Electronic Supplementary Information

Aerobic photooxidative synthesis of 2-aryl-4-quinazolinones from aromatic aldehydes and aminobenzamide using catalytic amounts of molecular iodine

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1. General Information

Unless otherwise noted, all reactants or reagents including dry solvents were obtained from commercial suppliers and used as received. The fluorescent lamp was a 23 W Twist lamp from Osram Sylvania Inc. Analytical thin-layer chromatography (TLC) was carried out using 0.25 mm commercial silica gel plates (Merck silica gel 60 F254) and preparative thin-layer chromatography (PTLC) was carried out using 0.50 mm commercial silica gel plates (Merck silica gel 60 F254). Flash column chromatography was performed with Kanto silica gel 60N (Spherical, Neutral, 40–50 mm). The developed chromatogram was analyzed by UV lamp (254 nm). $^1$H NMR spectra was obtained on a JEOL ECA 500 spectrometer (500 MHz for $^1$H NMR) or a JEOL AL 400 spectrometer (400MHz for $^1$H NMR). Chemical shifts (δ) are expressed in parts per million and are internally referenced [2.50 ppm (DMSO) or 0.00 ppm (TMS) for $^1$H NMR].
2. General Procedure

Synthesis of 2-phenyl-4-quinazolinone (3a) (Table 1): A solution of 2-aminobenzamide (1a, 0.3 mmol), benzaldehyde (2a, 0.3 mmol) and iodine (0.015 mmol) in dry EtOAc (5 mL) in a pyrex test tube, purged with an O₂ balloon, was stirred and irradiated externally with a fluorescent lamp for 1 h. The reaction mixture was concentrated under reduced pressure, and purification of the crude product by PTLC (CHCl₃:MeOH = 9:1) provided 2-phenyl-4-quinazolinone (3a) (Rf = 0.6, 57.3 mg, 86%).

2-phenyl-4-quinazolinone (3a)<sup>[S-1]</sup> (Table 1)

![Chemical structure of 2-phenyl-4-quinazolinone](image)

Prepared according to the general procedure: <sup>1</sup>H-NMR (500 MHz, DMSO-d₆): δ 12.55 (br, 1H), 8.19-8.15 (m, 3H), 7.82 (t, J = 8.7 Hz, 1H), 7.74 (d, J = 8.0 Hz, 1H), 7.58-7.50 (m, 5H).

2-(4-hydroxyphenyl)-4-quinazolinone (3b)<sup>[S-2]</sup> (Table 2)

![Chemical structure of 2-(4-hydroxyphenyl)-4-quinazolinone](image)

Prepared according to the general procedure: <sup>1</sup>H-NMR (500 MHz, DMSO-d₆): δ 12.31 (br, 1H), 10.19 (s, 1H), 8.12-8.07 (m, 3H), 7.79 (t, J = 7.5 Hz, 1H), 7.68 (d, J = 8.8 Hz, 1H), 7.45 (t, J = 6.8 Hz, 1H), 6.90 (d, J = 7.8 Hz, 2H).

2-(4-methoxyphenyl)-4-quinazolinone (3c)<sup>[S-3]</sup> (Table 2)

![Chemical structure of 2-(4-methoxyphenyl)-4-quinazolinone](image)

Prepared according to the general procedure: <sup>1</sup>H-NMR (400 MHz, CDCl₃): δ 8.33-8.31 (m, 1H), 7.88-7.80 (m, 2H), 7.72-7.66 (m, 2H), 7.55-7.47 (m, 2H), 7.15-7.13 (m, 1H), 5.96 (s, 1H), 3.96 (s, 3H).

2-(3-methoxyphenyl)-4-quinazolinone (3d)<sup>[S-3]</sup> (Table 2)

![Chemical structure of 2-(3-methoxyphenyl)-4-quinazolinone](image)

Prepared according to the general procedure: <sup>1</sup>H-NMR (500 MHz, CDCl₃): δ 10.72 (br, 1H), 8.32 (d, J = 8.0 Hz, 2H), 7.85-7.79 (m, 2H), 7.73-7.69 (m, 2H), 7.52-7.46 (m, 1H), 7.13 (d, J = 8.0 Hz, 1H), 3.95 (s, 3H).
2-(4-tolyl)-4-quinazolinone (3e)\textsuperscript{[S-3]} (Table 2)

\[
\begin{array}{c}
\text{N} \\
\text{O} \\
\text{Me}
\end{array}
\]

Prepared according to the general procedure: \textsuperscript{1}H-NMR (500 MHz, DMSO-d\textsubscript{6}): \(\delta\) 12.47 (br, 1H), 8.15 (d, \(J = 8.0\) Hz, 1H), 8.10 (d, \(J = 8.0\) Hz, 2H), 7.83 (t, \(J = 8.0\) Hz, 1H), 7.73 (d, \(J = 8.0\) Hz, 1H), 7.51 (t, \(J = 7.5\) Hz, 1H), 7.36 (d, \(J = 8.0\) Hz, 2H), 2.39 (s, 3H).

2-(3-tolyl)-4-quinazolinone (3f)\textsuperscript{[S-3]} (Table 2)

\[
\begin{array}{c}
\text{N} \\
\text{O} \\
\text{Me}
\end{array}
\]

Prepared according to the general procedure: \textsuperscript{1}H-NMR (500 MHz, CDCl\textsubscript{3}): \(\delta\) 10.79 (br, 1H), 8.24 (d, \(J = 8.0\) Hz, 1H), 7.80 (d, \(J = 6.9\) Hz, 2H), 7.57 (d, \(J = 6.9\) Hz, 1H), 7.51-7.48 (m, 1H), 7.42 (t, \(J = 7.5\) Hz, 1H), 7.34 (d, \(J = 6.9\) Hz, 2H), 2.52 (s, 3H).

2-(4-tert-butylphenyl)-4-quinazolinone (3g)\textsuperscript{[S-1]} (Table 2)

\[
\begin{array}{c}
\text{N} \\
\text{O} \\
t\text{Bu}
\end{array}
\]

Prepared according to the general procedure: \textsuperscript{1}H-NMR (500 MHz, CDCl\textsubscript{3}): \(\delta\) 11.80 (br, 1H), 8.34 (d, \(J = 8.0\) Hz, 1H), 8.21 (d, \(J = 8.0\) Hz, 2H), 7.84-7.78 (m, 2H), 7.59 (d, \(J = 8.6\) Hz, 2H), 7.50 (t, \(J = 8.0\) Hz, 1H), 1.39 (s, 9H).

2-(4-fluorophenyl)-4-quinazolinone (3h)\textsuperscript{[S-1]} (Table 2)

\[
\begin{array}{c}
\text{N} \\
\text{O} \\
\text{F}
\end{array}
\]

Prepared according to the general procedure. The crude product was purified by filtration\textsuperscript{[S-1]}: \textsuperscript{1}H-NMR (500 MHz, DMSO-d\textsubscript{6}): \(\delta\) 12.58 (br, 1H), 8.25 (dd, \(J = 5.4\) Hz, 8.6 Hz, 2H), 8.15 (d, \(J = 7.5\) Hz, 1H), 7.84 (t, \(J = 8.6\) Hz, 1H), 7.73 (d, \(J = 8.2\) Hz, 1H), 7.52 (t, \(J = 7.8\) Hz, 1H), 7.39 (d, \(J = 8.6\) Hz, 2H).
2-(4-chlorophenyl)-4-quinazolinone (3i)\(^{[S-1]}\) (Table 2)

\[
\text{[Structure Image]}
\]

Prepared according to the general procedure. The crude product was purified by the filtration\(^{[S-1]}\): \(^1\)H-NMR (500 MHz, DMSO-d6): \(\delta 12.61\) (br, 1H), 8.21-8.15 (m, 3H), 7.85 (t, \(J = 8.0\) Hz, 1H), 7.75 (d, \(J = 8.6\) Hz, 1H), 7.63 (d, \(J = 7.6\) Hz, 2H), 7.54 (t, \(J = 7.1\) Hz, 1H).

2-(4-bromophenyl)-4-quinazolinone (3j)\(^{[S-1]}\) (Table 2)

\[
\text{[Structure Image]}
\]

Prepared according to the general procedure. The crude product was purified by the filtration\(^{[S-1]}\): \(^1\)H-NMR (500 MHz, DMSO-d6): \(\delta 12.61\) (br, 1H), 8.16-8.12 (m, 3H), 7.85 (t, \(J = 8.0\) Hz, 1H), 7.78-7.74 (m, 3H), 7.54 (t, \(J = 7.2\) Hz, 1H).

2-(4-trifluoromethylphenyl)-4-quinazolinone (3k)\(^{[S-1]}\) (Table 2)

\[
\text{[Structure Image]}
\]

Prepared according to the general procedure. The crude product was purified by the filtration\(^{[S-1]}\): \(^1\)H-NMR (500 MHz, DMSO-d6): \(\delta 12.75\) (br, 1H), 8.38-8.35 (m, 2H), 8.19-8.15 (m, 1H), 7.94-7.84 (m, 3H), 7.79-7.76 (m, 1H), 7.58-7.53 (m, 1H).

2-(4-cyanophenyl)-4-quinazolinone (3l)\(^{[S-3]}\) (Table 2)

\[
\text{[Structure Image]}
\]

Prepared according to the general procedure. The crude product was purified by the filtration\(^{[S-1]}\): \(^1\)H-NMR (500 MHz, DMSO-d6): \(\delta 12.72\) (br, 1H), 8.31 (d, \(J = 8.6\) Hz, 2H), 8.15 (d, \(J = 8.0\) Hz, 1H), 8.01 (d, \(J = 8.0\) Hz, 2H), 7.84 (t, \(J = 7.5\) Hz, 1H), 7.75 (d, \(J = 8.0\) Hz, 1H), 7.54 (t, \(J = 7.5\) Hz, 1H).
2-(4-nitrophenyl)-4-quinazolinone (3m)\textsuperscript{[S-1]} (Table 2)

\[
\begin{array}{c}
\text{N} \\
\text{H} \\
\text{O} \\
\text{N} \\
\text{O}
\end{array}
\]

Prepared according to the general procedure. The crude product was purified by the filtration\textsuperscript{[S-1]}: \textsuperscript{1}H-NMR (500 MHz, DMSO-d\textsubscript{6}): \(\delta\) 12.84 (br, 1H), 8.41-8.40 (m, 4H), 8.19 (d, \(J = 6.9\) Hz, 1H), 7.90-7.87 (m, 1H), 7.80 (d, \(J = 7.4\) Hz, 1H), 7.60-7.57 (m, 1H).

2-phenyl-2,3-dihydroquinazolin-4-one (4a)\textsuperscript{[S-4]} (Scheme 2)

\[
\begin{array}{c}
\text{N} \\
\text{H} \\
\text{O}
\end{array}
\]

\textbf{Synthesis of 2-phenyl-2,3-dihydroquinazolin-4-one (4a):} A solution of 2-aminobenzamide (1a, 0.3 mmol), benzaldehyde (2a, 0.3 mmol) and iodine (0.015 mmol) in dry Hexane (5 mL) in a pyrex test tube, purged with an O\textsubscript{2} balloon, was stirred and irradiated externally with a fluorescent lamp for 1 h. The reaction mixture was concentrated under reduced pressure, and purification of the crude product by PTLC (CHCl\textsubscript{3}:MeOH = 20:1) provided 2-phenyl-2,3-dihydroquinazolin-4-one (4a) (R\textsubscript{f} = 0.4, 33 mg, 49%).

\textsuperscript{1}H-NMR (500 MHz, DMSO-d\textsubscript{6}): \(\delta\) 8.29 (s, 1H), 7.61 (d, \(J = 8.1\) Hz, 1H), 7.50 (d, \(J = 6.8\) Hz, 2H), 7.40-7.33 (m, 3H), 7.24 (t, \(J = 7.9\) Hz, 1H), 7.11 (br, 1H), 6.75 (d, 8.6 Hz, 1H), 6.67 (t, \(J = 8.0\) Hz, 1H), 5.75 (s, 1H).

4. References

2-phenyl-4-quinazolinone (3a)[S-1] (Table 1)

2-(4-hydroxyphenyl)-4-quinazolinone (3b)[S-2] (Table 2)
2-(4-methoxyphenyl)-4-quinazolinone (3c)\textsuperscript{(S-3)} (Table 2)

2-(3-methoxyphenyl)-4-quinazolinone (3d)\textsuperscript{(S-3)} (Table 2)
2-(4-tolyl)-4-quinazolinone (3e) (Table 2)

2-(3-tolyl)-4-quinazolinone (3f) (Table 2)
2-(4-tert-butylphenyl)-4-quinazolinone (3g)\textsuperscript{(S-1)} (Table 2)

![Chemical Structure 1](image1)

2-(4-fluorophenyl)-4-quinazolinone (3h)\textsuperscript{(S-1)} (Table 2)

![Chemical Structure 2](image2)
2-(4-chlorophenyl)-4-quinazolinone (3i) (Table 2)

2-(4-bromophenyl)-4-quinazolinone (3j) (Table 2)
2-(4-trifluoromethylphenyl)-4-quinazolinone (3k)\(^{[S-1]}\) (Table 2)

2-(4-cyanophenyl)-4-quinazolinone (3l)\(^{[S-3]}\) (Table 2)
2-(4-nitrophenyl)-4-quinazolinone (3m)\textsuperscript{[S-1]} (Table 2)

\[
\begin{align*}
\text{Chemical Shift (ppm)} & \quad 12.0 & \quad 11.5 & \quad 11.0 & \quad 10.5 & \quad 10.0 & \quad 9.5 & \quad 9.0 & \quad 8.5 & \quad 8.0 & \quad 7.5 & \quad 7.0 & \quad 6.5 & \quad 6.0 & \quad 5.5 & \quad 5.0 & \quad 4.5 & \quad 4.0 & \quad 3.5 & \quad 3.0 & \quad 2.5 & \quad 2.0 & \quad 1.5 & \quad 1.0 & \quad 0.5 & \quad 0.0 & \quad 0.5 & \quad 1.0 & \quad 1.5 & \quad 2.0 & \quad 2.5 & \quad 3.0 & \quad 3.5 & \quad 4.0 & \quad 4.5 & \quad 5.0 & \quad 5.5 & \quad 6.0 & \quad 6.5 & \quad 7.0 & \quad 7.5 & \quad 8.0 & \quad 8.5 & \quad 9.0 & \quad 9.5 & \quad 10.0 & \quad 10.5 & \quad 11.0 & \quad 11.5 & \quad 12.0 & \\
2-phenyl-2,3-dihydroquinazolin-4-one (4a)\textsuperscript{[S-4]} (Scheme 2)
\end{align*}
\]