

Article

# Acid-Catalyzed, Metal- and Oxidant-Free C=C Bond Cleavage of Enaminones: One-Pot Synthesis of 3,4-Dihydroquinazolines

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**Abstract:** In this study, we present the HOAc-catalyzed selective cleavage of the C=C double bond of enaminones, enabling the formation of a new C–N bond and a new C=N bond for the one-pot synthesis of 2-substituted 3,4-dihydroquinazolines directly from ynones and 2-(aminomethyl)anilines. This method operates in ethanol under transition-metal-free and oxidant-free conditions, offering a sustainable and efficient approach for the synthesis of 3,4-dihydroquinazolines with broad functional group tolerance.

**Keywords:** 3,4-dihydroquinazoline; enaminones; C–C bond cleavage; ynones; organic synthesis

## 1. Introduction

3,4-Dihydroquinazoline is a versatile nitrogen-containing heterocyclic scaffold found in many bioactive compounds with diverse biological activities (Figure 1). For example, vasicine (I), a natural alkaloid from *Adhatoda vasica*, exhibits various bioactivities [1–3]. Synthetic derivatives of 3,4-dihydroquinazoline have been developed as antiparasitic (II) [4], antiviral (III) [5,6], and antifungal (IV) [7] agents, T-type calcium channel blockers (V) [8,9], and tryptophan reductase inhibitors (VI) [10]. Consequently, various synthetic methods have been established for the construction of 3,4-dihydroquinazoline skeletons [11–22]. However, most of reported reactions need harsh conditions and require metal catalysis or special reagents, such as harmful carbodiimide, isocyanate, azide, and isocyanide derivatives. The limitations of these methods for synthesizing such alkaloids heavily impede their biological studies. Hence, the discovery of novel and more direct approaches for the synthesis of such compounds from simple starting materials is highly welcome.

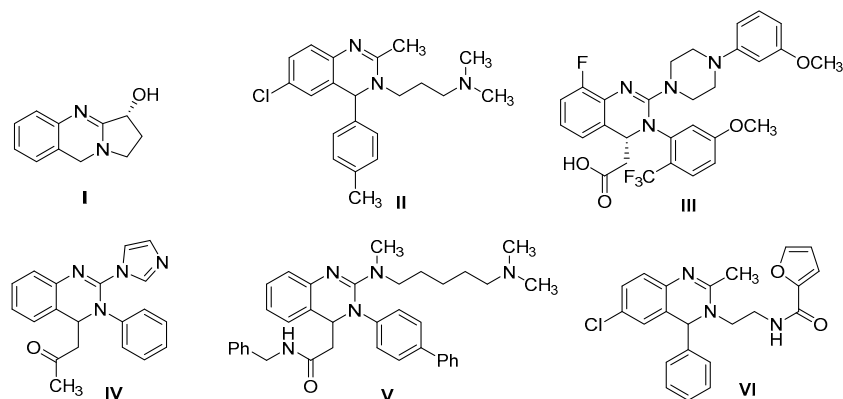


**Figure 1.** Biologically active 3,4-dihydroquinazolines.



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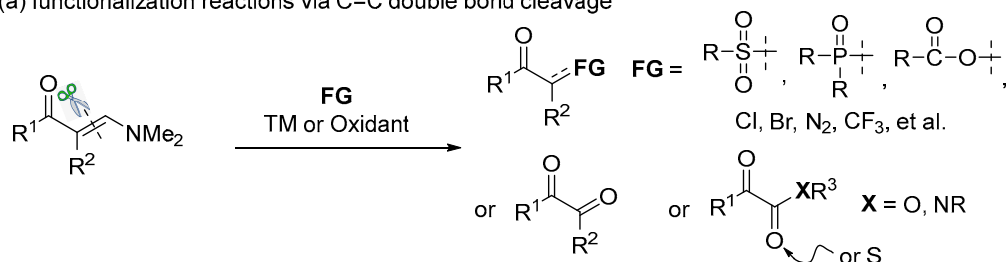
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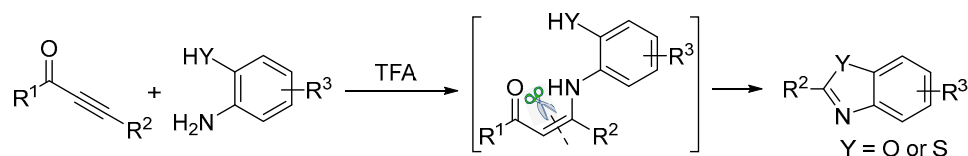
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Enaminones, which bear an electron-donating amino group and electron-withdrawing carbonyl group(s) at both termini of a C=C double bond, respectively, are gaining increasing interest because of their unique properties and their importance in organic synthesis as versatile building blocks [23–27]. Particularly, the functionalization of the enaminone via vinyl C=C double bond cleavage is gaining great attention and developing rapidly [28–43]. On one hand, the construction of new chemical bonds has been identified as a highly beneficial strategy for the synthesis of many valuable chemical products, such as functionalized  $\alpha$ -ketoamides [28],  $\alpha$ -ketoesters [29], 1,2-diketones [30], and other non-cyclic compounds [31–38] (Scheme 1a). On the other hand, the construction of cyclic compounds via cyclization processes with the C=C double bond cleavage has also been achieved for the synthesis of benzoxazoles [39], benzthiazoles [40] (Scheme 1b), and 4(3H)-quinazolinones [41–43] (Scheme 1c). However, in order to avoid one or more of the limitations, such as harsh oxidative conditions, the use of noble metal catalysts, or a restricted substrate scope, a new strategy for oxidizing the olefin C=C double bond is still desired. As our successive efforts in enaminone chemistry [44,45], we report herein the acid-catalyzed selective cleavage of C=C double bond of  $\beta$ -enaminones, enabling the formation of a new C–N bond and a new C=N bond for the one-pot synthesis of 2-substituted 3,4-dihydroquinazolines directly from ynones and 2-(aminomethyl)anilines (Scheme 1d).

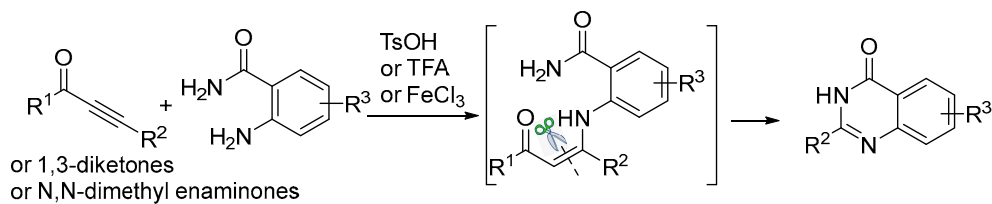
(a) functionalization reactions via C=C double bond cleavage



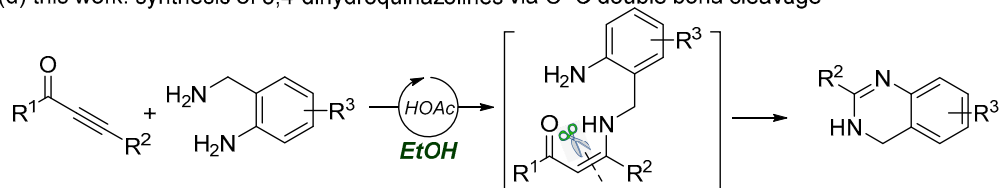
(b) synthesis of benzoxazoles/benzthiazoles via C=C double bond cleavage



(c) synthesis of 4(3H)-quinazolinones via C=C double bond cleavage



(d) this work: synthesis of 3,4-dihydroquinazolines via C=C double bond cleavage



**Scheme 1.** Functionalization reactions of enaminones via C=C double bond cleavage.

## 2. Results and Discussion

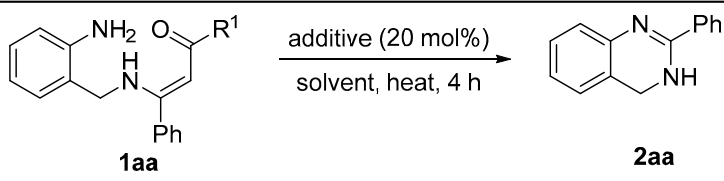
Initially, (Z)-3-((2-aminobenzyl)amino)-1,3-diphenylprop-2-en-1-one **1aa** was chosen as a model substrate to begin our exploration of the reaction conditions (Table 1). Under additive-free conditions, the reaction of  $\beta$ -enaminone **1aa** in ethanol at 100 °C for 4 h afforded the desired 2-phenyl-3,4-dihydroquinazoline **2aa** with a yield of 43%, with 48% of the starting material remaining unreacted (Entry 2). To improve the reaction efficiency, we systematically screened a variety of bases and acids as catalysts, including NaOH, KOH, Et<sub>3</sub>N, HOAc, TFA, TsOH·H<sub>2</sub>O, NH<sub>4</sub>Cl, and (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>4</sub> (Entries 2–9). Among these, HOAc proved to be the most effective, delivering the target 3,4-dihydroquinazoline product with an excellent yield of 96%. The effect of the solvent on the reaction was also examined. Substituting ethanol with other solvents, such as methanol, isopropanol, DMSO, DMF, acetonitrile, toluene, or dioxane, led to a noticeable decline in efficiency (Entries 10–16, 37–91%). Additionally, temperature variation revealed that reducing the reaction temperature to 90 °C slightly lowered the yield to 92%, while increasing the temperature beyond 100 °C did not result in a further improvement (Entries 17–18). Finally, we evaluated the impact of substituent variation at the R<sup>1</sup> position. Replacing the phenyl group with *p*-methoxyphenyl, *p*-fluorophenyl, or methyl groups resulted in yields of 89%, 94%, and 46%, respectively (Entries 19–21). The optimized reaction conditions were identified as follows: 20 mol% of HOAc as the additive and EtOH as the solvent at 100 °C for 4 h (Entry 5).

As the enaminones **1** could be readily prepared from the Michael addition of the aliphatic amines **3** to ynones **4** [46], we employed a straightforward one-pot strategy to synthesize the desired 3,4-dihydroquinazoline products **2** directly from the 2-(aminomethyl)anilines **3** and ynones **4**, without isolating the enaminone intermediates **1**. To our delight, from the one-pot strategy, 2-phenyl-3,4-dihydroquinazoline **2aa** was afforded at a comparable yield to that from enaminone **1aa** (94% vs. 96%). Then, the scope of ynones **4** was explored. As illustrated in Scheme 2, When R<sup>2</sup> was an aryl substituent, steric effects exert a pronounced influence on the reaction. Substrates with *ortho*-substituents, such as methoxy, fluorine, or chlorine, experience significant steric hindrance, which interferes with the nucleophilic attack of the amino group on the C=C double bond. Consequently, these substrates require longer reaction times, and the yields are generally lower compared to substrates with *para*- or *meta*-substituents (**2ab–2ad**, 53–68%). In contrast, substrates with *meta*- or *para*-substituents undergo the reaction smoothly, yielding the target 3,4-dihydroquinazoline products with good to excellent yields (**2ae–2ap**, 86–95%). The electronic effects of substituents on the phenyl ring play a lesser role in determining the reaction outcome. Both electron-donating groups (e.g., Me-, Et-, *t*Bu-, and MeO-) and electron-withdrawing groups (e.g., F-, CF<sub>3</sub>-) at the *para*-position do not significantly alter the reactivity, allowing the reaction to proceed efficiently. As a result, high yields of the desired products are consistently achieved (**2ai–2ap**, 86–95%). Furthermore, the reaction demonstrates notable tolerance to a variety of halogen substituents, enabling the synthesis of halogenated 3,4-dihydroquinazoline derivatives (**2ac–2ad**, **2af–2ag**, **2am–2ao**). This tolerance is particularly advantageous for subsequent structural modifications, such as palladium-catalyzed coupling reactions, which could facilitate the further functionalization of the products.

In addition to phenyl rings, ynones substituted with other fused or heterocyclic aromatic groups (R<sup>2</sup>) also serve as excellent substrates for this reaction. Ynones substituted with a 2-naphthyl, 3-pyridyl, 2-thienyl, or 3-thienyl group undergo the reaction smoothly, yielding the target products at good to excellent yields (**2aq–2at**, 82–89%). Ynones bearing alkyl-substituted R<sup>2</sup> groups, such as hexyl and *tert*-butyl, are also viable substrates in this reaction, albeit with relatively lower yields of 62% and 56%, respectively (**2au–2av**). This may be attributed to the absence of conjugation disruption in the corresponding products.

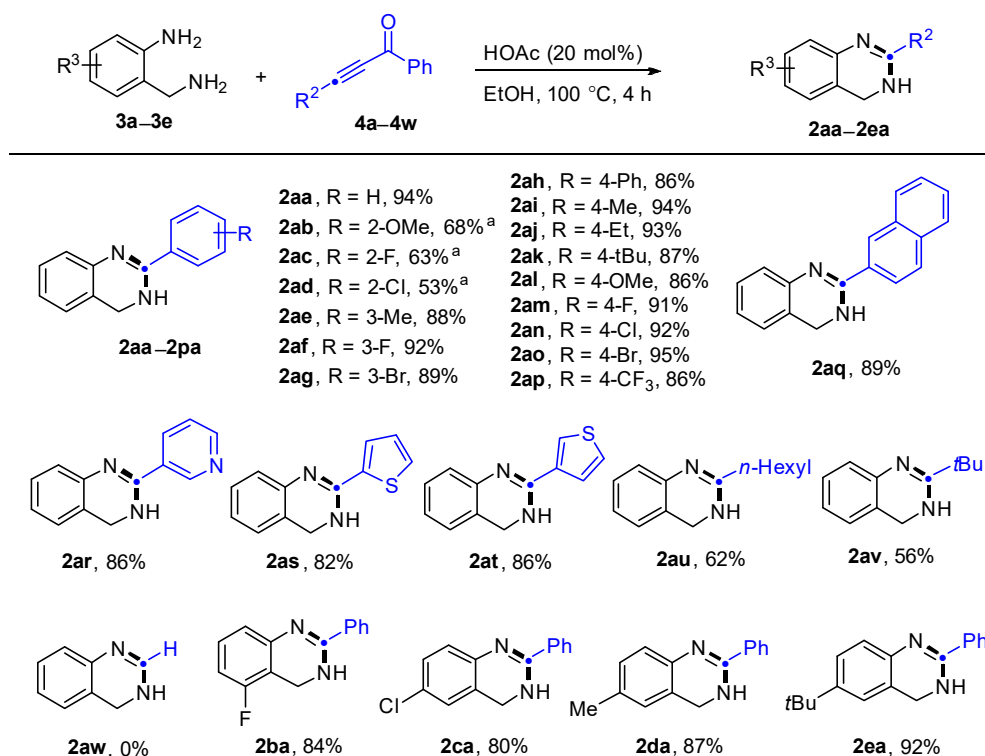
When R<sup>2</sup> was H (1-phenyl-prop-2-yn-1-one **4w** as substrate), the reaction failed to yield the targeted product **2aw**.

**Table 1.** Optimization of reaction conditions <sup>a</sup>.

|  |                                                               |                    |        |                                      |                       |
|------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------|--------|--------------------------------------|-----------------------|
| Entry                                                                              | Additive                                                      | Solvent            | T (°C) | R <sup>1</sup>                       | Yield(%) <sup>b</sup> |
| 1                                                                                  | no                                                            | EtOH               | 100    | Ph                                   | 43                    |
| 2                                                                                  | NaOH                                                          | EtOH               | 100    | Ph                                   | 52                    |
| 3                                                                                  | KOH                                                           | EtOH               | 100    | Ph                                   | 46                    |
| 4                                                                                  | Et <sub>3</sub> N                                             | EtOH               | 100    | Ph                                   | 53                    |
| 5                                                                                  | HOAc                                                          | EtOH               | 100    | Ph                                   | 96                    |
| 6                                                                                  | TFA                                                           | EtOH               | 100    | Ph                                   | 88                    |
| 7                                                                                  | TsOH·H <sub>2</sub> O                                         | EtOH               | 100    | Ph                                   | 91                    |
| 8                                                                                  | NH <sub>4</sub> Cl                                            | EtOH               | 100    | Ph                                   | 94                    |
| 9                                                                                  | (NH <sub>4</sub> ) <sub>2</sub> S <sub>2</sub> O <sub>4</sub> | EtOH               | 100    | Ph                                   | 93                    |
| 10                                                                                 | HOAc                                                          | MeOH               | 100    | Ph                                   | 88                    |
| 11                                                                                 | HOAc                                                          | <i>i</i> PrOH      | 100    | Ph                                   | 91                    |
| 12                                                                                 | HOAc                                                          | DMSO               | 100    | Ph                                   | 38                    |
| 13                                                                                 | HOAc                                                          | DMF                | 100    | Ph                                   | 88                    |
| 14                                                                                 | HOAc                                                          | CH <sub>3</sub> CN | 100    | Ph                                   | 55                    |
| 15                                                                                 | HOAc                                                          | PhMe               | 100    | Ph                                   | 37                    |
| 16                                                                                 | HOAc                                                          | dioxane            | 100    | Ph                                   | 70                    |
| 17                                                                                 | HOAc                                                          | EtOH               | 90     | Ph                                   | 92                    |
| 18                                                                                 | HOAc                                                          | EtOH               | 110    | Ph                                   | 96                    |
| 19                                                                                 | HOAc                                                          | EtOH               | 100    | 4-OMeC <sub>6</sub> H <sub>4</sub> - | 89                    |
| 20                                                                                 | HOAc                                                          | EtOH               | 100    | 4-FC <sub>6</sub> H <sub>4</sub> -   | 94                    |
| 21                                                                                 | HOAc                                                          | EtOH               | 100    | Me                                   | 46                    |

<sup>a</sup> Reaction conditions: **1a** (0.2 mmol), additive (0.04 mmol), in 1 mL of solvent at 100 °C for 4 h. <sup>b</sup> Isolated yields. TFA = trifluoroacetic acid. TsOH = *p*-toluenesulfonic acid. DMF = *N,N*-dimethylformamide. DMSO = dimethylsulfoxide.

For 2-(aminomethyl)anilines, various functional groups are compatible, including electron-withdrawing groups, such as fluorine (**3b**) and chlorine (**3c**), as well as electron-donating groups, like methyl (**3d**) and *tert*-butyl (**3e**). The reaction with these substrates proceeded successfully, yielding the desired products at 84–92% yields (**2ba–2ea**). Additionally, we obtained single crystals of product **2ba**, and the structure of the target compound was further confirmed via single-crystal X-ray diffraction analysis (Figure 2). Based on the X-ray crystallographic data (see Supplementary Materials), the double bond is fixed rather than undergoing facile tautomerization.



**Scheme 2.** Substrate scope. <sup>a</sup> For 8 h.

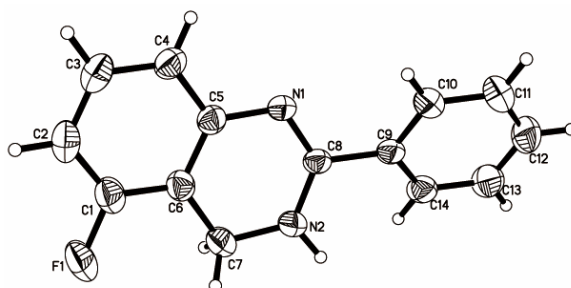
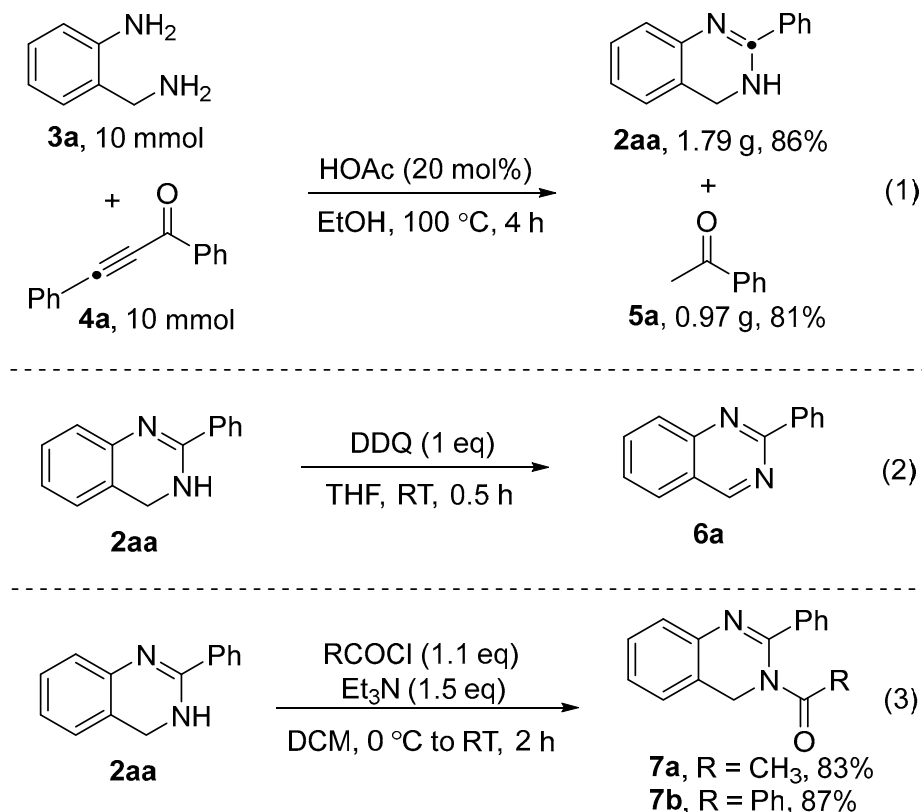


**Figure 2.** X-ray structure of **2ba**.

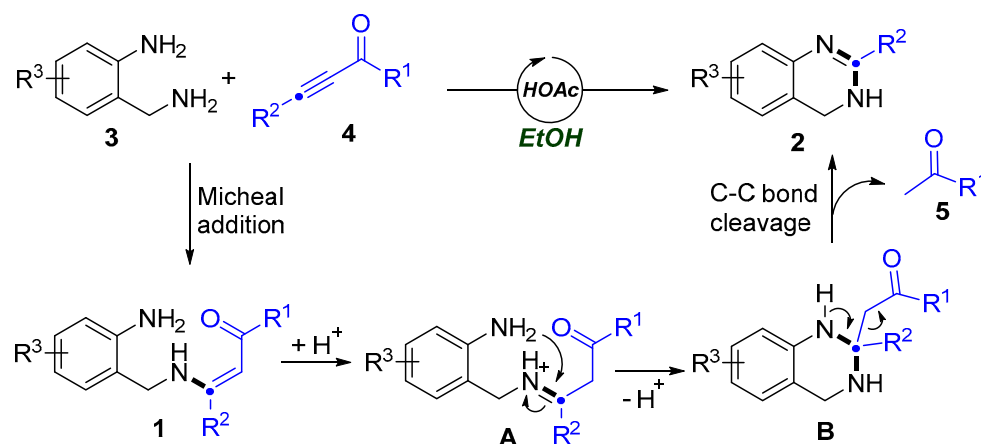
To validate the practicality of this acid-catalyzed cascade transformation, a gram-scale one-pot synthesis of 2-phenyl-3,4-dihydroquinazoline **2aa** was carried out. Starting from 1.22 g of **3a** (10 mmol) and 2.06 g of **4a** (10 mmol), the reaction afforded 1.79 g of **2aa** with an overall yield of 86% (Scheme 3, Equation (1)). Notably, the reaction also produced acetophenone **5a** as a byproduct, which was isolated at an 81% yield. To further demonstrate the synthetic versatility of the obtained product, we explored its application in the preparation of quinazoline and acylated 3,4-dihydroquinazoline derivatives. The oxidation of **2aa** using DDQ as an oxidant at room temperature resulted in the efficient formation of 2-phenylquinazoline **6a** with a yield of 88% (Equation (2)). Additionally, **2aa** underwent smooth acylation using acetyl chloride and benzoyl chloride as acylating agents to furnish the corresponding acylated products, **7a** and **7b**, with yields of 83% and 87%, respectively (Equation (3)).

Based on our study and the previous literature [39–43], a plausible reaction mechanism was proposed (Scheme 4). With the help of HOAc, the Michael addition of 2-(aminomethyl)anilines **3** to ynone **4** would generate the enaminone intermediates **1**. Iminoketone intermediates **A** may exist though the tautomerization of enaminones **1** in the presence of HOAc. Then, the intramolecular nucleophilic addition of **1** produced the

intermediates **B**. After that, the C–C bond cleavage reaction occurred to generate the 3,4-dihydroquinazoline products **2** and byproduct **5**.



**Scheme 3.** Gram-scale reaction and synthetic application.



**Scheme 4.** Proposed reaction mechanism.

### 3. Experimental Sections

#### 3.1. General Information

Unless otherwise stated, all commercial materials and solvents were used directly without further purification. <sup>1</sup>H NMR spectra were recorded on 400 MHz spectrometers (Bruker, Karlsruhe, Germany) and <sup>13</sup>C NMR spectra were recorded on a 100 MHz spectrometer. Chemical shifts (in ppm) were referenced to tetramethylsilane (δ = 0 ppm) in CDCl<sub>3</sub> as an internal standard at room temperature. <sup>13</sup>C NMR spectra were obtained by using the same NMR spectrometers and were calibrated with CDCl<sub>3</sub> (δ = 77.00 ppm). High-resolution mass spectra (HRMS) were equipped with an ESI source and a TOF detector (Agilent, Santa

Clara, CA, USA). Column chromatography was performed on a silica gel (70–230 mesh ASTM, Adamas-beta, Shanghai, China) using the reported eluents. Thin-layer chromatography (TLC) was carried out on 4 × 15 cm plates with a layer thickness of 0.2 mm (silica gel 60 F254). The ynone substrates were prepared according to the literature [47]. Enaminone **1aa** was prepared according to the literature [46].

### 3.2. General Procedure for the Synthesis of 3,4-Dihydroquinazolines **2**

A mixture of ynones **4** (0.3 mmol), 2-(aminomethyl)anilines **3** (0.3 mmol, 1.0 equiv.), and HOAc (0.06 mmol, 20 mol%) in EtOH (1.5 mL) was stirred at 100 °C in a sealed tube for 4 h. After completion of the reaction (monitored by TLC), the reaction was quenched by 10 mL of water and made alkaline with 10% NaOH. The mixture was extracted with dichloromethane (3 × 10 mL). The organic layer was washed with water (20 mL), dried over sodium sulfate, and filtered. The solvent was removed in vacuo, and the crude products was purified via chromatography (silica gel, EtOAc/PE: 1/1 to MeOH/ EtOAc: 1/4) to give **2** (copies of <sup>1</sup>H, <sup>13</sup>C and <sup>19</sup>F NMR spectra see Supplementary Materials).

2-Phenyl-3,4-dihydroquinazoline **2aa**. 58.7 mg, 94% yield (one-pot operation). White solid, mp 134–136 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.77 (d, *J* = 7.0 Hz, 2H), 7.40 (dq, *J* = 14.4, 7.1 Hz, 3H), 7.22–7.09 (m, 2H), 7.05 (td, *J* = 7.4, 1.0 Hz, 1H), 6.93 (d, *J* = 7.4 Hz, 1H), 4.89 (s, 1H), 4.74 (s, 2H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 155.3, 139.9, 134.0, 131.0, 128.6, 128.2, 126.8, 125.6, 124.9, 121.1, 119.7, 44.4. HRMS (ESI) *m/z* calcd for C<sub>14</sub>H<sub>13</sub>N<sub>2</sub> (MH<sup>+</sup>) 209.1073, found 209.1077. The NMR data are in accordance with those reported in the literature [48].

2-(2-Methoxyphenyl)-3,4-dihydroquinazoline **2ab**. 48.6 mg, 68% yield. White solid, mp 128–130 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.99 (d, *J* = 7.7 Hz, 1H), 7.36 (t, *J* = 7.8 Hz, 1H), 7.15 (t, *J* = 7.6 Hz, 1H), 7.00 (dt, *J* = 15.3, 7.6 Hz, 3H), 6.95–6.84 (m, 2H), 6.26 (s, 1H), 4.71 (s, 2H), 3.86 (s, 3H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 157.2, 154.9, 140.0, 131.9, 130.8, 127.9, 125.5, 124.3, 121.8, 121.1, 120.2, 119.8, 111.4, 55.8, 44.5. HRMS (ESI) *m/z* calcd for C<sub>15</sub>H<sub>15</sub>N<sub>2</sub>O (MH<sup>+</sup>) 239.1179, found 239.1180.

2-(2-Fluorophenyl)-3,4-dihydroquinazoline **2ac**. 42.7 mg, 63% yield. Pale yellow oil. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.01 (td, *J* = 7.9, 1.8 Hz, 1H), 7.42–7.35 (m, 1H), 7.22–7.14 (m, 2H), 7.12–6.98 (m, 3H), 6.93 (d, *J* = 7.2 Hz, 1H), 5.57 (s, 1H), 4.75 (s, 2H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 160.5 (d, *J* = 248.0 Hz), 151.9, 140.7, 131.9 (d, *J* = 9.0 Hz), 130.9 (d, *J* = 2.6 Hz), 128.0, 125.5, 124.6 (d, *J* = 3.0 Hz), 124.6, 122.3 (d, *J* = 10.4 Hz), 121.1, 120.0, 116.0 (d, *J* = 23.4 Hz), 44.8; <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ −116.06 (s). The characterization data are in accordance with that reported in the literature [49].

2-(2-Chlorophenyl)-3,4-dihydroquinazoline **2ad**. 38.5 mg, 53% yield. Pale yellow solid, mp 126–128 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.56 (dd, *J* = 7.3, 1.7 Hz, 1H), 7.41–7.26 (m, 3H), 7.16 (t, *J* = 7.5 Hz, 1H), 7.03 (t, *J* = 7.4 Hz, 1H), 6.95 (dd, *J* = 14.1, 7.6 Hz, 2H), 5.03 (s, 1H), 4.72 (s, 2H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 154.5, 140.6, 135.1, 131.7, 130.8, 130.7, 129.9, 128.0, 127.1, 125.6, 124.6, 120.9, 119.9, 45.0; HRMS (ESI) *m/z* calcd for C<sub>14</sub>H<sub>12</sub>ClN<sub>2</sub> (MH<sup>+</sup>) 243.0684, found 243.0684.

2-(*m*-Tolyl)-3,4-dihydroquinazoline **2ae**. 58.6 mg, 88% yield. White solid, mp 117–118 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.64 (s, 1H), 7.53 (d, *J* = 7.3 Hz, 1H), 7.28 (dd, *J* = 11.7, 6.1 Hz, 2H), 7.18 (t, *J* = 7.4 Hz, 1H), 7.02 (t, *J* = 7.4 Hz, 2H), 6.94 (d, *J* = 7.3 Hz, 1H), 5.26 (dd, *J* = 304.8, 230.4 Hz, 1H), 4.77 (s, 2H), 2.39 (s, 3H); <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>) δ 160.4, 155.0, 138.4, 135.4, 131.3, 128.6, 128.4, 128.0, 127.2, 125.5, 124.6, 123.3, 120.2, 44.4, 21.4. HRMS (ESI) *m/z* calcd for C<sub>15</sub>H<sub>15</sub>N<sub>2</sub> (MH<sup>+</sup>) 223.1230, found 223.1235.

2-(3-Fluorophenyl)-3,4-dihydroquinazoline **2af**. 62.4 mg, 92% yield. White solid, mp 124–125 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.54 (d, *J* = 8.1 Hz, 2H), 7.38 (dd, *J* = 13.9, 7.8 Hz, 1H), 7.16 (ddd, *J* = 11.7, 9.8, 4.5 Hz, 2H), 7.05 (dd, *J* = 12.6, 5.3 Hz, 2H), 6.94 (d, *J* = 7.3 Hz, 1H), 4.78 (s, 2H), 4.27 (s, 1H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 162.8 (d, *J* = 246.9 Hz), 153.6,

140.9, 137.6 (d,  $J = 7.5$  Hz), 130.2 (d,  $J = 8.1$  Hz), 128.2, 125.5, 124.8, 122.1, 121.9 (d,  $J = 2.9$  Hz), 120.1, 117.5 (d,  $J = 21.2$  Hz), 113.8 (d,  $J = 23.2$  Hz), 44.7;  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  −112.11 (s). HRMS (ESI)  $m/z$  calcd for  $\text{C}_{14}\text{H}_{12}\text{FN}_2$  (MH $^{+}$ ) 227.0979, found 227.0978.

2-(3-Bromophenyl)-3,4-dihydroquinazoline **2ag**. 76.4 mg, 89% yield. White solid, mp 132–133 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.93 (s, 1H), 7.67 (d,  $J = 7.7$  Hz, 1H), 7.56 (d,  $J = 7.9$  Hz, 1H), 7.26 (t,  $J = 7.8$  Hz, 1H), 7.19 (t,  $J = 7.5$  Hz, 1H), 7.05 (t,  $J = 8.3$  Hz, 2H), 6.94 (d,  $J = 7.3$  Hz, 1H), 4.94 (s, 1H), 4.77 (s, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  153.4, 140.9, 137.3, 133.5, 130.1, 129.7, 128.2, 125.6, 125.0, 124.9, 122.7, 121.8, 120.1, 44.7. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{14}\text{H}_{12}\text{BrN}_2$  (MH $^{+}$ ) 287.0178, found 287.0178.

2-([1,1'-Biphenyl]-4-yl)-3,4-dihydroquinazoline **2ah**. 73.3 mg, 86% yield. Grey solid, mp 193–195 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.87 (d,  $J = 8.1$  Hz, 2H), 7.61 (dd,  $J = 18.2$ , 7.7 Hz, 4H), 7.44 (t,  $J = 7.5$  Hz, 2H), 7.37 (t,  $J = 7.2$  Hz, 1H), 7.20 (t,  $J = 7.5$  Hz, 1H), 7.11 (d,  $J = 7.6$  Hz, 1H), 7.03 (t,  $J = 7.3$  Hz, 1H), 6.94 (d,  $J = 7.0$  Hz, 1H), 4.78 (s, 2H), 4.24 (s, 1H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  154.5, 143.4, 140.1, 133.8, 128.9, 128.1, 127.8, 127.2, 127.1, 127.0, 127.0, 125.5, 124.6, 121.6, 120.2, 44.67. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{20}\text{H}_{17}\text{N}_2$  (MH $^{+}$ ) 285.1386, found 285.1389.

2-(*p*-Tolyl)-3,4-dihydroquinazoline **2ai**. 62.6 mg, 94% yield. White solid, mp 159–161 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.72 (d,  $J = 8.0$  Hz, 2H), 7.23–7.08 (m, 4H), 7.03 (t,  $J = 7.3$  Hz, 1H), 6.90 (d,  $J = 7.4$  Hz, 1H), 5.07 (s, 1H), 4.70 (s, 2H), 2.32 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  155.1, 141.5, 139.8, 130.9, 129.3, 128.2, 126.7, 125.5, 124.7, 120.9, 119.8, 44.3, 21.4. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{15}\text{H}_{15}\text{N}_2$  (MH $^{+}$ ) 223.1230, found 223.1235.

2-(4-Ethylphenyl)-3,4-dihydroquinazoline **2aj**. 65.8 mg, 93% yield. White solid, mp 126–128 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.70 (d,  $J = 7.8$  Hz, 2H), 7.24 (t,  $J = 6.5$  Hz, 2H), 7.18 (t,  $J = 7.5$  Hz, 1H), 7.11–6.97 (m, 2H), 6.92 (d,  $J = 7.2$  Hz, 1H), 4.82 (s, 1H), 4.74 (s, 2H), 2.67 (q,  $J = 7.5$  Hz, 2H), 1.23 (t,  $J = 7.6$  Hz, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  154.9, 147.1, 141.4, 132.7, 128.0, 128.0, 126.4, 125.5, 124.3, 121.6, 120.3, 44.7, 28.7, 15.4. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{26}\text{H}_{17}\text{N}_2$  (MH $^{+}$ ) 237.1386, found 237.1389.

2-(4-(*tert*-Butyl)phenyl)-3,4-dihydroquinazoline **2ak**. 76.8 mg, 87% yield. White solid, mp 148–150 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.72 (d,  $J = 8.5$  Hz, 2H), 7.43 (d,  $J = 8.5$  Hz, 2H), 7.18 (t,  $J = 7.2$  Hz, 1H), 7.12–6.98 (m, 2H), 6.94 (d,  $J = 7.3$  Hz, 1H), 4.89 (d,  $J = 37.4$  Hz, 1H), 4.76 (s, 2H), 1.33 (s, 9H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  154.7, 153.9, 141.5, 132.6, 128.0, 126.1, 125.5, 125.5, 124.3, 120.3, 44.8, 34.8, 31.2. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{18}\text{H}_{21}\text{N}_2$  (MH $^{+}$ ) 265.1699, found 265.1703.

2-(4-Methoxyphenyl)-3,4-dihydroquinazoline **2al**. 61.4 mg, 86% yield. White solid, mp 151–153 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.74 (d,  $J = 8.7$  Hz, 2H), 7.18 (t,  $J = 7.5$  Hz, 1H), 7.07 (d,  $J = 7.7$  Hz, 1H), 7.02 (t,  $J = 7.3$  Hz, 1H), 6.91 (t,  $J = 8.4$  Hz, 3H), 4.72 (s, 2H), 4.48 (s, 1H), 3.82 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  161.6, 154.6, 141.2, 128.1, 128.0, 127.3, 125.5, 124.3, 121.5, 120.2, 113.8, 55.4, 44.5. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{15}\text{H}_{15}\text{N}_2\text{O}$  (MH $^{+}$ ) 239.1179, found 239.1179.

2-(4-Fluorophenyl)-3,4-dihydroquinazoline **2am**. 61.7 mg, 91% yield. White solid, mp 162–163 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.85–7.77 (m, 2H), 7.22 (t,  $J = 7.5$  Hz, 1H), 7.09 (dt,  $J = 13.5$ , 8.0 Hz, 4H), 6.97 (d,  $J = 7.3$  Hz, 1H), 4.80 (s, 2H), 3.99 (s, 1H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  164.2 (d,  $J = 250.6$  Hz), 153.8, 141.2, 131.5 (d,  $J = 3.1$  Hz), 128.6 (d,  $J = 8.6$  Hz), 128.1, 125.5, 124.6, 121.8, 120.1, 115.6 (d,  $J = 21.8$  Hz), 44.7;  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  −109.73 (s). HRMS (ESI)  $m/z$  calcd for  $\text{C}_{14}\text{H}_{12}\text{FN}_2$  (MH $^{+}$ ) 227.0979, found 227.0979.

2-(4-Chlorophenyl)-3,4-dihydroquinazoline **2an**. 66.8 mg, 92% yield. White solid, mp 168–170 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.77–7.69 (m, 2H), 7.43–7.34 (m, 2H), 7.19 (t,  $J = 7.6$  Hz, 1H), 7.04 (dd,  $J = 11.5$ , 4.1 Hz, 2H), 6.94 (d,  $J = 7.4$  Hz, 1H), 4.77 (s, 2H), 3.93 (s, 1H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  153.7, 141.2, 136.6, 133.8, 128.8, 128.1, 127.8, 125.5, 124.7, 121.9, 120.1, 44.7. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{14}\text{H}_{12}\text{ClN}_2$  (MH $^{+}$ ) 243.0684, found 243.0683.

2-(4-Bromophenyl)-3,4-dihydroquinazoline **2ao**. 81.5 mg 95% yield. White solid, mp 173–175 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.68 (d,  $J$  = 8.4 Hz, 2H), 7.56 (d,  $J$  = 8.5 Hz, 2H), 7.20 (t,  $J$  = 7.4 Hz, 1H), 7.05 (t,  $J$  = 7.3 Hz, 2H), 6.95 (d,  $J$  = 7.2 Hz, 1H), 5.27 (s, 1H), 4.79 (s, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  153.7, 141.2, 134.3, 131.7, 128.1, 128.0, 125.5, 124.9, 124.7, 120.1, 44.7. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{14}\text{H}_{12}\text{BrN}_2$  (MH $^+$ ) 287.0178, found 287.0178.

2-(4-(Trifluoromethyl)phenyl)-3,4-dihydroquinazoline **2ap**. 71.2 mg, 86% yield. White solid, mp 181–183 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.89 (d,  $J$  = 8.1 Hz, 2H), 7.66 (d,  $J$  = 8.2 Hz, 2H), 7.21 (t,  $J$  = 7.5 Hz, 1H), 7.06 (t,  $J$  = 7.3 Hz, 2H), 6.96 (d,  $J$  = 7.4 Hz, 1H), 5.40 (s, 1H), 4.81 (s, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  153.4, 138.8, 132.3 (q,  $J$  = 32.6 Hz), 128.2, 126.8, 125.6, 125.5, 125.2, 125.0, 122.4, 120.0, 44.7;  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  −62.78 (s). HRMS (ESI)  $m/z$  calcd for  $\text{C}_{15}\text{H}_{12}\text{F}_3\text{N}_2$  (MH $^+$ ) 277.0947, found 277.0946.

2-(Naphthalen-2-yl)-3,4-dihydroquinazoline **2aq**. 68.9 mg, 89% yield. Pale yellow solid, mp 156–158 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.23 (s, 1H), 7.90 (dt,  $J$  = 17.8, 8.9 Hz, 4H), 7.52 (p,  $J$  = 7.2 Hz, 2H), 7.21 (t,  $J$  = 7.5 Hz, 1H), 7.13 (s, 1H), 7.05 (t,  $J$  = 7.4 Hz, 1H), 6.97 (d,  $J$  = 7.4 Hz, 1H), 4.83 (s, 2H), 4.82–4.77 (m, 1H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  154.8, 134.3, 132.8, 132.7, 128.6, 128.4, 128.1, 127.7, 127.1, 126.6, 126.0, 125.5, 124.5, 123.8, 120.3, 44.7. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{18}\text{H}_{15}\text{N}_2$  (MH $^+$ ) 259.1230, found 259.1228.

2-(Pyridin-3-yl)-3,4-dihydroquinazoline **2ar**. 53.9 mg, 86% yield. Pale yellow solid, mp 126–128 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.96 (d,  $J$  = 1.7 Hz, 1H), 8.57 (dd,  $J$  = 4.8, 1.3 Hz, 1H), 8.15 (dt,  $J$  = 8.0, 1.8 Hz, 1H), 7.27 (dd,  $J$  = 7.3, 5.4 Hz, 1H), 7.16 (d,  $J$  = 7.1 Hz, 1H), 7.06 (ddd,  $J$  = 10.1, 8.4, 4.1 Hz, 2H), 6.91 (d,  $J$  = 7.4 Hz, 1H), 6.18 (s, 1H), 4.74 (s, 2H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  153.2, 151.4, 147.6, 139.5, 135.0, 130.0, 128.2, 125.6, 125.2, 123.4, 121.1, 119.5, 44.2. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{13}\text{H}_{12}\text{N}_3$  (MH $^+$ ) 210.1026, found 210.1028.

2-(Thiophen-2-yl)-3,4-dihydroquinazoline **2as**. 52.6 mg, 82% yield. White solid, mp 98–99 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.44–7.37 (m, 2H), 7.18 (t,  $J$  = 7.5 Hz, 1H), 7.04 (dt,  $J$  = 14.7, 5.8 Hz, 3H), 6.94 (d,  $J$  = 7.4 Hz, 1H), 4.74 (s, 2H), 4.13 (s, 1H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  149.8, 139.8, 128.8, 128.4, 128.1, 127.3, 126.4, 125.5, 125.3, 124.5, 120.5, 44.7. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{12}\text{H}_{11}\text{N}_2\text{S}$  (MH $^+$ ) 215.0637, found 215.0638.

2-(Thiophen-3-yl)-3,4-dihydroquinazoline **2at**. 55.2 mg, 86% yield. White solid, mp 139–141 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.77 (dd,  $J$  = 2.8, 1.1 Hz, 1H), 7.50 (dd,  $J$  = 5.1, 1.0 Hz, 1H), 7.33 (dd,  $J$  = 5.0, 3.0 Hz, 1H), 7.18 (t,  $J$  = 7.3 Hz, 1H), 7.03 (dd,  $J$  = 15.2, 7.7 Hz, 2H), 6.93 (d,  $J$  = 7.4 Hz, 1H), 4.74 (s, 2H), 4.25 (s, 1H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  150.9, 141.0, 137.6, 128.1, 126.4, 126.1, 125.6, 125.2, 124.5, 121.5, 120.2, 44.5. HRMS (ESI)  $m/z$  calcd for  $\text{C}_{12}\text{H}_{11}\text{N}_2\text{S}$  (MH $^+$ ) 215.0637, found 215.0638.

2-Hexyl-3,4-dihydroquinazoline **2au**. 34.9 mg, 62% yield. Pale yellow oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.11 (d,  $J$  = 6.9 Hz, 1H), 7.00–6.92 (m, 1H), 6.88 (d,  $J$  = 6.3 Hz, 2H), 4.95 (s, 1H), 4.62 (d,  $J$  = 2.5 Hz, 2H), 2.32–2.13 (m, 2H), 1.63 (dt,  $J$  = 15.6, 7.9 Hz, 2H), 1.34 (d,  $J$  = 5.2 Hz, 2H), 1.28 (d,  $J$  = 3.1 Hz, 4H), 0.86 (d,  $J$  = 2.8 Hz, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  158.5, 140.7, 134.0, 127.8, 125.5, 123.7, 119.7, 44.8, 36.4, 31.5, 29.0, 27.2, 22.5, 14.0; HRMS (ESI)  $m/z$  calcd for  $\text{C}_{14}\text{H}_{21}\text{N}_2$  (MH $^+$ ) 217.1699, found 217.1703. The characterization data are in accordance with those reported in the literature [50].

2-(*tert*-Butyl)-3,4-dihydroquinazoline **2av**. 36.3 mg, 56% yield. Pale yellow oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.42 (d,  $J$  = 7.4 Hz, 1H), 7.16 (t,  $J$  = 7.6 Hz, 1H), 7.08 (t,  $J$  = 7.4 Hz, 1H), 6.94 (d,  $J$  = 7.4 Hz, 1H), 4.75 (s, 2H), 4.21–3.99 (m, 1H), 1.42 (s, 9H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  166.9, 134.7, 128.5, 125.8, 125.7, 118.2, 117.8, 44.0, 37.2, 27.7; HRMS (ESI)  $m/z$  calcd for  $\text{C}_{12}\text{H}_{17}\text{N}_2$  (MH $^+$ ) 189.1386, found 189.1389.

5-Fluoro-2-phenyl-3,4-dihydroquinazoline **2ba**. 57.0 mg, 84% yield. White solid, mp 142–144 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  7.75 (d,  $J$  = 7.4 Hz, 2H), 7.56–7.30 (m, 3H), 7.12 (dd,  $J$  = 14.7, 7.5 Hz, 1H), 6.86 (d,  $J$  = 7.7 Hz, 1H), 6.73 (t,  $J$  = 8.5 Hz, 1H), 4.79 (s, 3H);  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  158.9 (d,  $J$  = 245.1 Hz), 155.3, 143.6, 135.2, 130.7, 128.6 (d,

$J = 9.3$  Hz), 128.6, 126.4, 118.2 (d,  $J = 3.7$  Hz), 110.8 (d,  $J = 21.0$  Hz), 107.7 (d,  $J = 17.7$  Hz), 38.9. HRMS (ESI)  $m/z$  calcd for  $C_{14}H_{12}FN_2$  (MH<sup>+</sup>) 227.0979, found 227.0979.

6-Chloro-2-phenyl-3,4-dihydroquinazoline **2ca**. 58.1 mg, 80% yield. White solid, mp 152–154 °C.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  7.80–7.73 (m, 2H), 7.49–7.37 (m, 3H), 7.14 (d,  $J = 8.4$  Hz, 1H), 7.02 (d,  $J = 8.3$  Hz, 1H), 6.91 (s, 1H), 4.72 (d,  $J = 2.6$  Hz, 2H), 4.42 (s, 1H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  155.1, 140.6, 135.1, 130.8, 129.2, 128.6, 128.1, 126.4, 125.4, 123.9, 121.9, 44.0. HRMS (ESI)  $m/z$  calcd for  $C_{18}H_{18}NO_3$  (MH<sup>+</sup>) 296.1281, found 296.1282.

6-Methyl-2-phenyl-3,4-dihydroquinazoline **2da**. 57.9 mg, 87% yield. Pale yellow oil.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  7.79 (d,  $J = 7.5$  Hz, 2H), 7.37 (dt,  $J = 14.5, 7.1$  Hz, 3H), 7.01 (dd,  $J = 28.8, 7.9$  Hz, 2H), 6.72 (s, 1H), 5.60 (s, 1H), 4.68 (s, 2H), 2.29 (s, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  155.0, 137.0, 134.8, 133.6, 131.0, 128.8, 128.6, 126.8, 126.1, 121.2, 119.4, 44.1, 21.0. HRMS (ESI)  $m/z$  calcd for  $C_{15}H_{15}N_2$  (MH<sup>+</sup>) 223.1230, found 223.1233.

6-(*tert*-Butyl)-2-phenyl-3,4-dihydroquinazoline **2ea**. 72.9 mg, 92% yield. White solid, mp 152–154 °C.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  7.78 (d,  $J = 7.1$  Hz, 2H), 7.39 (dd,  $J = 15.6, 8.1$  Hz, 3H), 7.22 (d,  $J = 8.0$  Hz, 1H), 7.05 (d,  $J = 8.2$  Hz, 1H), 6.95 (s, 1H), 4.92 (s, 1H), 4.75 (s, 2H), 1.30 (s, 9H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  154.8, 147.9, 138.1, 134.8, 130.7, 128.6, 126.6, 125.0, 122.4, 121.2, 119.3, 44.7, 34.4, 31.4. HRMS (ESI)  $m/z$  calcd for  $C_{18}H_{21}N_2$  (MH<sup>+</sup>) 265.1699, found 265.1703.

### 3.3. Procedure for Synthesis of **6a**

2-Phenyl-3,4-dihydroquinazoline **2aa** (0.3 mmol) was dissolved in anhydrous THF (1 mL) and a solution of DDQ (0.3 mmol, 1 equiv.) in anhydrous THF (1 mL) was added. The reaction was stirred at room temperature for 30 min. The reaction was then quenched by the addition of aqueous NaOH solution (1 M, 1 mL).  $CH_2Cl_2$  (10 mL) and  $H_2O$  (10 mL) were added to the reaction, and the organic phase was separated. The aqueous phase was extracted with  $CH_2Cl_2$  ( $2 \times 10$  mL) and the combined organic phases were dried with  $MgSO_4$  and filtered, and all volatiles were removed in vacuo. The residue was purified via flash column chromatography on silica (EtOAc/PE: 1/20) yielding 2-phenylquinazoline **6a**.

2-Phenylquinazoline **6a**. 54.4 mg, 88% yield. White solid, mp 99–101 °C.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  9.46 (s, 1H), 8.81–8.50 (m, 2H), 8.09 (d,  $J = 8.4$  Hz, 1H), 7.98–7.82 (m, 2H), 7.65–7.44 (m, 4H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  161.0, 160.5, 150.7, 138.0, 134.1, 130.6, 128.6, 128.6, 128.5, 127.2, 127.1, 123.6. The characterization data are in accordance with those reported in the literature [19] (copies of  $^1H$  and  $^{13}C$  NMR spectra see Supplementary Materials).

### 3.4. Procedure for Synthesis of **7**

2-Phenyl-3,4-dihydroquinazoline **2aa** (0.3 mmol) was dissolved in anhydrous DCM (2 mL). The solution was cooled to 0 °C, and acyl chloride (0.33 mmol, 1.10 equiv.) and  $Et_3N$  (0.45 mmol, 1.50 equiv.) were added. The mixture was stirred at RT for 2 h. The reaction was then quenched by the addition of  $H_2O$  (10 mL).  $CH_2Cl_2$  (10 mL) was added to the reaction, and the organic phase was separated. The aqueous phase was extracted with  $CH_2Cl_2$  ( $2 \times 10$  mL), and the combined organic phases were dried with  $MgSO_4$  and filtered, and all volatiles were removed in vacuo. The residue was purified via flash column chromatography on silica (EtOAc/PE: 1/10), yielding **7a** and **7b** at 83% and 87%, respectively (copies of  $^1H$  and  $^{13}C$  NMR spectra see Supplementary Materials).

1-(2-Phenylquinazolin-3(4*H*)-yl)ethan-1-one **7a**. 62.3 mg, 83% yield. White solid, mp 86–88 °C.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  7.85 (dd,  $J = 7.8, 1.7$  Hz, 2H), 7.55–7.44 (m, 4H), 7.35 (s, 1H), 7.22 (d,  $J = 8.1$  Hz, 2H), 4.97 (s, 2H), 1.74 (s, 3H);  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  170.5, 154.0, 142.1, 136.5, 131.3, 129.0, 128.5, 128.5, 127.1, 126.5, 125.3, 125.1, 42.9, 25.2; HRMS (ESI)  $m/z$  calcd for  $C_{16}H_{15}N_2O$  (MH<sup>+</sup>) 251.1179, found 251.1177.

Phenyl(2-phenylquinazolin-3(4*H*)-yl)methanone **7b**. 81.4 mg, 87% yield. White solid, mp 130–132 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 7.59–7.54 (m, 3H), 7.46–7.40 (m, 1H), 7.29 (dd, *J* = 11.8, 7.2 Hz, 4H), 7.20 (tt, *J* = 13.3, 6.6 Hz, 4H), 7.12 (t, *J* = 7.6 Hz, 2H), 5.10 (s, 2H); <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 171.0, 155.0, 142.2, 136.5, 135.6, 131.3, 130.4, 128.6, 128.6, 128.2, 128.0, 127.1, 125.7, 125.3, 125.2, 45.0; HRMS (ESI) *m/z* calcd for C<sub>21</sub>H<sub>17</sub>N<sub>2</sub>O (MH<sup>+</sup>) 313.1335, found 313.1336.

## 4. Conclusions

In conclusion, we have successfully developed a transition-metal-free method for the synthesis of substituted 3,4-dihydroquinazolines via selective cleavage of the C=C bond of enaminones. This protocol utilizes only 0.2 equiv. of HOAc as an additive and employs ethanol as a green and sustainable solvent, making the process both efficient and environmentally friendly. Given the accessibility of the starting materials, the broad substrate scope, and the high reaction efficiencies, this acid-catalyzed cascade reaction holds significant potential for wide-ranging applications in synthetic organic chemistry.

**Supplementary Materials:** The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/molecules30020350/s1>, The crystallographic data of **2ba** and copies of the NMR (<sup>1</sup>H, <sup>13</sup>C, <sup>19</sup>F) spectra of all products are available in the online Supplementary Materials.

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