t, *J* = 7.6 Hz, 3H,CH_2CH_3).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 154.24 , 140.24 , 139.49 , 135.44 , 132.58 , 130.37 , 130.04 , 129.39 , 128.61 , 127.52 , 126.40 , 120.95 , 116.08 , 114.99 , 114.81 , 28.01 , 21.45 , 15.63 .HRMS: calculated for $C_{22}H_{20}N_2O[M+H]^+$: 329.1650, found:329.1648.

*7-methyl-3-(4-nitrophenoxy)-2-phenylimidazo[1,2-a] pyridine (**3II-38**).* yellow solid (159 mg, 92 % yield), mp: 171-172 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.16-8.07 (m, 2H), 7.89-7.81 (m, 2H), 7.53 (d, J = 6.9 Hz, 1H), 7.42-7.37 (m, 1H), 7.29 (t, J = 7.6 Hz, 2H), 7.24-7.15 (m, 1H), 7.02-6.93 (m, 2H), 6.61 (dd, J = 7.0, 1.4 Hz, 1H), 2.35(S,3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 160.74 , 143.97 , 140.30 , 136.99 , 131.26 , 130.22 , 128.86 , 128.42 , 128.29 , 126.45 , 126.16 , 120.46 , 116.08 , 116.04 , 115.57 , 21.50; HRMS: calculated for $C_{20}H_{15}N_3O_3$ $[M+H]^+$: 346.1194, found: 346.1186.

*3-(2,6-dimethylphenoxy)-7-methyl-2-phenylimidazo[1,2-a]pyridine (**3II-39**).* white solid (133 mg, 81 % yield), mp: 123-125 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.81-7.74 (m, 2H), 7.58 (d, J = 9.2 Hz, 1H), 7.39-7.34 (m, 1H), 7.29-7.21 (m, 2H), 7.21-7.12 (m, 1H), 6.98 (dd, J = 9.2, 1.6 Hz, 1H), 6.94-6.86 (m, 3H), 2.18 (d, J = 1.1 Hz, 3H), 2.00 (s, 6H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 151.91 , 136.83 , 132.76 , 131.45 , 129.96 , 128.34 , 128.17 , 127.99 , 127.66 , 127.15 , 126.37 , 124.74 , 123.06 , 118.96 , 116.50 , 18.51 , 16.78; HRMS: calculated for $C_{22}H_{20}N_2O$ $[M+H]^+$: 329.1649, found: 329.1649.

*7-methyl-2-phenyl-3-(2,4,6-trichlorophenoxy)imidazo[1,2-a]pyridine(**3II-40**).*yellow solid (133 mg, 66 % yield), mp: 160-161 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.80 (dd, *J* = 7.0, 1.0 Hz, 1H), 7.73-7.66 (m, 2H), 7.34 (d, *J* = 1.3 Hz, 1H), 7.32-7.25 (m, 2H), 7.24-7.19 (m, 3H), 6.68 (dd, *J* = 7.0, 1.6 Hz, 1H), 2.41 (d, *J* = 1.1 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 146.68 , 139.24 , 134.93 , 132.28 , 131.07 , 129.83 , 129.39 , 128.46 , 128.12 , 127.61 , 127.47 , 126.82 , 120.78 , 116.04 , 115.22 , 21.44; HRMS: calculated for $C_{20}H_{13}Cl_3N_2O$ $[M+H]^+$: 403.0167, found: 403.0166.

*methyl 2-phenyl-3-(m-tolyloxy)imidazo[1,2-a]pyridine-7-carboxylate (**3II-41**).* yellow solid (176 mg, 98 % yield), mp: 143-144 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.29 (s, 1H), 8.02-7.94 (m, 2H), 7.66 (d, J = 7.1 Hz, 1H), 7.36-7.16 (m, 5H), 7.09 (t, J = 7.9 Hz, 1H), 6.87-6.80 (m, 1H), 6.70-6.58 (m, 2H), 3.87 (s, 3H), 2.20 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 165.64 , 155.75 , 140.73 , 138.52 , 134.03 , 133.97 , 131.90 , 130.00 , 128.76 , 128.27 , 126.62 , 125.65 , 124.84 , 121.14 , 120.51 , 115.54 , 111.92 , 111.72 , 52.61 , 21.46 ; HRMS: calculated for $C_{22}H_{18}N_2O_3$ $[M+H]^+$: 359.1390, found: 359.1390.

*methyl 3-(3-methoxyphenoxy)-2-phenylimidazo[1,2-a] pyridine-7-carboxylate (**3II-42**).* white solid (165 mg, 88 % yield), mp: 122-123 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.37 (d, J = 1.3 Hz, 1H), 8.09-8.02 (m, 2H), 7.80-7.73 (m, 1H), 7.44-7.28 (m, 4H), 7.19 (t, J = 8.3 Hz, 1H), 6.66 (dd, J = 8.3, 2.3 Hz, 1H), 6.54 (t, J = 2.4 Hz, 1H), 6.46 (dd, J = 8.2, 2.4 Hz, 1H), 3.96 (s, 3H), 3.75 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 165.63 , 161.34 , 156.90 , 138.59 , 134.12 , 131.91 , 131.16 , 130.79 , 128.76 , 128.30 , 126.66 , 125.66 , 121.11 , 120.56 , 111.72 , 109.36 , 106.93 , 101.68 , 55.46 , 52.61; HRMS: calculated for $C_{22}H_{18}N_2O_4$ $[M+H]^+$: 375.1343, found: 375.1339.

*methyl 3-(4-ethylphenoxy)-2-phenylimidazo[1,2-a]pyridine-7-carboxylate(**3II-43**).*yellow solid (180 mg, 97 % yield), mp: 101-102 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.36 (t, *J* = 1.3 Hz, 1H), 8.10-8.03 (m, 2H), 7.75 (dd, *J* = 7.1, 0.9 Hz, 1H), 7.39 (dd, *J* = 8.3, 6.8 Hz, 2H), 7.35-7.27 (m, 2H), 7.12 (d, *J* = 8.6 Hz, 2H), 6.84 (d, *J* = 8.6 Hz, 2H), 3.95 (s, 3H), 2.59 (q, *J* = 7.6 Hz, 2H), 1.19 (t, *J* = 7.6 Hz, 3H).^{13}C NMR ($CDCl_3$, 101 MHz) δ: 165.69 , 153.82 , 139.89 , 138.54 , 134.09 , 132.02 , 131.57 , 129.53 , 128.74 , 128.22 , 126.65 , 125.52 , 121.15 , 120.58 , 114.81 , 111.62 , 52.59 , 28.01 , 15.60 .HRMS: calculated for $C_{23}H_{20}N_2O_3[M+H]^+$:373.1551, found:373.1547.

*methyl 3-(4-nitrophenoxy)-2-phenylimidazo[1,2-a]pyridine-7-carboxylate (**3II-44**).* red solid (185 mg, 95 % yield), mp: 170-171 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.32 (t, J = 1.2 Hz, 1H), 8.18-8.09 (m, 2H), 7.91-7.84 (m, 2H), 7.69 (dd, J = 7.1, 0.9 Hz, 1H), 7.36 (dd, J = 7.1, 1.5 Hz, 1H), 7.31 (dd, J = 8.3, 6.6 Hz, 2H), 7.27-7.20 (m, 1H), 7.03-6.94 (m, 2H), 3.88 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 165.24 , 160.24 , 144.16 , 138.78 , 133.84 , 130.91 , 129.86 , 128.97 , 128.88 , 126.65 , 126.55 , 126.11 , 120.78 , 120.46 , 115.60 , 112.56 , 52.80; HRMS: calculated for $C_{21}H_{15}N_3O_5$ $[M+H]^+$: 390.1087, found: 390.1084.

*methyl 2-phenyl-3-(2,4,6-trichlorophenoxy)imidazo[1,2-a]pyridine-7-carboxylate(**3II-45**).*yellow solid (178 mg, 80 % yield), mp: 148-149 °C,^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.34 (t, *J* = 1.3 Hz, 1H), 7.93 (dd, *J* = 7.1, 1.0 Hz, 1H), 7.66-7.58 (m, 2H), 7.45 (dd, *J* = 7.1, 1.6 Hz, 1H), 7.28-7.17 (m, 3H), 7.15 (s, 2H), 3.90 (s, 3H).^{13}C NMR ($CDCl_3$, 101 MHz)δ: 165.44 , 146.09 , 137.14 , 132.44 , 131.17 , 130.79 , 130.57 , 129.45 , 128.54 , 128.31 , 127.77 , 126.91 , 125.90 , 121.10 , 120.14 , 112.43 , 52.70 .HRMS: calculated for $C_{21}H_{13}Cl_3N_2O_3$ $[M+H]^+$: 447.0067, found: 447.0065.

3-methoxy-2-phenylimidazo[1,2-a]pyridine (***3III-1***)[5]. yellow oil (108 mg, 96 % yield), ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.05-7.97 (m, 2H), 7.83 (d, J = 6.8 Hz, 1H), 7.48-7.41 (m, 1H), 7.37 (t, J = 7.8 Hz, 2H), 7.26- 7.16 (m, 1H), 7.00 (ddd, J = 9.1, 6.7, 1.3 Hz, 1H), 6.67 (td, J = 6.7, 1.1 Hz, 1H), 3.84 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 138.92 , 136.72 , 133.30 , 128.70 , 128.45 , 127.38 , 126.41 , 123.74 , 121.28 , 117.80 , 112.02 , 61.12; HRMS: calculated for $C_{14}H_{12}N_2O$ $[M+H]^+$:225.1024,found: 225.1022.

3-(4-methoxyphenoxy)-2-methylimidazo[1,2-a]pyridine (***3III-2***). brown oil (84 mg, 66 % yield), ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.67 (d, J = 6.8 Hz, 1H), 7.49 – 7.39 (m, 1H), 7.05 (ddd, J = 9.1, 6.7, 1.3 Hz, 1H), 6.75 (s, 4H), 6.66 (td, J = 6.7, 1.1 Hz, 1H), 3.70 (s, 3H), 2.28 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 155.56 , 150.93 , 131.26 , 128.92 , 123.45 , 121.30 , 117.16 , 115.67 , 114.94 , 111.87 , 55.72 , 12.18 ; HRMS: calculated for $C_{15}H_{14}N_2O_2$ $[M+H]^+$:255.1131,found: 255.1128.

4.3. Analytical Data for Compounds ***5****.*

*3-phenoxy-2-phenylbenzo[d]imidazo[2,1-b]thiazole (**5-1**)*[5]**.** brown solid (169 mg, 98 % yield), mp: 172-174 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.90 (d, J = 7.7 Hz, 2H), 7.69-7.62 (m, 1H), 7.49-7.42 (m, 1H), 7.39-7.20 (m, 7H), 7.15-7.04 (m, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 156.46 , 142.28 , 133.51 , 131.85 , 131.54 , 131.48 , 130.41 , 129.97 , 128.72 , 127.38 , 126.43 , 125.58 , 125.12 , 124.07 , 123.94 , 114.99 , 113.58; HRMS: calculated for $C_{21}H_{14}N_2OS$ $[M+H]^+$:343.0903,found: 343.0900.

2-*phenyl-3-(m-tolyloxy)benzo[d]imidazo[2,1-b]thiazole (**5-2**)***.** brown oil (176 mg, 99 % yield); ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.94-7.87 (m, 2H), 7.68-7.60 (m, 1H), 7.49-7.41 (m, 1H), 7.34 (t, J = 7.7 Hz, 2H), 7.27-7.18 (m, 4H), 6.94-6.83 (m, 3H), 2.30 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 156.64 , 142.18 , 140.69 , 133.69 , 132.64 , 132.13 , 131.67 , 130.00 , 129.98 , 128.62 , 127.04 , 126.26 , 125.51 , 124.79 , 124.64 , 123.96 , 115.52 , 113.47 , 111.96 , 21.54; HRMS: calculated for $C_{22}H_{16}N_2OS$ $[M+H]^+$: 357.1048, found:357.1056.

3-*(4-ethylphenoxy)-2-phenylbenzo[d]imidazo[2,1-b] thiazole (**5-3**)***.** brown oil (176 mg, 95 % yield); ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.83-7.76 (m, 2H), 7.39 (dd, J = 6.2, 3.0 Hz, 1H), 7.27 (dd, J = 6.3, 3.1 Hz, 1H), 7.18 (t, J = 7.7 Hz, 2H), 7.10-6.98 (m, 3H), 6.96 (d, J = 8.6 Hz, 2H), 6.83 (d, J = 8.6 Hz, 2H), 2.40 (q, J = 7.6 Hz, 2H), 1.01 (t, J = 7.6 Hz, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 154.66 , 142.16 , 139.62 , 133.98 , 132.63 , 132.01 , 131.58 , 129.89 , 129.63 , 128.68 , 127.11 , 126.27 , 125.59 , 124.84 , 123.94 , 114.84 , 113.48 , 28.04 , 15.61; HRMS: calculated for $C_{23}H_{18}N_2OS$ $[M+H]^+$: 371.1222, found: 371.1213.

*3-(2,6-dimethylphenoxy)-2-phenylbenzo[d]imidazo[2,1-b] thiazole (**5-4**)***.** brown oil (74 mg, 40 % yield); ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.69 – 7.58 (m, 2H), 7.36 – 7.23 (m, 5H), 7.13 – 7.01 (m, 3H), 6.90 – 6.81 (m, 3H), 2.05 (s, 6H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 152.47 , 140.00 , 137.50 , 131.97 , 130.16 , 130.06 , 129.90 , 128.01 , 127.96 , 127.58 , 127.02 , 126.99 , 126.31 , 125.08 , 124.67 , 124.15 , 113.76 , 16.94; HRMS: calculated for $C_{22}H_{16}N_2O_2S$ $[M+H]^+$: 371.1219, found: 371.1213.

*3-(3-methoxyphenoxy)-2-phenylbenzo[d]imidazo[2,1-b] thiazole (**5-5**)***.** yellow solid (167 mg, 90 % yield), mp: 97-99 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.90 (dd, J = 8.3, 1.3 Hz, 2H), 7.62 (dd, J = 6.0, 3.2 Hz, 1H), 7.48-7.40 (m, 1H), 7.34 (dd, J = 8.4, 7.1 Hz, 2H), 7.27-7.17 (m, 4H), 6.70-6.58 (m, 3H), 3.74 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 1161.35 , 157.75 , 142.27 , 133.49 , 132.53 , 132.18 , 131.59 , 130.85 , 129.94 , 128.65 , 127.14 , 126.29 , 125.56 , 124.86 , 123.97 , 113.44 , 109.06 , 107.06 , 101.69 , 55.48; HRMS: calculated for $C_{22}H_{16}N_2O_2S$ $[M+H]^+$: 373.1010, found: 373.1005.

2-*phenyl-3-(2,4,6-trichlorophenoxy)benzo[d]imidazo[2,1-b] thiazole (**5-6**).* yellow oil (127 mg, 57 % yield); ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.77 (dd, J = 8.0, 1.2 Hz, 1H), 7.61 (dd, J = 7.9, 1.2 Hz, 1H), 7.44-7.37 (m, 2H), 7.35-7.25 (m, 2H), 7.20-7.05 (m, 5H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 146.32 , 140.73 , 135.74 , 131.86 , 130.16 , 130.07 , 129.34 , 128.69 , 128.06 , 128.02 , 127.55 , 127.26 , 126.87 , 126.29 , 125.14 , 124.12 , 113.82; HRMS: calculated for $C_{21}H_{11}Cl_3N_2OS$ $[M+H]^+$: 444.9736, found: 444.9730.

3-*(4-nitrophenoxy)-2-phenylbenzo[d]imidazo[2,1-b] thiazole (**5-7**).* brown solid (170 mg, 88 % yield), mp: 175-176 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 8.16 (d, J = 9.2 Hz, 2H), 7.77 – 7.70 (m, 2H), 7.66 – 7.58 (m, 1H), 7.35 – 7.21 (m, 5H), 7.21 – 7.10 (m, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 160.92 , 144.13 , 143.00 , 132.29 , 132.03 , 131.30 , 131.16 , 130.01 , 128.90 , 127.89 , 126.65 , 126.12 , 125.61 , 125.52 , 124.41 , 115.68 , 113.02 , 77.40 ; HRMS: calculated for $C_{21}H_{13}N_3O_3S$ $[M+H]^+$: 388.0756, found: 388.0750.

*2-(4-methoxyphenyl)-3-phenoxybenzo[d]imidazo[2,1-b] thiazole (**5-8**)***.** white solid (160 mg, 86 % yield), mp: 130-131 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.79-7.71 (m, 2H), 7.60-7.53 (m, 1H), 7.40-7.33 (m, 1H), 7.27-7.21 (m, 2H), 7.18 (ddd, J = 5.3, 2.2, 1.1 Hz, 2H), 7.05-6.97 (m, 3H), 6.83-6.78 (m, 2H), 3.70 (s, 3H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 158.96 , 156.55 , 141.99 , 132.60 , 131.53 , 131.47 , 130.38 , 129.88 , 126.92 , 126.40 , 124.98 , 124.52 , 124.04 , 123.87 , 114.98 , 114.17 , 113.46 , 55.26; HRMS: calculated for $C_{22}H_{16}N_2O_2S$ $[M+H]^+$: 373.1006, found: 373.1005.

*2-(4-bromophenyl)-3-phenoxybenzo[d]imidazo[2,1-b] thiazole (**5-9**).* yellow solid (189 mg, 90 % yield), mp: 180-182 °C, ^{1}H NMR ($CDCl_3$, 400 MHz) δ: 7.69 (d, J = 8.4 Hz, 2H), 7.66-7.61 (m, 1H), 7.45-7.36 (m, 3H), 7.26 (q, J = 10.6, 9.2 Hz, 4H), 7.06 (t, J = 7.4 Hz, 1H), 7.01-6.95 (m, 2H); ^{13}C NMR ($CDCl_3$, 101 MHz) δ: 156.08 , 142.52 , 133.54 , 132.49 , 131.94 , 131.55 , 131.23 , 130.54 , 129.93 , 127.12 , 126.71 , 125.60 , 124.27 , 124.23 , 121.61 , 114.86 , 113.80; HRMS: calculated for $C_{21}H_{13}BrN_2OS$ $[M+H]^+$: 421.0003, found: 421.0005.

4.4. Accession Codes

CCDC 1855870 （ ***3I-4*** ） contains the supplementary crystallographic data for this paper. These data can be obtained free of charge via www.ccdc.cam.ac.uk/data_request/cif, or by emailing data_request@ccdc.cam.ac.uk, or by contacting The Cambridge Crystallographic Data Centre, 12 Union Road, Cambridge CB2 1EZ, U.K.; fax: +44 1223 336033.

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