ROYAL SOCIETY OPEN SCIENCE

royalsocietypublishing.org/journal/rsos

Research

Cite this article: Zhong B, Chen F, Ge Y, Liu D. 2023 Developing a fast and catalyst-free protocol to form C=N double bond with high functional group tolerance. *R. Soc. Open Sci.* **10**: 231263. https://doi.org/10.1098/rsos.231263

Received: 25 August 2023
Accepted: 12 September 2023

Subject Category:
Chemistry

Subject Areas:
organic chemistry

Keywords:
no catalyst, mild condition, C=N forming, high functional group tolerance, no addition

Authors for correspondence:
Yushu Ge
e-mail: geyushu@163.com
Dan Liu
e-mail: dliu919@ustc.edu.cn

This article has been edited by the Royal Society of Chemistry, including the commissioning, peer review process and editorial aspects up to the point of acceptance.

Electronic supplementary material is available online at https://doi.org/10.6084/m9.figshare.c.6856586.

ROYAL SOCIETY OF CHEMISTRY

THE ROYAL SOCIETY PUBLISHING

Developing a fast and catalyst-free protocol to form C=N double bond with high functional group tolerance

Bin Zhong[1], Feng Chen[1], Yushu Ge[1] and Dan Liu[1,2]

[1]Heifei National Laboratory for Physical Sciences at Microscale, the CAS Key Laboratory of Innate Immunity and Chronic Disease, School of Basic Medical Sciences, Division of Life Sciences and Medicine, University of Science and Technology of China, Hefei, 230027, People's Republic of China
[2]The First Affiliated Hospital of University of Science and Technology of China, Hefei, Anhui 230001, People's Republic of China

The carbon–nitrogen double bond (C=N) is a fundamentally important functional group in organic chemistry. This is largely due to the fact that C=N acts as electrophilic synthon to give nitrogen-containing compounds. Here, we report the condensation of primary amine or hydrazine with very electron-deficient aldehyde to form C=N bond in the absence of any catalysts (metals and acids). The protocol performs at room temperature and applies water as co-solvent. Two hundred examples are presented here. With its intrinsic advantages of wide substrate scopes, excellent efficiency (high yields and short reaction time), operational simplicity, mild condition (room temperature as reaction temperature, no catalysts, no additions, water as co-solvent and opening to air) and available starting materials, the protocol can be compatible with various drugs, prodrugs, dyes and pharmacophores containing primary amino group. In addition, we also successfully apply this protocol to rapidly synthesize the core scaffolds of bioactive molecules.

1. Introduction

The carbon–nitrogen double bond is present in many natural products and bioactive molecules with valuable biological activities including anti-tumour, antiviral, antifungal and antibacterial [1–4]. As shown in figure 1, compound **A** possesses significant antimicrobial activity, and shows even more potent than the standard drugs and is more influential against the bacterial than the fungal strains [5]. Sirtinol **B** has been known as a human sirtuin-2 (SIRT2) inhibitor [6], which is reported to induce senescence-like growth arrest in human breast cancer MCF-7 cells and lung cancer H1299 cells [7]. Histone deacetylase

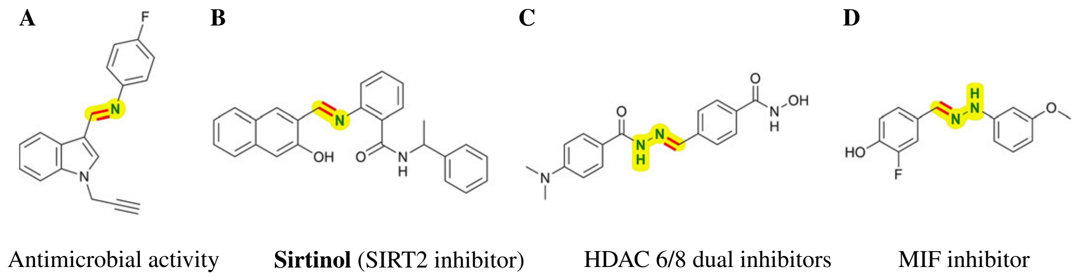
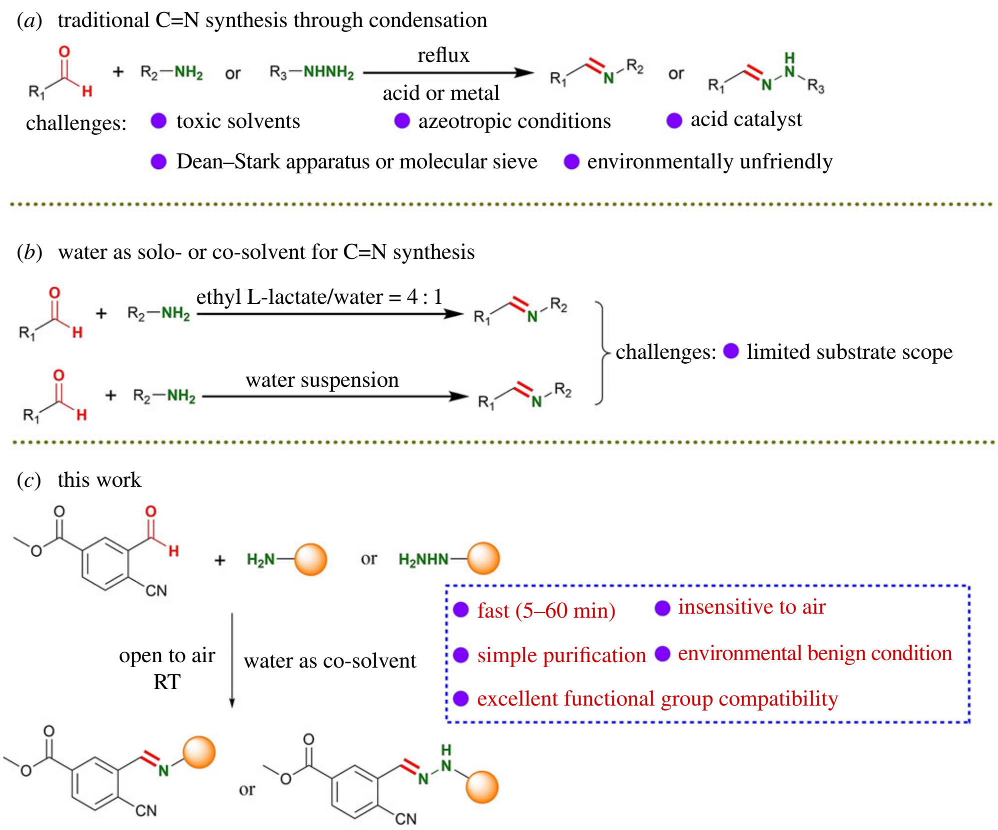


Figure 1. Selected examples of bioactive molecules containing C=N bond.

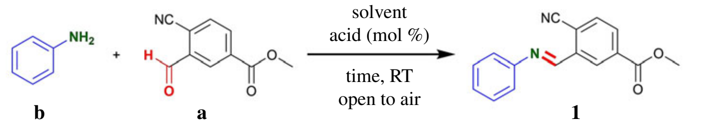


Scheme 1. Strategies for the formation of C=N bond and our work.

6/8 (HDAC 6/8) dual inhibitor **C** exhibits important anti-tumour activities against hepatocellular carcinoma cells and induces cell cycle arrest in the G2/M phase and eventual cell death in HepG2 cells [8]. Compound **D** has been reported as a migration inhibitory factor (MIF) inhibitor, and a relatively low concentration of **D** can effectively improve survival in sepsis [9]. More importantly, C=N bonds of the imines and hydrazones are versatile electrophiles in organic chemistry that give rise to nitrogen-containing compounds by reduction, cyclization and addition reactions [10–25], which are ubiquitous in natural products, pharmaceuticals, organic materials, dyes and biomolecules [26–28]. Very recently, the C=N unit as linkage has been applied to construct covalent organic frameworks [29].

Traditionally, C=N bond formation is a simple reaction which involves condensation of primary amino group with carbonyl group along with the loss of H_2O (scheme 1*a*) [30–32]. There are various factors which influence the formation of C=N bond. These factors include concentration, steric effect, electronic effect, pH, temperature and solvents. According to Le Chatelier's principle, adding H_2O to imine leads to hydrolysis of the C=N to recover the starting materials [33]. Therefore, the direct formation of C=N bond is usually executed in dry solvents (benzene, toluene and $CHCl_3$) and needs acid or metal to serve as Lewis acids to catalyse the nucleophilic attack of the amine on the carbonyl group [34]. The equilibrium in this reaction usually favours the reverse reaction, so that drying agents

Table 1. Optimization of reaction conditions.[a]



entry	solvent	acid (mol%)	time (min)	yields (%)1
1	MeOH	HCl (10)	10	n.d.[b]
2	MeOH	HCl (20)	10	n.d.[b]
3	MeOH	HCl (30)	10	n.d.[b]
4	DMSO	HCl (10)	10	n.d.[b]
5	CH_2Cl_2	HCl (10)	10	n.d.[b]
6	EtOAc	HCl (10)	10	n.d.[b]
7	THF	HCl (10)	10	n.d.[b]
8	DMF	HCl (10)	10	n.d.[b]
9	H_2O	HCl (10)	10	n.d.[b]
10	H_2O	none	10	40%[c]
11	CH_3OH	none	10	30%[c]
12	EtOAc	none	10	70%[c]
13	$CHCl_3$	none	10	72%[c]
14	CH_2Cl_2	none	10	75%[c]
15	H_2O (1mL)	none	10	35%[c]
16	H_2O/CH_2Cl_2 (3 : 1)	none	10	89%[c]
17	H_2O/CH_2Cl_2 (4 : 1)	none	10	95%[c]
18	H_2O/CH_3OH (4 : 1)	none	10	42%[c]
19	H_2O/CH_2Cl_2 (5: 1)	none	5	95%[c]

[a]Reaction conditions: reactions were performed with aniline and **b** (0.3 mmol) in 10 ml solvent under an air atmosphere.
[b]n.d. = not detected by ^1H NMR.
[c]Isolated yield. DMSO = dimethyl sulfoxide. THF = tetrahydrofuran. DMF = *N*, *N*-dimethylformamide.

(e.g. molecular sieve) or azeotropic distillation by Dean–Stark apparatus are acquired to remove H_2O as it is formed in the reaction mixture to drive the reaction towards completion. In view of environmental concerns, researchers have shown remarkable interest in developing sustainable protocols to form C=N bond with microwaves [35–37], ultrasound [38] and IR [39] as energy sources. Furthermore, water and ethyl lactate can be mixed to create polarity conditions that are ideal for the synthesis of aryl aldimines (scheme 1*b*) [40]. More simply, pure water-mediated protocol for the synthesis of C=N bond that requires neither catalyst nor azeotropic removal of water has been reported (scheme 1*b*) [41]. However, these protocols exhibit limited flexibility in the installation of functional groups.

Herein, we demonstrate a novel protocol using water as co-solvent to construct C=N bond at room temperature (RT) without using any catalysts and additions. The protocol shows superiorities including modularity, excellent efficiency (high yields and short reaction time), operational simplicity, mild condition (RT as reaction temperature, no catalysts, no additions, water as co-solvent and insensitive to air) and excellent functional group compatibility (scheme 1*c*). Two hundred compounds containing C=N bond have been synthesized through condensation of primary amine or hydrazine with very electron-deficient aldehyde. The successful synthesize of these compounds including various pharmacophores implies that the protocol has broad application in organic chemistry and significant influence for drug development.

2. Results and discussion

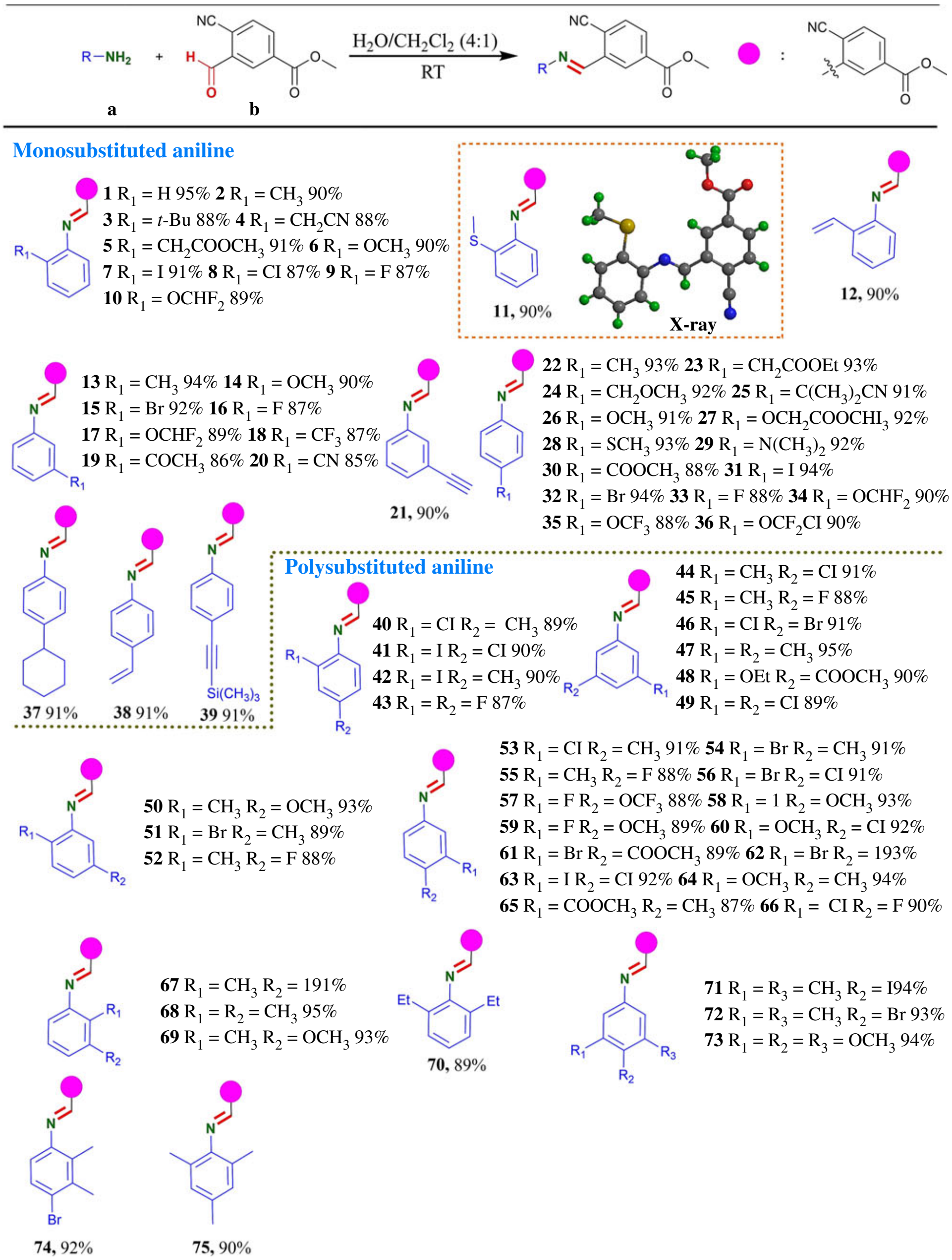
Firstly, we tested the feasibility of this protocol. As shown in table 1, 4-cyano-3-formylmethylbenzoate **b** and commercially available aniline were chosen as the model substrates and allowed to react in MeOH with 10 mol% of HCl in open to air at RT (table 1, entry 1). Unfortunately, the desired product methyl (E)-4-cyano-3-((phenylimino)methyl) benzoate **1** was not detected by ^1H NMR. There was no improvement with increased loading of HCl (entries 2 and 3). Later, we focused on investigation of the reaction with a number of solvents (DMSO, CH_2Cl_2, EtOAc, THF, DMF and H_2O) with 10 mol% of HCl, and the product **1** was also not detected by ^1H NMR (entries 4–9). Next, the reaction was performed in series of solvents

(H_2O, CH_3OH, EtOAc, $CHCl_3$ and CH_2Cl_2) without addition of HCl. Among these, **1** was obtained in 30–75% yields (entries 10–14). We also performed the reaction in 1 ml H_2O, the product **1** was obtained in only 35% yields (entry 15). These results indicated that acid might have negative effect on the C=N bond formation. In order to optimize the conditions, this reaction was carried out in H_2O/CH_2Cl_2 (3 : 1) or H_2O/CH_2Cl_2 (4 : 1) or H_2O/CH_3OH (4 : 1) without addition of HCl under an air atmosphere, the **1** was obtained in 89%, 95% and 42% yields (entries 16–18). To further improve the reaction efficiency, we shortened the reaction time to 5 min to give 95% yield of **1** (entry 19). This protocol using H_2O as co-solvent was carried out under mild conditions (RT and open to air) in the absence of any catalysts and additions. Meanwhile, the corresponding product **1** could be obtained by simply extracting and removing the CH_2Cl_2 under reduced pressure without chromatographic purification or recrystallization.

With the optimized reaction condition in hand, the scopes and generality of the protocol were evaluated (table 2). Firstly, we investigated the substrate scopes of this protocol for monosubstituted anilines (o-, m- and p-substituted anilines) and polysubstituted anilines. As shown in table 2, **b** demonstrated excellent reactivity towards primary amino groups of different reagents. In total, 85–95% yields were obtained in condensation of primary amino groups bearing one or more substituents on the ortho-, meta- or para-position of the anilines with **b** in table 2. To our delight, the present reactions were compatible with electron-donating groups (alkoxy, alkylthiol, alkyl, halogen (Cl, Br, I), *N*, *N*-dimethy, *N*, *N*-diphenyl and unsaturated bonds on aromatic rings), even the strong electron-withdrawing groups (-F, -CN, -CF_3, -OCF_3, -$OCHF_2$, -OCF_2Cl, ester carboxyl, ketone carbonyl) on aromatic rings were also tolerated with longer reaction time (table 2). Furthermore, **b** was found to be reactive towards primary amino groups in large steric hindrance environments to obtain corresponding products (**3**, 88%, **70**, 89% and **75**, 90%) with longer reaction time. It is worth mentioning that reactions of **b** with substituted aniline containing electron donor groups or alkane primary amine were completed in 5–15 min. Longer reaction times (30–60 min) were required for some substrates owing to their poor solubility, hindrance or the lower reactivity of their amino groups. Obviously, electron-withdrawing groups on aromatic ring and large steric hindrance around the primary amino group had a little negative effect on reaction time. In the recent past, a significant positive effect of fluorine had been observed through introduction into an aromatic system on drug potency and target selectivity by modulating the physico-chemical parameters and drug metabolism [42]. Cheerfully, fluorine groups (-F, -CF_3, -OCF_3, -$OCHF_2$, -OCF_2Cl) on the aromatic ring system were tolerated for this protocol to give the corresponding products in up to 90% yields (table 2). The trimethylsilyl protecting group was also employed, such as 4-((trimethylsilyl)ethynyl) aniline, then the Schiff base **39** was formed in excellent yield (91%). To verify the structure of compounds containing C=N bond, X-ray diffraction (XRD) analysis of a representative product **11** (CCDC 2024116) was performed as shown in table 2.

To further evaluate the chemoselectivity and generality of the protocol, we investigated the reaction of **b** with various pharmacophores and drug fragments containing primary amino group. The benzene ring is not only stable unique dimensionality, π-electron system, aromaticity and rigidity. It is also frequently found in bioactive compounds and materials. Therefore, **b** was examined to benzene derivatives containing primary amino group, and the results are summarized in table 3. Biphenyl scaffolds are privileged substructures used in the discovery and design of therapeutics with high affinity and specificity for a broad range of protein target [43]. The condensation of aminobiphenyls with **b** gave desired products in 89–91% yields (**76**–**78**). Phenoxy aniline derivatives containing primary amino group readily provided the corresponding products **79**–**81** in 90–93% yields. In the case of benzyloxy-substituted aniline, the desired product **82** was obtained in 93% yields. Anilines containing benzyl could also produce the corresponding products **83** in 90% yields. Additionally, **84** containing the tetraphenylmethane motif which had been used in the field of porous materials [44] was obtained in 93% yield. *P*-aminodiphenylamines were able to yield the desired products **85** and **86** in 90% and 92% yields, respectively. Tetraphenylethene (TPE) derivatives are a family of typical aggregation-induced-emission (AIE)-active organic compounds [45]. We synthesized the compound **87** containing the TPE motif in 94% yield. Naphthalene skeletons are important and ubiquitous structural motifs in many important pharmaceutical drugs and have also received much attention in materials science [46,47]. α- or β-amino naphthalene underwent C=N bond formation to generate **88** (94% yield) and **89** (95% yield). Alicyclic anilines were also compatible with this protocol, and gave the desired products **90**–**93** in excellent yields. Fluorene derivatives [48,49], which represented an excellent scaffold for the development of novel pharmaceutical drugs, dyes, polymers and ligands, were tolerated for the protocol to give the corresponding products **94** and **95** in 93%

Table 2. Substrate scopes of primary amine.[a,b]

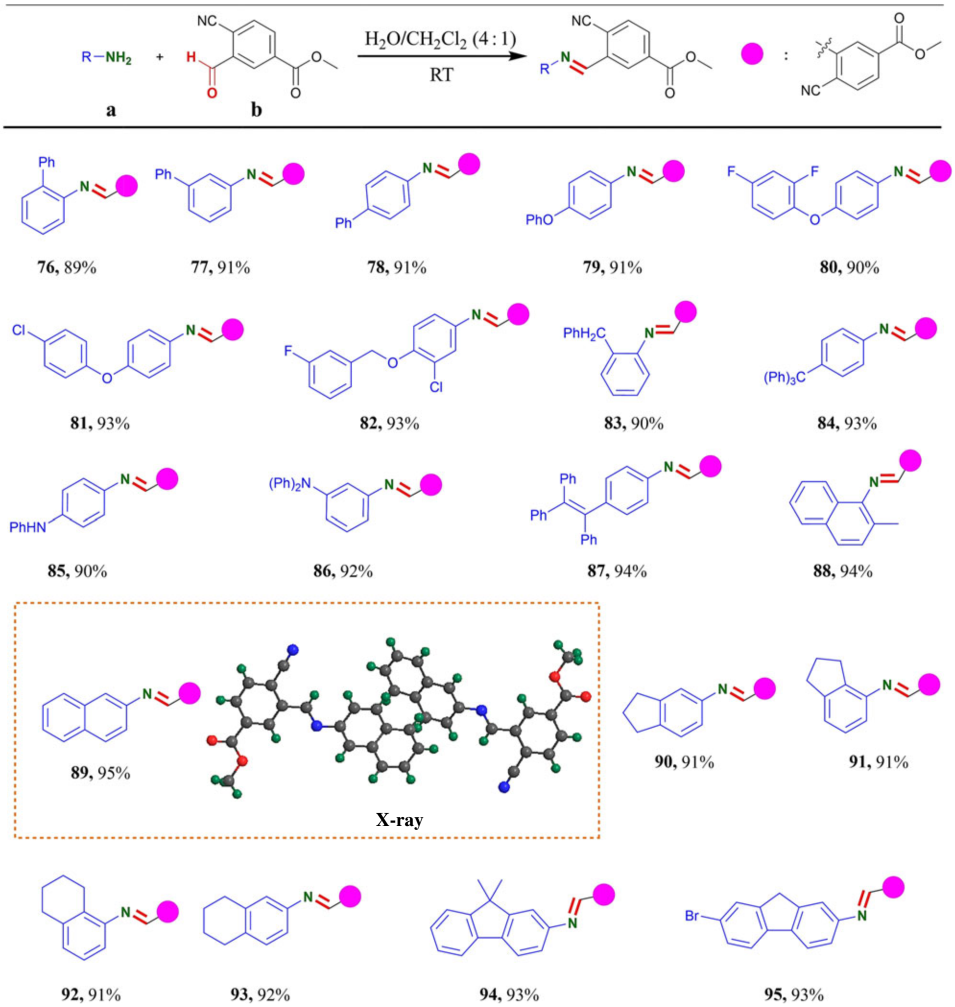


[a]Reaction conditions: reactions were performed with **a** (0.3 mmol) and **b** (0.3 mmol) in 10 ml H_2O/CH_2Cl_2 (4:1) for 5–60 min under an air atmosphere.
[b]Isolated yields.

yields. Notably, a single crystal X-ray analysis of the sample of **89** established the absolute configuration of this series of products.

According to the literature, pyridine is the most common N-heterocycle among the small molecule drugs [50]. Piperidine and piperazine are the second and third most commonly used N-heterocycles, respectively, in the FDA approved drugs. Whereas, pyrimidine and pyrazole hold the fourth position followed by indole [50]. Consequently, we further explored the scopes of this protocol with various nitrogen heterocycles containing primary amino group, and the results were summarized in table 4. With the established protocol in hand, indoles and indazoles containing primary amino group could provide the desired products (**96–107**) in the excellent yields of up to 95% yields. Aminoquinoline skeletons and *N*, *N*-dimethylbenzimidazolone amine could react with **b** to yield the products **108–111** in more than 90% yields. In addition, substituents of piperidine (**112–114**), imidazolidin-2-one (**115**),

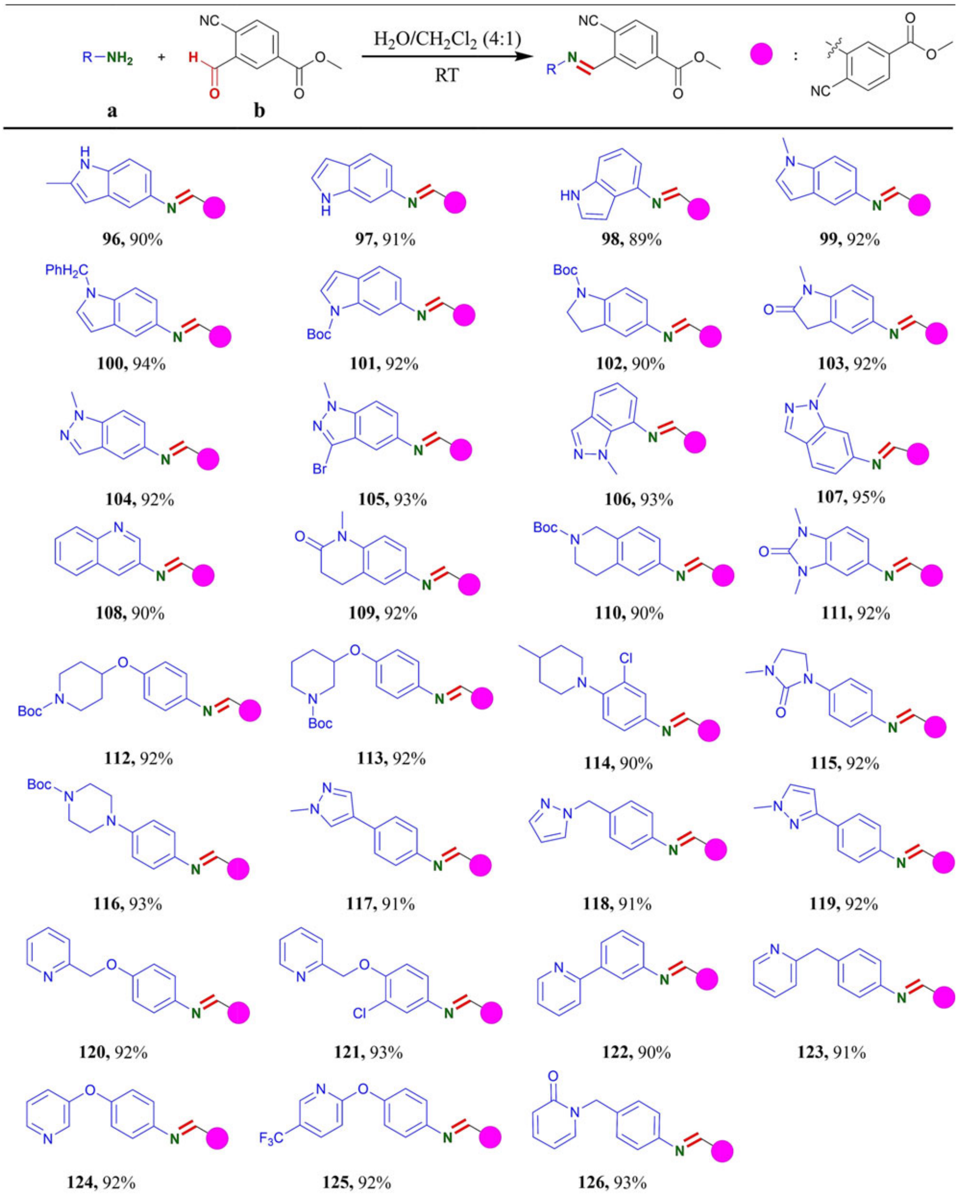
Table 3. Substrate scopes of benzene derivative containing primary amino group.[a,b]



[a]Reaction conditions: reactions were performed with **a** (0.3 mmol) and **b** (0.3 mmol) in 10 ml H_2O/CH_2Cl_2 (4 : 1) for 5–60 min under an air atmosphere.
[b]Isolated yields.

piperazine (**116**), 1-methyl-1H-pyrazole (**117**–**119**) and pyridine (**120**–**126**) on the ortho-, meta- or para-position of anilines could also react with **b** to provide the desired products in up to 93% yields. Indeed, the oxygen-containing heterocycles are fundamental structural units, which are often encountered in a wide range of pharmaceuticals, agrochemicals and natural products [51,52]. The high cation affinity and potency as hydrogen bond acceptors make the O-heterocycles key pharmacophore in drugs [51]. Therefore, various O-heterocycles containing the primary amino group were also investigated and the results were shown in table 5. The condensation of 4-aminobenzo-15-crown-5 with **b** afforded corresponding product **127** in 92% yield. The aminobenzodioxane derivative (**128**), benzofuran amine derivatives (**129**–**133**), benzoxazole amine derivatives (**136**–**139**) and benzo [1,4] oxazinone amine (**140**) were effectively transformed to desired products in up to 94% yields. Additionally, substituents of tetrahydro-2H-pyran (**134**), furan (**135**), oxazole (**141**), isoxazole (**142**) and morphine (**143** and **144**) on the meta-, or para-position of aniline were amenable to this protocol to offer desired products in 89–93% yields. In the past decades, the importance of sulfur-containing heterocycles in new drug discovery programmes has led to increasing attention toward their chemical and biological behaviour [53]. Consequently, S-heterocycles bearing the primary amino group were also investigated, and the results were showed in table 5. The benzothiophene amine (**145**) and benzothiazole amine derivatives (**147**–**150**) were proved to give the corresponding products in 93–95% yields. Meanwhile, the substituents of thiophene (**146**) and thiazole (**151** and **152**) on the meta- or para- position of anilines were smoothly transformed to the corresponding products in excellent yields of up to 92%.

Table 4. Substrate scopes of N-heterocycle containing primary amino group.[a,b]

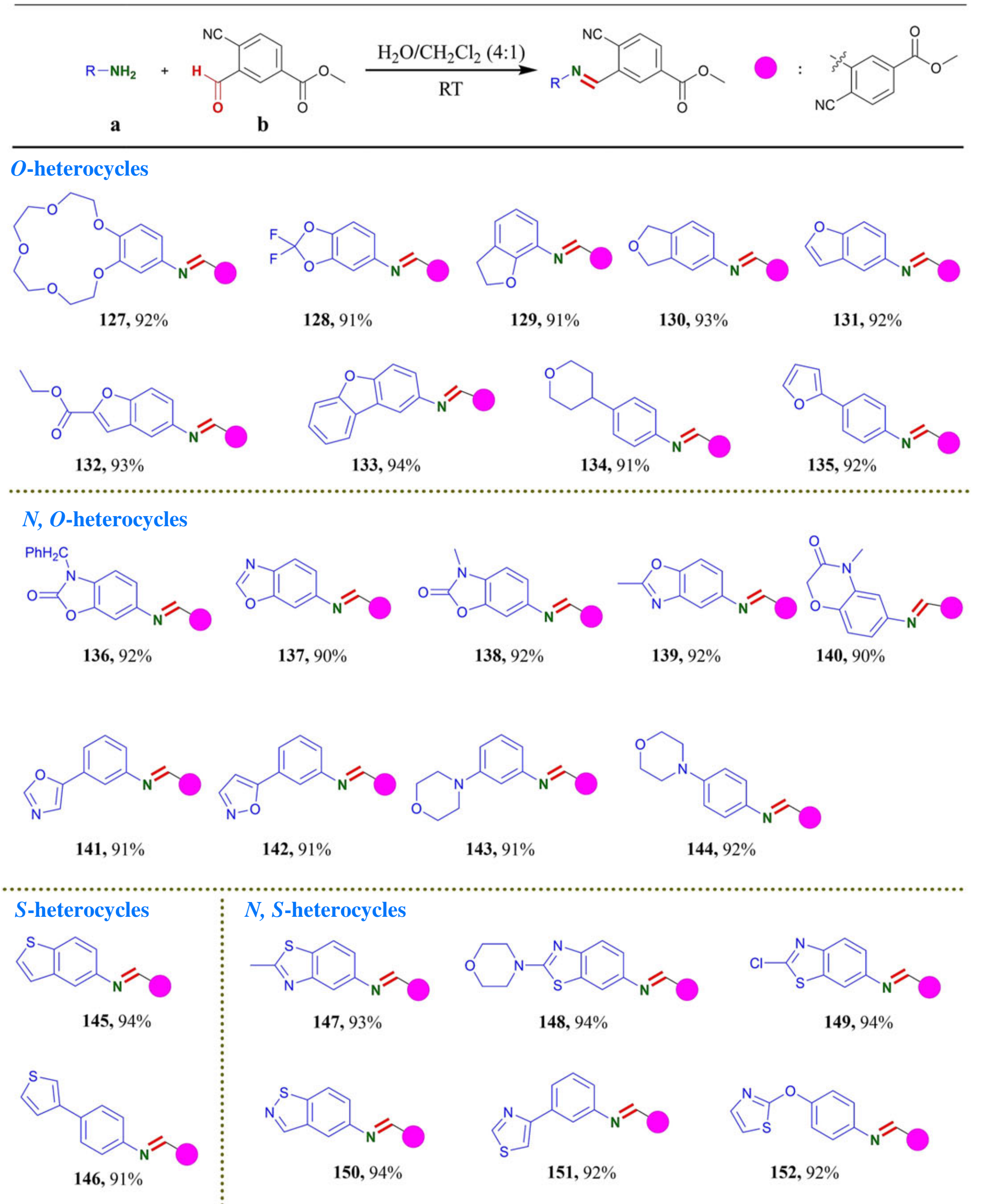


[a]Reaction conditions: reactions were performed with **a** (0.3 mmol) and **b** (0.3 mmol) in 10 ml H_2O/CH_2Cl_2 (4 : 1) for 5–60 min under an air atmosphere.

[b]Isolated yields.

Next, we investigated whether **b** could react toward arylhydrazine in same condition. As shown in table 6, a series of arylhydrazine containing electron-donating groups furnished the desired products within 5–15 min in excellent yields of up to 95% yields. Arylhydrazine containing electron-withdrawing groups were well tolerated in this transformation with longer reaction time (30–60 min) in 88–93% yields (table 6). These results indicated that electronic effect of substituents was negligible in the present reaction since reaction proceeded well with substrates bearing electron donating as well as withdrawing functionalities and the position of the substituents on the phenyl ring had a limited effect on the reaction efficiency. Notably, large steric phenylhydrazine could also provide the desired products in 90% yields (**168** and **169**). 1-naphthylhydrazine hydrochloride and 2-hydrazinopyridine were also compatible with this protocol to obtain the corresponding products (**170** and **171**, 91%). We also applied this protocol for sulfonylhydrazines. The reaction of benzenesulfonohydrazide with **b** gave the desired product in 93% yield (**172**). Arylsulfonyl hydrazines bearing electron-donating group ($-OCH_3$) gave corresponding product in 92% yield (**173**). Arylsulfonyl hydrazines including steric

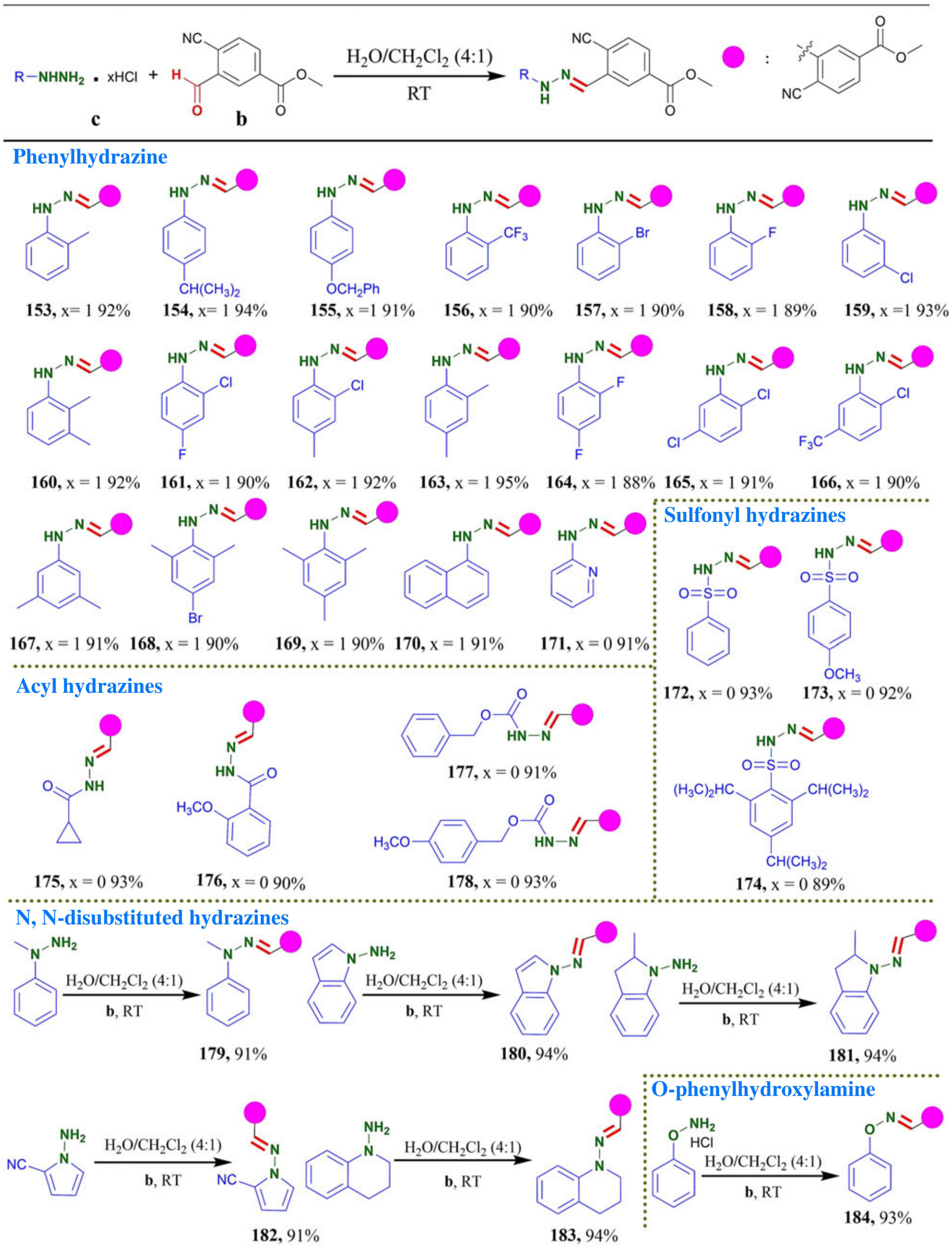
Table 5. Substrate scopes of O- or S-heterocycle containing primary amino group.[a,b]



[a]Reaction conditions: reactions were performed with **a** (0.3 mmol) and **b** (0.3 mmol) in 10 ml H_2O/CH_2Cl_2 (4 : 1) for 5–60 min under an air atmosphere.
[b]Isolated yields.

hindrance substitute (–$CH(CH_3)_2$) also provided the desired product within 30 min in 89% yields (**174**). It indicated that steric effect had slight influence on this reaction. Meanwhile, aryl acyl hydrazines and aliphatic acyl hydrazines were smoothly transformed to corresponding products in excellent yields of up to 93% (**175–178**). Finally, we explored the substrate scopes of *N*, *N*-disubstituted hydrazines and *O*-phenylhydroxylamine hydrochloride for this protocol in table 6. The reaction of **b** with 1-methyl-1-phenylhydrazine delivered the desired products in 91% yield (**179**). To our delight, this protocol was also successfully applied for cyclo-hydrazine derivatives under the same conditions. Some pharmaceutical skeletons, including 1H-indol-amine (**180**) [54], 2-methylindolin-1-amine (**181**) [55], 1-amino-1H-pyrrole-2-carbonitrile (**182**) and 3,4-dihydroquinolin-1(2H)-amine (**183**), were effective reaction partners and could afford the desired products in excellent yields of up to 94% yields.

Table 6. Substrate scopes of hydrazine.[a,b]



[a]Reaction conditions: reactions were performed with **a** (0.3 mmol) and **b** (0.3 mmol) in 10 ml H_2O/CH_2Cl_2 (4 : 1) for 5–60 min under an air atmosphere.
[b]Isolated yields.

Notably, the condensation of *O*-phenylhydroxylamine with **b** was completed in 15 min to obtain the oxime product **184** with 93% yield.

Having determined the substrate scopes, we performed a gram-scale reaction **b** with 4-bromo-3,5-dimethylaniline (figure 2*a*) and were pleased to find that the desired product **72** was generated in 90% yield. In addition, to highlight the synthetic potential of this protocol for late-stage functionalization, we investigated several substrates containing primary amino group derived from marketed drugs, prodrugs, dyes and bioactive molecules to showcase the prospective utility of this protocol (figure 2*b*). The fluoranthene [56] (**185**), pyrene [57] (**186**) and phenanthrene [58] (**187**) skeletons, which are often found in natural products and used as fluorescent materials, were tolerated in this protocol to obtain the desired products in up to 95% yields. Sorafenib [59,60] (antirenal and antihepatic carcinomas) precursor (**188**), Analgin [61] (analgesic) precursor (**189**), Fluazuron [62] (pesticide) precursor (**190**), Aminoglutethimide [63] (antineoplastic) (**191**), Linezolid [64,65] (antibiotic)

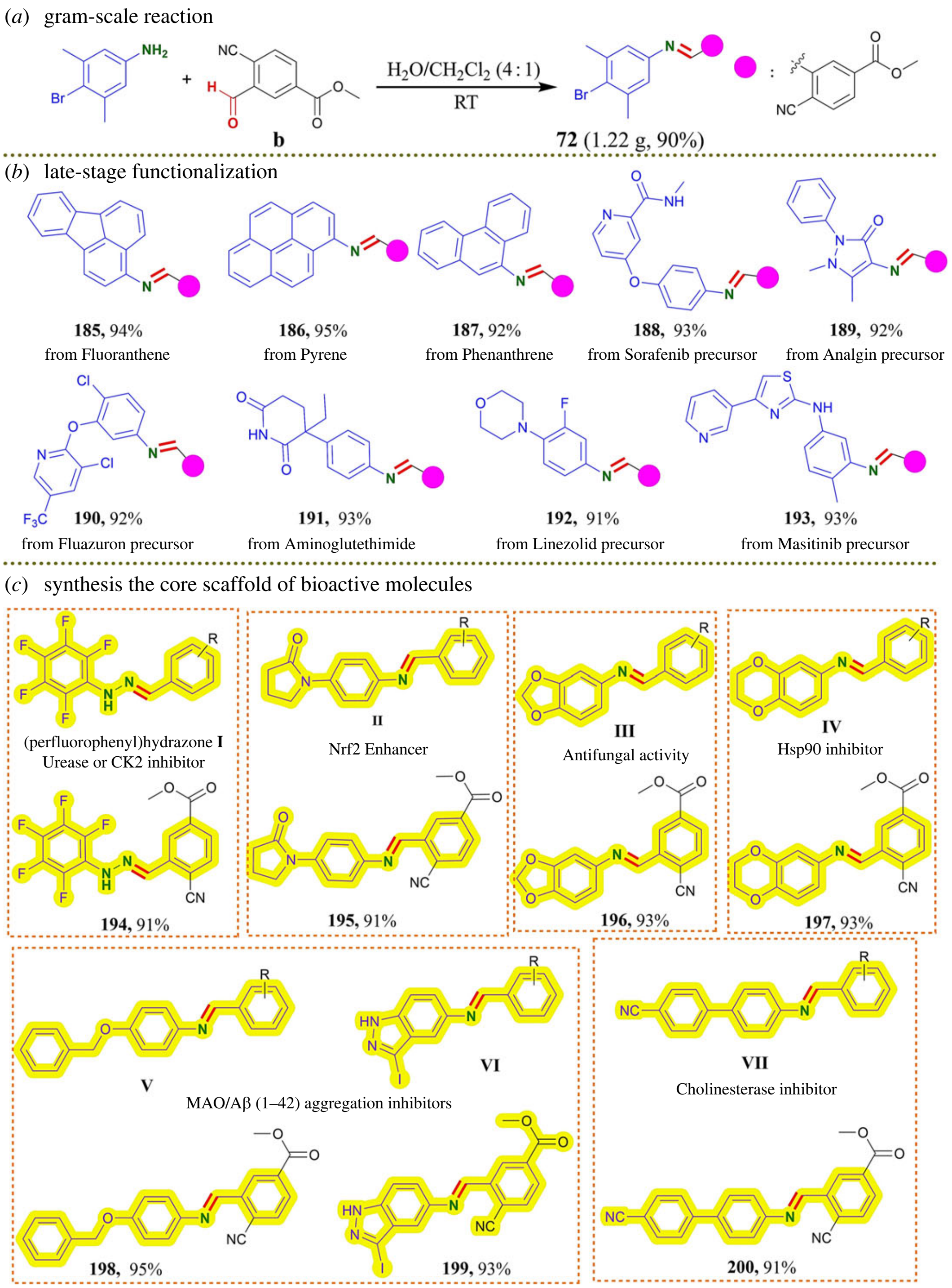


Figure 2. Synthetic application. (*a*) Scale-up synthesis of **72**. (*b*) Late-stage functionalization of dyes, drugs and prodrug. Fluoranthene (**185**), pyrene (**186**), phenanthrene (**187**), sorafenib precursor (**188**), analgin precursor (**189**), fluazuron precursor (**190**), aminoglutethimide (**191**), linezolid precursor (**192**) and masitinib precursor (**193**). (*c*) Synthesis of the core scaffold of bioactive molecules. Synthesis of the core of urease inhibitor or CK2 inhibitor I (**194**), Nrf2 enhancer II (**195**), antifungal activity III (**196**), Hsp90 inhibitor IV (**197**), MAO/Aβ (1–42) aggregation inhibitors V and VI (**198** and **199**) and cholinesterase inhibitor IX (**200**).

precursor (**192**) and Masitinib [66] (tyrosine kinase inhibitor) precursor (**193**) obtained the corresponding products in 91–93% yields. To further demonstrate the unique advantages of our reaction, we applied our synthetic strategy to the rapid synthesis of the core scaffold of bioactive molecules (figure 2*c*). **I** (urease or protein kinase CK2 inhibitor) [67,68] derivative **194**, **II** (Nrf2 enhancer) [69] derivative **195**, **III** (antifungal activity) [70] derivative **196**, **IV** (Hsp90 inhibitor) [71] derivative **197**, **V** and **VI** (MAO/Aβ (1–42)

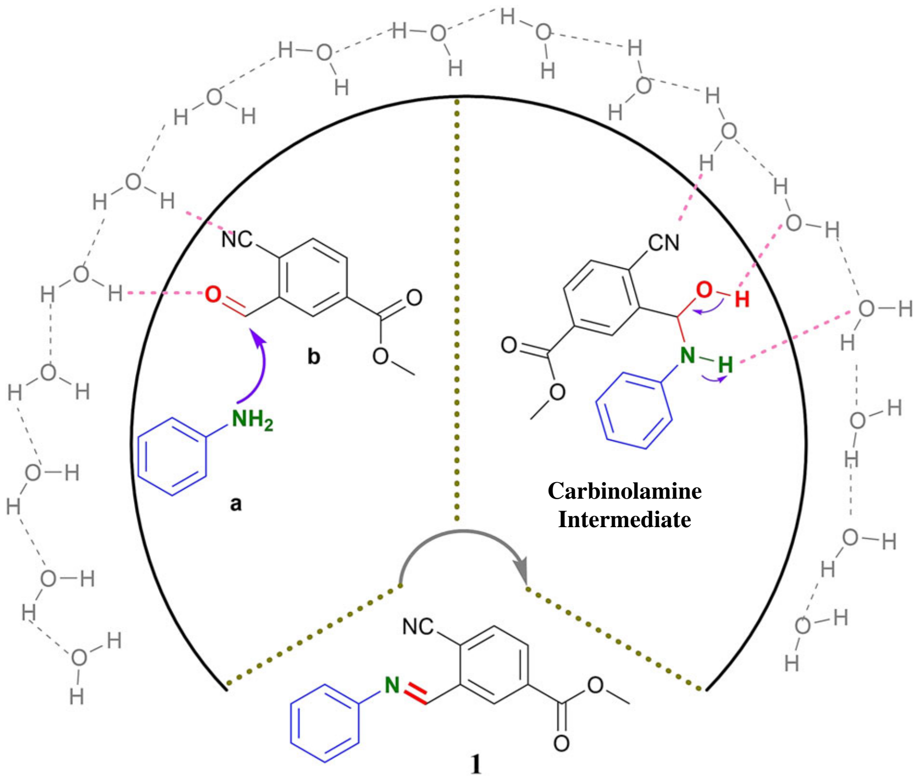


Figure 3. Proposed mechanism.

aggregation inhibitors) [72,73] derivative **198** and **199**, and VII (cholinesterase inhibitor) [74] derivative **200** were assembled in 91–95% yield. These results further demonstrated the possibility of its utility for pharmaceutical chemistry research.

Based on the literature [75,76], a plausible transition state involving an oil–water interface was assumed in accordance with the Jung and Marcus model [77] to explain the high efficiency of protocol. As shown in figure 3, the nucleophilic attack of the primary amino group to carbonyl at the water–oil phase boundary was facilitated by the hydrogen-bonding interactions between interfacial water and substrates, and the water–oil phase could also stabilize the carbinolamine intermediate through hydrogen-bonding interactions to deliver the product with high efficiency (high yield and fast reaction). Meanwhile, the ortho-cyanide and ester functional groups make the carbonyl more electrophilic.

3. Conclusion

In summary, we have developed a novel protocol to form C=N bond without any catalysts and additions at RT. This practical one-step protocol using water as co-solvent represents a simple and economically acceptable route toward the straightforward synthesis of compounds containing C=N bond. With its intrinsic advantages of high yield, fast reaction time (5–60 min), simple purification, no catalysts and additions, mild conditions (H_2O as co-solvent, RT as reaction temperature and opening to air) and available starting materials, the reaction tolerates a wide range of functional groups and pharmacophores. Different types of primary amine or hydrazine, especially those derived from drugs, prodrug, dye and bioactive molecules are all suitable substrates for this protocol. Moreover, we envision that this protocol potentially can provide a versatile platform for organic synthesis, bio-conjugation, medicinal chemistry, chemical biology and materials science in the future.

4. Material and methods

4.1. General methods

Unless otherwise stated, all the reagents were purchased from commercial suppliers without further purification. All solvents were distilled from appropriate drying agents prior to use according to

Purification of Laboratory Chemicals. The eluents were technical grade. Silica gel (200–300 mesh) for column chromatography and silica GF254 for TLC were produced by Qingdao Marine Chemical Company (China). ^{1}H NMR chemical shifts (δ) are reported in parts per million relative to tetramethylsilane (0 ppm) or residual $CHCl_3$ (7.2600 ppm). ^{13}C NMR chemical shifts are reported relative to the centre line signal of the $CDCl_3$ triplet at 77.0000 ppm. All ^{1}H NMR, ^{13}C NMR spectra and ^{19}F NMR were recorded in $CDCl_3$ on 400 MHz spectrometers. The following abbreviations were used to explain the multiplicities: s, singlet; d, doublet; t, triplet; q, quartet; b, broad; td, triple doublet; dt, double triplet; dq, double quartet; m, multiplet. High-resolution mass spectra (HRMS) were recorded on a matrix assisted laser desorption ionization time of flight mass spectrometer (MALDI-TOF-MS) using electrospray ionization (ESI) as ionization method.

4.2. Preparation of the starting material **b**

S1 to S2. To a solution of 4-cyano-3-methyl-benzoic acid methyl ester **S1** (6.5 g, 37.10 mmol) in CCl_4 (80 ml) was added NBS (16.51 g 92.76 mmol) and BPO (1.08 g, 4.45 mmol) successively. The reaction mixture was subsequently stirred for 24 h at 78°C and monitored by TLC (hexane: EtOAc = 10 : 1). After cooling to RT, precipitate of succinimide and unreacted NBS was removed by filtration and washed with CCl_4 (10 ml). Ultimately, the filtrate was concentrated under reduced pressure to give crude product **S2** (10.1 g), yellow solid. The **S2** was used for the next step without further purification.

S2 to b. To a solution of **S2** (10.1 g, 30.33 mmol) in acetonitrile (32 ml) was added a solution of $AgNO_3$ (12.88 g, 75.83 mmol) in water (8 ml), and the mixture was heated for 12 h under reflux. After the solution was allowed to cool, AgBr was filtered off and washed with EtOAc (3 × 30 ml), the combined filtrate was washed with water (25 ml) and dried over $MgSO_4$. The solvent was evaporated and the residue was purified by column chromatography on silica gel to afford **b** as white solid (4.2 g, two steps yield 60%). ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.36 (s, 1H), 8.65 (d, J = 1.7 Hz, 1H), 8.38 (dd, J = 8.0, 1.7 Hz, 1H), 7.93 (d, J = 8.0 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 187.67, 164.45, 137.03, 134.66, 134.61, 134.39, 116.92, 115.32, 53.07; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{10}H_7NO_3$ 190.04595, found 190.15905.

4.3. General procedure for the preparation of compounds containing C=N bond

Aniline derivatives or hydrazine (0.3 mmol) and **b** (0.3 mmol) was added into 10 ml H_2O/CH_2Cl_2 (4 : 1). The reaction mixture was stirred at RT for 5–60 min, Reaction was monitoring by TLC (hexane: EtOAc = 2 : 1). The reaction mixture was extracted three times with CH_2Cl_2. The combined organic layers were dried over $MgSO_4$ and concentrated under reduced pressure to directly obtain the corresponding products.

Methyl (E)-4-cyano-3-((phenylimino)methyl)benzoate (1)

Yellow solid, 75.38 mg, 95% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, J = 1.7 Hz, 1H), 8.87 (s, 1H), 8.20 (dd, J = 8.1, 1.7 Hz, 1H), 7.83 (d, J = 8.0 Hz, 1H), 7.48–7.40 (m, 2H), 7.32 (dt, J = 8.1, 1.1 Hz, 3H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.11, 154.39, 150.27, 138.63, 134.28, 133.30, 131.46, 129.30, 128.74, 127.42, 121.13, 116.67, 116.21, 52.80; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{16}H_{13}N_2O_2$ 265.09323, found 265.09753.

Methyl (E)-4-cyano-3-((o-tolylimino)methyl)benzoate (2)

Yellow solid, 75.39 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, J = 1.7 Hz, 1H), 8.76 (s, 1H), 8.19 (dd, J = 8.0, 1.7 Hz, 1H), 7.84 (d, J = 8.0 Hz, 1H), 7.29–7.18 (m, 3H), 7.03 (dd, J = 7.6, 1.5 Hz, 1H), 4.00 (s, 3H), 2.43 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.14, 153.74, 149.36, 138.79, 134.22, 133.54, 132.93, 131.31, 130.54, 129.14, 127.14, 126.79, 117.28, 116.41, 116.32, 52.82, 17.94; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{17}H_{15}N_2O_2$ 279.10888, found 279.11205.

Methyl (E)-3-(((2-(tert-butyl)phenyl)imino)methyl)-4-cyanobenzoate (3)

Yellow solid, 84.35 mg, 88% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, J = 1.7 Hz, 1H), 8.74 (s, 1H), 8.21 (dd, J = 8.1, 1.7 Hz, 1H), 7.85 (d, J = 8.1 Hz, 1H), 7.47–7.43 (m, 1H), 7.28–7.26 (m, 1H), 7.26–7.24 (m, 1H), 6.94–6.91 (m, 1H), 4.00 (s, 3H), 1.47 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.16, 152.62, 150.03, 143.66, 138.96, 134.38, 133.41, 131.28, 128.94, 127.15, 127.05, 126.31, 119.06, 116.62, 116.30, 52.88, 35.63, 30.59; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{20}H_{21}N_2O_2$ 321.15583, found 321.15985.

Methyl (E)-4-cyano-3-(((2-(cyanomethyl)phenyl)imino)methyl)benzoate (4)

Light yellow solid, 80.02 mg, 88% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.84 (s, 1H), 8.82 (d, J = 1.7 Hz, 1H), 8.24 (dd, J = 8.1, 1.7 Hz, 1H), 7.89 (d, J = 8.1 Hz, 1H), 7.54 (dd, J = 7.4, 1.5 Hz, 1H), 7.44 (td, J = 7.6, 1.6 Hz, 1H), 7.37 (td, J = 7.5, 1.4 Hz, 1H), 7.21 (dd, J = 7.8, 1.4 Hz, 1H), 4.04 (s, 2H), 4.02 (s, 3H);

^{13}C NMR (101 MHz, $CDCl_3$) δ 164.99, 155.10, 147.83, 138.11, 134.41, 134.08, 131.90, 130.00, 129.52, 129.28, 128.31, 126.22, 118.09, 117.52, 116.58, 116.20, 52.96, 20.31; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{14}N_3O_2$ 304.1041, found 304.1074.

Methyl (E)-4-cyano-3-(((2-(2-methoxy-2-oxoethyl)phenyl)imino)methyl)benzoate (5)

Yellow solid, 92.05 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.86 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.37–7.32 (m, 2H), 7.30 (dd, *J* = 7.2, 1.3 Hz, 1H), 7.16 (dd, *J* = 7.7, 1.3 Hz, 1H), 4.00 (s, 3H), 3.91 (s, 2H), 3.67 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.24, 165.09, 154.23, 148.82, 138.60, 134.28, 133.57, 131.51, 130.79, 129.95, 129.26, 128.56, 127.66, 117.36, 116.40, 116.35, 52.84, 51.92, 37.52; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{19}H_{17}N_2O_4$ 337.11436, found 337.11829.

Methyl (E)-4-cyano-3-(((2-methoxyphenyl)imino)methyl)benzoate (6)

Red-brown solid, 79.82 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.00 (s, 1H), 8.97 (d, *J* = 1.7 Hz, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.27 (td, *J* = 7.8, 1.7 Hz, 1H), 7.15 (dd, *J* = 7.7, 1.7 Hz, 1H), 7.05–6.98 (m, 2H), 3.98 (s, 3H), 3.92 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.21, 155.92, 152.38, 139.87, 139.08, 134.32, 133.19, 131.43, 128.68, 128.16, 121.54, 121.11, 116.79, 116.29, 111.77, 55.85, 52.75; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{15}N_2O_3$ 295.10380, found 295.10733.

Methyl (E)-4-cyano-3-(((2-iodophenyl)imino)methyl)benzoate (7)

Yellow solid, 106.34 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.03 (d, *J* = 1.7 Hz, 1H), 8.72 (s, 1H), 8.23 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.93 (dd, *J* = 7.8, 1.3 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.41 (td, *J* = 7.6, 1.4 Hz, 1H), 7.08 (dd, *J* = 7.9, 1.5 Hz, 1H), 7.00 (td, *J* = 7.6, 1.6 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.03, 155.47, 151.55, 139.28, 138.10, 134.47, 133.30, 131.90, 129.43, 129.10, 128.32, 118.26, 116.84, 116.10, 95.15, 52.89; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{12}IN_2O_2$ 390.98988, found 390.99340.

Methyl (E)-3-(((2-chlorophenyl)imino)methyl)-4-cyanobenzoate (8)

Yellow solid, 78.02 mg, 87% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (d, *J* = 1.7 Hz, 1H), 8.80 (s, 1H), 8.23 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.47 (dd, *J* = 7.9, 1.5 Hz, 1H), 7.31 (td, *J* = 7.6, 1.5 Hz, 1H), 7.25–7.18 (m, 1H), 7.10 (dd, *J* = 7.8, 1.6 Hz, 1H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.02, 156.54, 148.01, 138.17, 134.44, 133.33, 131.98, 130.16, 129.02, 128.35, 127.71, 127.69, 119.73, 116.91, 116.07, 52.85; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{12}ClN_2O_2$ 299.05426, found 299.05819.

Methyl (E)-4-cyano-3-(((2-fluorophenyl)imino)methyl)benzoate (9)

Yellow solid, 73.45 mg, 87% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (s, 2H), 8.23 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85 (d, *J* = 8.0 Hz, 1H), 7.31–7.15 (m, 4H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.07, 157.15 (d, *J* = 3.7 Hz), 138.44, 134.39, 134.36, 133.35, 131.87, 128.86, 128.29 (d, *J* = 7.8 Hz), 124.67 (d, *J* = 3.9 Hz), 122.20 (d, *J* = 1.5 Hz), 116.86, 116.63, 116.43, 116.13, 52.85; ^{19}F NMR (376 MHz, $CDCl_3$) δ -125.33 (ddd, *J* = 12.9, 7.0, 4.2 Hz); HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{12}FN_2O_2$ 283.08381, found 283.08813.

Methyl (E)-4-cyano-3-(((2-(difluoromethoxy)phenyl)imino)methyl)benzoate (10)

Orange solid, 87.98, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.24 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.86 (d, *J* = 8.1 Hz, 1H), 7.33–7.27 (m, 3H), 7.22–7.17 (m, 1H), 6.95–6.53 (m, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.02, 156.65, 144.15, 142.72, 138.17, 134.46, 133.58, 131.98, 129.33, 128.24, 126.74, 122.30, 120.26, 116.69, 116.37 (d, *J* = 520.6 Hz), 116.29 (d, *J* = 16.9 Hz), 52.91; ^{19}F NMR (376 MHz, $CDCl_3$) δ -81.28 (d, *J* = 74.4 Hz); HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{13}F_2N_2O_3$ 331.08495, found 331.08810.

Methyl (E)-4-cyano-3-(((2-(methylthio)phenyl)imino)methyl)benzoate (11)

Yellow solid, 84.10 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.00 (d, *J* = 1.7 Hz, 1H), 8.83 (s, 1H), 8.22 (dd, *J* = 8.1, 1.8 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.30 (ddd, *J* = 8.3, 7.1, 1.4 Hz, 1H), 7.26–7.17 (m, 2H), 7.08 (dd, *J* = 7.8, 1.4 Hz, 1H), 4.00 (s, 3H), 2.49 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.15, 154.27, 147.50, 138.59, 135.18, 134.45, 133.30, 131.70, 129.03, 127.87, 125.25, 124.62, 117.43, 116.76, 116.24, 52.85, 14.72; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{15}N_2O_2S$ 311.08095, found 311.08507.

Methyl (E)-4-cyano-3-(((2-vinylphenyl)imino)methyl)benzoate (12)

Yellow solid, 79.05 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.7 Hz, 1H), 8.78 (s, 1H), 8.20 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.63 (dd, *J* = 7.5, 1.8 Hz, 1H), 7.36–7.31 (m, 1H), 7.31–7.28 (m, 1H), 7.26 (d, *J* = 2.4 Hz, 1H), 7.04 (dd, *J* = 7.3, 1.6 Hz, 1H), 5.76 (dd, *J* = 17.7, 1.3 Hz, 1H), 5.34 (dd, *J* = 11.1, 1.3 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.14, 154.50, 148.08, 138.64, 134.34, 133.55, 132.94, 132.20, 131.51, 129.14, 128.79, 127.35, 125.77, 117.98, 116.54, 116.35, 115.32, 52.85; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{15}N_2O_2$ 291.10888, found 291.11299.

5.3.13 Methyl (E)-4-cyano-3-((m-tolylimino)methyl)benzoate (13)

Yellow solid, 78.35 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.86 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.83 (d, *J* = 8.0 Hz, 1H), 7.36–7.28 (m, 1H), 7.12 (d, *J* = 6.9 Hz, 3H), 3.99 (s, 3H), 2.41 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.14, 154.11, 150.27, 139.22, 138.74, 134.28, 133.30, 131.39, 129.12, 128.73, 128.22, 121.77, 118.21, 116.62, 116.27, 52.80, 21.33; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{15}N_2O_2$ 279.10888, found 279.11348.

Methyl (E)-4-cyano-3-(((3-methoxyphenyl)imino)methyl)benzoate (14)

Orange solid, 79.25 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.95 (d, *J* = 1.7 Hz, 1H), 8.88 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.37–7.32 (m, 1H), 6.92–6.88 (m, 2H), 6.86 (d, *J* = 1.3 Hz, 1H), 4.00 (s, 3H), 3.87 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.17, 160.41, 154.67, 151.75, 138.62, 134.35, 133.37, 131.58, 130.11, 128.83, 116.78, 116.25, 113.30, 112.99, 107.00, 55.41, 52.86; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{15}N_2O_3$ 295.10380, found 295.10693.

Methyl (E)-3-(((3-bromophenyl)imino)methyl)-4-cyanobenzoate (15)

Yellow solid, 95.10 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.22 (dd, *J* = 8.1, 1.8 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.47–7.40 (m, 2H), 7.30 (t, *J* = 7.8 Hz, 1H), 7.25–7.20 (m, 1H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.99, 155.49, 151.60, 138.13, 134.35, 133.43, 131.85, 130.60, 130.16, 128.94, 124.13, 122.92, 119.89, 116.79, 116.11, 52.86; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{16}H_{12}BrN_2O_2$ 343.00375, found 343.00728.

Methyl (E)-4-cyano-3-(((3-fluorophenyl)imino)methyl)benzoate (16)

Orange solid, 73.78 mg, 87% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.84 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.43–7.34 (m, 1H), 7.12–7.05 (m, 1H), 7.05–6.98 (m, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.02, 163.22 (d, *J* = 247.2 Hz), 155.47, 152.03 (d, *J* = 8.8 Hz), 138.20, 134.37, 133.40, 131.82, 130.52 (d, *J* = 9.1 Hz), 128.92, 116.84, 116.75 (d, *J* = 3.0 Hz), 116.10, 114.09 (d, *J* = 21.4 Hz), 108.53 (d, *J* = 22.8 Hz), 52.85; ^{19}F NMR (376 MHz, $CDCl_3$) δ -111.91 (td, *J* = 9.0, 6.2 Hz); HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{16}H_{12}FN_2O_2$ 283.08381, found 283.08728.

Methyl (E)-4-cyano-3-(((3-(difluoromethoxy)phenyl)imino)methyl)benzoate (17)

Yellow solid, 88.03 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.24 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.86 (d, *J* = 8.1 Hz, 1H), 7.43 (dd, *J* = 8.9, 8.0 Hz, 1H), 7.16 (d, *J* = 0.8 Hz, 1H), 7.10–7.05 (m, 2H), 6.58 (s, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.08, 155.63, 151.94, 138.24, 134.44, 133.46, 131.91, 130.54, 129.00, 118.38, 118.10, 117.62, 116.90, 116.15, 115.80, 112.89, 52.91; ^{19}F NMR (376 MHz, $CDCl_3$) δ -80.77, -80.96; HRMS-ESI (*m*/*z*) $[M+H+H_2O]^+$ calculated for $C_{17}H_{13}F_2N_2O_3$ 349.09999, found 349.09976.

Methyl (E)-4-cyano-3-(((3-(trifluoromethyl)phenyl)imino)methyl)benzoate (18)

Yellow solid, 86.65 mg, 87% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.87 (s, 1H), 8.25 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.87 (d, *J* = 8.1 Hz, 1H), 7.60–7.54 (m, 3H), 7.46 (ddd, *J* = 5.8, 4.5, 2.2 Hz, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.98, 156.01, 150.76, 138.03, 134.41, 133.49, 131.99, 129.94, 129.02, 123.81 (dd, *J* = 7.9, 4.2 Hz), 118.46 (q, *J* = 3.7 Hz), 116.83, 116.10, 52.88; ^{19}F NMR (376 MHz, $CDCl_3$) δ -62.62. HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{12}F_3N_2O_2$ 333.08062, found 333.08270.

Methyl (E)-3-(((3-acetylphenyl)imino)methyl)-4-cyanobenzoate (19)

Yellow solid, 79.35 mg, 86% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.87 (s, 1H), 8.22 (dd, *J* = 8.0, 1.6 Hz, 1H), 7.88 (dd, *J* = 7.5, 1.5 Hz, 1H), 7.86–7.81 (m, 2H), 7.55–7.44 (m, 2H), 3.99 (s, 3H), 2.64 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.46, 164.97, 155.55, 150.69, 138.22, 138.18, 134.34, 133.45, 131.80, 129.59, 128.96, 126.98, 125.34, 121.02, 116.72, 116.11, 52.83, 26.71; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{18}H_{15}N_2O_3$ 307.10380, found 307.10745.

Methyl (E)-4-cyano-3-(((3-cyanophenyl)imino)methyl)benzoate (20)

Yellow solid, 74.28 mg, 85% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, *J* = 1.7 Hz, 1H), 8.83 (s, 1H), 8.25 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.87 (d, *J* = 8.1 Hz, 1H), 7.62–7.48 (m, 4H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.90, 156.65, 151.01, 137.74, 134.44, 133.54, 132.21, 130.52, 130.31, 129.09, 125.24, 124.81, 118.18, 116.93, 116.01, 113.42, 52.93; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{12}N_3O_2$ 290.08848, found 290.09203.

Methyl (E)-4-cyano-3-(((3-ethynylphenyl)imino)methyl)benzoate (21)

Yellow solid, 77.59 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.86 (s, 1H), 8.23 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.86 (d, *J* = 8.1 Hz, 1H), 7.46–7.37 (m, 3H), 7.31 (dt, *J* = 7.6, 1.8 Hz, 1H), 4.00 (s, 3H), 3.13 (s, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.11, 155.23, 150.35, 138.39, 134.40, 133.43, 131.78, 130.96, 129.40, 128.94, 124.51, 123.28, 121.92, 116.83, 116.20, 82.91, 77.89, 52.90; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{18}H_{13}N_2O_2$ 289.09323, found 289.09653.

Methyl (E)-4-cyano-3-((p-tolylimino)methyl)benzoate (22)

Orange solid, 77.25 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.88 (s, 1H), 8.18 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.29–7.21 (m, 4H), 3.99 (s, 3H), 2.39 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.16, 153.26, 147.61, 138.85, 137.66, 134.24, 133.25, 131.23, 129.92, 128.62, 121.20, 116.53, 116.28, 52.77, 21.08; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{15}N_2O_2$ 279.10888, found 279.11200.

Methyl (E)-4-cyano-3-(((4-(2-ethoxy-2-oxoethyl)phenyl)imino)methyl)benzoate (23)

Brown solid, 97.25 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.88 (s, 1H), 8.20 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.36 (d, *J* = 8.4 Hz, 2H), 7.29 (d, *J* = 8.3 Hz, 2H), 4.17 (q, *J* = 7.1 Hz, 2H), 4.00 (s, 3H), 3.66 (s, 2H), 1.27 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.40, 165.17, 154.29, 149.21, 138.67, 134.32, 133.55, 133.34, 131.50, 130.26, 128.77, 121.40, 116.70, 116.26, 60.99, 52.85, 40.97, 14.16; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{19}N_2O_4$ 351.13001, found 351.13376.

Methyl (E)-4-cyano-3-(((4-(methoxymethyl)phenyl)imino)methyl)benzoate (24)

Red-brown solid, 85.25 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (d, *J* = 1.7 Hz, 1H), 8.89 (s, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (dd, *J* = 8.1, 0.6 Hz, 1H), 7.42 (d, *J* = 8.4 Hz, 2H), 7.34–7.30 (m, 2H), 4.50 (s, 2H), 4.00 (s, 3H), 3.42 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.18, 154.30, 149.72, 138.70, 137.65, 134.35, 133.35, 131.51, 128.80, 128.73, 121.26, 116.71, 116.28, 74.19, 58.16, 52.86; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{18}H_{17}N_2O_3$ 309.11945, found 309.12369.

Methyl (E)-4-cyano-3-(((4-(2-cyanopropan-2-yl)phenyl)imino)methyl)benzoate (25)

Orange solid, 90.25 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.86 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.54 (d, *J* = 8.5 Hz, 2H), 7.33 (d, *J* = 8.6 Hz, 2H), 4.00 (s, 3H), 1.76 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.08, 155.01, 149.86, 140.53, 138.41, 134.35, 133.38, 131.69, 128.85, 126.15, 124.30, 121.62, 116.76, 116.18, 52.86, 36.90, 29.13; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{18}N_3O_2$ 332.13543, found 332.13870.

Methyl (E)-4-cyano-3-(((4-methoxyphenyl)imino)methyl)benzoate (26)

Brown solid, 80.59 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.90 (s, 1H), 8.17 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.41–7.36 (m, 2H), 6.99–6.95 (m, 2H), 4.00 (s, 3H), 3.86 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.29, 159.56, 151.67, 143.00, 139.11, 134.27, 133.29, 131.04, 128.54, 122.94, 116.44, 116.37, 114.55, 55.53, 52.82; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{17}H_{15}N_2O_3$ 295.10380, found 295.10754.

Methyl (E)-4-cyano-3-(((4-(2-methoxy-2-oxoethoxy)phenyl)imino)methyl)benzoate (27)

Red solid, 97.45 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.87 (s, 1H), 8.17 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.35 (d, *J* = 8.9 Hz, 2H), 6.97 (d, *J* = 8.9 Hz, 2H), 4.68 (s, 2H), 3.99 (s, 3H), 3.83 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 169.14, 165.22, 157.55, 152.46, 144.08, 138.92, 134.29, 133.30, 131.19, 128.62, 122.92, 116.47, 116.36, 115.34, 65.49, 52.82, 52.33; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{19}H_{17}N_2O_5$ 353.10928, found 353.11307.

Methyl (E)-4-cyano-3-(((4-(methylthio)phenyl)imino)methyl)benzoate (28)

Red-brown oil, 86.18 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.88 (s, 1H), 8.18 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.30 (s, 4H), 3.99 (s, 3H), 2.52 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 153.19, 147.08, 138.73, 138.35, 134.26, 133.30, 131.31, 128.66, 127.13, 121.92, 116.51, 116.27, 52.80, 15.85; HRMS-ESI (*m*/*z*) $[M + H+H_2O]^+$ calculated for $C_{17}H_{17}N_2O_3S$ 329.09599, found 329.09578.

Methyl (E)-4-cyano-3-(((4-(dimethylamino)phenyl)imino)methyl)benzoate (29)

Brown solid, 85.12 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96–8.88 (m, 2H), 8.10 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.81–7.74 (m, 1H), 7.41 (d, *J* = 9.1 Hz, 2H), 6.74 (d, *J* = 9.0 Hz, 2H), 3.98 (s, 3H), 3.02 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.41, 150.51, 148.12, 139.73, 138.50, 134.07, 133.13, 130.21, 128.14, 123.24, 116.64, 115.76, 112.36, 52.70, 40.42; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{18}H_{18}N_3O_2$ 308.13543, found 308.13946.

Methyl (E)-4-cyano-3-(((4-(methoxycarbonyl)phenyl)imino)methyl)benzoate (30)

Yellow solid, 85.15 mg, 88% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.24 (dd, *J* = 8.1, 1.7 Hz, 1H), 8.14–8.09 (m, 2H), 7.86 (dd, *J* = 8.0, 0.6 Hz, 1H), 7.33–7.28 (m, 2H), 4.00 (s, 3H), 3.94 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.58, 165.03, 156.09, 154.35, 138.15, 134.45, 133.48, 132.02, 130.99, 129.06, 128.69, 120.89, 116.95, 116.11, 52.92, 52.19; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{18}H_{15}N_2O_4$ 323.09871, found 323.10175.

Methyl (E)-4-cyano-3-(((4-iodophenyl)imino)methyl)benzoate (31)

Orange solid, 109.85 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (dd, *J* = 8.1, 0.6 Hz, 1H), 7.73 (d, *J* = 8.6 Hz, 2H), 7.05 (d, *J* = 8.7 Hz, 2H), 3.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.99, 154.75, 149.74, 138.37, 138.26, 134.29, 133.37, 131.68, 128.82, 123.09, 116.68, 116.11, 92.35, 52.85; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{16}H_{12}IN_2O_2$ 390.98988, found 390.99360.

Methyl (E)-3-(((4-bromophenyl)imino)methyl)-4-cyanobenzoate (32)

Orange solid, 96.35 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (d, *J* = 8.0 Hz, 1H), 7.53 (d, *J* = 8.6 Hz, 2H), 7.19 (d, *J* = 8.6 Hz, 2H), 3.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.00, 154.69, 149.06, 138.27, 134.30, 133.37, 132.38, 131.67, 128.81, 122.83, 121.06, 116.67, 116.12, 52.84; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{16}H_{12}BrN_2O_2$ 343.00375, found 343.00702.

Methyl (E)-4-cyano-3-(((4-fluorophenyl)imino)methyl)benzoate (33)

Yellow solid, 74.44 mg, 88% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.36–7.30 (m, 2H), 7.12 (t, *J* = 8.6 Hz, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.08, 162.11 (d, *J* = 247.3 Hz), 153.91 (d, *J* = 1.9 Hz), 146.21 (d, *J* = 3.0 Hz), 138.52, 134.32, 133.35, 131.49, 128.73, 122.88 (d, *J* = 8.5 Hz), 116.61, 116.22, 116.15 (d, *J* = 22.7 Hz), 52.82; ^{19}F NMR (376 MHz, $CDCl_3$) δ -114.53 (tt, *J* = 8.8, 4.9 Hz); HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{16}H_{12}FN_2O_2$ 283.08381, found 283.08774.

Methyl (E)-4-cyano-3-(((4-(difluoromethoxy)phenyl)imino)methyl)benzoate (34)

Orange solid, 88.85 mg, 90% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.34 (d, *J* = 8.9 Hz, 2H), 7.19 (d, *J* = 8.8 Hz, 2H), 6.76–6.33 (m, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.11, 154.44, 150.32, 147.46, 138.43, 134.35, 133.39, 131.63, 128.81, 122.65, 120.46, 118.36 ($OCHF_2$), 116.70, 116.21 ($OCHF_2$), 115.77, 113.18 (305.2 Hz $OCHF_2$), 52.88; ^{19}F NMR (376 MHz, $CDCl_3$) δ -80.90 (d, *J* = 73.6 Hz); HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{17}H_{13}F_2N_2O_3$ 331.08495, found 331.08826.

Methyl (E)-4-cyano-3-(((4-(trifluoromethoxy)phenyl)imino)methyl)benzoate (35)

Orange solid, 92.38 mg, 88% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.37–7.26 (m, 4H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.07, 155.16, 148.79, 148.26 (d, *J* = 2.0 Hz), 138.29, 134.40, 133.43, 131.79, 128.91, 122.48, 121.91, 119.16, 116.81, 116.15, 52.88; ^{19}F NMR (376 MHz, $CDCl_3$) δ -57.92. HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{17}H_{12}F_3N_2O_3$ 349.07553, found 349.07938.

Methyl (E)-3-(((4-(chlorodifluoromethoxy)phenyl)imino)methyl)-4-cyanobenzoate (36)

Red solid, 98.56 mg, 90% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.37–7.28 (m, 4H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.07, 155.20, 149.27, 148.94, 138.31, 134.43, 133.44, 131.79, 128.95, 123.96 (d, *J* = 246.7 Hz), 122.43 (d, *J* = 2.8 Hz), 116.81, 116.16, 115.40, 52.87; ^{19}F NMR (376 MHz, $CDCl_3$) δ -25.64; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{17}H_{12}ClF_2N_2O_3$ 365.04598, found 365.04928.

Methyl (E)-4-cyano-3-(((4-cyclohexylphenyl)imino)methyl)benzoate (37)

Orange solid, 94.95 mg, 91% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 8.95 (d, *J* = 1.7 Hz, 1H), 8.89 (s, 1H), 8.19 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.28 (s, 3H), 3.99 (s, 3H), 2.54 (ddt, *J* = 11.4, 7.1, 3.5 Hz, 1H), 1.94–1.81 (m, 4H), 1.79–1.74 (m, 1H), 1.50–1.35 (m, 4H), 1.28 (tt, *J* = 12.1, 3.7 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.22, 153.35, 147.93, 147.91, 138.92, 134.26, 133.28, 131.25, 128.66, 127.70, 121.26, 116.57, 116.33, 52.82, 44.21, 34.41, 26.81, 26.07; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{22}H_{23}N_2O_2$ 347.17148, found 347.17497.

Methyl (E)-4-cyano-3-(((4-vinylphenyl)imino)methyl)benzoate (38)

Yellow solid, 79.02 mg, 91% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.89 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.48 (d, *J* = 8.4 Hz, 2H), 7.31 (d, *J* = 8.5 Hz, 2H), 6.74 (dd, *J* = 17.6, 10.9 Hz, 1H), 5.78 (dd, *J* = 17.6, 0.9 Hz, 1H), 5.28 (dd, *J* = 10.9, 0.8 Hz, 1H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.15, 153.82, 149.57, 138.72, 137.05, 136.05, 134.33, 133.33, 131.43, 128.78, 127.18, 121.56, 116.65, 116.25, 114.24, 52.80; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{18}H_{15}N_2O_2$ 291.10888, found 291.11249.

Methyl (E)-4-cyano-3-(((4-((trimethylsilyl)ethynyl)phenyl)imino)methyl)benzoate (39)

Brown oil, 98.25 mg, 91% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.53 (d, *J* = 8.5 Hz, 2H), 7.27 (s, 1H), 7.24 (d, *J* = 1.8 Hz, 1H), 3.99 (s, 3H), 0.26 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.09, 154.69, 149.98, 138.42, 134.34, 133.41, 133.32, 133.07, 131.69, 128.88, 122.28, 116.71, 116.21, 114.51, 104.59, 95.42, 52.86; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{21}H_{21}N_2O_2Si$ 361.13276, found 361.13615.

Methyl (E)-3-(((2-chloro-4-methylphenyl)imino)methyl)-4-cyanobenzoate (40)

Yellow solid, 83.89 mg, 89% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 8.98 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.32–7.29 (m, 1H), 7.12 (ddd, *J* = 8.0, 1.9, 0.8 Hz, 1H), 7.04 (d, *J* = 8.0 Hz, 1H), 4.00 (s, 3H), 2.37 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.09, 155.61, 145.25, 138.43, 138.31, 134.43, 133.29, 131.79, 130.68, 128.96, 128.63, 128.38, 119.33, 116.81, 116.16, 52.85, 20.78; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{17}H_{14}ClN_2O_2$ 313.06991, found 313.07306.

Methyl (E)-3-(((4-chloro-2-iodophenyl)imino)methyl)-4-cyanobenzoate (41)

Yellow solid, 115.32 mg, 90% yield; ^1H NMR (400 MHz, $CDCl_3$) δ 9.01 (d, *J* = 1.7 Hz, 1H), 8.70 (s, 1H), 8.24 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.91 (d, *J* = 2.3 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.39 (dd, *J* = 8.4, 2.3 Hz, 1H), 7.02 (d, *J* = 8.4 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.97, 155.77, 150.13, 138.61, 137.87, 134.54, 133.38, 132.99, 132.10, 129.51, 129.20, 118.64, 116.89, 116.05, 95.68, 52.94; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{11}ClIN_2O_2$ 424.95090, found 424.95423.

Methyl (E)-4-cyano-3-(((2-iodo-4-methylphenyl)imino)methyl)benzoate (42)

Yellow solid, 109.42 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.04 (d, *J* = 1.7 Hz, 1H), 8.73 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85–7.81 (m, 1H), 7.79–7.74 (m, 1H), 7.22–7.18 (m, 1H), 7.01 (d, *J* = 8.0 Hz, 1H), 4.00 (s, 3H), 2.35 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.11, 154.57, 148.85, 139.78, 138.84, 138.36, 134.47, 133.25, 131.70, 130.13, 129.07, 117.75, 116.73, 116.18, 96.02, 52.88, 20.45; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}IN_2O_2$ 405.00553, found 405.00903.

Methyl (E)-4-cyano-3-(((2,4-difluorophenyl)imino)methyl)benzoate (43)

Yellow solid, 78.26 mg, 87% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.98–8.89 (m, 2H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.31–7.22 (m, 1H), 6.95 (tdd, *J* = 7.9, 4.5, 2.6 Hz, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.03, 156.74 (dd, *J* = 4.3, 1.9 Hz), 138.35, 134.39, 133.39, 131.89, 128.82, 123.09 (dd, *J* = 9.8, 2.7 Hz), 116.77, 116.12, 111.80 (d, *J* = 3.8 Hz), 111.58 (d, *J* = 3.8 Hz), 105.24, 104.99 (d, *J* = 2.3 Hz), 104.74, 52.87; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{11}F_2N_2O_2$ 301.07439, found 301.07814.

Methyl (E)-3-(((3-chloro-5-methylphenyl)imino)methyl)-4-cyanobenzoate (44)

Yellow solid, 84.97 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.11 (d, *J* = 0.8 Hz, 2H), 6.99 (d, *J* = 1.3 Hz, 1H), 4.00 (s, 3H), 2.39 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.06, 155.20, 151.32, 140.79, 138.29, 134.61, 134.37, 133.43, 131.78, 128.93, 127.93, 120.14, 118.39, 116.76, 116.18, 52.87, 21.19; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}ClN_2O_2$ 313.06991, found 313.07364.

Methyl (E)-4-cyano-3-(((3-fluoro-5-methylphenyl)imino)methyl)benzoate (45)

Orange solid, 78.02 mg, 88% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 6.89 (d, *J* = 1.7 Hz, 1H), 6.83 (dd, *J* = 9.4, 1.6 Hz, 2H), 3.99 (s, 3H), 2.40 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.05, 163.13 (d, *J* = 246.3 Hz), 155.15, 151.70 (d, *J* = 9.5 Hz), 141.20 (d, *J* = 9.0 Hz), 138.31, 134.36, 133.39, 131.73, 128.89, 117.45 (d, *J* = 2.5 Hz), 116.77, 116.16, 114.76 (d, *J* = 21.3 Hz), 105.55 (d, *J* = 23.0 Hz), 52.85, 21.36 (d, *J* = 2.0 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ -113.13 (t, *J* = 9.5 Hz); HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}FN_2O_2$ 297.09946, found 297.10349.

Methyl (E)-3-(((3-bromo-5-chlorophenyl)imino)methyl)-4-cyanobenzoate (46)

Light yellow solid, 102.98 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, *J* = 1.7 Hz, 1H), 8.80 (s, 1H), 8.25 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.87 (d, *J* = 8.1 Hz, 1H), 7.45 (t, *J* = 1.8 Hz, 1H), 7.33 (t, *J* = 1.8 Hz, 1H), 7.23 (t, *J* = 1.8 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.93, 156.55, 152.31, 137.74, 135.72, 134.46, 133.57, 132.24, 129.77, 129.16, 123.13, 122.55, 120.32, 116.95, 116.03, 52.94; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{11}BrClN_2O_2$ 376.96477, found 376.96906.

5.3.47 Methyl (E)-4-cyano-3-(((3,5-dimethylphenyl)imino)methyl)benzoate (47)

Orange solid, 83.45 mg, 95% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.86 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 6.95 (d, *J* = 5.1 Hz, 3H), 3.99 (s, 3H), 2.37 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 153.80, 150.23, 138.97, 138.80, 134.23, 133.27, 131.29, 129.13, 128.66, 118.87, 116.53, 116.29, 52.76, 21.21; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{17}N_2O_2$ 293.12453, found 293.12857.

Methyl (E)-4-cyano-3-(((3-ethoxy-5-(methoxycarbonyl)phenyl)imino)methyl) benzoate (48)

Orange solid, 99.55 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (d, *J* = 8.0 Hz, 1H), 7.54–7.47 (m, 2H), 7.01 (t, *J* = 2.2 Hz, 1H), 4.11 (q, *J* = 7.0 Hz, 2H), 3.98 (s, 3H), 3.92 (s, 3H), 1.44 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.43, 165.01, 159.66, 155.42, 151.61, 138.24, 134.32, 133.44, 132.18, 131.76, 128.97, 116.74, 116.13, 114.06, 113.84, 112.51, 63.99, 52.83, 52.29, 14.66; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{20}H_{19}N_2O_5$ 367.12493, found 367.12888.

Methyl (E)-4-cyano-3-(((3,5-dichlorophenyl)imino)methyl)benzoate (49)

Yellow solid, 89.14 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, *J* = 1.7 Hz, 1H), 8.80 (s, 1H), 8.25 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.87 (d, *J* = 8.0 Hz, 1H), 7.30 (t, *J* = 1.8 Hz, 1H), 7.18 (d, *J* = 1.8 Hz, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.94, 156.54, 152.19, 137.76, 135.58, 134.46, 133.56, 132.24, 129.15, 127.01, 119.78, 116.96, 116.04, 52.95; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{11}Cl_2N_2O_2$ 333.01529, found 333.01878.

Methyl (E)-4-cyano-3-(((5-methoxy-2-methylphenyl)imino)methyl)benzoate (50)

Red-brown solid, 85.93 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.88 (d, *J* = 1.7 Hz, 1H), 8.75 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.87–7.82 (m, 1H), 7.18–7.14 (m, 1H), 6.77 (dd, *J* = 8.3, 2.6 Hz, 1H), 6.58 (d, *J* = 2.6 Hz, 1H), 4.00 (s, 3H), 3.83 (s, 3H), 2.34 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.15, 158.50, 154.01, 150.07, 138.70, 134.24, 133.57, 131.40, 131.13, 129.17, 124.84, 116.39, 112.29, 103.34, 55.43, 52.84, 17.04; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{17}N_2O_3$ 309.11945, found 309.12289.

Methyl (E)-3-(((2-bromo-5-methylphenyl)imino)methyl)-4-cyanobenzoate (51)

Yellow solid, 95.58 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.99 (d, *J* = 1.7 Hz, 1H), 8.77 (s, 1H), 8.24 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.52 (d, *J* = 8.1 Hz, 1H), 6.96 (dd, *J* = 8.1, 2.1 Hz, 1H), 6.90 (d, *J* = 2.1 Hz, 1H), 4.00 (s, 3H), 2.36 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.09, 155.97, 149.00, 138.65, 138.29, 134.51, 133.33, 132.88, 131.93, 129.03, 128.83, 120.14, 116.89, 116.16, 115.15, 52.89, 20.95; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}BrN_2O_2$ 357.01940, found 357.02337.

Methyl (E)-4-cyano-3-(((5-fluoro-2-methylphenyl)imino)methyl)benzoate (52)

Yellow solid, 78.08 mg, 88% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.88 (d, *J* = 1.7 Hz, 1H), 8.73 (s, 1H), 8.23 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.87 (d, *J* = 8.1 Hz, 1H), 7.21 (dd, *J* = 8.4, 6.1 Hz, 1H), 6.91 (td, *J* = 8.4, 2.6 Hz, 1H), 6.77 (dd, *J* = 9.5, 2.6 Hz, 1H), 4.00 (s, 3H), 2.38 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 161.61 (d, *J* = 245.2 Hz), 154.86, 150.28 (d, *J* = 7.3 Hz), 138.42, 134.39, 133.74, 131.74, 131.50 (d, *J* = 8.5 Hz), 129.41, 128.56 (d, *J* = 3.3 Hz), 116.53, 116.38, 113.50 (d, *J* = 21.0 Hz), 104.70 (d, *J* = 22.6 Hz), 52.94, 17.31; ^{19}F NMR (376 MHz, $CH_3CN + D_2O$) δ -118.76 (q, *J* = 8.2 Hz); HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}FN_2O_2$ 297.09946, found 297.10321.

Methyl (E)-3-(((3-chloro-4-methylphenyl)imino)methyl)-4-cyanobenzoate (53)

Orange solid, 84.98 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.86 (s, 1H), 8.22 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.35 (d, *J* = 2.1 Hz, 1H), 7.31–7.28 (m, 1H), 7.15 (dd, *J* = 8.1, 2.2 Hz, 1H), 4.00 (s, 3H), 2.41 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.11, 154.47, 149.02, 138.45, 135.35, 134.97, 134.36, 133.40, 131.65, 131.47, 128.86, 121.89, 119.57, 116.71, 116.22, 52.87, 19.74; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}ClN_2O_2$ 313.06991, found 313.07382.

Methyl (E)-3-(((3-bromo-4-methylphenyl)imino)methyl)-4-cyanobenzoate (54)

Orange solid, 97.68 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, *J* = 1.8 Hz, 1H), 8.84 (s, 1H), 8.21 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.53 (d, *J* = 2.1 Hz, 1H), 7.31–7.27 (m, 1H), 7.20 (dd, *J* = 8.1, 2.2 Hz, 1H), 4.00 (s, 3H), 2.43 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.10, 154.50, 149.03, 138.42, 137.17, 134.36, 133.41, 131.66, 131.25, 128.87, 125.26, 125.02, 120.22, 116.70, 116.22, 52.87, 22.55; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}BrN_2O_2$ 357.01940, found 357.02318.

Methyl (E)-4-cyano-3-(((4-fluoro-3-methylphenyl)imino)methyl)benzoate (55)

Orange solid, 77.95 mg, 88% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, *J* = 1.8 Hz, 1H), 8.84 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.83 (d, *J* = 8.0 Hz, 1H), 7.17 (ddd, *J* = 13.7, 5.9, 2.3 Hz, 2H), 7.06 (t, *J* = 8.8 Hz, 1H), 3.99 (s, 3H), 2.33 (d, *J* = 2.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 160.74 (d, *J* = 246.0 Hz), 153.52 (d, *J* = 1.9 Hz), 145.85 (d, *J* = 3.2 Hz), 138.66, 134.31, 133.34, 131.40, 128.70, 125.87 (d, *J* = 18.7 Hz), 124.23 (d, *J* = 5.5 Hz), 120.18 (d, *J* = 8.4 Hz), 116.54, 116.29, 115.70 (d, *J* = 23.8 Hz), 52.82, 14.62 (d, *J* = 3.4 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ -118.54 (dtt, *J* = 7.0, 4.8, 2.4 Hz); HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}FN_2O_2$ 297.09946, found 297.10369.

Methyl (E)-3-(((3-bromo-4-chlorophenyl)imino)methyl)-4-cyanobenzoate (56)

Yellow solid, 103.15 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.8 Hz, 1H), 8.82 (s, 1H), 8.24 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.86 (d, *J* = 8.1 Hz, 1H), 7.59 (d, *J* = 2.4 Hz, 1H), 7.51 (d, *J* = 8.5 Hz, 1H), 7.22 (dd, *J* = 8.5, 2.4 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.99, 155.67, 149.55, 137.99, 134.45, 133.52, 133.19, 132.04, 130.83, 129.06, 126.26, 123.05, 121.33, 116.85, 116.10, 52.92; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{16}H_{11}BrClN_2O_2$ 376.96477, found 376.96868.

Methyl (E)-4-cyano-3-(((3-fluoro-4-(trifluoromethoxy)phenyl)imino)methyl)benzoate (57)

Yellow solid, 96.78 mg, 88% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.83 (s, 1H), 8.25 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.87 (d, *J* = 8.0 Hz, 1H), 7.38 (td, *J* = 8.3, 1.2 Hz, 1H), 7.18 (dd, *J* = 10.7, 2.4 Hz, 1H), 7.10 (ddd, *J* = 8.7, 2.5, 1.4 Hz, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.99, 156.28, 156.08, 153.56, 150.15, 137.85, 134.48, 133.53, 132.17, 129.08, 124.35, 117.15 (d, *J* = 3.6 Hz), 116.99, 116.06, 110.42, 110.22, 52.96; ^{19}F NMR (376 MHz, $CDCl_3$) δ -58.86 (d, *J* = 4.7 Hz); HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{11}F_4N_2O_3$ 367.06611, found 367.06949.

Methyl (E)-4-cyano-3-(((3-iodo-4-methoxyphenyl)imino)methyl)benzoate (58)

Orange solid, 117.29 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.88 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.17 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.86–7.78 (m, 2H), 7.38 (dd, *J* = 8.7, 2.5 Hz, 1H), 6.87 (d, *J* = 8.7 Hz, 1H), 3.99 (s, 3H), 3.92 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.10, 157.86, 152.57, 144.01, 138.61, 134.25, 133.35, 132.34, 131.30, 128.69, 123.00, 116.37, 116.30, 110.81, 86.31, 56.63, 52.81; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{17}H_{14}IN_2O_3$ 421.00044, found 421.00363.

Methyl (E)-4-cyano-3-(((3-fluoro-4-methoxyphenyl)imino)methyl)benzoate (59)

Red-brown solid, 83.14 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.19 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.22–7.14 (m, 2H), 7.01 (t, *J* = 8.8 Hz, 1H), 3.99 (s, 3H), 3.94 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.17, 153.73, 152.91, 151.27, 147.52 (d, J = 10.9 Hz), 143.10 (d, J = 7.3 Hz), 138.61, 134.30, 133.37, 131.38, 128.68, 117.84 (d, J = 3.3 Hz), 116.40 (d, J = 20.2 Hz), 113.41 (d, J = 2.6 Hz), 109.57 (d, J = 19.2 Hz), 56.42, 52.86; ^{19}F NMR (376 MHz, $CDCl_3$) δ -133.40 (dd, J = 11.9, 8.8 Hz); HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{17}H_{14}FN_2O_3$ 313.09438, found 313.09781.

Methyl (E)-3-(((4-chloro-3-methoxyphenyl)imino)methyl)-4-cyanobenzoate (60)

Orange solid, 90.35 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, J = 1.7 Hz, 1H), 8.84 (s, 1H), 8.20 (dd, J = 8.1, 1.7 Hz, 1H), 7.83 (d, J = 8.0 Hz, 1H), 7.39 (d, J = 8.3 Hz, 1H), 6.91 (d, J = 2.3 Hz, 1H), 6.85 (dd, J = 8.3, 2.3 Hz, 1H), 3.99 (s, 3H), 3.95 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.01, 155.47, 154.66, 149.96, 138.29, 134.33, 133.42, 131.68, 130.57, 128.85, 121.41, 116.66, 116.16, 112.75, 106.29, 56.18, 52.85; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{17}H_{14}ClN_2O_3$ 329.06482, found 329.06848.

Methyl (E)-2-bromo-5-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)benzoate (61)

Yellow solid, 107.15 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, J = 1.7 Hz, 1H), 8.85 (s, 1H), 8.23 (dd, J = 8.1, 1.7 Hz, 1H), 7.85 (d, J = 8.1 Hz, 1H), 7.74–7.69 (m, 2H), 7.29 (dd, J = 8.5, 2.7 Hz, 1H), 4.00 (s, 3H), 3.96 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.99, 164.97, 155.66, 149.20, 138.03, 135.31, 134.42, 133.53, 132.93, 132.01, 129.06, 125.24, 123.91, 120.06, 116.79, 116.11, 52.91, 52.65; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{18}H_{14}BrN_2O_4$ 401.00922, found 401.01307.

Methyl (E)-3-(((3-bromo-4-iodophenyl)imino)methyl)-4-cyanobenzoate (62)

Yellow solid, 130.43 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, J = 1.7 Hz, 1H), 8.82 (s, 1H), 8.23 (dd, J = 8.0, 1.7 Hz, 1H), 7.92–7.83 (m, 2H), 7.57 (d, J = 2.4 Hz, 1H), 6.97 (dd, J = 8.4, 2.4 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.97, 155.75, 151.22, 140.77, 137.98, 134.45, 133.52, 132.06, 130.45, 129.07, 125.31, 121.37, 116.86, 116.08, 99.00, 52.92; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{16}H_{11}BrIN_2O_2$ 468.90039, found 468.90379.

Methyl (E)-3-(((4-chloro-3-iodophenyl)imino)methyl)-4-cyanobenzoate (63)

Yellow solid, 116.95 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, J = 1.7 Hz, 1H), 8.81 (s, 1H), 8.24 (dd, J = 8.0, 1.7 Hz, 1H), 7.86 (d, J = 8.1 Hz, 1H), 7.81 (d, J = 2.4 Hz, 1H), 7.50 (d, J = 8.4 Hz, 1H), 7.29–7.24 (m, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.98, 155.53, 149.32, 138.01, 137.29, 134.43, 133.52, 132.55, 132.00, 129.63, 129.05, 122.27, 116.81, 116.11, 98.45, 52.91; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{16}H_{11}ClIN_2O_2$ 424.95090, found 424.95557.

Methyl (E)-4-cyano-3-(((3-methoxy-4-methylphenyl)imino)methyl)benzoate (64)

Orange solid, 86.98 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, J = 1.7 Hz, 1H), 8.89 (s, 1H), 8.18 (dd, J = 8.0, 1.7 Hz, 1H), 7.82 (d, J = 8.0 Hz, 1H), 7.17 (d, J = 8.3 Hz, 1H), 6.90–6.81 (m, 2H), 3.99 (s, 3H), 3.89 (s, 3H), 2.25 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.16, 158.23, 153.28, 149.22, 138.82, 134.26, 133.30, 131.26, 130.94, 128.66, 126.37, 116.52, 116.29, 111.91, 104.33, 55.35, 52.78, 16.00; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{18}H_{17}N_2O_3$ 309.11945, found 309.12266.

Methyl (E)-5-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)-2-methylbenzoate (65)

Yellow solid, 88.06 mg, 87% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, J = 1.7 Hz, 1H), 8.88 (s, 1H), 8.20 (dd, J = 8.1, 1.7 Hz, 1H), 7.87 (d, J = 2.3 Hz, 1H), 7.83 (d, J = 8.1 Hz, 1H), 7.38 (dd, J = 8.1, 2.4 Hz, 1H), 7.31 (d, J = 8.2 Hz, 1H), 3.99 (s, 3H), 3.92 (s, 3H), 2.62 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 167.39, 165.07, 154.33, 147.82, 139.59, 138.51, 134.32, 133.39, 132.70, 131.56, 130.38, 128.85, 124.65, 123.31, 116.61, 116.22, 52.82, 51.97, 21.32; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{19}H_{17}N_2O_4$ 337.11436, found 337.11853.

Methyl (E)-3-(((3-chloro-4-fluorophenyl)imino)methyl)-4-cyanobenzoate (66)

Light yellow solid, 83.06 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, J = 1.7 Hz, 1H), 8.83 (s, 1H), 8.23 (dd, J = 8.1, 1.7 Hz, 1H), 7.85 (d, J = 8.0 Hz, 1H), 7.40 (ddd, J = 6.6, 2.1, 0.8 Hz, 1H), 7.23–7.19 (m, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.03, 157.35 (d, J = 249.9 Hz), 155.04 (d, J = 2.1 Hz), 146.77, 138.11, 134.41, 133.49, 131.89, 128.94, 123.36, 121.77 (d, J = 19.0 Hz), 121.12 (d, J = 7.3 Hz), 117.14 (d, J = 22.3 Hz), 116.76, 116.16, 52.92; ^{19}F NMR (376 MHz, $CDCl_3$) δ -116.94 (q, J = 6.4 Hz); HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{16}H_{11}ClFN_2O_2$ 317.04484, found 317.04792.

Methyl (E)-4-cyano-3-(((3-iodo-2-methylphenyl)imino)methyl)benzoate (67)

Yellow solid, 110.75 mg, 91%;^{1}H NMR (400 MHz, $CDCl_3$) δ 8.87 (d, J = 1.7 Hz, 1H), 8.69 (s, 1H), 8.21 (dd, J = 8.0, 1.7 Hz, 1H), 7.85 (d, J = 8.1 Hz, 1H), 7.75 (dd, J = 7.1, 2.0 Hz, 1H), 7.00–6.89 (m, 2H), 4.00 (s, 3H), 2.53 (s, 3H);^{13}C NMR (101 MHz, $CDCl_3$) δ 165.03, 154.90, 150.00, 138.28, 137.64, 135.81, 134.31, 133.60, 131.68, 129.24, 128.20, 117.64, 116.51, 116.27, 102.69, 52.89, 23.55; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{17}H_{14}IN_2O_2$ 405.00553, found 405.00980.

Methyl (E)-4-cyano-3-(((2,3-dimethylphenyl)imino)methyl)benzoate (68)

Brown solid, 83.39 mg, 95% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91–8.88 (m, 1H), 8.75 (s, 1H), 8.19 (dd, J = 8.0, 1.7 Hz, 1H), 7.84 (d, J = 8.1 Hz, 1H), 7.18–7.08 (m, 2H), 6.92–6.85 (m, 1H), 4.00 (s, 3H), 2.35 (d, J = 8.9 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.18, 153.66, 149.43, 138.92, 137.80, 134.22, 133.53, 131.42, 131.22, 129.12, 128.66, 126.13, 116.44, 116.31, 115.17, 52.81, 20.06, 13.98; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{17}N_2O_2$ 293.12453, found 293.12836.

Methyl (E)-4-cyano-3-(((3-methoxy-2-methylphenyl)imino)methyl)benzoate (69)

Yellow solid, 86.21 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, $J = 1.6$ Hz, 1H), 8.77 (s, 1H), 8.21 (dd, $J = 8.0$, 1.7 Hz, 1H), 7.85 (d, $J = 8.0$ Hz, 1H), 7.21 (t, $J = 8.1$ Hz, 1H), 6.82 (d, $J = 8.2$ Hz, 1H), 6.68 (d, $J = 7.9$ Hz, 1H), 4.00 (s, 3H), 3.88 (s, 3H), 2.31 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.19, 158.19, 154.12, 150.27, 138.85, 134.26, 133.50, 131.35, 129.07, 126.71, 121.43, 116.42, 116.39, 110.19, 108.81, 55.68, 52.84, 10.49; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{17}N_2O_3$ 309.11945, found 309.12317.

Methyl (E)-4-cyano-3-(((2,6-diethylphenyl)imino)methyl)benzoate (70)

Dark green solid, 85.98 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.95 (d, $J = 1.7$ Hz, 1H), 8.66 (s, 1H), 8.26 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.87 (d, $J = 8.1$ Hz, 1H), 7.17–7.07 (m, 3H), 4.01 (s, 3H), 2.53 (q, $J = 7.5$ Hz, 4H), 1.17 (t, $J = 7.5$ Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.07, 157.52, 149.19, 138.34, 134.38, 133.46, 132.70, 131.74, 128.52, 126.36, 124.80, 116.58, 116.08, 52.84, 24.62, 14.71; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{20}H_{21}N_2O_2$ 321.15583, found 321.16028.

Methyl (E)-4-cyano-3-(((4-iodo-3,5-dimethylphenyl)imino)methyl)benzoate (71)

Brown solid, 117.58 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, $J = 1.7$ Hz, 1H), 8.85 (s, 1H), 8.19 (dd, $J = 8.0$, 1.7 Hz, 1H), 7.82 (d, $J = 8.0$ Hz, 1H), 7.02 (s, 2H), 3.99 (s, 3H), 2.52 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.06, 154.32, 149.58, 143.13, 138.55, 134.31, 133.36, 131.53, 128.78, 119.49, 116.59, 116.23, 106.51, 52.82, 29.63; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{16}IN_2O_2$ 419.02118, found 419.02557.

Methyl (E)-3-(((4-bromo-3,5-dimethylphenyl)imino)methyl)-4-cyanobenzoate (72)

Orange solid, 103.03 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, $J = 1.7$ Hz, 1H), 8.86 (s, 1H), 8.21 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.86–7.81 (m, 1H), 7.07–7.04 (m, 2H), 4.00 (s, 3H), 2.47 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 154.23, 148.57, 139.35, 138.60, 134.35, 133.40, 131.55, 128.79, 126.36, 120.78, 116.61, 116.29, 52.86, 23.94; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{16}BrN_2O_2$ 371.03505, found 371.03852.

Methyl (E)-4-cyano-3-(((3,4,5-trimethoxyphenyl)imino)methyl)benzoate (73)

Orange solid, 100.02 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, $J = 1.7$ Hz, 1H), 8.85 (s, 1H), 8.18 (dd, $J = 8.0$, 1.7 Hz, 1H), 7.82 (d, $J = 8.0$ Hz, 1H), 6.59 (s, 2H), 3.98 (s, 3H), 3.91 (s, 6H), 3.87 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.08, 153.64, 153.34, 145.94, 138.57, 137.70, 134.29, 133.37, 131.37, 128.71, 116.46, 116.27, 98.65, 60.96, 56.15, 52.79; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{19}H_{19}N_2O_5$ 355.12493, found 355.12897.

Methyl (E)-3-(((4-bromo-2,3-dimethylphenyl)imino)methyl)-4-cyanobenzoate (74)

Yellow solid, 102.45 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.86 (d, $J = 1.7$ Hz, 1H), 8.71 (s, 1H), 8.20 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.84 (d, $J = 8.1$ Hz, 1H), 7.44 (d, $J = 8.4$ Hz, 1H), 6.76 (d, $J = 8.4$ Hz, 1H), 4.00 (s, 3H), 2.43 (s, 3H), 2.43 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.10, 154.01, 148.54, 138.64, 137.21, 134.28, 133.64, 133.44, 131.45, 130.34, 129.23, 124.03, 116.39, 116.32, 116.24, 52.87, 19.82, 15.43; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{18}H_{16}BrN_2O_2$ 371.03505, found 371.03882.

Methyl (E)-4-cyano-3-((mesitylimino)methyl)benzoate (75)

Dark green solid, 83.26 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, $J = 1.7$ Hz, 1H), 8.65 (s, 1H), 8.23 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.85 (d, $J = 8.0$ Hz, 1H), 6.92 (s, 2H), 4.00 (s, 3H), 2.30 (s, 3H), 2.17 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.14, 157.87, 147.52, 138.61, 134.31, 134.09, 133.41, 131.59, 128.94, 128.45, 126.87, 116.47, 116.19, 52.83, 20.72, 18.29; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{19}H_{19}N_2O_2$ 307.14018, found 307.14336.

Methyl (E)-3-(([1,1′-biphenyl]-2-ylimino)methyl)-4-cyanobenzoate (76)

Yellow solid, 90.56 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.86 (s, 1H), 8.74 (d, $J = 1.7$ Hz, 1H), 8.16 (dd, $J = 8.0$, 1.8 Hz, 1H), 7.79 (d, $J = 8.1$ Hz, 1H), 7.56–7.48 (m, 3H), 7.46–7.39 (m, 4H), 7.37–7.34 (m, 1H), 7.22–7.18 (m, 1H), 3.95 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.02, 154.74, 148.02, 139.05, 138.75, 136.00, 134.24, 133.16, 131.32, 130.53, 130.14, 128.97, 128.44, 127.74, 127.34, 126.93, 118.57, 116.48, 116.13, 52.68; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{22}H_{17}N_2O_2$ 341.12453, found 341.12866.

Methyl (E)-3-(([1,1′-biphenyl]-3-ylimino)methyl)-4-cyanobenzoate (77)

Orange solid, 93.15 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (d, $J = 1.7$ Hz, 1H), 8.94 (s, 1H), 8.21 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.84 (d, $J = 8.1$ Hz, 1H), 7.67–7.63 (m, 2H), 7.57–7.53 (m, 3H), 7.50–7.45 (m, 2H), 7.39 (d, $J = 7.5$ Hz, 1H), 7.33–7.28 (m, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.10, 154.65, 150.79, 142.48, 140.38, 138.58, 134.30, 133.35, 131.54, 129.70, 128.82, 128.81, 127.60, 127.14, 126.16, 120.18, 119.58, 116.69, 116.23, 52.81; HRMS-ESI (*m/z*) $[M + H]^+$ calculated for $C_{22}H_{17}N_2O_2$ 341.12453, found 341.12802.

Methyl (E)-3-(([1,1′-biphenyl]-4-ylimino)methyl)-4-cyanobenzoate (78)

Orange solid, 93.15 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (d, *J* = 1.7 Hz, 1H), 8.94 (s, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.70–7.62 (m, 4H), 7.49–7.37 (m, 5H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.15, 154.01, 149.25, 140.45, 140.21, 138.69, 134.29, 133.33, 131.45, 128.81, 128.77, 127.98, 127.47, 126.94, 121.76, 116.65, 116.27, 52.82; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{17}N_2O_2$ 341.12453, found 341.12846.

Methyl (E)-4-cyano-3-(((4-phenoxyphenyl)imino)methyl)benzoate (79)

Orange solid, 97.51 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.89 (s, 1H), 8.19 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.40–7.33 (m, 4H), 7.18–7.11 (m, 1H), 7.09–7.02 (m, 4H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.18, 157.06, 156.86, 153.05, 145.27, 138.79, 134.29, 133.32, 131.30, 129.83, 128.66, 123.59, 122.87, 119.35, 119.05, 116.53, 116.32, 52.83; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{17}N_2O_3$ 357.11945, found 357.12332.

Methyl (E)-4-cyano-3-(((4-(2,4-difluorophenoxy)phenyl)imino)methyl)benzoate (80)

Yellow solid, 106.25 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.87 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.37–7.29 (m, 2H), 7.11 (td, *J* = 9.0, 5.5 Hz, 1H), 7.00 (d, *J* = 8.8 Hz, 2H), 6.96 (dd, *J* = 8.0, 2.6 Hz, 1H), 6.89 (dddd, *J* = 9.3, 7.7, 3.1, 1.8 Hz, 1H), 3.99 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.19, 157.27, 153.20, 145.28, 138.75, 134.32, 133.35, 131.36, 128.69, 123.01, 122.89, 119.17, 117.36, 116.56, 116.32, 111.62 (d, *J* = 3.9 Hz), 111.39 (d, *J* = 4.0 Hz), 105.59 (d, *J* = 48.8 Hz), 105.59 (d, *J* = 4.8 Hz), 52.85; ^{19}F NMR (376 MHz, $CDCl_3$) δ -114.42 (ddd, *J* = 13.0, 8.1, 4.9 Hz), -125.33 (td, *J* = 10.2, 5.1 Hz); HRMS-ESI (*m*/*z*) $[M + H + H_2O]^+$ calculated for $C_{22}H_{17}F_2N_2O_4$ 411.11564, found 411.11462.

Methyl (E)-3-(((4-(4-chlorophenoxy)phenyl)imino)methyl)-4-cyanobenzoate (81)

Red solid, 109.25 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.88 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.33 (dd, *J* = 16.4, 8.9 Hz, 4H), 7.05 (d, *J* = 8.8 Hz, 2H), 6.98 (d, *J* = 9.0 Hz, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.14, 156.54, 155.57, 153.36, 145.66, 138.67, 134.28, 133.33, 131.38, 129.80, 128.67, 128.55, 122.93, 120.17, 119.45, 116.54, 116.29, 52.84; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{16}ClN_2O_3$ 391.08047, found 391.08397.

Methyl (E)-3-(((3-chloro-4-((3-fluorobenzyl)oxy)phenyl)imino)methyl)-4-cyanobenzoate (82)

Orange solid, 117.58 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.19 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.48 (d, *J* = 2.5 Hz, 1H), 7.37 (td, *J* = 7.9, 5.8 Hz, 1H), 7.26–7.19 (m, 3H), 7.04 (dd, *J* = 8.6, 2.6 Hz, 1H), 7.00 (d, *J* = 8.7 Hz, 1H), 5.19 (s, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.14, 162.99 (d, *J* = 246.5 Hz), 153.51, 153.21, 143.83, 138.75 (d, *J* = 7.4 Hz), 138.54, 134.32, 133.40, 131.46, 130.22 (d, *J* = 8.2 Hz), 128.75, 124.01, 123.54, 122.38 (d, *J* = 3.0 Hz), 121.09, 116.52, 116.30, 114.99 (d, *J* = 21.0 Hz), 114.12, 113.93 (d, *J* = 22.3 Hz), 70.21 (d, *J* = 2.2 Hz), 52.86; ^{19}F NMR (376 MHz, $CDCl_3$) δ -112.46 (td, *J* = 9.1, 5.8 Hz); HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{23}H_{17}ClFN_2O_3$ 423.08670, found 423.08958.

Methyl (E)-3-(((2-benzylphenyl)imino)methyl)-4-cyanobenzoate (83)

Light yellow solid, 95.87 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.87 (d, *J* = 1.7 Hz, 1H), 8.71 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.30 (ddd, *J* = 7.6, 5.4, 3.7 Hz, 2H), 7.24 (t, *J* = 1.5 Hz, 1H), 7.22–7.18 (m, 4H), 7.16–7.10 (m, 1H), 7.07 (dd, *J* = 7.5, 1.0 Hz, 1H), 4.22 (s, 2H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.17, 154.03, 148.98, 141.16, 138.72, 136.01, 134.25, 133.48, 131.42, 130.40, 129.08, 128.95, 128.26, 127.51, 127.44, 125.80, 117.54, 116.44, 116.36, 52.88, 37.64; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{23}H_{19}N_2O_2$ 355.14018, found 355.14387.

Methyl (E)-4-cyano-3-(((4-tritylphenyl)imino)methyl)benzoate (84)

Yellow solid, 141.25 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.89 (s, 1H), 8.19 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.32–7.27 (m, 5H), 7.25 (s, 5H), 7.24–7.18 (m, 9H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.17, 154.24, 148.00, 146.54, 146.44, 138.74, 134.31, 133.32, 132.10, 131.43, 131.07, 131.03, 128.74, 127.56, 127.43, 126.02, 120.31, 116.66, 116.30, 64.75, 52.84; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{35}H_{27}N_2O_2$ 507.20278, found 507.20563.

Methyl (E)-4-cyano-3-(((4-(phenylamino)phenyl)imino)methyl)benzoate (85)

Brown solid, 96.22 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.95 (d, *J* = 1.7 Hz, 1H), 8.92 (s, 1H), 8.16 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.81 (d, *J* = 8.1 Hz, 1H), 7.39–7.35 (m, 2H), 7.35–7.29 (m, 2H), 7.16–7.10 (m, 4H), 7.04–6.96 (m, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.34, 150.63, 143.50, 142.63, 142.21, 139.32, 134.25, 133.27, 130.84, 129.46, 128.48, 123.13, 121.83, 118.66, 117.44, 116.52, 116.24, 52.80; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{18}N_3O_2$ 356.13543, found 356.13919.

Methyl (E)-4-cyano-3-(((3-(diphenylamino)phenyl)imino)methyl)benzoate (86)

Brown solid, 119.23 mg 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.90 (s, 1H), 8.17 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.32–7.26 (m, 6H), 7.16–7.11 (m, 6H), 7.06 (td, *J* = 7.3, 1.1 Hz, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.25, 151.68, 147.79, 147.35, 144.01, 139.11, 134.24, 133.27, 130.97, 129.35, 128.92, 128.54, 124.66, 123.60, 123.33, 122.61, 122.46, 116.42, 116.32, 52.79; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{28}H_{22}N_3O_2$ 432.16673, found 432.17028.

Methyl (E)-4-cyano-3-(((4-(1,2,2-triphenylvinyl)phenyl)imino)methyl)benzoate (87)

Orange solid, 146.65 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, *J* = 1.7 Hz, 1H), 8.84 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.17–7.04 (m, 19H), 3.99 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.16, 153.68, 148.14, 143.56, 143.53, 143.48, 143.43, 141.48, 140.15, 138.79, 134.30, 133.32, 132.39, 131.36, 131.30, 128.71, 127.83, 127.73, 127.63, 126.65, 126.57, 126.49, 120.71, 116.55, 116.31, 52.81; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{36}H_{27}N_2O_2$ 519.20278, found 519.20621.

Methyl (E)-4-cyano-3-(((2-methylnaphthalen-1-yl)imino)methyl)benzoate (88)

Yellow solid, 92.36 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.08 (d, *J* = 1.7 Hz, 1H), 8.82 (s, 1H), 8.28 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.89 (d, *J* = 8.1 Hz, 1H), 7.82 (ddd, *J* = 11.4, 8.2, 2.8 Hz, 2H), 7.62 (d, *J* = 8.4 Hz, 1H), 7.47–7.42 (m, 2H), 7.39 (d, *J* = 8.4 Hz, 1H), 4.02 (s, 3H), 2.40 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.12, 159.31, 146.19, 138.39, 134.47, 133.58, 132.59, 131.91, 129.16, 128.76, 127.79, 126.32, 126.00, 125.39, 124.75, 122.91, 121.67, 116.69, 116.18, 52.89, 18.30; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{21}H_{17}N_2O_2$ 329.12453, found 329.12818.

Methyl (E)-4-cyano-3-((naphthalen-2-ylimino)methyl)benzoate (89)

Red solid, 89.25 mg, 95% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.01–8.96 (m, 2H), 8.19 (dd, *J* = 8.1, 1.6 Hz, 1H), 7.91–7.81 (m, 4H), 7.74 (d, *J* = 2.2 Hz, 1H), 7.58–7.45 (m, 3H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.09, 154.17, 147.51, 138.63, 134.22, 133.77, 133.30, 132.64, 131.39, 129.22, 128.73, 128.25, 127.70, 126.62, 126.08, 120.20, 119.51, 116.55, 116.29, 52.79; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{15}N_2O_2$ 315.10888, found 315.11285.

Methyl (E)-4-cyano-3-(((2,3-dihydro-1H-inden-5-yl)imino)methyl)benzoate (90)

Orange solid, 83.28 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.89 (s, 1H), 8.18 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.30–7.24 (m, 1H), 7.24–7.20 (m, 1H), 7.14 (dd, *J* = 7.9, 2.0 Hz, 1H), 3.99 (s, 3H), 2.95 (q, *J* = 7.6 Hz, 4H), 2.13 (p, *J* = 7.4 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.23, 153.00, 148.64, 145.62, 144.10, 139.01, 134.26, 133.25, 131.16, 128.64, 124.89, 119.86, 116.82, 116.51, 116.35, 52.78, 32.81, 32.52, 25.62; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{19}H_{17}N_2O_2$ 305.12453, found 305.12781.

Methyl (E)-4-cyano-3-(((2,3-dihydro-1H-inden-4-yl)imino)methyl)benzoate (91)

Yellow solid, 83.25 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, *J* = 1.8 Hz, 1H), 8.84 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.25–7.15 (m, 2H), 6.95 (d, *J* = 6.2 Hz, 1H), 4.00 (s, 3H), 3.07 (t, *J* = 7.4 Hz, 2H), 2.98 (t, *J* = 7.5 Hz, 2H), 2.17–2.07 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.20, 154.12, 146.80, 145.91, 138.93, 138.65, 134.23, 133.48, 131.29, 129.02, 127.30, 123.21, 116.41, 116.39, 115.53, 52.82, 33.08, 30.80, 25.15; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{17}H_{14}ClN_2O_2$ 305.12453, found 305.12836.

Methyl (E)-4-cyano-3-(((5,6,7,8-tetrahydronaphthalen-1-yl)imino)methyl)benzoate (92)

Brown solid, 86.98 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.88 (d, *J* = 1.7 Hz, 1H), 8.74 (s, 1H), 8.19 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.15 (t, *J* = 7.7 Hz, 1H), 7.03 (d, *J* = 7.6 Hz, 1H), 6.81 (d, *J* = 7.6 Hz, 1H), 4.00 (s, 3H), 2.84 (dt, *J* = 11.6, 5.8 Hz, 4H), 1.90–1.76 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.22, 153.51, 149.49, 138.92, 138.27, 134.24, 133.53, 131.85, 131.26, 129.15, 128.04, 125.96, 116.43, 116.35, 114.41, 52.85, 29.66, 25.30, 22.99, 22.89; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{19}N_2O_2$ 319.14018, found 319.14401.

Methyl (E)-4-cyano-3-(((5,6,7,8-tetrahydronaphthalen-2-yl)imino)methyl)benzoate (93)

Orange oil, 88.16 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.8 Hz, 1H), 8.88 (s, 1H), 8.17 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.81 (d, *J* = 8.1 Hz, 1H), 7.15–7.10 (m, 2H), 7.06 (d, *J* = 2.0 Hz, 1H), 3.99 (s, 3H), 2.81 (d, *J* = 7.5 Hz, 4H), 1.85–1.79 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.20, 153.02, 147.57, 138.98, 138.16, 137.04, 134.24, 133.25, 131.16, 129.95, 128.62, 121.73, 118.51, 116.48, 116.34, 52.77, 29.42, 29.13, 23.10, 23.00; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{19}N_2O_2$ 319.14018, found 319.14389.

Methyl (E)-4-cyano-3-(((9,9-dimethyl-9H-fluoren-2-yl)imino)methyl)benzoate (94)

Orange solid, 106.31 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.99 (d, *J* = 1.4 Hz, 2H), 8.21 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.78 (d, *J* = 8.0 Hz, 1H), 7.76–7.73 (m, 1H), 7.48–7.43 (m, 2H), 7.39–7.30 (m, 3H), 4.01 (s, 3H), 1.54 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.20, 155.00, 153.93, 153.22, 149.34, 139.01, 138.89, 138.45, 134.32, 133.40, 131.33, 128.78, 127.45, 127.10, 122.63, 120.73, 120.24, 120.10, 116.50, 116.40, 116.20, 52.83, 46.99, 27.12; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{25}H_{21}N_2O_2$ 381.15583, found 381.15869.

Methyl (E)-3-(((7-bromo-9H-fluoren-2-yl)imino)methyl)-4-cyanobenzoate (95)

Brown solid, 129.39 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.98 (d, *J* = 1.7 Hz, 1H), 8.96 (s, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85 (d, *J* = 8.0 Hz, 1H), 7.80 (d, *J* = 8.1 Hz, 1H), 7.70 (d, *J* = 1.7 Hz, 1H), 7.65

(d, $J = 8.2$ Hz, 1H), 7.55–7.49 (m, 2H), 7.40 (dd, $J = 8.1$, 1.9 Hz, 1H), 4.01 (s, 3H), 3.95 (s, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.20, 153.55, 149.31, 145.50, 144.22, 140.41, 140.05, 138.81, 134.36, 133.38, 131.42, 130.10, 128.79, 128.33, 121.22, 121.14, 120.80, 120.63, 117.80, 116.60, 116.38, 52.87, 36.78; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{23}H_{16}BrN_2O_2$ 431.03505, found 431.03861.

Methyl (E)-4-cyano-3-(((2-methyl-1H-indol-5-yl)imino)methyl)benzoate (96)

Brown solid, 85.99 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.00 (d, $J = 3.6$ Hz, 2H), 8.16 (dd, $J =$ 8.1, 1.7 Hz, 1H), 8.01 (s, 1H), 7.82 (d, $J = 8.1$ Hz, 1H), 7.58 (d, $J = 2.0$ Hz, 1H), 7.33 (d, $J = 8.5$ Hz, 1H), 7.26–7.23 (m, 1H), 6.29 (dt, $J = 2.1$, 1.1 Hz, 1H), 4.00 (s, 3H), 2.47 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.40, 150.89, 142.70, 139.48, 136.57, 135.92, 134.17, 133.21, 130.66, 129.63, 128.44, 116.60, 116.16, 115.52, 112.78, 110.74, 101.22, 52.76, 13.76; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{19}H_{16}N_3O_2$ 318.11978, found 318.12347.

Methyl (E)-3-(((1H-indol-6-yl)imino)methyl)-4-cyanobenzoate (97)

Brown solid, 83.25 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.01 (s, 1H), 8.99 (d, $J = 1.7$ Hz, 1H), 8.31 (s, 1H), 8.18 (dd, $J = 8.0$, 1.7 Hz, 1H), 7.83 (dd, $J = 8.1$, 0.5 Hz, 1H), 7.68 (d, $J = 8.4$ Hz, 1H), 7.46 (dd, $J = 1.8$, 0.9 Hz, 1H), 7.29–7.27 (m, 1H), 7.25 (d, $J = 1.8$ Hz, 1H), 6.59 (td, $J = 2.1$, 1.0 Hz, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.35, 151.93, 144.95, 139.30, 136.24, 134.29, 133.29, 130.92, 128.64, 127.99, 125.70, 121.28, 116.53, 116.34, 114.13, 104.85, 102.98, 52.79; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{18}H_{14}N_3O_2$ 304.10413, found 304.10834.

Methyl (E)-3-(((1H-indol-4-yl)imino)methyl)-4-cyanobenzoate (98)

Dark green solid, 83.02 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.11 (s, 1H), 9.03 (d, $J = 1.7$ Hz, 1H), 8.36 (s, 1H), 8.21 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.86 (d, $J = 8.1$ Hz, 1H), 7.36 (dt, $J = 8.2$, 0.9 Hz, 1H), 7.29 (dd, $J = 3.2$, 2.4 Hz, 1H), 7.23 (d, $J = 8.0$ Hz, 1H), 7.01 (dd, $J = 7.5$, 0.8 Hz, 1H), 6.87 (ddd, $J = 3.2$, 2.1, 1.0 Hz, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.32, 154.04, 143.10, 139.28, 136.99, 134.23, 133.45, 131.12, 128.99, 124.81, 122.99, 122.47, 116.59, 116.32, 110.55, 110.01, 100.87, 52.80; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{18}H_{14}N_3O_2$ 304.10413, found 304.10757.

Methyl (E)-4-cyano-3-(((1-methyl-1H-indol-5-yl)imino)methyl)benzoate (99)

Brown solid, 87.23 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.01 (s, 1H), 9.00 (d, $J = 1.7$ Hz, 1H), 8.16 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.82 (d, $J = 8.1$ Hz, 1H), 7.69 (t, $J = 1.4$ Hz, 1H), 7.37 (d, $J = 1.3$ Hz, 2H), 7.10 (d, $J = 3.1$ Hz, 1H), 6.55 (d, $J = 3.1$ Hz, 1H), 4.00 (s, 3H), 3.83 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.39, 151.05, 142.48, 139.46, 136.51, 134.20, 133.22, 130.72, 130.08, 128.92, 128.46, 116.59, 116.22, 116.15, 114.07, 109.80, 101.88, 52.78, 33.07; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{19}H_{16}N_3O_2$ 318.11978, found 318.12329.

Methyl (E)-3-(((1-benzyl-1H-indol-5-yl)imino)methyl)-4-cyanobenzoate (100)

Red oil, 111.35 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.01–8.97 (m, 2H), 8.16 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.81 (d, $J = 8.1$ Hz, 1H), 7.73–7.69 (m, 1H), 7.34–7.27 (m, 5H), 7.18 (d, $J = 3.2$ Hz, 1H), 7.16–7.10 (m, 2H), 6.62 (d, $J = 3.2$ Hz, 1H), 5.35 (s, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.39, 151.26, 142.77, 139.42, 137.14, 136.09, 134.20, 133.23, 130.76, 129.56, 129.22, 128.82, 128.49, 127.74, 126.73, 116.56, 116.35, 116.27, 114.10, 110.32, 102.62, 52.79, 50.33; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{25}H_{20}N_3O_2$ 394.15108, found 394.15479.

Tert-butyl (E)-6-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)-1H-indole-1-carboxylate (101)

Red-brown solid, 111.35 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.98 (s, 1H), 8.97 (d, $J = 1.8$ Hz, 1H), 8.22–8.15 (m, 2H), 7.82 (d, $J = 8.0$ Hz, 1H), 7.63 (d, $J = 3.7$ Hz, 1H), 7.59 (d, $J = 8.2$ Hz, 1H), 7.31 (dd, $J = 8.3$, 1.9 Hz, 1H), 6.62–6.56 (m, 1H), 4.00 (s, 3H), 1.70 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.22, 152.90, 149.52, 146.80, 138.92, 134.19, 133.29, 131.13, 130.18, 128.72, 127.02, 121.35, 117.42, 116.42, 116.36, 112.14, 107.93, 107.17, 84.10, 52.78, 28.15; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{23}H_{22}N_3O_4$ 404.15656, found 404.15973.

Tert-butyl (E)-6-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)indoline-1-carboxylate (102)

Red-brown solid, 109.25 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, $J = 12.1$ Hz, 2H), 8.18 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.82 (d, $J = 8.1$ Hz, 1H), 7.26 (s, 1H), 7.18 (d, $J = 7.8$ Hz, 1H), 6.94 (dd, $J = 7.8$, 2.0 Hz, 1H), 4.09–4.00 (m, 2H), 3.99 (s, 3H), 3.12 (t, $J = 8.6$ Hz, 2H), 1.57 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.21, 152.47, 138.86, 134.23, 133.34, 131.27, 128.85, 116.31, 52.80, 48.10, 28.44; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{23}H_{24}N_3O_4$ 406.17221, found 406.17544.

Methyl (E)-4-cyano-3-(((1-methyl-2-oxoindolin-5-yl)imino)methyl)benzoate (103)

Yellow solid, 92.15 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, $J = 1.7$ Hz, 1H), 8.91 (s, 1H), 8.18 (dd, $J = 8.1$, 1.7 Hz, 1H), 7.83 (d, $J = 8.1$ Hz, 1H), 7.36 (dt, $J = 8.3$, 1.1 Hz, 2H), 6.88 (d, $J = 8.9$ Hz, 1H), 4.00 (s, 3H), 3.60 (s, 2H), 3.26 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.91, 165.21, 152.00, 145.06, 144.94, 138.89, 134.33, 133.34, 131.21, 128.63, 125.60, 122.22, 117.66, 116.41, 108.47, 52.85, 35.76, 26.37; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{19}H_{16}N_3O_3$ 334.11470, found 334.11837.

Methyl (E)-4-cyano-3-(((1-methyl-1H-indazol-5-yl)imino)methyl)benzoate (104)

Brown solid, 88.23 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.99–8.95 (m, 2H), 8.18 (dd, J = 8.0, 1.7 Hz, 1H), 8.03 (d, J = 0.9 Hz, 1H), 7.83 (d, J = 8.1 Hz, 1H), 7.72 (d, J = 1.9 Hz, 1H), 7.52 (dd, J = 8.8, 1.9 Hz, 1H), 7.44 (d, J = 9.0 Hz, 1H), 4.11 (s, 3H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.22, 152.52, 143.54, 139.36, 138.93, 134.28, 133.52, 133.31, 131.14, 128.64, 124.45, 121.22, 116.41, 116.40, 113.48, 109.70, 52.81, 35.72; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{18}H_{15}N_4O_2$ 319.11503, found 319.11829.

Methyl (E)-3-(((3-bromo-1-methyl-1H-indazol-5-yl)imino)methyl)-4-cyanobenzoate (105)

Orange solid, 111.23 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (s, 1H), 8.95 (d, J = 1.6 Hz, 1H), 8.20 (dd, J = 8.1, 1.6 Hz, 1H), 7.85 (d, J = 8.0 Hz, 1H), 7.55 (d, J = 2.0 Hz, 1H), 7.53 (d, J = 1.9 Hz, 1H), 7.42 (d, J = 9.7 Hz, 1H), 4.08 (s, 3H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.16, 153.29, 144.27, 140.44, 138.68, 134.32, 133.42, 131.40, 128.78, 124.22, 122.67, 120.59, 116.46, 116.39, 112.32, 110.11, 52.87, 36.17; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{18}H_{14}BrN_4O_2$ 397.02554, found 397.02882.

Methyl (E)-4-cyano-3-(((1-methyl-1H-indazol-7-yl)imino)methyl)benzoate (106)

Yellow solid, 88.45 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.99 (s, 1H), 8.93 (d, J = 1.7 Hz, 1H), 8.23 (dd, J = 8.1, 1.7 Hz, 1H), 8.00 (s, 1H), 7.89 (d, J = 8.0 Hz, 1H), 7.70–7.67 (m, 1H), 7.18–7.10 (m, 2H), 4.41 (s, 3H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.05, 154.03, 138.36, 135.98, 134.82, 134.42, 133.80, 132.78, 131.61, 129.18, 126.11, 121.16, 120.83, 116.45, 116.34, 113.78, 52.98, 39.42; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{18}H_{15}N_4O_2$ 319.11503, found 319.11853.

Methyl (E)-4-cyano-3-(((1-methyl-1H-indazol-6-yl)imino)methyl)benzoate (107)

Yellow solid, 90.36 mg, 95% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (s, 2H), 8.22 (dd, J = 8.1, 1.7 Hz, 1H), 7.99 (d, J = 1.1 Hz, 1H), 7.85 (d, J = 8.0 Hz, 1H), 7.76 (d, J = 8.5 Hz, 1H), 7.30 (s, 1H), 7.18 (dd, J = 8.6, 1.7 Hz, 1H), 4.11 (s, 3H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 154.63, 148.89, 140.46, 138.58, 134.39, 133.45, 132.84, 131.59, 128.90, 123.24, 121.91, 116.66, 116.32, 114.97, 101.47, 52.86, 35.66; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{18}H_{15}N_4O_2$ 319.11503, found 319.11832.

Methyl (E)-4-cyano-3-((quinolin-3-ylimino)methyl)benzoate (108)

Yellow solid, 85.39 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.00 (s, 1H), 8.97 (dd, J = 3.7, 2.1 Hz, 2H), 8.22 (dd, J = 8.1, 1.7 Hz, 1H), 8.15–8.09 (m, 1H), 7.97 (d, J = 2.5 Hz, 1H), 7.88–7.82 (m, 2H), 7.70 (ddd, J = 8.4, 6.9, 1.5 Hz, 1H), 7.57 (ddd, J = 8.1, 6.8, 1.2 Hz, 1H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.94, 156.27, 147.22, 146.44, 143.19, 138.04, 134.38, 133.45, 131.97, 129.41, 129.22, 128.97, 128.11, 128.03, 127.36, 124.36, 116.76, 116.10, 52.88; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{19}H_{14}N_3O_2$ 316.10413, found 316.10858.

Methyl (E)-4-cyano-3-(((1-methyl-2-oxo-1,2,3,4-tetrahydroquinolin-6-yl)imino)methyl)benzoate (109)

Yellow solid, 96.19 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, J = 1.7 Hz, 1H), 8.89 (s, 1H), 8.19 (dd, J = 8.1, 1.7 Hz, 1H), 7.83 (d, J = 8.0 Hz, 1H), 7.29 (dd, J = 8.5, 2.5 Hz, 1H), 7.21 (d, J = 2.4 Hz, 1H), 7.04 (d, J = 8.6 Hz, 1H), 3.99 (s, 3H), 3.39 (s, 3H), 3.00–2.93 (m, 2H), 2.73–2.66 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 170.24, 165.15, 152.89, 144.77, 140.22, 138.74, 134.29, 133.35, 131.32, 128.64, 127.22, 120.78, 116.45, 116.34, 115.39, 52.84, 31.50, 29.69, 25.35; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{20}H_{18}N_3O_3$ 348.13035, found 348.13409.

Tert-butyl (E)-6-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)-3,4-dihydroisoquinoline-2(1H)-carboxylate (110)

Red oil, 113.24 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, J = 1.7 Hz, 1H), 8.87 (s, 1H), 8.19 (dd, J = 8.0, 1.7 Hz, 1H), 7.83 (d, J = 8.1 Hz, 1H), 7.17 (d, J = 1.4 Hz, 2H), 7.11 (s, 1H), 4.60 (s, 2H), 3.99 (s, 3H), 3.67 (t, J = 5.9 Hz, 2H), 2.88 (t, J = 5.9 Hz, 2H), 1.50 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.12, 154.84, 153.92, 148.44, 138.67, 135.90, 134.28, 133.32, 131.42, 128.71, 127.25, 119.28, 116.58, 116.27, 79.88, 52.82, 29.04, 28.44; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{24}H_{26}N_3O_4$ 420.18786, found 420.19120.

Methyl (E)-4-cyano-3-(((1,3-dimethyl-2-oxo-2,3-dihydro-1H-benzo[d]imidazol-5-yl)imino)methyl) benzoate (111)

Yellow solid, 96.15 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97–8.92 (m, 2H), 8.18 (dd, J = 8.1, 1.7 Hz, 1H), 7.83 (d, J = 8.1 Hz, 1H), 7.19 (dd, J = 8.3, 1.9 Hz, 1H), 7.06 (d, J = 1.9 Hz, 1H), 7.01 (d, J = 8.3 Hz, 1H), 4.00 (s, 3H), 3.47 (s, 3H), 3.46 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.21, 154.84, 152.02, 144.21, 138.91, 134.32, 133.39, 131.17, 130.78, 129.97, 128.66, 116.46, 116.33, 115.32, 107.63, 101.07, 52.84, 27.34; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{19}H_{17}N_4O_3$ 349.12560, found 349.12921.

Tert-butyl (E)-4-(4-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)phenoxy)piperidine-1-carboxylate (112)

Tan solid, 128.33 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, J = 1.7 Hz, 1H), 8.88 (s, 1H), 8.16 (dd, J = 8.0, 1.7 Hz, 1H), 7.81 (d, J = 8.0 Hz, 1H), 7.35 (d, J = 8.7 Hz, 2H), 6.96 (d, J = 8.8 Hz, 2H), 4.51 (dt, J = 7.2, 3.7 Hz, 1H), 3.98 (s, 3H), 3.71 (ddd, J = 12.1, 7.3, 3.7 Hz, 2H), 3.36 (ddd, J = 13.7, 7.8, 3.8 Hz, 2H), 1.94 (td, *J* = 8.1, 3.7 Hz, 2H), 1.81–1.73 (m, 2H), 1.47 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.20, 157.12, 154.79, 151.85, 143.25, 139.01, 134.24, 133.26, 131.04, 128.52, 122.96, 116.63, 116.37, 116.34, 79.60, 72.47, 52.77, 30.44, 28.39; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{26}H_{30}N_3O_5$ 464.21408, found 464.21756.

Tert-butyl (E)-3-(4-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)phenoxy)piperidine-1-carboxylate (113)

Brown solid, 128.11 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 8.93 (d, *J* = 1.7 Hz, 1H), 8.88 (s, 1H), 8.17 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.81 (d, *J* = 8.1 Hz, 1H), 7.35 (d, *J* = 8.8 Hz, 2H), 6.97 (d, *J* = 8.9 Hz, 2H), 4.51 (dt, *J* = 7.2, 3.6 Hz, 1H), 3.99 (s, 3H), 3.71 (ddd, *J* = 12.2, 7.4, 3.7 Hz, 2H), 3.36 (ddd, *J* = 13.5, 7.7, 3.8 Hz, 2H), 2.00–1.90 (m, 2H), 1.83–1.72 (m, 2H), 1.47 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.23, 157.11, 154.82, 151.87, 143.22, 139.00, 134.23, 133.28, 131.07, 128.52, 122.98, 116.62, 116.39, 116.35, 79.65, 72.43, 52.81, 30.42, 28.39; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{26}H_{30}N_3O_5$ 464.21408, found 464.21756.

Methyl (E)-3-(((3-chloro-4-(4-methylpiperidin-1-yl)phenyl)imino)methyl)-4-cyanobenzoate (114)

Brown solid, 106.52 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 8.91 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.18 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.43 (d, *J* = 2.5 Hz, 1H), 7.27 (s, 1H), 7.08 (d, *J* = 8.6 Hz, 1H), 3.99 (s, 3H), 3.41 (d, *J* = 12.0 Hz, 2H), 2.67 (t, *J* = 11.2 Hz, 2H), 1.79–1.72 (m, 2H), 1.55–1.40 (m, 3H), 1.01 (d, *J* = 5.8 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.24, 152.84, 150.08, 144.71, 138.78, 134.34, 133.41, 131.37, 129.28, 128.74, 123.77, 120.90, 120.69, 116.52, 116.38, 52.90, 52.19, 34.50, 30.69, 21.98; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{23}ClN_3O_2$ 396.14341, found 396.14694.

Methyl (E)-4-cyano-3-(((4-(3-methyl-2-oxoimidazolidin-1-yl)phenyl)imino)methyl)benzoate (115)

Yellow solid, 100.65 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 8.94 (d, *J* = 1.7 Hz, 1H), 8.91 (s, 1H), 8.17 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.67–7.63 (m, 2H), 7.42–7.38 (m, 2H), 3.99 (s, 3H), 3.88–3.83 (m, 2H), 3.54–3.48 (m, 2H), 2.92 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.28, 157.93, 152.12, 144.02, 140.53, 139.07, 134.27, 133.31, 131.10, 128.62, 122.22, 117.65, 116.43, 116.39, 52.82, 43.99, 42.33, 31.22; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{19}N_4O_3$ 363.14125, found 363.14517.

Tert-butyl (E)-4-(4-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)phenyl)piperazine-1-carboxylate (116)

Dark brown solid, 125.11 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 8.93 (d, *J* = 1.7 Hz, 1H), 8.90 (s, 1H), 8.14 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.80 (d, *J* = 8.1 Hz, 1H), 7.37 (d, *J* = 8.9 Hz, 2H), 6.96 (d, *J* = 9.0 Hz, 2H), 3.98 (s, 3H), 3.60 (t, *J* = 5.2 Hz, 4H), 3.21 (t, *J* = 5.2 Hz, 4H), 1.49 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.29, 154.66, 150.95, 150.69, 141.87, 139.26, 134.19, 133.23, 130.80, 128.41, 122.88, 116.48, 116.46, 116.17, 80.00, 52.77, 48.85, 28.39; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{25}H_{29}N_4O_4$ 449.21441, found 449.21776.

Methyl (E)-4-cyano-3-(((4-(1-methyl-1H-pyrazol-4-yl)phenyl)imino)methyl)benzoate (117)

Red-brown solid, 94.15 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 8.96 (d, *J* = 1.7 Hz, 1H), 8.93 (s, 1H), 8.20 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.80 (s, 1H), 7.66 (s, 1H), 7.55 (d, *J* = 8.5 Hz, 2H), 7.37 (d, *J* = 8.5 Hz, 2H), 4.00 (s, 3H), 3.97 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.18, 153.33, 148.20, 138.82, 136.71, 134.32, 133.32, 132.21, 131.33, 128.74, 127.00, 126.25, 122.54, 122.02, 116.57, 116.30, 52.80, 39.08; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{17}N_4O_2$ 345.13068, found 345.13394.

Methyl (E)-3-(((4-((1H-pyrazol-1-yl)methyl)phenyl)imino)methyl)-4-cyanobenzoate (118)

Orange solid, 94.22 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 8.92 (d, *J* = 1.7 Hz, 1H), 8.84 (s, 1H), 8.20 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.57 (d, *J* = 1.9 Hz, 1H), 7.42 (d, *J* = 2.3 Hz, 1H), 7.28 (s, 4H), 6.30 (t, *J* = 2.1 Hz, 1H), 5.37 (s, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.09, 154.71, 150.05, 139.65, 138.48, 135.86, 134.31, 133.34, 131.58, 129.27, 128.80, 128.64, 121.56, 116.72, 116.18, 106.08, 55.39, 52.83. HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{17}N_4O_2$ 345.13068, found 345.13413.

Methyl (E)-4-cyano-3-(((4-(1-methyl-1H-pyrazol-3-yl)phenyl)imino)methyl)benzoate (119)

Orange solid, 95.10 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 8.97 (d, *J* = 1.7 Hz, 1H), 8.94 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.90–7.86 (m, 2H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.42–7.37 (m, 3H), 6.58 (d, *J* = 2.3 Hz, 1H), 4.00 (s, 3H), 3.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.20, 153.58, 150.84, 149.24, 138.83, 134.32, 133.35, 133.05, 131.50, 131.39, 128.79, 126.42, 121.73, 116.61, 116.34, 102.99, 52.83, 39.09; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{20}H_{17}N_4O_2$ 345.13068, found 345.13434.

Methyl (E)-4-cyano-3-(((4-(pyridin-2-ylmethoxy)phenyl)imino)methyl)benzoate (120)

Orange solid, 102.66 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) *δ* 8.91 (d, *J* = 1.7 Hz, 1H), 8.85 (s, 1H), 8.61 (d, *J* = 4.5 Hz, 1H), 8.19 (dd, *J* = 8.1, 1.8 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.78 (td, *J* = 7.7, 1.7 Hz, 1H), 7.67 (d, *J* = 7.9 Hz, 1H), 7.49 (d, *J* = 2.5 Hz, 1H), 7.29–7.24 (m, 3H), 7.05 (d, *J* = 8.8 Hz, 1H), 5.34 (s, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) *δ* 165.12, 156.36, 153.40, 153.20, 148.95, 143.79, 138.54, 137.22, 134.31, 133.38, 131.45, 128.73, 123.70, 123.47, 122.88, 121.25, 121.21, 116.52, 116.28, 113.93, 71.32, 52.85; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{18}N_3O_3$ 372.13035, found 372.13494.

Methyl (E)-3-(((3-chloro-4-(pyridin-2-ylmethoxy)phenyl)imino)methyl)-4-cyanobenzoate (121)

Yellow solid, 113.21 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.7 Hz, 1H), 8.84 (s, 1H), 8.60 (dt, *J* = 5.0, 1.3 Hz, 1H), 8.19 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.77 (dd, *J* = 7.7, 1.8 Hz, 1H), 7.67 (d, *J* = 7.9 Hz, 1H), 7.48 (d, *J* = 2.5 Hz, 1H), 7.29–7.26 (m, 1H), 7.24 (d, *J* = 2.5 Hz, 1H), 7.04 (d, *J* = 8.7 Hz, 1H), 5.33 (s, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.12, 156.32, 153.38, 153.21, 148.86, 143.81, 138.54, 137.30, 134.31, 133.37, 131.45, 128.73, 123.71, 123.46, 122.90, 121.29, 121.21, 116.52, 116.28, 113.94, 71.27, 52.85; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{17}ClN_3O_3$ 406.09137, found 406.09531.

Methyl (E)-4-cyano-3-(((3-(pyridin-2-yl)phenyl)imino)methyl)benzoate (122)

Yellow solid, 92.21 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (s, 2H), 8.72 (d, *J* = 4.9 Hz, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.98–7.93 (m, 2H), 7.85 (d, *J* = 8.0 Hz, 1H), 7.79 (dd, *J* = 3.6, 1.3 Hz, 2H), 7.55 (t, *J* = 7.7 Hz, 1H), 7.41–7.37 (m, 1H), 7.28 (d, *J* = 9.7 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.12, 156.57, 154.69, 150.78, 149.65, 140.57, 138.61, 136.91, 134.31, 133.40, 131.55, 129.72, 128.93, 125.85, 122.47, 121.68, 120.68, 119.69, 116.64, 116.27, 52.82; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{21}H_{16}N_3O_2$ 342.11978, found 342.12360.

Methyl (E)-4-cyano-3-(((4-(pyridin-2-ylmethyl)phenyl)imino)methyl)benzoate (123)

Orange solid, 97.23 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.87 (s, 1H), 8.61–8.55 (m, 1H), 8.19 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.62 (td, *J* = 7.7, 1.8 Hz, 1H), 7.34 (d, *J* = 8.4 Hz, 2H), 7.28 (d, *J* = 8.4 Hz, 2H), 7.15 (ddd, *J* = 7.4, 2.8, 1.0 Hz, 2H), 4.21 (s, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.19, 160.57, 153.94, 149.30, 148.67, 139.03, 138.78, 136.77, 134.32, 133.31, 131.41, 130.07, 128.75, 123.18, 121.51, 121.43, 116.66, 116.28, 52.83, 44.13; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{18}N_3O_2$ 356.13543, found 356.13895.

Methyl (E)-4-cyano-3-(((4-(pyridin-3-yloxy)phenyl)imino)methyl)benzoate (124)

Yellow oil, 98.10 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.89 (s, 1H), 8.45 (d, *J* = 2.7 Hz, 1H), 8.40 (dd, *J* = 4.5, 1.5 Hz, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.39–7.36 (m, 2H), 7.36–7.34 (m, 1H), 7.33–7.29 (m, 1H), 7.12–7.08 (m, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.15, 155.84, 153.77, 153.73, 146.22, 144.42, 141.24, 138.61, 134.34, 133.38, 131.50, 128.75, 125.76, 124.25, 123.07, 119.66, 116.62, 116.29, 52.87; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{21}H_{16}N_3O_3$ 358.11470, found 358.11850.

Methyl (E)-4-cyano-3-(((4-((5-(trifluoromethyl)pyridin-2-yl)oxy)phenyl)imino)methyl)benzoate (125)

Yellow solid, 117.51 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.8 Hz, 1H), 8.90 (s, 1H), 8.48–8.45 (m, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.93 (dd, *J* = 8.7, 2.5 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.42 (d, *J* = 8.7 Hz, 2H), 7.23 (d, *J* = 8.7 Hz, 2H), 7.06 (d, *J* = 8.7 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.62, 165.14, 154.28, 152.47, 147.43, 145.43 (d, *J* = 4.4 Hz), 138.58, 136.81 (d, *J* = 3.8 Hz), 134.33, 133.37, 131.54, 128.80, 122.69, 122.34, 122.27, 121.73 (d, *J* = 33.4 Hz), 116.70, 116.24, 111.48, 52.85; ^{19}F NMR (376 MHz, $CDCl_3$) δ -61.67; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{15}F_3N_3O_3$ 426.10208, found 426.10663.

Methyl (E)-4-cyano-3-(((4-((2-oxopyridin-1(2H)-yl)methyl)phenyl)imino)methyl)benzoate (126)

Yellow solid, 103.56 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.84 (s, 1H), 8.21 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.37 (td, *J* = 5.6, 1.9 Hz, 2H), 7.35–7.31 (m, 1H), 7.31–7.27 (m, 3H), 6.64 (dt, *J* = 9.0, 1.2 Hz, 1H), 6.18 (td, *J* = 6.7, 1.4 Hz, 1H), 5.18 (s, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.06, 162.63, 154.74, 150.05, 139.56, 138.43, 137.13, 135.54, 134.27, 133.33, 131.58, 129.14, 128.78, 121.59, 121.20, 116.67, 116.16, 106.43, 52.82, 51.56; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{22}H_{18}N_3O_3$ 372.13035, found 372.13391.

Methyl (E)-4-cyano-3-(((2,3,5,6,8,9,11,12-octahydrobenzo[b][1,4,7,10,13]**pentaoxacyclopentadecin-15-yl)imino)methyl)benzoate (127)**

Yellow solid, 126.11 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.6 Hz, 1H), 8.85 (s, 1H), 8.15 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.80 (d, *J* = 8.0 Hz, 1H), 6.99–6.93 (m, 2H), 6.90 (d, *J* = 9.1 Hz, 1H), 4.22–4.15 (m, 4H), 3.98 (d, *J* = 1.1 Hz, 3H), 3.93 (dq, *J* = 4.4, 2.4 Hz, 4H), 3.80–3.73 (m, 8H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.19, 151.88, 149.53, 149.12, 143.59, 138.94, 134.24, 133.29, 131.05, 128.55, 116.38, 116.30, 113.98, 113.89, 107.94, 71.00, 70.39, 70.36, 69.45, 69.40, 69.07, 68.90, 52.76; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{24}H_{27}N_2O_7$ 455.17736, found 455.18143.

Methyl (E)-4-cyano-3-(((2,2-difluorobenzo[d][1,3]**dioxol-5-yl)imino)methyl)benzoate (128)**

Yellow solid, 94.12 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 (d, *J* = 1.7 Hz, 1H), 8.83 (s, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.11 (td, *J* = 5.0, 2.4 Hz, 3H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.07, 154.38, 146.39, 144.42, 143.06, 138.20, 134.39, 133.46, 131.78, 131.75, 128.91, 117.12, 116.71, 116.17, 109.75, 103.08, 52.89; ^{19}F NMR (376 MHz, $CDCl_3$) δ -49.67; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{17}H_{11}F_2N_2O_4$ 345.06422, found 345.06753.

Methyl (E)-4-cyano-3-(((2,3-dihydrobenzofuran-7-yl)imino)methyl)benzoate (129)

Yellow solid, 83.86 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.86 (d, J = 2.1 Hz, 2H), 8.22 (dd, J = 8.1, 1.7 Hz, 1H), 7.85 (d, J = 8.1 Hz, 1H), 7.36 (t, J = 7.6 Hz, 1H), 7.19 (d, J = 7.5 Hz, 1H), 7.09 (d, J = 7.8 Hz, 1H), 5.31–5.27 (m, 2H), 5.19 (d, J = 2.2 Hz, 2H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.09, 154.83, 144.44, 140.76, 138.37, 134.30, 133.56, 131.67, 129.10, 128.84, 119.88, 116.56, 116.27, 73.82, 72.71, 52.90; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{18}H_{15}N_2O_3$ 307.10380, found 307.10773.

Methyl (E)-4-cyano-3-(((1,3-dihydroisobenzofuran-5-yl)imino)methyl)benzoate (130)

Orange solid, 85.84 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, J = 1.7 Hz, 1H), 8.89 (s, 1H), 8.21 (dd, J = 8.1, 1.7 Hz, 1H), 7.84 (d, J = 8.1 Hz, 1H), 7.30 (d, J = 8.0 Hz, 1H), 7.24 (dd, J = 8.0, 1.9 Hz, 1H), 7.20 (d, J = 1.9 Hz, 1H), 5.15 (s, 4H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 154.23, 149.88, 140.65, 138.59, 138.48, 134.33, 133.35, 131.52, 128.78, 121.71, 120.84, 116.65, 116.26, 113.62, 73.34, 73.30, 52.85; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{18}H_{15}N_2O_3$ 307.10380, found 307.10654.

Methyl (E)-3-((benzofuran-5-ylimino)methyl)-4-cyanobenzoate (131)

Orange solid, 83.86 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (d, J = 1.7 Hz, 1H), 8.94 (s, 1H), 8.18 (dd, J = 8.0, 1.7 Hz, 1H), 7.82 (d, J = 8.1 Hz, 1H), 7.67 (d, J = 2.2 Hz, 1H), 7.58 (d, J = 2.2 Hz, 1H), 7.54 (d, J = 8.6 Hz, 1H), 7.35 (dd, J = 8.7, 2.2 Hz, 1H), 6.82 (d, J = 2.2 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.21, 154.44, 153.24, 146.17, 145.73, 138.89, 134.31, 133.30, 131.23, 128.70, 128.28, 118.68, 116.53, 116.36, 113.37, 111.94, 106.99, 52.80; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{18}H_{13}N_2O_3$ 305.08815, found 305.09138.

Ethyl (E)-5-((2-cyano-5-(methoxycarbonyl)benzylidene)amino)benzofuran-2-carboxylate (132)

Yellow solid, 104.55 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.95 (d, J = 1.7 Hz, 1H), 8.92 (s, 1H), 8.21 (dd, J = 8.1, 1.7 Hz, 1H), 7.84 (d, J = 8.1 Hz, 1H), 7.66–7.60 (m, 2H), 7.56 (s, 1H), 7.48 (dd, J = 8.8, 2.2 Hz, 1H), 4.46 (q, J = 7.2 Hz, 2H), 4.00 (s, 3H), 1.44 (t, J = 7.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.12, 159.31, 154.95, 154.16, 146.82, 146.60, 138.54, 134.33, 133.38, 131.52, 128.79, 127.76, 122.09, 116.62, 116.29, 114.47, 113.92, 113.03, 61.66, 52.87, 14.30; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{21}H_{17}N_2O_5$ 377.10928, found 377.11343.

Methyl (E)-4-cyano-3-((dibenzo[b,d]furan-2-ylimino)methyl)benzoate (133)

Yellow solid, 100.20 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.00 (s, 1H), 8.98 (d, J = 1.7 Hz, 1H), 8.20 (dd, J = 8.0, 1.7 Hz, 1H), 8.00 (d, J = 7.6 Hz, 1H), 7.95 (d, J = 2.2 Hz, 1H), 7.85 (d, J = 8.0 Hz, 1H), 7.61 (dd, J = 11.7, 8.4 Hz, 2H), 7.51 (dt, J = 8.7, 2.0 Hz, 2H), 7.38 (t, J = 7.5 Hz, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.21, 156.90, 155.63, 153.31, 145.45, 138.80, 134.32, 133.39, 131.34, 128.76, 127.65, 125.15, 124.01, 122.96, 121.29, 120.93, 116.50, 116.43, 113.15, 112.25, 111.84, 52.86; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{22}H_{15}N_2O_3$ 355.10380, found 355.10773.

Methyl (E)-4-cyano-3-(((4-(tetrahydro-2H-pyran-4-yl)phenyl)imino)methyl)benzoate (134)

Red-brown solid, 95.16 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.95 (d, J = 1.7 Hz, 1H), 8.89 (s, 1H), 8.20 (dd, J = 8.1, 1.7 Hz, 1H), 7.83 (d, J = 8.1 Hz, 1H), 7.31 (s, 4H), 4.14–4.08 (m, 2H), 4.00 (s, 3H), 3.55 (td, J = 11.4, 3.0 Hz, 2H), 2.87–2.77 (m, 1H), 1.87–1.78 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.17, 153.79, 148.48, 145.46, 138.78, 134.29, 133.30, 131.37, 128.70, 127.64, 121.43, 116.63, 116.28, 68.29, 52.82, 41.18, 33.86; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{21}H_{21}N_2O_3$ 349.15075, found 349.15432.

Methyl (E)-4-cyano-3-(((4-(furan-2-yl)phenyl)imino)methyl)benzoate (135)

Dark brown solid, 91.24 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (d, J = 1.7 Hz, 1H), 8.92 (s, 1H), 8.20 (dd, J = 8.1, 1.7 Hz, 1H), 7.84 (d, J = 8.1 Hz, 1H), 7.76–7.72 (m, 2H), 7.50 (d, J = 1.8 Hz, 1H), 7.38 (d, J = 8.5 Hz, 2H), 6.70 (d, J = 3.5 Hz, 1H), 6.50 (dd, J = 3.4, 1.8 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.18, 153.65, 153.36, 148.89, 142.38, 138.71, 134.31, 133.36, 131.45, 130.25, 128.77, 124.70, 121.88, 116.62, 116.31, 111.85, 105.52, 52.86; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{20}H_{15}N_2O_3$ 331.10380, found 331.10768.

Methyl (E)-3-(((3-benzyl-2-oxo-2,3-dihydrobenzo[d]oxazol-6-yl)imino)methyl)-4-cyanobenzoate (136)

Yellow solid, 113.60 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (d, J = 1.7 Hz, 1H), 8.85 (s, 1H), 8.20 (dd, J = 8.0, 1.7 Hz, 1H), 7.84 (d, J = 8.1 Hz, 1H), 7.38 (d, J = 4.6 Hz, 3H), 7.36–7.31 (m, 2H), 7.29 (d, J = 1.9 Hz, 1H), 7.15 (dd, J = 8.3, 2.0 Hz, 1H), 6.88 (d, J = 8.3 Hz, 1H), 5.05 (s, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.12, 154.75, 153.53, 145.50, 143.24, 138.44, 134.38, 134.35, 133.41, 131.54, 130.38, 129.06, 128.81, 128.43, 127.65, 117.81, 116.59, 116.26, 109.14, 103.66, 52.89, 46.29; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{24}H_{18}N_3O_4$ 412.12526, found 412.12884.

Methyl (E)-3-((benzo[d]oxazol-6-ylimino)methyl)-4-cyanobenzoate (137)

Yellow solid, 82.66 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (d, J = 1.7 Hz, 1H), 8.92 (s, 1H), 8.22 (dd, J = 8.0, 1.7 Hz, 1H), 8.14 (s, 1H), 7.84 (dd, J = 12.2, 8.2 Hz, 2H), 7.56 (d, J = 2.0 Hz, 1H), 7.40 (dd, J = 8.5, 2.0 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.09, 154.93, 153.36, 150.56, 148.43, 139.43, 138.35, 134.38, 133.44, 131.72, 128.90, 120.86, 118.95, 116.76, 116.22, 103.76, 52.90; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{12}N_3O_3$ 306.08340, found 306.08734.

Methyl (E)-4-cyano-3-(((3-methyl-2-oxo-2,3-dihydrobenzo[d]oxazol-6-yl)imino)methyl)benzoate (138)

Yellow solid, 92.33 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.89 (s, 1H), 8.21 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.85 (dd, *J* = 8.1, 0.6 Hz, 1H), 7.31–7.28 (m, 1H), 7.26 (d, *J* = 2.0 Hz, 1H), 7.02 (d, *J* = 8.2 Hz, 1H), 4.01 (s, 3H), 3.46 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.12, 154.73, 153.39, 145.38, 143.20, 138.48, 134.37, 133.44, 131.54, 131.35, 128.83, 118.00, 116.57, 116.30, 108.23, 103.52, 52.89, 28.30; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{18}H_{14}N_3O_4$ 336.09396, found 336.09772.

Methyl (E)-4-cyano-3-(((2-methylbenzo[d]oxazol-5-yl)imino)methyl)benzoate (139)

Red-brown solid, 86.66 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.95 (d, *J* = 1.7 Hz, 1H), 8.91 (s, 1H), 8.20 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.61 (d, *J* = 2.0 Hz, 1H), 7.50 (d, *J* = 8.6 Hz, 1H), 7.32 (dd, *J* = 8.6, 2.1 Hz, 1H), 3.99 (s, 3H), 2.66 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.20, 165.15, 154.20, 150.36, 147.12, 142.35, 138.57, 134.30, 133.36, 131.48, 128.78, 118.68, 116.66, 116.26, 111.69, 110.56, 52.85, 14.62; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{18}H_{14}N_3O_3$ 320.09905, found 320.10263.

Methyl (E)-4-cyano-3-(((4-methyl-3-oxo-3,4-dihydro-2H-benzo[b][1,4]oxazin-6-yl)imino)methyl) benzoate (140)

Orange solid, 95.96 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.7 Hz, 1H), 8.87 (s, 1H), 8.20 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.03 (s, 3H), 4.66 (s, 2H), 3.99 (s, 3H), 3.41 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.10, 164.29, 153.31, 145.11, 144.64, 138.52, 134.32, 133.41, 131.47, 130.10, 128.71, 117.37, 116.52, 116.28, 115.30, 109.72, 67.54, 52.87, 28.13; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{19}H_{16}N_3O_4$ 350.10961, found 350.11389.

Methyl (E)-4-cyano-3-(((3-(oxazol-5-yl)phenyl)imino)methyl)benzoate (141)

Yellow solid, 90.20 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (d, *J* = 1.7 Hz, 1H), 8.91 (s, 1H), 8.24 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.97 (s, 1H), 7.87 (d, *J* = 8.1 Hz, 1H), 7.64–7.59 (m, 2H), 7.54–7.48 (m, 1H), 7.44 (s, 1H), 7.31–7.27 (m, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.07, 155.28, 150.99, 150.92, 150.67, 138.35, 134.39, 133.45, 131.79, 130.03, 128.94, 128.88, 123.17, 122.12, 120.86, 117.38, 116.79, 116.20, 52.89; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{19}H_{14}N_3O_3$ 332.09905, found 332.10260.

Methyl (E)-4-cyano-3-(((3-(isoxazol-5-yl)phenyl)imino)methyl)benzoate (142)

Yellow solid, 90.75 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (d, *J* = 1.7 Hz, 1H), 8.92 (s, 1H), 8.33 (d, *J* = 1.8 Hz, 1H), 8.25 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.87 (dd, *J* = 8.1, 0.5 Hz, 1H), 7.78–7.74 (m, 1H), 7.72 (t, *J* = 1.9 Hz, 1H), 7.56 (t, *J* = 7.8 Hz, 1H), 7.38 (ddd, *J* = 7.9, 2.2, 1.1 Hz, 1H), 6.60 (d, *J* = 1.9 Hz, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.69, 165.07, 155.58, 151.09, 150.86, 138.31, 134.47, 133.49, 131.89, 130.15, 129.05, 128.44, 124.63, 122.36, 118.92, 116.86, 116.18, 99.27, 52.89; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{19}H_{14}N_3O_3$ 332.09905, found 332.10284.

Methyl (E)-4-cyano-3-(((3-morpholinophenyl)imino)methyl)benzoate (143)

Red solid, 95.43 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.6 Hz, 1H), 8.87 (s, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.83 (d, *J* = 8.0 Hz, 1H), 7.33 (t, *J* = 7.9 Hz, 1H), 6.89–6.79 (m, 3H), 3.99 (s, 3H), 3.90–3.86 (m, 4H), 3.24–3.20 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.15, 154.33, 152.18, 151.44, 138.70, 134.31, 133.35, 131.47, 129.96, 128.77, 116.67, 116.27, 114.56, 111.55, 109.11, 66.81, 52.83, 49.08; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{20}H_{20}N_3O_3$ 350.14600, found 350.14981.

Methyl (E)-4-cyano-3-(((4-morpholinophenyl)imino)methyl)benzoate (144)

Dark brown solid, 96.27 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.91 (s, 1H), 8.14 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.80 (d, *J* = 8.1 Hz, 1H), 7.39 (d, *J* = 8.9 Hz, 2H), 6.96 (d, *J* = 8.9 Hz, 2H), 3.99 (s, 3H), 3.88 (t, *J* = 4.8 Hz, 4H), 3.23 (t, *J* = 4.8 Hz, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.32, 151.09, 150.60, 141.76, 139.32, 134.22, 133.24, 130.79, 128.42, 122.91, 116.50, 116.19, 115.66, 66.75, 52.78, 48.85; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{20}H_{20}N_3O_3$ 350.14600, found 350.15005.

Methyl (E)-3-((benzo[b]thiophen-5-ylimino)methyl)-4-cyanobenzoate (145)

Orange solid, 90.03 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.00 (d, *J* = 2.5 Hz, 2H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.93 (d, *J* = 8.6 Hz, 1H), 7.85 (d, *J* = 8.0 Hz, 1H), 7.79 (d, *J* = 2.0 Hz, 1H), 7.52 (d, *J* = 5.4 Hz, 1H), 7.42–7.38 (m, 2H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.22, 153.88, 147.12, 140.48, 138.93, 138.81, 134.34, 133.37, 131.41, 128.78, 127.93, 124.16, 123.17, 118.42, 116.61, 116.38, 115.84, 52.87; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{18}H_{13}N_2O_2S$ 321.06530, found 321.06882.

Methyl (E)-4-cyano-3-(((4-(thiophen-3-yl)phenyl)imino)methyl)benzoate (146)

Red-brown solid, 94.99 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (d, *J* = 1.7 Hz, 1H), 8.94 (s, 1H), 8.21 (dd, *J* = 8.2, 1.7 Hz, 1H), 7.85 (d, *J* = 8.2 Hz, 1H), 7.68 (d, *J* = 8.6 Hz, 2H), 7.51 (dd, *J* = 2.8, 1.6 Hz, 1H), 7.44–7.37 (m, 4H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.20, 153.81, 148.95, 141.47, 138.74, 135.23, 134.33, 133.36, 131.47, 128.78, 127.30, 126.45, 126.16, 121.90, 120.53, 116.66, 116.32, 52.87; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{20}H_{15}N_2O_2S$ 347.08095, found 347.08430.

Methyl (E)-4-cyano-3-(((2-methylbenzo[d]thiazol-5-yl)imino)methyl)benzoate (147)

Yellow solid, 93.35 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (d, *J* = 1.7 Hz, 1H), 8.95 (s, 1H), 8.20 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.88 (d, *J* = 2.0 Hz, 1H), 7.84 (dd, *J* = 8.3, 4.1 Hz, 2H), 7.37 (dd, *J* = 8.4, 2.1 Hz, 1H), 4.00 (s, 3H), 2.85 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.62, 165.13, 154.72, 154.23, 148.83, 138.51, 134.63, 134.29, 133.34, 131.56, 128.80, 121.85, 118.90, 116.77, 116.19, 114.38, 52.85, 20.25; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{18}H_{14}N_3O_2S$ 336.07620, found 336.08017.

Methyl (E)-4-cyano-3-(((2-morpholinobenzo[d]thiazol-5-yl)imino)methyl)benzoate (148)

Red-brown solid, 115.02 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (d, *J* = 1.7 Hz, 1H), 8.94 (s, 1H), 8.19 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.64 (d, *J* = 8.3 Hz, 1H), 7.54 (d, *J* = 2.0 Hz, 1H), 7.15 (dd, *J* = 8.3, 2.1 Hz, 1H), 4.00 (s, 3H), 3.87–3.83 (m, 4H), 3.68–3.63 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 169.85, 165.19, 153.86, 153.42, 148.95, 138.74, 134.23, 133.29, 131.34, 129.80, 128.72, 121.15, 116.67, 116.37, 116.26, 110.85, 66.17, 52.81, 48.42; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{21}H_{19}N_4O_3S$ 407.11332, found 407.11758.

Methyl (E)-3-(((2-chlorobenzo[d]thiazol-6-yl)imino)methyl)-4-cyanobenzoate (149)

Yellow solid, 100.59 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, *J* = 1.7 Hz, 1H), 8.91 (s, 1H), 8.22 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.98 (d, *J* = 8.7 Hz, 1H), 7.85 (d, *J* = 8.0 Hz, 1H), 7.72 (d, *J* = 2.0 Hz, 1H), 7.48 (dd, *J* = 8.7, 2.1 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.04, 155.11, 153.50, 150.25, 148.00, 138.24, 137.16, 134.39, 133.46, 131.81, 128.95, 123.47, 120.86, 116.74, 116.20, 113.52, 52.91; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{11}ClN_3O_2S$ 356.02158, found 356.02506.

Methyl (E)-3-((benzo[d]isothiazol-5-ylimino)methyl)-4-cyanobenzoate (150)

Yellow solid, 90.35 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.99 (s, 2H), 8.97 (d, *J* = 0.9 Hz, 1H), 8.24 (dd, *J* = 8.1, 1.7 Hz, 1H), 8.02 (dd, *J* = 8.6, 0.9 Hz, 1H), 7.97 (dd, *J* = 2.0, 0.6 Hz, 1H), 7.87 (d, *J* = 8.1 Hz, 1H), 7.58 (dd, *J* = 8.6, 1.9 Hz, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.09, 155.13, 155.10, 150.64, 147.85, 138.37, 137.06, 134.43, 133.47, 131.78, 128.95, 122.43, 120.37, 116.77, 116.25, 115.55, 52.92; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{12}N_3O_2S$ 322.06055, found 322.06348.

Methyl (E)-4-cyano-3-(((3-(thiazol-4-yl)phenyl)imino)methyl)benzoate (151)

Orange solid, 95.62 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.96 (d, *J* = 1.7 Hz, 1H), 8.94 (s, 1H), 8.90 (d, *J* = 2.0 Hz, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.88 (dt, *J* = 3.8, 1.8 Hz, 2H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.62 (d, *J* = 2.0 Hz, 1H), 7.51 (t, *J* = 8.0 Hz, 1H), 7.31 (ddd, *J* = 7.9, 2.1, 1.1 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 155.63, 154.76, 152.98, 150.84, 138.60, 135.40, 134.35, 133.41, 131.59, 129.81, 128.95, 125.39, 120.83, 119.33, 116.68, 116.27, 113.29, 52.84; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{19}H_{14}N_3O_2S$ 348.07620, found 348.08066.

Methyl (E)-4-cyano-3-(((4-(thiazol-2-yloxy)phenyl)imino)methyl)benzoate (152)

Yellow solid, 100.45 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, *J* = 1.7 Hz, 1H), 8.88 (s, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.42–7.35 (m, 4H), 7.28–7.25 (m, 1H), 6.86 (d, *J* = 3.8 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.50, 165.06, 154.52, 154.43, 147.65, 138.42, 137.51, 134.27, 133.34, 131.55, 128.76, 122.70, 120.94, 116.65, 116.17, 113.16, 52.82; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{19}H_{14}N_3O_3S$ 364.07112, found 364.07477.

Methyl (E)-4-cyano-3-((2-(o-tolyl)hydrazineylidene)methyl)benzoate (153)

Dark brown solid, 80.99 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.69 (d, *J* = 1.6 Hz, 1H), 8.10 (d, *J* = 4.9 Hz, 2H), 7.95 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.70 (d, *J* = 8.1 Hz, 1H), 7.64 (d, *J* = 8.1 Hz, 1H), 7.29–7.23 (m, 1H), 7.12 (d, *J* = 7.4 Hz, 1H), 6.90 (td, *J* = 7.3, 1.2 Hz, 1H), 4.00 (s, 3H), 2.30 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.57, 141.29, 138.93, 134.01, 133.04, 131.90, 130.57, 128.08, 127.42, 126.63, 121.08, 120.82, 117.13, 113.38, 112.71, 52.74, 17.02; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{17}H_{16}N_3O_2$ 294.11978, found 294.12307.

Methyl (E)-3-((2-(4-(tert-butyl)phenyl)hydrazineylidene)methyl)-4-cyanobenzoate (154)

Yellow solid, 92.36 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.63 (d, *J* = 1.6 Hz, 1H), 8.19 (s, 1H), 7.97 (s, 1H), 7.93 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.69 (d, *J* = 8.1 Hz, 1H), 7.35 (d, *J* = 8.7 Hz, 2H), 7.14 (d, *J* = 8.7 Hz, 2H), 3.99 (s, 3H), 1.32 (s, 9H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.64, 144.37, 141.04, 139.08, 133.94, 133.13, 130.52, 127.82, 126.66, 126.23, 117.20, 113.01, 112.46, 52.73, 34.19, 31.46; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{20}H_{22}N_3O_2$ 336.16673, found 336.17081.

Methyl (E)-3-((2-(4-(benzyloxy)phenyl)hydrazineylidene)methyl)-4-cyanobenzoate (155)

Red-brown solid, 105.37 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.61–8.58 (m, 1H), 8.19 (s, 1H), 7.93–7.88 (m, 2H), 7.66 (d, *J* = 8.3 Hz, 1H), 7.44 (d, *J* = 7.0 Hz, 2H), 7.39 (t, *J* = 7.2 Hz, 2H), 7.33 (d, *J* = 7.4 Hz, 1H), 7.13 (d, *J* = 7.9 Hz, 2H), 6.96 (d, *J* = 8.4 Hz, 2H), 5.04 (s, 2H), 3.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.64, 153.81, 139.14, 137.64, 137.20, 133.89, 133.11, 130.15, 128.53, 127.88, 127.62, 127.47, 126.54, 117.23, 116.04, 114.39, 112.24, 70.59, 52.70; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{23}H_{20}N_3O_3$ 386.14600, found 386.15051.

Methyl (E)-4-cyano-3-((2-(2-(trifluoromethyl)phenyl)hydrazineylidene)methyl)benzoate (156)

Yellow solid, 94.20 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.62 (s, 1H), 8.46 (s, 1H), 8.10 (d, J = 1.6 Hz, 1H), 8.01 (dd, J = 7.6, 1.7 Hz, 1H), 7.90 (d, J = 8.3 Hz, 1H), 7.75 (d, J = 7.6 Hz, 1H), 7.54 (dd, J = 10.9, 7.8 Hz, 2H), 7.00 (t, J = 7.4 Hz, 1H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.40, 141.09, 138.08, 134.19, 134.10, 133.51, 133.44, 128.83, 127.40, 126.20 (d, J = 5.2 Hz), 125.94, 120.43, 117.05, 115.45, 113.20, 112.89, 52.81; ^{19}F NMR (376 MHz, $CDCl_3$) δ -60.41; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{17}H_{13}F_3N_3O_2$ 348.09152, found 348.09491.

Methyl (E)-3-((2-(2-bromophenyl)hydrazineylidene)methyl)-4-cyanobenzoate (157)

Yellow solid, 97.15 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.64 (d, J = 1.6 Hz, 1H), 8.53 (s, 1H), 8.12 (d, J = 1.2 Hz, 1H), 7.99 (dd, J = 8.1, 1.6 Hz, 1H), 7.74 (d, J = 8.1 Hz, 1H), 7.70 (dd, J = 8.2, 1.6 Hz, 1H), 7.47 (dd, J = 8.0, 1.4 Hz, 1H), 7.33 (td, J = 7.8, 1.4 Hz, 1H), 6.82 (td, J = 7.7, 1.6 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.46, 140.33, 138.32, 134.04, 133.47, 133.36, 132.39, 128.77, 128.58, 127.13, 121.96, 117.08, 115.05, 113.07, 107.30, 52.80; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{16}H_{13}BrN_3O_2$ 358.01464, found 358.01860.

Methyl (E)-4-cyano-3-((2-(2-fluorophenyl)hydrazineylidene)methyl)benzoate (158)

Orange solid, 79.28 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.63 (d, J = 1.7 Hz, 1H), 8.29 (s, 1H), 8.08 (d, J = 1.3 Hz, 1H), 7.98 (dd, J = 8.1, 1.7 Hz, 1H), 7.73 (d, J = 8.1 Hz, 1H), 7.71–7.66 (m, 1H), 7.16 (t, J = 7.7 Hz, 1H), 7.06 (ddd, J = 11.8, 8.2, 1.4 Hz, 1H), 6.88 (dddd, J = 8.2, 6.7, 5.0, 1.7 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.50, 151.01, 148.62, 138.42, 134.04, 133.26 (d, J = 16.7 Hz), 131.86 (d, J = 8.9 Hz), 128.48, 127.08, 125.06 (d, J = 3.6 Hz), 120.89 (d, J = 7.1 Hz), 117.05, 115.01 (d, J = 17.7 Hz), 115.00 (d, J = 2.1 Hz), 112.99, 52.78; ^{19}F NMR (376 MHz, $CDCl_3$) δ -136.50 (ddt, J = 12.0, 8.1, 4.4 Hz); HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{16}H_{13}FN_3O_2$ 298.09471, found 298.09790.

Methyl (E)-3-((2-(3-chlorophenyl)hydrazineylidene)methyl)-4-cyanobenzoate (159)

Orange solid, 87.25 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.64 (d, J = 1.7 Hz, 1H), 8.26 (s, 1H), 8.01 (s, 1H), 7.98 (dd, J = 8.1, 1.7 Hz, 1H), 7.72 (d, J = 8.1 Hz, 1H), 7.25–7.19 (m, 2H), 7.05–7.01 (m, 1H), 6.91 (ddd, J = 7.8, 2.1, 1.0 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.52, 144.59, 138.46, 135.28, 134.12, 133.20, 132.29, 130.44, 128.49, 126.83, 121.24, 117.00, 113.28, 112.99, 111.44, 52.82; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{16}H_{13}ClN_3O_2$ 314.06516, found 314.06923.

Methyl (E)-4-cyano-3-((2-(2,3-dimethylphenyl)hydrazineylidene)methyl)benzoate (160)

Red solid, 85.13 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.65 (d, J = 1.7 Hz, 1H), 8.12 (s, 1H), 7.94 (s, 1H), 7.92 (dd, J = 8.1, 1.7 Hz, 1H), 7.68 (d, J = 8.1 Hz, 1H), 7.07 (d, J = 8.1 Hz, 1H), 6.99 (d, J = 2.4 Hz, 1H), 6.94 (dd, J = 8.0, 2.4 Hz, 1H), 3.99 (s, 3H), 2.27 (s, 3H), 2.22 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.67, 141.39, 139.12, 137.71, 133.89, 133.08, 130.41, 130.29, 129.53, 127.69, 126.60, 117.20, 114.59, 112.41, 110.68, 52.73, 20.01, 18.98; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{18}H_{18}N_3O_2$ 308.13543, found 308.13992.

Methyl (E)-3-((2-(2-chloro-4-fluorophenyl)hydrazineylidene)methyl)-4-cyanobenzoate (161)

Yellow solid, 90.06 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.59 (d, J = 1.6 Hz, 1H), 8.40 (s, 1H), 8.10 (s, 1H), 7.99 (dd, J = 8.0, 1.7 Hz, 1H), 7.74 (d, J = 8.1 Hz, 1H), 7.67 (dd, J = 9.1, 5.3 Hz, 1H), 7.11–7.00 (m, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.43, 156.84 (d, J = 242.7 Hz), 138.19, 136.20 (d, J = 2.9 Hz), 134.05, 133.57, 133.45, 128.61, 127.18, 117.41 (d, J = 10.3 Hz), 117.11, 116.31 (d, J = 26.0 Hz), 115.46 (d, J = 8.0 Hz), 115.25 (d, J = 22.2 Hz), 113.00, 52.82; ^{19}F NMR (376 MHz, $CDCl_3$) δ -121.75 (td, J = 8.0, 5.2 Hz); HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{16}H_{12}ClFN_3O_2$ 332.05574, found 332.05927.

Methyl (E)-3-((2-(2-chloro-4-methylphenyl)hydrazineylidene)methyl)-4-cyanobenzoate (162)

Yellow solid, 90.25 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.60 (d, J = 1.7 Hz, 1H), 8.46 (s, 1H), 8.06 (d, J = 1.3 Hz, 1H), 7.95 (dd, J = 8.1, 1.7 Hz, 1H), 7.70 (d, J = 8.1 Hz, 1H), 7.58 (d, J = 8.3 Hz, 1H), 7.11 (d, J = 1.9 Hz, 1H), 7.09–7.05 (m, 1H), 3.99 (s, 3H), 2.28 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.49, 138.49, 137.07, 133.95, 133.27, 132.80, 131.21, 129.45, 128.79, 128.29, 126.97, 117.25, 117.09, 114.65, 112.85, 52.74, 20.37; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{17}H_{15}ClN_3O_2$ 328.08081, found 328.08445.

Methyl (E)-4-cyano-3-((2-(2,4-dimethylphenyl)hydrazineylidene)methyl)benzoate (163)

Brown-red oil, 87.35 mg, 95% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.69 (d, J = 1.6 Hz, 1H), 8.07 (s, 1H), 7.99 (s, 1H), 7.94 (dd, J = 8.1, 1.6 Hz, 1H), 7.69 (d, J = 8.1 Hz, 1H), 7.51 (d, J = 8.2 Hz, 1H), 7.06 (dd, J = 8.2, 2.1 Hz, 1H), 6.94 (d, J = 2.0 Hz, 1H), 3.99 (d, J = 1.0 Hz, 3H), 2.29 (s, 3H), 2.26 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.65, 139.09, 138.97, 134.00, 133.02, 131.30, 131.26, 130.57, 127.92, 126.58, 120.94, 117.18, 113.67, 112.62, 52.74, 20.58, 16.98; HRMS-ESI (*m/z*) $[M+H]^+$ calculated for $C_{18}H_{18}N_3O_2$ 308.13543, found 308.13851.

Methyl (E)-4-cyano-3-((2-(2,4-difluorophenyl)hydrazineylidene)methyl)benzoate (164)

Yellow solid, 83.14 mg, 88% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.60 (d, J = 1.6 Hz, 1H), 8.15 (s, 1H), 8.07 (d, J = 1.3 Hz, 1H), 7.99 (dd, J = 8.1, 1.7 Hz, 1H), 7.74 (d, J = 8.2 Hz, 1H), 7.65 (td, J = 9.1, 5.7 Hz, 1H), 6.95–6.84 (m, 2H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.47, 138.26, 134.03, 133.45, 133.30, 128.54, 127.14, 117.10, 115.45 (d, J = 3.5 Hz), 115.36 (d, J = 3.4 Hz), 112.93, 111.84 (d, J = 3.6 Hz), 111.62 (d, J = 3.7 Hz), 103.71 (d, J = 5.1 Hz), 103.71 (d, J = 48.8 Hz), 52.82; ^{19}F NMR (376 MHz, $CDCl_3$) δ -120.64 – -120.77 , -132.56 (t, J = 10.6 Hz); HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{16}H_{12}F_2N_3O_2$ 316.08529, found 316.08945.

Methyl (E)-4-cyano-3-((2-(2,5-dichlorophenyl)hydrazineylidene)methyl)benzoate (165)

Yellow solid, 95.21 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.65 (d, J = 1.6 Hz, 1H), 8.47 (s, 1H), 8.15 (s, 1H), 8.03 (dd, J = 8.1, 1.7 Hz, 1H), 7.75 (d, J = 8.1 Hz, 1H), 7.69 (d, J = 2.5 Hz, 1H), 7.23 (d, J = 8.5 Hz, 1H), 6.85 (dd, J = 8.5, 2.5 Hz, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.39, 140.23, 137.87, 134.80, 134.22, 134.13, 133.33, 130.09, 129.08, 127.12, 121.21, 116.91, 115.68, 114.61, 113.53, 52.87; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{16}H_{12}Cl_2N_3O_2$ 348.02619, found 348.02931.

Methyl (E)-3-((2-(2-chloro-5-(trifluoromethyl)phenyl)hydrazineylidene)methyl)-4-cyanobenzoate (166)

Yellow solid, 10.3.25 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (d, J = 1.6 Hz, 1H), 8.57 (s, 1H), 8.20 (d, J = 1.2 Hz, 1H), 8.05 (dd, J = 8.1, 1.6 Hz, 1H), 7.96 (d, J = 2.2 Hz, 1H), 7.77 (d, J = 8.1 Hz, 1H), 7.44 (dd, J = 8.3, 1.0 Hz, 1H), 7.16–7.11 (m, 1H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.33, 139.88, 137.66, 135.21, 134.23, 133.43, 130.72 (d, J = 32.9 Hz), 129.78, 129.24, 127.33, 122.38, 120.62, 117.67 (d, J = 3.9 Hz), 116.96, 113.57, 111.57 (d, J = 4.0 Hz), 52.89; ^{19}F NMR (376 MHz, $CDCl_3$) δ -62.74; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{17}H_{12}ClF_3N_3O_2$ 382.05254, found 382.05627.

Methyl (E)-4-cyano-3-((2-(3,5-dimethylphenyl)hydrazineylidene)methyl)benzoate (167)

Red oil, 83.56 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (d, J = 1.7 Hz, 1H), 8.10 (s, 1H), 7.96 (s, 1H), 7.93 (dd, J = 8.1, 1.7 Hz, 1H), 7.69 (d, J = 8.1 Hz, 1H), 6.82 (s, 2H), 6.61 (s, 1H), 3.99 (s, 3H), 2.32 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.67, 143.33, 139.27, 139.01, 133.97, 133.08, 130.73, 127.89, 126.67, 123.37, 117.15, 112.65, 111.11, 52.75, 21.47; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{18}H_{18}N_3O_2$ 308.13543, found 308.13841.

Methyl (E)-3-((2-(4-bromo-2,6-dimethylphenyl)hydrazineylidene)methyl)-4-cyanobenzoate (168)

Yellow solid, 104.55 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.58 (d, J = 1.7 Hz, 1H), 7.94 (dd, J = 8.0, 1.7 Hz, 1H), 7.79 (s, 1H), 7.68 (d, J = 8.1 Hz, 1H), 7.60 (s, 1H), 7.26 (s, 2H), 3.96 (s, 3H), 2.34 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.54, 139.19, 137.48, 134.00, 133.64, 132.94, 131.73, 130.50, 128.01, 126.23, 118.40, 116.93, 112.82, 52.69, 18.59; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{18}H_{17}BrN_3O_2$ 386.04594, found 386.04928.

Methyl (E)-4-cyano-3-((2-mesitylhydrazineylidene)methyl)benzoate (169)

Brown solid, 90.06 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.57 (d, J = 1.7 Hz, 1H), 7.89 (dd, J = 8.1, 1.7 Hz, 1H), 7.63 (d, J = 8.0 Hz, 2H), 6.94 (s, 2H), 3.94 (s, 3H), 2.29 (s, 3H), 2.28 (s, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.64, 139.78, 136.19, 135.08, 133.80, 133.09, 132.86, 129.56, 128.88, 127.47, 126.17, 117.01, 112.51, 52.58, 20.84, 18.28; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{19}H_{20}N_3O_2$ 322.15108, found 322.15497.

Methyl (E)-4-cyano-3-((2-(naphthalen-1-yl)hydrazineylidene)methyl)benzoate (170)

Tan solid, 90.25 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.78–8.73 (m, 2H), 8.24 (s, 1H), 7.97 (dt, J = 8.1, 1.4 Hz, 1H), 7.88 (td, J = 8.0, 2.4 Hz, 2H), 7.75–7.69 (m, 2H), 7.54–7.47 (m, 4H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.56, 138.71, 138.07, 134.16, 134.06, 133.14, 133.07, 128.87, 128.36, 126.88, 126.55, 125.91, 125.54, 121.84, 121.48, 119.14, 117.15, 112.95, 109.42, 52.79; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{20}H_{16}N_3O_2$ 330.11978, found 330.12391.

Methyl (E)-4-cyano-3-((2-(pyridin-2-yl)hydrazineylidene)methyl)benzoate (171)

Yellow solid, 76.56 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.72–8.67 (m, 1H), 8.61–8.55 (m, 1H), 8.47 (d, J = 1.7 Hz, 1H), 8.44–8.40 (m, 2H), 7.94–7.87 (m, 1H), 7.79–7.73 (m, 1H), 7.38 (ddd, J = 7.4, 4.9, 1.2 Hz, 1H), 4.02 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.40, 158.68, 149.39, 149.29, 138.74, 137.97, 135.00, 132.15, 131.29, 129.47, 128.15, 127.79, 123.45, 121.16, 52.87; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{17}H_{14}ClN_2O_2$ 281.09938, found 281.10335.

Methyl (E)-4-cyano-3-((2-(phenylsulfonyl)hydrazineylidene)methyl)benzoate (172)

Light yellow solid, 95.66 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.55 (d, J = 1.7 Hz, 1H), 8.17 (s, 1H), 8.04 (ddd, J = 10.1, 7.6, 1.7 Hz, 3H), 7.71 (d, J = 8.1 Hz, 1H), 7.62–7.50 (m, 3H), 3.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.10, 141.29, 138.04, 136.56, 134.30, 133.53, 133.16, 130.49, 129.17, 127.93, 127.46, 116.17, 114.66, 52.93; HRMS-ESI (m/z) $[M+H]^+$ calculated for $C_{16}H_{14}N_3O_4S$ 344.06603, found 344.06941.

Methyl (E)-4-cyano-3-((2-((4-methoxyphenyl)sulfonyl)hydrazineylidene)methyl)benzoate (173)

Yellow solid, 102.33 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.53 (d, *J* = 1.6 Hz, 1H), 8.15 (s, 1H), 8.04 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.95 (d, *J* = 9.0 Hz, 2H), 7.70 (d, *J* = 8.0 Hz, 1H), 6.97 (d, *J* = 9.0 Hz, 3H), 3.97 (s, 3H), 3.83 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.13, 163.57, 141.05, 136.67, 134.23, 133.16, 130.35, 130.20, 129.42, 127.48, 116.21, 114.59, 114.35, 55.60, 52.90; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{17}H_{16}N_3O_5S$ 374.07660, found 374.07987.

Methyl (E)-4-cyano-3-((2-((2,4,6-triisopropylphenyl)sulfonyl)hydrazineylidene)methyl)benzoate (174)

Light yellow solid, 125.68 mg, 89% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.31 (s, 1H), 8.61 (d, *J* = 1.7 Hz, 1H), 8.24 (s, 1H), 8.07 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.72 (d, *J* = 8.1 Hz, 1H), 7.20 (s, 2H), 4.30 (p, *J* = 6.7 Hz, 2H), 3.94 (s, 3H), 2.90 (p, *J* = 6.9 Hz, 1H), 1.32 (d, *J* = 6.7 Hz, 12H), 1.25 (d, *J* = 6.9 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.07, 153.71, 151.48, 139.53, 137.05, 134.20, 132.83, 131.11, 130.32, 126.82, 123.96, 116.12, 114.73, 52.70, 34.15, 30.06, 24.84, 23.45; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{25}H_{32}N_3O_4S$ 470.20688, found 470.21057.

Methyl (E)-4-cyano-3-((2-(cyclopropanecarbonyl)hydrazineylidene)methyl)benzoate (175)

Light yellow solid, 75.36 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.19 (s, 1H), 8.57–8.53 (m, 1H), 8.16 (s, 1H), 8.08 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.79 (d, *J* = 8.1 Hz, 1H), 3.98 (s, 3H), 2.81 (tt, *J* = 8.1, 4.6 Hz, 1H), 1.19 (dd, *J* = 4.5, 3.1 Hz, 2H), 1.05–1.00 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 177.15, 165.19, 138.21, 137.07, 134.15, 133.85, 129.95, 128.27, 116.69, 114.19, 52.88, 10.45, 9.47; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{14}H_{14}N_3O_3$ 272.09905, found 272.10318.

Methyl (E)-4-cyano-3-((2-(2-methoxybenzoyl)hydrazineylidene)methyl)benzoate (176)

Light yellow solid, 91.05 mg, 90% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 11.13 (s, 1H), 8.95 (d, *J* = 1.7 Hz, 1H), 8.64 (s, 1H), 8.33 (dd, *J* = 7.8, 1.9 Hz, 1H), 8.13 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.77 (d, *J* = 8.1 Hz, 1H), 7.55 (ddd, *J* = 8.5, 7.3, 1.9 Hz, 1H), 7.19–7.13 (m, 1H), 7.06 (d, *J* = 8.3 Hz, 1H), 4.09 (s, 3H), 3.97 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.17, 162.48, 157.31, 141.91, 137.46, 134.44, 134.06, 133.03, 132.92, 130.56, 127.75, 121.87, 119.76, 116.45, 114.98, 111.50, 56.33, 52.76; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{18}H_{16}N_3O_4$ 338.10961, found 338.11331.

Benzyl (E)-2-(2-cyano-5-(methoxycarbonyl)benzylidene)hydrazine-1-carboxylate (177)

Light yellow solid, 91.98 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.13 (d, *J* = 14.1 Hz, 1H), 8.73 (s, 1H), 8.31 (s, 1H), 8.05 (dd, *J* = 8.2, 1.7 Hz, 1H), 7.68 (d, *J* = 8.0 Hz, 1H), 7.40 (d, *J* = 8.1 Hz, 2H), 7.34 (dtd, *J* = 6.8, 4.9, 2.9 Hz, 3H), 5.29 (s, 2H), 3.94 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.16, 137.23, 135.47, 134.25, 132.83, 130.19, 128.55, 128.45, 128.34, 127.22, 116.25, 114.70, 67.84, 52.78; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{18}H_{16}N_3O_4$ 338.10961, found 338.11260.

4-methoxybenzyl (E)-2-(2-cyano-5-(methoxycarbonyl)benzylidene)hydrazine-1-carboxylate (178)

Light yellow solid, 102.32 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.79–8.69 (m, 2H), 8.29 (s, 1H), 8.07 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.71 (d, *J* = 8.1 Hz, 1H), 7.36 (d, *J* = 8.6 Hz, 2H), 6.89 (d, *J* = 8.7 Hz, 2H), 5.23 (s, 2H), 3.96 (s, 3H), 3.81 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.16, 159.86, 137.18, 134.33, 132.86, 130.40, 130.26, 127.56, 127.36, 116.26, 114.78, 113.99, 67.81, 55.27, 52.77; HRMS-ESI (*m*/*z*) $[M + Na]^+$ calculated for $C_{19}H_{17}NaN_3O_5$ 390.11682, found 390.10629.

Methyl (E)-4-cyano-3-((2-methyl-2-phenylhydrazineylidene)methyl)benzoate (179)

Orange solid, 80.36 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (d, *J* = 1.7 Hz, 1H), 7.91 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.72–7.67 (m, 2H), 7.47–7.42 (m, 2H), 7.38 (dd, *J* = 8.8, 7.2 Hz, 2H), 7.04 (tt, *J* = 7.2, 1.3 Hz, 1H), 3.98 (s, 3H), 3.52 (d, *J* = 0.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.76, 147.06, 140.23, 133.89, 133.12, 129.16, 127.30, 126.56, 126.13, 122.16, 117.48, 116.19, 112.69, 52.68, 33.88; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{17}H_{16}N_3O_2$ 294.11978, found 294.12301.

Methyl (E)-3-(((1H-indol-1-yl)imino)methyl)-4-cyanobenzoate (180)

Orange solid, 85.23 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.83 (d, *J* = 1.6 Hz, 1H), 8.63 (s, 1H), 8.10 (dd, *J* = 7.7, 1.6 Hz, 1H), 7.91 (d, *J* = 7.7 Hz, 1H), 7.80 (d, *J* = 7.7 Hz, 1H), 7.74 (d, *J* = 3.6 Hz, 1H), 7.59 (d, *J* = 7.5 Hz, 1H), 7.36 (t, *J* = 7.3 Hz, 1H), 7.22 (t, *J* = 7.2 Hz, 1H), 6.76 (d, *J* = 3.4 Hz, 1H), 4.02 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.23, 137.41, 137.34, 136.79, 134.22, 133.54, 129.98, 127.77, 127.08, 124.11, 122.03, 121.08, 116.73, 116.45, 114.51, 111.04, 106.67, 52.89; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{18}H_{14}N_3O_2$ 304.10413, found 304.10757.

Methyl (E)-4-cyano-3-(((2-methylindolin-1-yl)imino)methyl)benzoate (181)

Orange solid, 90.35 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66 (d, *J* = 1.7 Hz, 1H), 7.91 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.76 (d, *J* = 1.1 Hz, 1H), 7.71 (d, *J* = 8.0 Hz, 1H), 7.37 (d, *J* = 7.9 Hz, 1H), 7.29 (d, *J* = 9.3 Hz, 1H), 7.20 (d, *J* = 7.4 Hz, 1H), 6.95 (td, *J* = 7.3, 1.2 Hz, 1H), 4.68 (dddd, *J* = 11.9, 6.7, 3.3, 1.8 Hz, 1H), 4.03 (s, 3H), 3.58 (dd, *J* = 16.0, 9.4 Hz, 1H), 2.86 (dd, *J* = 16.0, 3.0 Hz, 1H), 1.45 (d, *J* = 6.2 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.78, 145.93, 140.14, 133.79, 133.13, 128.10, 126.91, 126.69, 126.21, 125.67, 125.20, 121.75, 117.53, 111.99, 109.99, 55.07, 52.63, 36.36, 17.37; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{19}H_{18}N_3O_2$ 320.13543, found 320.13876.

Methyl (E)-4-cyano-3-(((2-cyano-1H-pyrrol-1-yl)imino)methyl)benzoate (182)

Yellow solid, 76.28 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, *J* = 1.7 Hz, 1H), 8.84 (s, 1H), 8.24 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.85 (d, *J* = 8.1 Hz, 1H), 7.50 (dd, *J* = 3.2, 1.5 Hz, 1H), 6.93 (dd, *J* = 4.2, 1.5 Hz, 1H), 6.42 (dd, *J* = 4.1, 3.2 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.80, 145.09, 135.38, 134.78, 133.34, 132.04, 127.99, 120.24, 116.26, 115.90, 115.55, 112.01, 111.12, 106.18, 53.03; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{15}H_{11}N_4O_2$ 279.08373, found 279.08859.

Methyl (E)-4-cyano-3-(((3,4-dihydroquinolin-1(2H)-yl)imino)methyl)benzoate (183)

Brown solid, 90.11 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.64 (d, *J* = 1.7 Hz, 1H), 7.84 (ddd, *J* = 16.0, 8.2, 1.4 Hz, 2H), 7.69 (s, 1H), 7.65 (d, *J* = 8.2 Hz, 1H), 7.24 (td, *J* = 7.7, 1.6 Hz, 1H), 7.06–7.01 (m, 1H), 6.88 (td, *J* = 7.3, 1.2 Hz, 1H), 3.96 (s, 3H), 3.69 (t, *J* = 6.4 Hz, 2H), 2.75 (d, *J* = 6.2 Hz, 2H), 2.18 (p, *J* = 6.1 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.74, 142.00, 140.41, 133.81, 133.08, 128.31, 127.60, 127.09, 126.45, 124.78, 124.68, 121.10, 117.51, 115.20, 112.49, 52.63, 45.60, 26.82, 21.73; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{18}H_{14}N_3O_2$ 320.10159, found 320.10272.

Methyl (E)-4-cyano-3-((phenoxyimino)methyl)benzoate (184)

Light yellow solid, 78.15 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.76 (s, 1H), 8.65 (d, *J* = 1.7 Hz, 1H), 8.15 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.82 (d, *J* = 8.1 Hz, 1H), 7.37 (dd, *J* = 8.8, 7.1 Hz, 2H), 7.34–7.28 (m, 2H), 7.12–7.07 (m, 1H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.95, 158.92, 147.11, 134.70, 134.28, 133.63, 130.86, 129.44, 128.26, 123.13, 116.25, 115.15, 114.62, 52.89; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{16}H_{13}N_2O_3$ 281.08815, found 281.09292.

Methyl (E)-4-cyano-3-((fluoranthen-3-ylimino)methyl)benzoate (185)

Yellow solid, 110.02 mg, 94% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.99 (d, *J* = 1.5 Hz, 2H), 8.29 (d, *J* = 8.3 Hz, 1H), 8.21 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.97 (d, *J* = 6.9 Hz, 1H), 7.93 (d, *J* = 7.4 Hz, 1H), 7.92–7.88 (m, 2H), 7.86 (d, *J* = 8.0 Hz, 1H), 7.69 (dd, *J* = 8.3, 6.9 Hz, 1H), 7.41–7.36 (m, 2H), 7.33 (d, *J* = 7.3 Hz, 1H), 4.03 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.16, 154.80, 147.63, 139.71, 138.90, 138.60, 136.61, 136.41, 134.30, 133.69, 133.16, 131.59, 129.46, 128.29, 127.67, 127.54, 126.11, 123.69, 121.61, 121.51, 120.76, 120.59, 116.54, 116.42, 115.13, 52.92; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{26}H_{17}N_2O_2$ 389.12453, found 389.12810.

Methyl (E)-4-cyano-3-((pyren-1-ylimino)methyl)benzoate (186)

Orange solid, 110.89 mg, 95% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.08 (s, 1H), 9.01 (d, *J* = 1.7 Hz, 1H), 8.81 (d, *J* = 9.1 Hz, 1H), 8.26–8.12 (m, 5H), 8.08–7.95 (m, 3H), 7.88 (dd, *J* = 15.0, 7.6 Hz, 1H), 7.81 (d, *J* = 8.0 Hz, 1H), 4.05 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.20, 154.25, 143.32, 138.90, 134.20, 133.61, 131.41, 131.35, 131.26, 130.92, 129.31, 127.76, 127.55, 127.21, 126.56, 126.27, 125.56, 125.46, 125.38, 125.24, 124.64, 123.22, 116.69, 116.23, 114.83, 52.90; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{26}H_{17}N_2O_2$ 389.12453, found 389.12839.

Methyl (E)-4-cyano-3-((phenanthren-1-ylimino)methyl)benzoate (187)

Yellow solid, 100.28 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.09–9.05 (m, 2H), 8.74–8.65 (m, 2H), 8.47 (dd, *J* = 8.0, 1.5 Hz, 1H), 8.25 (dd, *J* = 8.1, 1.7 Hz, 1H), 7.93 (dd, *J* = 7.3, 1.9 Hz, 1H), 7.89 (d, *J* = 8.1 Hz, 1H), 7.75–7.60 (m, 4H), 7.38 (s, 1H), 4.03 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.18, 154.65, 146.79, 138.68, 134.44, 133.67, 132.02, 131.68, 130.81, 129.94, 129.49, 128.94, 128.69, 127.39, 127.05, 126.82, 126.47, 124.65, 122.67, 116.60, 116.48, 112.16, 52.92; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{24}H_{17}N_2O_2$ 365.12453, found 365.12836.

Methyl (E)-4-cyano-3-(((4-((2-(methylcarbamoyl)pyridin-4-yl)oxy)phenyl)imino)methyl)benzoate (188)

Orange solid, 115.29 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, *J* = 1.8 Hz, 1H), 8.87 (s, 1H), 8.38 (d, *J* = 5.6 Hz, 1H), 8.20 (dd, *J* = 8.1, 1.7 Hz, 1H), 8.02 (s, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.74 (d, *J* = 2.6 Hz, 1H), 7.39 (d, *J* = 8.7 Hz, 2H), 7.15 (d, *J* = 8.8 Hz, 2H), 6.98 (dd, *J* = 5.5, 2.6 Hz, 1H), 3.99 (s, 3H), 3.00 (d, *J* = 5.1 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.95, 165.06, 164.38, 154.45, 153.06, 152.30, 149.73, 147.62, 138.41, 134.29, 133.37, 131.58, 128.82, 123.14, 121.60, 116.66, 116.17, 114.16, 110.38, 52.82, 26.08; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{23}H_{19}N_4O_4$ 415.13616, found 415.13971.

Methyl (E)-4-cyano-3-(((1,5-dimethyl-3-oxo-2-phenyl-2,3-dihydro-1H-pyrazol-4-yl)imino)methyl)benzoate (189)

Yellow solid, 103.59 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.91 (s, 1H), 8.52 (d, *J* = 1.7 Hz, 1H), 8.05 (dd, *J* = 8.0, 1.7 Hz, 1H), 7.79 (d, *J* = 8.1 Hz, 1H), 7.52–7.46 (m, 2H), 7.41–7.35 (m, 3H), 3.96 (s, 3H), 3.24 (s, 3H), 2.58 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.43, 160.07, 152.94, 150.80, 140.62, 134.58, 134.28, 133.71, 130.12, 129.73, 129.31, 127.46, 125.00, 117.75, 117.36, 113.74, 52.69, 35.24, 10.26; HRMS-ESI (*m*/*z*) $[M+H]^+$ calculated for $C_{21}H_{19}N_4O_3$ 375.14125, found 375.14511.

Methyl (E)-3-(((4-chloro-3-((3-chloro-5-(trifluoromethyl)pyridin-2-yl)oxy)phenyl)imino)methyl)-4-cyanobenzoate (190)

Yellow solid, 136.66 mg, 92% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.93 (d, J = 1.7 Hz, 1H), 8.89 (s, 1H), 8.27 (dd, J = 2.2, 1.1 Hz, 1H), 8.23 (dd, J = 8.1, 1.7 Hz, 1H), 8.03 (d, J = 2.2 Hz, 1H), 7.85 (d, J = 8.1 Hz, 1H), 7.56 (dt, J = 8.8, 1.2 Hz, 1H), 7.27 (s, 1H), 7.25 (d, J = 2.4 Hz, 1H), 4.00 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.01, 160.13, 155.43, 149.63 (d, J = 55.0 Hz), 142.54 (d, J = 4.5 Hz), 138.10, 136.61 (d, J = 3.5 Hz), 134.40, 133.48, 131.94, 131.06, 129.00, 126.01, 124.09, 123.16, 122.83, 121.38, 120.12, 119.00, 116.81, 116.13, 52.91; ^{19}F NMR (376 MHz, $CDCl_3$) δ -61.61; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{22}H_{13}Cl_2F_3N_3O_3$ 494.02414, found 494.02758.

Methyl (E)-4-cyano-3-(((4-(3-ethyl-2,6-dioxopiperidin-3-yl)phenyl)imino)methyl)benzoate (191)

Yellow solid, 112.18 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, J = 1.7 Hz, 1H), 8.85 (s, 1H), 8.27 (s, 1H), 8.20 (dd, J = 8.0, 1.7 Hz, 1H), 7.84 (d, J = 8.1 Hz, 1H), 7.40–7.28 (m, 4H), 3.99 (s, 3H), 2.68–2.58 (m, 1H), 2.50–2.36 (m, 2H), 2.28 (dd, J = 14.1, 4.8 Hz, 1H), 2.08 (dd, J = 14.3, 7.3 Hz, 1H), 1.95 (dd, J = 14.2, 7.3 Hz, 1H), 0.89 (t, J = 7.4 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 175.00, 172.24, 165.08, 154.94, 149.61, 138.42, 137.96, 134.33, 133.38, 131.65, 128.85, 127.25, 121.72, 116.73, 116.18, 52.85, 50.86, 32.87, 29.23, 27.06, 8.99; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{23}H_{22}N_3O_4$ 404.15656, found 404.15997.

Methyl (E)-4-cyano-3-(((3-fluoro-4-morpholinophenyl)imino)methyl)benzoate (192)

Brown solid, 100.42 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.92 (d, J = 1.7 Hz, 1H), 8.86 (s, 1H), 8.19 (dd, J = 8.1, 1.7 Hz, 1H), 7.83 (d, J = 8.1 Hz, 1H), 7.16 (d, J = 1.4 Hz, 1H), 7.16–7.11 (m, 1H), 6.98 (t, J = 9.0 Hz, 1H), 3.99 (s, 3H), 3.92–3.87 (m, 4H), 3.17–3.13 (m, 4H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.17, 155.60 (d, J = 248.0 Hz), 152.80, 144.47 (d, J = 8.3 Hz), 139.58, 138.66, 134.30, 133.35, 131.35, 128.66, 118.69 (d, J = 4.1 Hz), 118.13 (d, J = 2.9 Hz), 116.50, 116.31, 109.71 (d, J = 22.0 Hz), 66.89, 52.86, 50.76 (d, J = 3.5 Hz); ^{19}F NMR (376 MHz, $CDCl_3$) δ -121.00 (dd, J = 13.3, 9.2 Hz); HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{20}H_{19}FN_3O_3$ 368.13657, found 368.14069.

Methyl (E)-4-cyano-3-(((4-methyl-3-((4-(pyridin-3-yl)thiazol-2-yl)amino)phenyl)imino)methyl) benzoate (193)

Yellow solid, 127.11 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.10–9.07 (m, 1H), 8.96 (d, J = 1.7 Hz, 1H), 8.93 (s, 1H), 8.56–8.52 (m, 1H), 8.21 (dd, J = 8.1, 1.7 Hz, 1H), 8.19–8.14 (m, 1H), 7.85 (dd, J = 8.1, 0.6 Hz, 1H), 7.77 (d, J = 2.1 Hz, 1H), 7.38–7.29 (m, 2H), 7.07 (dd, J = 8.0, 2.1 Hz, 1H), 6.95 (s, 1H), 4.00 (s, 3H), 2.40 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.97, 165.15, 154.25, 149.48, 148.53, 148.35, 147.34, 139.30, 138.59, 134.30, 133.44, 133.36, 131.80, 131.51, 130.40, 128.87, 127.88, 123.56, 116.92, 116.67, 116.26, 112.94, 103.57, 52.85, 17.60; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{25}H_{20}N_5O_2S$ 454.12930, found 454.13330.

Methyl (E)-4-cyano-3-((2-(perfluorophenyl)hydrazineylidene)methyl)benzoate (194)

Yellow solid, 100.65 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (d, J = 1.8 Hz, 1H), 8.20 (s, 1H), 8.04 (dd, J = 8.1, 1.7 Hz, 1H), 7.91 (s, 1H), 7.74 (d, J = 8.1 Hz, 1H), 3.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.30, 138.60, 136.54, 136.14, 135.99, 135.59, 133.32, 131.92, 128.49, 125.73, 118.35, 115.48, 112.88, 51.87; ^{19}F NMR (376 MHz, $CDCl_3$) δ -155.20 (dd, J = 22.5, 5.3 Hz), -162.64 (td, J = 21.8, 5.4 Hz), -164.84–165.02 . HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{16}H_9F_5N_3O_2$ 370.05702, found 370.06140.

Methyl (E)-4-cyano-3-(((4-(2-oxopyrrolidin-1-yl)phenyl)imino)methyl)benzoate (195)

Red solid, 95.10 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, J = 1.7 Hz, 1H), 8.89 (s, 1H), 8.21–8.18 (m, 1H), 7.83 (dd, J = 8.1, 0.6 Hz, 1H), 7.74–7.70 (m, 2H), 7.42–7.36 (m, 2H), 4.00 (s, 3H), 3.91 (t, J = 7.0 Hz, 2H), 2.65 (dd, J = 8.5, 7.6 Hz, 2H), 2.20 (p, J = 7.5 Hz, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.37, 165.19, 153.45, 146.14, 138.99, 138.78, 134.31, 133.35, 131.38, 128.73, 121.92, 120.46, 116.59, 116.32, 52.84, 48.77, 32.74, 17.94; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{20}H_{18}N_3O_3$ 348.13035, found 348.13351.

Methyl (E)-3-((benzo[d][1,3]dioxol-5-ylimino)methyl)-4-cyanobenzoate (196)

Yellow solid, 86.23 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, J = 1.9 Hz, 1H), 8.83 (s, 1H), 8.16 (dd, J = 8.1, 1.7 Hz, 1H), 7.80 (d, J = 8.1 Hz, 1H), 6.92 (d, J = 7.5 Hz, 2H), 6.90–6.82 (m, 1H), 3.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.19, 151.89, 148.51, 147.53, 144.39, 138.83, 134.22, 133.28, 131.10, 128.57, 116.48, 116.37, 116.34, 108.42, 101.65, 52.79; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{17}H_{13}N_2O_4$ 309.08306, found 309.08707.

Methyl (E)-4-cyano-3-(((2,3-dihydrobenzo[b][1,4]dioxin-6-yl)imino)methyl)benzoate (197)

Orange solid, 90.25 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, J = 1.7 Hz, 1H), 8.83 (s, 1H), 8.15 (dd, J = 8.1, 1.7 Hz, 1H), 7.80 (d, J = 8.0 Hz, 1H), 6.96–6.89 (m, 3H), 4.28 (s, 4H), 3.98 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.18, 152.19, 143.83, 143.67, 143.58, 138.87, 134.18, 133.23, 131.05, 128.51, 117.64, 116.39, 116.31, 115.29, 110.20, 64.36, 64.26, 52.75; HRMS-ESI (m/z) $[M + H]^+$ calculated for $C_{18}H_{15}N_2O_4$ 323.09871, found 323.10175.

Methyl (E)-3-(((4-(benzyloxy)phenyl)imino)methyl)-4-cyanobenzoate (198)

Red solid, 103.58 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.94 (d, J = 1.8 Hz, 1H), 8.89 (s, 1H), 8.17 (dd, J = 8.1, 1.7 Hz, 1H), 7.81 (d, J = 8.0 Hz, 1H), 7.48–7.35 (m, 7H), 7.04 (d, J = 8.9 Hz, 2H), 5.11 (s, 2H), 3.99 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.26, 158.70, 151.79, 143.20, 139.06, 136.63, 134.25, 133.28, 131.05, 128.62, 128.54, 128.07, 127.48, 122.93, 116.42, 116.37, 115.49, 70.25, 52.81; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{23}H_{19}N_2O_3$ 371.13510, found 371.13898.

Methyl (E)-4-cyano-3-(((3-iodo-1H-indazol-5-yl)imino)methyl)benzoate (199)

Yellow solid, 120.05 mg, 93% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.98 (d, J = 4.0 Hz, 2H), 8.22 (dd, J = 8.1, 1.7 Hz, 1H), 7.86 (d, J = 8.1 Hz, 1H), 7.56 (d, J = 1.3 Hz, 2H), 7.47 (t, J = 1.3 Hz, 1H), 4.02 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.21, 153.67, 144.96, 139.90, 138.73, 134.42, 133.47, 131.48, 128.91, 128.32, 123.09, 116.57, 116.40, 113.47, 110.86, 94.68, 52.88; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{17}H_{12}IN_4O_2$ 430.99602, found 430.99937.

Methyl (E)-4-cyano-3-(((4′-cyano-[1,1′-biphenyl]-4-yl)imino)methyl)benzoate (200)

Orange solid, 100.12 mg, 91% yield; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 (d, J = 1.7 Hz, 1H), 8.92 (s, 1H), 8.23 (dd, J = 8.0, 1.7 Hz, 1H), 7.86 (d, J = 8.1 Hz, 1H), 7.73 (d, J = 3.0 Hz, 3H), 7.67 (d, J = 8.5 Hz, 2H), 7.63 (d, J = 11.0 Hz, 1H), 7.43 (d, J = 8.3 Hz, 2H), 4.01 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 165.08, 154.93, 150.58, 144.67, 138.41, 138.09, 134.37, 133.42, 132.64, 132.47, 131.73, 128.89, 128.19, 128.16, 127.50, 126.53, 121.98, 118.85, 116.76, 116.21, 115.33, 110.98, 52.89; HRMS-ESI (*m*/*z*) $[M + H]^+$ calculated for $C_{23}H_{16}N_3O_2$ 366.11978, found 366.12405.

Ethics. This work did not require ethical approval from a human subject or animal welfare committee.

Data accessibility. The data are provided in electronic supplementary material [78].

Declaration of AI use. We have not used AI-assisted technologies in creating this article.

Authors' contributions. B.Z.: investigation, methodology, resources, writing—original draft; F.C.: investigation, writing—review and editing; Y.G.: funding acquisition, writing—review and editing; D.L.: funding acquisition, writing—review and editing.

All authors gave final approval for publication and agreed to be held accountable for the work performed therein.

Conflict of interest declaration. We declare we have no competing interests.

Funding. We gratefully acknowledge the great support from Prof. Yucai Wang who has kindly provided sufficient chemical synthesized equipment for this work. We also gratefully acknowledge the financial support from National Natural Science Foundation of China (Projects 32090041, 22103074), Major Research Plan of the National Natural Science Foundation of China (grant no. 2016YFA0101200). This work was also supported in part by the Hefei National Laboratory for Physical Sciences at Microscale and the CAS Key Laboratory of Innate Immunity and Chronic Disease.

References

1. Hamed AA, Abdelhamid IA, Saad GR, Elkady NA, Elsabee MZ. 2020 Synthesis, characterization and antimicrobial activity of a novel chitosan Schiff bases based on heterocyclic moieties. *Int. J. Biol. Macromol.* **153**, 492–501. (doi:10.1016/j.ijbiomac.2020.02.302)
2. Rollas S, Küçükgüzel SG. 2007 Biological activities of hydrazone derivatives. *Molecules* **12**, 1910–1939. (doi:10.3390/12081910)
3. Mladenova R, Ignatova M, Manolova N, Petrova T, Rashkov I. 2002 Preparation, characterization and biological activity of Schiff base compounds derived from 8-hydroxyquinoline-2-carboxaldehyde and Jeffamines ED®. *Eur. Polym. J.* **38**, 989–999. (doi:10.1016/S0014-3057(01)00260-9)
4. Sinha D, Tiwari AK, Singh S, Shukla G, Mishra P, Chandra H, Mishra AK. 2008 Synthesis, characterization and biological activity of Schiff base analogues of indole-3-carboxaldehyde. *Eur. J. Med. Chem.* **43**, 160–165. (doi:10.1016/j.ejmech.2007.03.022)
5. Singh G *et al.* 2018 Acetylenic indole-encapsulated Schiff bases: synthesis, in silico studies as potent antimicrobial agents, cytotoxic evaluation and synergistic effects. *ChemistrySelect* **3**, 2366–2375. (doi:10.1002/slct.201703018)
6. Grozinger CM, Chao ED, Blackwell HE, Moazed D, Schreiber SL. 2001 Identification of a class of small molecule inhibitors of the sirtuin family of NAD-dependent deacetylases by phenotypic screening. *J. Biol. Chem.* **276**, 38 837–38 843. (doi:10.1074/jbc.M106779200)
7. Ota H *et al.* 2006 Sirt1 inhibitor, Sirtinol, induces senescence-like growth arrest with attenuated Ras–MAPK signaling in human cancer cells. *Oncogene* **25**, 176–185. (doi:10.1038/sj.onc.1209049)
8. Rodrigues DA, Ferreira-Silva GÀ, Ferreira ACS, Fernandes RA, Kwee JK, Sant'Anna CMR, Ionta M, Fraga CAM. 2016 Design, synthesis, and pharmacological evaluation of novel N-acylhydrazone derivatives as potent histone deacetylase 6/8 dual inhibitors. *J. Med. Chem.* **59**, 655–670. (doi:10.1021/acs.jmedchem.5b01525)
9. Dabideen DR, Cheng KF, Aljabari B, Miller EJ, Pavlov VA, Al-Abed Y. 2007 Phenolic hydrazones are potent inhibitors of macrophage migration inhibitory factor proinflammatory activity and survival improving agents in sepsis. *J. Med. Chem.* **50**, 1993–1997. (doi:10.1021/jm061477+)
10. Hu Y, Nan J, Yin J, Huang G, Ren X, Ma Y. 2021 Rhodium-catalyzed dehydrogenative annulation of N-arylmethanimines with vinylene carbonate for synthesizing quinolines. *Org. Lett.* **23**, 8527–8532. (doi:10.1021/acs.orglett.1c03231)
11. Isoda M, Sato K, Funakoshi M, Omura K, Tarui A, Omote M, Ando A. 2015 Diastereoselective synthesis of syn-β-lactams using Rh-catalyzed reductive Mannich-type reaction of α,β-unsaturated esters. *J. Org. Chem.* **80**, 8398–8405. (doi:10.1021/acs.joc.5b01233)
12. Zhu X, Yang Y, Xiao G, Song J, Liang Y, Deng G. 2017 Double C–S bond formation via C–H bond functionalization: synthesis of benzothiazoles and naphtho[2,1-d]thiazoles from N-substituted arylamines and elemental sulfur. *Chem. Commun.* **53**, 11 917–11 920. (doi:10.1039/C7CC07366F)
13. Xu X, Guo X, Han X, Yang L, Hu W. 2014 Highly diasteroselective intermolecular 1,3-dipolar

cycloaddition reactions of carbonyl ylides with aldimines to afford sterically disfavored cis-oxazolidines. *Organ. Chem. Front.* **1**, 181–185. (doi:10.1039/C3QO00040K)

14. Sun S, Guo D, Li F, Wang J. 2022 From imines to amides via NHC-mediated oxidation. *Organ. Chem. Front.* **9**, 356–363. (doi:10.1039/D1QO01661J)
15. Chong CC, Kinjo R. 2015 Catalytic hydroboration of carbonyl derivatives, imines, and carbon dioxide. *ACS Catalysis* **5**, 3238–3259. (doi:10.1021/acscatal.5b00428)
16. Mihara M, Ishino Y, Minakata S, Komatsu M. 2005 Novel synthesis of gem-dichloroaziridines from imines via the KF/Al_2O_3-promoted generation of dichlorocarbene from chloroform. *J. Org. Chem.* **70**, 5320–5322. (doi:10.1021/jo050321z)
17. Kumar I, Mir NA, Ramaraju P, Singh D, Gupta VK. 2014 Direct catalytic synthesis of densely substituted 3-formylpyrroles from imines and 1,4-ketoaldehydes. *RSC Adv.* **4**, 34 548–34 551. (doi:10.1039/C4RA06581F)
18. Hao L, Wang G, Sun J, Xu J, Li H, Duan G, Xia C, Zhang P. 2020 From phenylhydrazone to 1H-1,2,4-triazoles via nitrification, reduction and cyclization. *Adv. Synth. Catal.* **362**, 1657–1662. (doi:10.1002/adsc.201901563)
19. Guru MM, Punniyamurthy T. 2012 Copper(II)-catalyzed aerobic oxidative synthesis of substituted 1,2,3- and 1,2,4-triazoles from bisarylhydrazones via C–H functionalization/C–C/N–N/C–N bonds formation. *J. Org. Chem.* **77**, 5063–5073. (doi:10.1021/jo300592t)
20. Xu P, Wang G, Wu Z, Zhu C. 2017 Rh(iii)-catalyzed double C–H activation of aldehyde hydrazones: a route for functionalized 1H-indazole synthesis. *Chem. Sci.* **8**, 1303–1308. (doi:10.1039/C6SC03888C)
21. Sai M, Yorimitsu H, Oshima K. 2011 Allyl-, allenyl-, and propargyl-transfer reactions through cleavage of C=C bonds catalyzed by an N-heterocyclic carbene/copper complex: synthesis of multisubstituted pyrroles. *Angew. Chem. Int. Ed.* **50**, 3294–3298. (doi:10.1002/anie.201100631)
22. Fan X-W, Lei T, Zhou C, Meng Q-Y, Chen B, Tung C-H, Wu L-Z. 2016 Radical addition of hydrazones by α-bromo ketones to prepare 1,3,5-trisubstituted pyrazoles via visible light catalysis. *J. Org. Chem.* **81**, 7127–7133. (doi:10.1021/acs.joc.6b00992)
23. Siddiqui IR, Rai P, Sagir H, Waseem MA. 2015 Molecular iodine catalysed domino cyclization in aqueous medium: a simple and efficient synthetic route to 1,4-dihydropyridazines. *RSC Adv.* **5**, 52 355–52 360. (doi:10.1039/C5RA05370F)
24. Ye Z, Wang F, Li Y, Zhang F. 2018 Electrochemical synthesis of tetrazoles via metal- and oxidant-free [3+2] cycloaddition of azides with hydrazones. *Green Chem.* **20**, 5271–5275. (doi:10.1039/C8GC02889C)
25. Kim Y, Kumar MR, Park N, Heo Y, Lee S. 2011 Copper-catalyzed, one-pot, three-component synthesis of benzimidazoles by condensation and C–N bond formation. *J. Org. Chem.* **76**, 9577–9583. (doi:10.1021/jo2019416)
26. Abdine RAA, Hedouin G, Colobert F, Wencel-Delord J. 2021 Metal-catalyzed asymmetric hydrogenation of C═N bonds. *ACS Catal.* **11**, 215–247. (doi:10.1021/acscatal.0c03353)
27. Brenna D, Rossi S, Cozzi F, Benaglia M. 2017 Iron catalyzed diastereoselective hydrogenation of chiral imines. *Org. Biomol. Chem.* **15**, 5685–5688. (doi:10.1039/c7ob01123g)
28. Baert JJ, De Clippeleer J, Hughes PS, De Cooman L, Aerts G. 2012 On the origin of free and bound staling aldehydes in beer. *J. Agric. Food Chem.* **60**, 11 449–11 472. (doi:10.1021/jf303670z)
29. Segura JL, Mancheño MJ, Zamora F. 2016 Covalent organic frameworks based on Schiff-base chemistry: synthesis, properties and potential applications. *Chem. Soc. Rev.* **45**, 5635–5671. (doi:10.1039/C5CS00878F)
30. Schiff H. 1864 Mittheilungen aus dem Universitätslaboratorium in Pisa: Eine neue Reihe organischer Basen. *Justus Liebigs Annalen der Chemie* **131**, 118–119. (doi:10.1002/jlac.18641310113)
31. Belowich ME, Stoddart JF. 2012 Dynamic imine chemistry. *Chem. Soc. Rev.* **41**, 2003–2024. (doi:10.1039/C2CS15305J)
32. Reeves JT, Visco MD, Marsini MA, Grinberg N, Busacca CA, Mattson AE, Senanayake CH. 2015 A general method for imine formation using $B(OCH_2CF_3)_3$. *Org. Lett.* **17**, 2442–2445. (doi:10.1021/acs.orglett.5b00949)
33. Meyer CD, Joiner CS, Stoddart JF. 2007 Template-directed synthesis employing reversible imine bond formation. *Chem. Soc. Rev.* **36**, 1705–1723. (doi:10.1039/B513441M)
34. Patil RD, Adimurthy S. 2013 Catalytic methods for imine synthesis. *Asian J. Organ. Chem.* **2**, 726–744. (doi:10.1002/ajoc.201300012)
35. Bhagat S, Sharma N, Chundawat TS. 2013 Synthesis of some salicylaldehyde-based Schiff bases in aqueous media. *J. Chem.* **2013**, 909217. (doi:10.1155/2013/909217)
36. Varma RS, Dahiya R, Kumar S. 1997 Clay catalyzed synthesis of imines and enamines under solvent-free conditions using microwave irradiation. *Tetrahedron Lett.* **38**, 2039–2042. (doi:10.1016/S0040-4039(97)00261-X)
37. Manjare SB, Mahadik RK, Manval KS, More PP, Dalvi SS. 2023 Microwave-assisted rapid and green synthesis of Schiff bases using cashew shell extract as a natural acid catalyst. *ACS Omega* **8**, 473–479. (doi:10.1021/acsomega.2c05187)
38. Guzen KP, Guarezemini AS, Órfão ATG, Cella R, Pereira CMP, Stefani HA. 2007 Eco-friendly synthesis of imines by ultrasound irradiation. *Tetrahedron Lett.* **48**, 1845–1848. (doi:10.1016/j.tetlet.2007.01.014)
39. Vázquez MÁ, Landa M, Reyes L, Miranda R, Tamariz J, Delgado F. 2004 Infrared irradiation: effective promoter in the formation of N-benzylideneanilines in the absence of solvent. *Synth. Commun.* **34**, 2705–2718. (doi:10.1081/SCC-200026190)
40. Bennett JS, Charles KL, Miner MR, Heuberger CF, Spina EJ, Bartels MF, Foreman T. 2009 Ethyl lactate as a tunable solvent for the synthesis of aryl aldimines. *Green Chem.* **11**, 166–168. (doi:10.1039/B817379F)
41. Tanaka K, Shiraishi R. 2000 Clean and efficient condensation reactions of aldehydes and amines in a water suspension medium. *Green Chem.* **2**, 272–273. (doi:10.1039/B006424F)
42. Zhou Y, Wang J, Gu Z, Wang S, Zhu W, Aceña JL, Soloshonok VA, Izawa K, Liu H. 2016 Next generation of fluorine-containing pharmaceuticals, compounds currently in phase II–III clinical trials of major pharmaceutical companies: new structural trends and therapeutic areas. *Chem. Rev.* **116**, 422–518. (doi:10.1021/acs.chemrev.5b00392)
43. Severinsen R, Bourne GT, Tran TT, Ankersen M, Begtrup M, Smythe ML. 2008 Library of biphenyl privileged substructures using a safety-catch linker approach. *J. Comb. Chem.* **10**, 557–566. (doi:10.1021/cc800006g)
44. Tian Y, Zhu G. 2020 Porous aromatic frameworks (PAFs). *Chem. Rev.* **120**, 8934–8986. (doi:10.1021/acs.chemrev.9b00687)
45. Chowdhury P, Banerjee A, Saha B, Bauri K, De P. 2022 Stimuli-responsive aggregation-induced emission (AIE)-active polymers for biomedical applications. *ACS Biomater. Sci. Eng.* **8**, 4207–4229. (doi:10.1021/acsbiomaterials.2c00656)
46. Jiang W, Li Y, Wang Z. 2014 Tailor-made rylene arrays for high performance n-channel semiconductors. *Acc. Chem. Res.* **47**, 3135–3147. (doi:10.1021/ar500240e)
47. Watson MD, Fechtenkötter A, Müllen K. 2001 Big is beautiful—'aromaticity' revisited from the viewpoint of macromolecular and supramolecular benzene chemistry. *Chem. Rev.* **101**, 1267–1300. (doi:10.1021/cr990322p)
48. Colis LC, Woo CM, Hegan DC, Li Z, Glazer PM, Herzon SB. 2014 The cytotoxicity of (−)-lomaiviticin A arises from induction of double-strand breaks in DNA. *Nat. Chem.* **6**, 504–510. (doi:10.1038/nchem.1944)
49. Romain M, Chevrier M, Bebiche S, Mohammed-Brahim T, Rault-Berthelot J, Jacques E, Poriel C. 2015 The structure–property relationship study of electron-deficient dihydroindeno[2,1-b]fluorene derivatives for n-type organic field effect transistors. *J. Mater. Chem. C* **3**, 5742–5753. (doi:10.1039/C5TC00355E)
50. Bhutani P, Joshi G, Raja N, Bachhav N, Rajanna PK, Bhutani H, Paul AT, Kumar R. 2021 U.S. FDA approved drugs from 2015–June 2020: a perspective. *J. Med. Chem.* **64**, 2339–2381. (doi:10.1021/acs.jmedchem.0c01786)
51. Lorente A, Lamariano-Merketegi J, Albericio F, Álvarez M. 2013 Tetrahydrofuran-containing macrolides: a fascinating gift from the deep sea. *Chem. Rev.* **113**, 4567–4610. (doi:10.1021/cr3004778)
52. Singh PK, Silakari O. 2018 The current status of O-heterocycles: a synthetic and medicinal overview. *ChemMedChem* **13**, 1071–1087. (doi:10.1002/cmdc.201800119)
53. Feng M, Tang B, Liang HS, Jiang X. 2016 Sulfur containing scaffolds in drugs: synthesis and application in medicinal chemistry. *Curr. Top. Med. Chem.* **16**, 1200–1216. (doi:10.2174/1568026615666150915111741)
54. Smith CP, Brougham LR, Huger FP, Davis L, Klein JT, Effland RC. 1993 N-(n-propyl)-n-(3-fluoro-4-pyridinyl)-1h-3-methylindol-1-amine

hydrochloride (HP 184): in vitro spontaneous release of acetylcholine and norepinephrine. *Drug Dev. Res.* **30**, 203–212. (doi:10.1002/ddr.430300402)

55. Dong DL, Wang QH, Yue P, Jiao JD, Gu RM, Yang BF. 2006 Indapamide induces apoptosis of GH3 pituitary cells independently of its inhibition of voltage-dependent K^+ currents. *Eur. J. Pharmacol.* **536**, 78–84. (doi:10.1016/j.ejphar.2006.02.037)
56. Li X-J, Li M, Yao W, Lu H-Y, Zhao Y, Chen C-F. 2015 Dialkoxybenzo[j]fluoranthenes: synthesis, structures, photophysical properties, and optical waveguide application. *RSC Adv.* **5**, 18 609–18 614. (doi:10.1039/C4RA17112H)
57. Ding L, Fang Y. 2010 Chemically assembled monolayers of fluorophores as chemical sensing materials. *Chem. Soc. Rev.* **39**, 4258–4273. (doi:10.1039/C003028G)
58. Machado AM, Munaro M, Martins TD, Dávila LYA, Giro R, Caldas MJ, Atvars TDZ, Akcelrud LC. 2006 Photoluminescence studies of phenanthrene–azomethyne conjugated–nonconjugated multiblock copolymer. *Macromolecules* **39**, 3398–3407. (doi:10.1021/ma052315a)
59. Escudier B *et al.* 2007 Sorafenib in advanced clear-cell renal-cell carcinoma. *N. Engl. J. Med.* **356**, 125–134. (doi:10.1056/NEJMoa060655)
60. Llovet JM *et al.* 2008 Sorafenib in advanced hepatocellular carcinoma. *N. Engl. J. Med.* **359**, 378–390. (doi:10.1056/NEJMoa0708857)
61. Mariappan G, Saha BP, Bhuyan NR, Bharti PR, Kumar D. 2010 Evaluation of antioxidant potential of pyrazolone derivatives. *J. Adv. Pharm. Technol. Res.* **1**, 260–267.
62. Chen L, Chen J, Guo Y, Li J, Yang Y, Xu L, Fu F. 2014 Study on the simultaneous determination of seven benzoylurea pesticides in Oolong tea and their leaching characteristics during infusing process by HPLC-MS/MS. *Food Chem.* **143**, 405–410. (doi:10.1016/j.foodchem.2013.08.027)
63. Brueggemeier RW, Hackett JC, Diaz-Cruz ES. 2005 Aromatase inhibitors in the treatment of breast cancer. *Endocr. Rev.* **26**, 331–345. (doi:10.1210/er.2004–0015)
64. Moellering RC. 2003 Linezolid: the first oxazolidinone antimicrobial. *Ann. Intern. Med.* **138**, 135–142. (doi:10.7326/0003-4819-138-2-200301210–00015)
65. Wilcox MH. 2005 Update on linezolid: the first oxazolidinone antibiotic. *Expert Opin Pharmacother.* **6**, 2315–2326. (doi:10.1517/14656566.6.13.2315)
66. Dubreuil P *et al.* 2009 Masitinib (AB1010), a potent and selective tyrosine kinase inhibitor targeting KIT. *PLoS ONE* **4**, e7258. (doi:10.1371/journal.pone.0007258)
67. Khan M *et al.* 2019 Synthesis, in vitro urease inhibitory activity, and molecular docking studies of (perfluorophenyl)hydrazone derivatives. *Med. Chem. Res.* **28**, 873–883. (doi:10.1007/s00044-019-02341-5)
68. Baier A, Kokel A, Horton W, Gizińska E, Pandey G, Szyszka R, Török B, Török M. 2021 Organofluorine hydrazone derivatives as multifunctional anti-Alzheimer's agents with CK2 inhibitory and antioxidant features. *ChemMedChem* **16**, 1927–1932. (doi:10.1002/cmdc.202100047)
69. Kahremany S *et al.* 2018 Computer-aided design and synthesis of 1-{4-[(3,4-dihydroxybenzylidene)amino]phenyl}-5-oxopyrrolidine-3-carboxylic acid as an Nrf2 enhancer. *ChemPlusChem* **83**, 320–333. (doi:10.1002/cplu.201700539)
70. Sui G, Xu D, Luo T, Guo H, Sheng G, Yin D, Ren L, Hao H, Zhou W. 2020 Design, synthesis and antifungal activity of amide and imine derivatives containing a kakuol moiety. *Bioorg. Med. Chem. Lett.* **30**, 126774. (doi:10.1016/j.bmcl.2019.126774)
71. O'Boyle NM, Knox AJS, Price TT, Williams DC, Zisterer DM, Lloyd DG, Meegan MJ. 2011 Lead identification of β-lactam and related imine inhibitors of the molecular chaperone heat shock protein 90. *Bioorg. Med. Chem.* **19**, 6055–6068. (doi:10.1016/j.bmc.2011.08.048)
72. Yang H-L, Cai P, Liu Q-H, Yang X-L, Fang S-Q, Tang Y-W, Wang C, Wang X-B, Kong L-Y. 2017 Design, synthesis, and evaluation of salicyladimine derivatives as multitarget-directed ligands against Alzheimer's disease. *Bioorg. Med. Chem.* **25**, 5917–5928. (doi:10.1016/j.bmc.2017.08.048)
73. Lan J-S, Liu Y, Hou J-W, Yang J, Zhang X-Y, Zhao Y, Xie S-S, Ding Y, Zhang T. 2018 Design, synthesis and evaluation of resveratrol-indazole hybrids as novel monoamine oxidases inhibitors with amyloid-β aggregation inhibition. *Bioorg. Chem.* **76**, 130–139. (doi:10.1016/j.bioorg.2017.11.009)
74. Abd Razik BM, Osman H, Basiri A, Salhin A, Kia Y, Ezzat MO, Murugaiyah V. 2014 Ionic liquid mediated synthesis and molecular docking study of novel aromatic embedded Schiff bases as potent cholinesterase inhibitors. *Bioorg. Chem.* **57**, 162–168. (doi:10.1016/j.bioorg.2014.10.005)
75. Butler RN, Coyne AG. 2016 Organic synthesis reactions on-water at the organic–liquid water interface. *Org. Biomol. Chem.* **14**, 9945–9960. (doi:10.1039/C6OB01724J)
76. Xiao J, Wen H, Wang L, Xu L, Hao Z, Shao C-L, Wang C-Y. 2016 Catalyst-free dehydrative SN1-type reaction of indolyl alcohols with diverse nucleophiles 'on water'. *Green Chem.* **18**, 1032–1037. (doi:10.1039/C5GC01838B)
77. Jung Y, Marcus RA. 2007 On the theory of organic catalysis 'on water'. *J. Am. Chem. Soc.* **129**, 5492–5502. (doi:10.1021/ja068120f)
78. Zhong B, Chen F, Ge Y, Liu D. 2023 Developing a fast and catalyst-free protocol to form C=N double bond with high functional group tolerance. Figshare. (doi:10.6084/m9.figshare.c.6856586)