Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry

Supporting Information

Direct Transformation of Arylpropynes to Acrylamides via a Three-Step Tandem Reaction

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1. General Methods

Unless stated otherwise, all reagents were purchased commercially without further purification. All reagents were weighed and handled in air at room temperature. All glassware was oven or flame dried immediately prior to use.

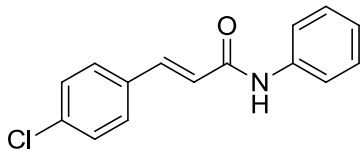
^{1}H NMR and ^{13}C NMR were obtained at 400 MHz and recorded relative to the tetramethylsilane signal (0 ppm) or residual protio-solvent. Chemical shifts are expressed in parts per million values (δ, ppm). ^{1}H NMR spectra were calibrated with DMSO-d_6 (δ= 2.50 ppm) and $CDCl_3$ (δ= 7.26 ppm). ^{13}C-NMR spectra were obtained at 100 MHz and were calibrated with DMSO-d_6 (δ= 39.50 ppm) and $CDCl_3$ (δ= 77.00 ppm). Data for ^{1}H NMR are recorded as follows: chemical shift (δ, ppm), multiplicity (s= singlet, d= doublet, t= triplet, q= quartet, m= multiplet or unresolved, br= broad singlet, coupling constant(s) in Hz, integration). Mass spectra were recorded using a PE SCLEX QSTAR spectrometer. Purification was done by column chromatography on silica gel (200–300 mesh) with petroleum ether and ethyl acetate as the eluent to give the pure product.

2. Experimental Procedure

2.1 Synthesis of acrylamides from 1, 3- diarylpropynes:

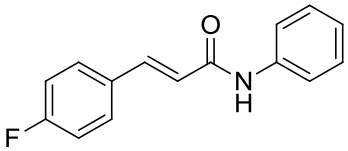
An oven-dried Schlenk tube was charge with **1** or **3** (1 mmol), NH_2-OH.HCl (0.035g, 0.5 mmol), DDQ (0.17 g, 0.75mmol), PPA (0.052g, 0.15mmol), HCOOH (1.5 mL) and CH_3CN (1.5 mL).The reaction mixture was stirred at 80^{o}C for 12 h monitored by TLC. The mixture was allowed to cool to room temperature and was quenched with H_2O (10 mL).The mixture was extracted with DCM (3×10 mL), and the organic layer was washed with brine (10mL). The combined organic layers were dried with Na_2SO_4, concentrated under reduced pressure, and dried under high vacuum. The residue was purified by flash chromatography on silica gel (petroleum ether/ethyl acetate, 15:1 to 8:1) to obtain the desired products **2** or **4**.

3. Characterization of the Compounds



***(E)*-3-(4- chlorophenyl)-*N*-phenylacrylamide (2a)[1]**

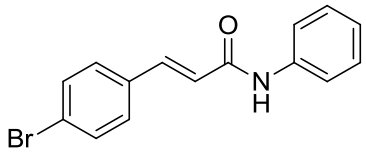
Eluent: petroleum ether/ethyl acetate (15:1). White solid (81% yield); **2a**: mp 176-178 ^{o}C (lit.[2b] 180 ^{o}C). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.72 (d, *J* = 15.6 Hz, 1H), 7.65 (d, *J* = 6.8 Hz, 2H), 7.54(br, 1H), 7.46 (d, *J* = 8.4 Hz, 2H), 7.39-7.35 (m, 4H), 7.16 (t, *J* = 7.2 Hz, 1H), 6.56 (d, *J* = 15.6 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.7, 141.1, 137.9, 135.9, 133.1, 129.2, 129.1, 127.6, 124.6, 121.4, 120.0. IR (KBr, cm^{-1}): *v* = 3279, 1657, 1625, 1598, 1533, 1488, 1442, 1333, 1247, 1184, 1093, 1012, 974, 818, 745, 692, 617, 508. HRMS m/z (ESI) calcd. for $C_{15}H_{12}ClNO$ $(M+Na)^{+}$: 280.0505, found 280.0489.



***(E)*-3-(4-Fluorophenyl)-*N*-phenylacrylamide (2b)[2]**

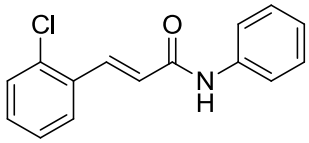
Eluent: petroleum ether/ethyl acetate (15:1). White solid (83% yield); **2b**: mp 164-165 ^{o}C. ^{1}H NMR

(400 MHz, $CDCl_3$, ppm): δ 7.74 (d, *J* = 15.6 Hz, 1H), 7.61-7.50 (m, 5H), 7.33 (d, *J* = 8.8 Hz, 2H), 7.09 (t, *J* = 8.4 Hz, 2H), 6.48 (d, *J* = 15.2 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.8, 163.7 (d, *J* = 249.7 Hz), 141.6, 136.5, 130.7 (d, *J* = 3.5 Hz), 129.8 (d, *J* = 8.4 Hz), 129.1, 121.2, 120.1, 116.1 (d, *J* = 21.8 Hz). ^{19}F NMR (376 MHz, $CDCl_3$, ppm): δ 109.72 (s, 1F). IR (KBr, cm^{-1}): *v* = 3271, 1653, 1625, 1591, 1539, 1508, 1396, 1339, 1240, 1183, 1158, 10894, 1013, 970, 826, 738, 664, 528, 507. HRMS m/z (ESI) calcd. for $C_{15}H_{12}FNO$ $(M+Na)^+$: 264.0801, found 264.0785.



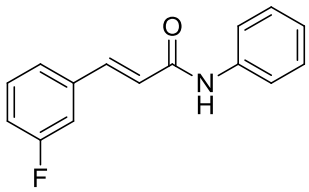
***(E)*-3-(4-Bromophenyl)-*N*-phenylacrylamide (2c)[1a, 2]**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (77% yield); **2c**: mp 190-191 °C. ^1H NMR (400 MHz, DMSO-d_6, ppm): δ 10.24(s, 1H), 7.70 (d, *J* = 8.0 Hz, 2H), 7.66 (d, *J* = 8.4 Hz, 2H), 7.60-7.55 (m, 3H), 7.34 (t, *J* = 8.0 Hz, 1H), 7.08 (t, *J* = 7.2 Hz, 1H), 6.86 (d, *J* = 15.6 Hz, 1H). ^{13}C NMR (100 MHz, DMSO-d_6, ppm): δ 163.8, 139.6, 139.3, 134.5, 132.5, 130.1, 129.3, 123.9, 123.7, 123.4, 119.7. IR (KBr, cm^{-1}): *v* = 3274, 3037, 1658, 1623, 1597, 1533, 1483, 1441, 1331, 1247, 1183, 1070, 1010, 973, 815, 742, 692, 574, 504. HRMS m/z (ESI) calcd. for $C_{15}H_{12}BrNO$ $(M+Na)^+$: 324.000, found 324.0026.



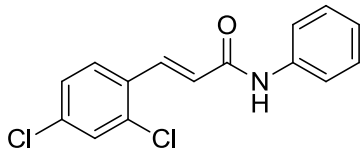
***(E)*-3-(2-chlorophenyl)-*N*-phenylacrylamide (2d) [1a, 3]**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (72% yield); **2d**: mp 179-180 °C. ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 8.15(d, *J* = 15.6 Hz, 1H), 7.79(br, 1H), 7.67 (d, *J* = 6.8 Hz, 2H), 7.58 (d, *J* = 7.6 Hz, 1H), 7.43 (d, *J* = 8.0 Hz, 1H), 7.36 (t, *J* = 8.0 Hz, 2H), 7.32-7.23 (m, 2H), 7.15 (t, *J* = 7.2 Hz, 1H), 6.63 (d, *J* = 15.6 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.5, 138.2, 137.9, 134.9, 133.0, 130.7, 130.2, 129.1, 127.7, 127.0, 124.6, 123.8, 120.0. IR (KBr, cm^{-1}): *v* = 3245, 3037, 1658, 1624, 1596, 1548, 1496, 1443, 1348, 1270, 1245, 1124, 1036, 1003, 975, 861, 768, 748, 694, 684. HRMS m/z (ESI) calcd. for $C_{15}H_{12}ClNO$ $(M+Na)^+$: 280.0505, found 280.0493.



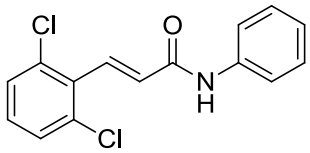
***(E)*-3-(3-(fluoromethyl) phenyl)-*N*-phenylacrylamide (2e)**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (78% yield); **2e**: mp 145-146 °C. ^1H NMR (400 MHz, $CDCl_3$, ppm): δ 8.06 (br, 1H), 7.75-7.67 (m, 3H), 7.39-7.30 (m, 3H), 7.22 (d, *J* = 7.6 Hz, 1H), 7.16 (d, *J* = 8.0 Hz, 2H), 7.06 (t, *J* = 8.0 Hz, 1H), 6.64 (d, *J* = 15.6 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.8, 163.0 (d, *J* = 245.1Hz), 141.1, 137.9, 136.9 (d, *J* = 7.6 Hz), 130.4 (d, *J* = 8.3 Hz), 129.1, 124.7, 124.1(d, *J* = 2.8 Hz), 122.3, 120.1, 116.8 (d, *J* = 21.3 Hz), 114.1(d, *J* = 21.8 Hz). ^{19}F NMR (376 MHz, $CDCl_3$, ppm): δ 112.58 (s, 1F). IR (KBr, cm^{-1}): *v* = 3273, 3065, 1662, 1629, 1595, 1585, 1547, 1490, 1444, 1350, 1254, 1189,1144, 979, 855, 785, 753, 692, 669, 553. HRMS m/z (ESI) calcd. for $C_{15}H_{12}FNO$ $(M+Na)^+$: 264.0801, found 264.0795.



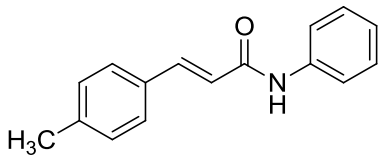
***(E)*-3-(2, 4-dichlorophenyl)-*N*-phenylacrylamide (2f)**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (85% yield); **2f**: mp 176-177 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 8.06 (d, *J* = 15.6 Hz, 1H), 7.78 (br, 1H), 7.66 (d, *J* = 6.8 Hz, 2H), 7.49 (d, *J* = 8.4 Hz, 1H), 7.44 (s, 1H), 7.36 (t, *J* = 8.0 Hz, 2H), 7.22 (d, *J* = 8.4 Hz, 1H), 7.16 (t, *J* = 7.2 Hz, 1H), 6.60 (d, *J* = 15.6 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.3, 137.8, 137.1, 136.0, 135.5, 131.6, 130.0, 129.1, 128.3, 127.4, 124.7, 124.2, 120.0. IR (KBr, cm^{-1}): *v* = 3277, 3132, 3061, 1656, 1626, 1599, 1543, 1498, 1466, 1442, 1341, 1258, 1186, 1100, 1002, 967, 863, 795, 752, 710, 688. HRMS m/z (ESI) calcd. for $C_{15}H_{11}Cl_2NO$ $(M+Na)^+$: 314.0115, found 314.0096.



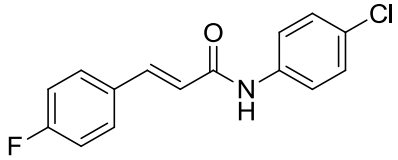
***(E)*-3-(2,4-dichlorophenyl)-*N*-phenylacrylamide (2g)**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (82% yield); **2g**: mp 177-179 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.89 (d, *J* = 15.6 Hz, 1H), 7.67 (d, *J* = 7.2 Hz, 2H), 7.48(br, 1H), 7.38 (t, *J* = 7.2 Hz, 4H), 7.29-7.15 (m, 2H), 6.76 (d, *J* = 16.0 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.1, 137.8, 135.9, 135.0, 132.3, 130.9, 129.6, 129.3, 129.1, 128.8, 124.6, 119.9. IR (KBr, cm^{-1}): *v* = 3265, 1661, 1619, 1599, 1540, 1444, 1429, 1339, 1260, 1189, 1088, 1025, 975, 803, 777, 690, 617, 472. HRMS m/z (ESI) calcd. for $C_{15}H_{11}Cl_2NO$ $(M+Na)^+$: 314.0115, found 314.0114.



***(E)*-3-(*p*-Tolyl)-*N*-phenylacrylamide (2h)** [1b, 2]

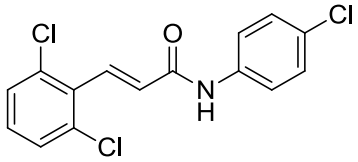
Eluent: petroleum ether/ethyl acetate (15:1). White solid (52% yield); **2h**: mp 166-168 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.76 (d, *J* = 15.6 Hz, 1H), 7.63 (d, *J* = 7.2 Hz, 2H), 7.45 (d, *J* = 7.6 Hz, 2H), 7.41(br, 1H), 7.37 (t, *J* = 8.0 Hz, 1H), 7.21 (d, *J* = 7.6 Hz, 2H), 7.15 (t, *J* = 7.2 Hz, 1H), 6.53 (d, *J* = 15.6 Hz, 1H), 2.40 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 164.2, 142.4, 140.4, 138.1, 131.9, 129.6, 128.0, 124.4, 119.9, 21.5. IR (KBr, cm^{-1}): *v* = 3286, 3034, 2918, 1656, 1625, 1598, 1528, 1498, 1442, 1335, 1247, 1181, 1076, 1004, 975, 811, 718, 669, 589, 492. HRMS m/z (ESI) calcd. for $C_{16}H_{15}NO$ $(M+Na)^+$: 260.1051, found 260.1037.



***(E)*-3-(4-Fluorophenyl)-*N*-(4-chlorophenyl)acrylamide (2j)**

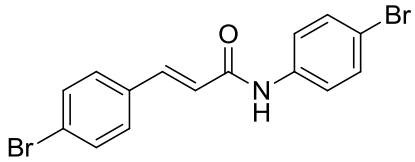
Eluent: petroleum ether/ethyl acetate (15:1). White solid (88% yield); **2j**: mp 169-170 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.73 (d, *J* = 15.2 Hz, 1H), 7.61-7.57 (m, 3H), 7.53-7.49 (m, 2H), 7.33 (d, *J* = 8.8 Hz, 2H), 7.09 (t, *J* = 8.8 Hz, 1H), 6.49 (d, *J* = 15.6 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.9, 163.8 (d, *J* = 249.7 Hz), 141.6, 136.5, 130.7, 129.8 (d, *J* = 8.4 Hz), 129.1, 121.2, 120.1, 116.1

(d, *J* = 21.8 Hz). ^{19}F NMR (376 MHz, $CDCl_3$, ppm): δ 109.68 (s, 1F). IR (KBr, cm^{-1}): *v* = 3269, 3114, 3055, 2962, 1657, 1627, 1601, 1542, 1509, 1491, 1399, 1346, 1247, 1186, 1160, 1089, 1013, 983, 821,800, 737, 529, 505, 425. HRMS m/z (ESI) calcd. for $C_{15}H_{11}FClNO$ $(M+Na)^+$: 298.0411, found 298.0408.



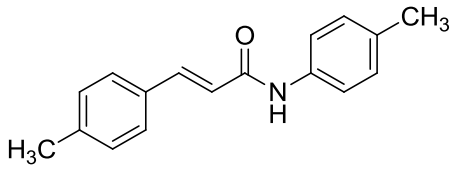
***(E)*-3-(2,4-dichlorophenyl)-*N*-(4-chlorophenyl)acrylamide (2k)**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (86% yield); **2k**: mp 186-189 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.88 (d, *J* = 16.0 Hz, 1H), 7.69(br, 1H), 7.62 (d, *J* = 7.2 Hz, 2H), 7.37 (d, *J* = 8.0 Hz, 2H), 7.32 (d, *J* = 8.4 Hz, 2H), 7.20 (t, *J* = 8.0 Hz, 1H), 6.76 (d, *J* = 15.6 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.2, 136.3, 135.1, 132.1, 129.7, 129.1, 129.0, 128.8, 128.3, 128.2, 121.2. IR (KBr, cm^{-1}): *v* = 3287, 3049, 1661, 1635, 1595, 1537, 1491, 1429, 1396, 1339, 1261, 1186, 1087, 1012, 969, 818, 779, 706, 666, 501. HRMS m/z (ESI) calcd. for $C_{15}H_{10}Cl_3NO$ $(M+Na)^+$: 347.9726, found 347.9725.



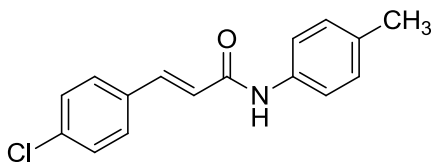
***(E)*- *N*, 3-Bis(4-bromophenyl)acrylamide (2l)[2]**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (83% yield); **2l:** mp 216-217 °C. ^{1}H NMR (400 MHz, DMSO-d_6, ppm): δ 10.38 (s, 1H), 7.67 (t, *J* = 8.0 Hz, 4H), 7.60-7.52 (m, 5H), 7.41 (d, *J* = 8.4 Hz, 1H), 6.83 (d, *J* = 15.6 Hz, 1H).^{13}C NMR (100 MHz, DMSO-d_6, ppm): δ 163.9, 139.7, 139.0, 134.4, 132.5, 132.1, 130.2, 123.5, 123.3, 121.6, 115.5. IR (KBr, cm^{-1}): *v* = 3286, 3044, 1667, 1624, 1590, 1537, 1488, 1390, 1334, 1256, 1180, 1090, 977, 819, 758, 705, 680, 501. HRMS m/z (ESI) calcd. for $C_{15}H_{11}Br_2NO$ $(M+Na)^+$: 403.9085, found 403.9093.



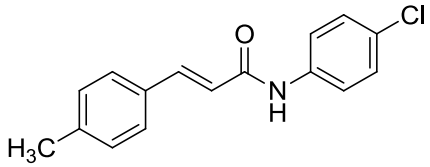
***(E)*- *N*, 3-Di- *p*-tolylacrylamide (2m)[1c, 2, 4]**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (31% yield); **2m:** mp 173-175 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.75 (d, *J* = 15.2 Hz, 1H), 7.57-7.51 (m, 2H), 7.46 (d, *J* = 8.0 Hz, 2H), 7.22 (d, *J* = 8.0 Hz, 2H), 7.18 (d, *J* = 8.4 Hz, 2H), 6.51 (d, *J* = 15.2 Hz, 1H), 2.40 (s, 3H), 2.36 (s, 3H).^{13}C NMR (100MHz, $CDCl_3$, ppm): δ 164.1, 142.2, 140.2, 135.5, 134.0, 132.0, 129.6, 127.9, 120.0, 21.4, 20.9. IR (KBr, cm^{-1}): *v* = 3237, 3030, 2915, 1657, 1619, 1523, 1405, 1337, 1244, 1172, 977, 815, 788, 622, 491. HRMS m/z (ESI) calcd. for $C_{17}H_{17}NO$ $(M+Na)^+$: 274.1208, found 274.1199.



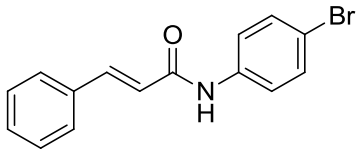
***(E)*-3-(4-chlorophenyl)-*N*-(*p*-tolyl)acrylamide (2n)**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (72% yield); **2n :** mp 174-176 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.71 (d, *J* = 15.6 Hz, 1H), 7.52 (d, *J* = 7.6 Hz, 2H), 7.47 (d, *J* = 8.0 Hz, 2H), 7.40 (br, 1H), 7.37 (d, *J* = 8.4 Hz, 2H), 7.18 (d, *J* = 8.0 Hz, 2H), 6.54 (d, *J* = 15.2 Hz, 1H), 2.35 (s, 1H).^{13}C NMR (100MHz, $CDCl_3$, ppm): δ 163.6, 140.8, 135.8, 135.3, 134.3, 133.2, 129.6, 129.1, 121.5, 120.1, 20.9. IR (KBr, cm^{-1}): *v* = 3281, 3042, 2920, 1655, 1627, 1598, 1537, 1489, 1402, 1344, 1260, 1185, 1090, 1011, 973, 815, 708, 673, 540, 501. HRMS m/z (ESI) calcd. for $C_{16}H_{14}ClNO$ $(M+Na)^+$: 294.0662, found 294.0651.



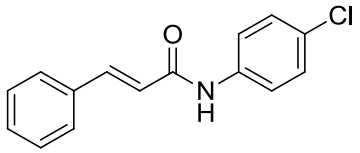
***(E)*-3-(*p*-Tolyl)- *N*-(4-chlorophenyl)acrylamide (2o)**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (61% yield); **2o:** mp 177-179 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.75 (d, *J* = 15.6 Hz, 1H), 7.60 (d, *J* = 8.0 Hz, 2H), 7.54 (br, 1H), 7.43 (d, *J* = 8.0 Hz, 2H), 7.32 (d, *J* = 8.4 Hz, 2H), 7.20 (d, *J* = 8.0 Hz, 2H), 6.52 (d, *J* = 15.6 Hz, 1H), 2.40 (s, 1H).^{13}C NMR (100MHz, $CDCl_3$, ppm): δ 164.2, 142.8, 140.6, 136.7, 131.7, 129.6, 129.1, 128.0, 121.2, 119.3, 21.5. IR (KBr, cm^{-1}): *v* = 3281, 3044, 2919, 1654, 1629, 1595, 1537, 1491, 1398, 1343, 1250, 1185, 1093, 1012, 975, 814, 733, 659, 500. HRMS m/z (ESI) calcd. for $C_{16}H_{14}ClNO$ $(M+Na)^+$: 294.0662, found 294.0661.



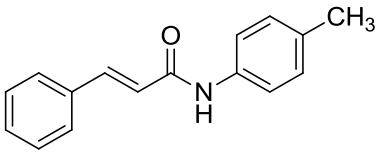
***N*-(4-Bromophenyl)cinnamamide (2p)[5]**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (75% yield); **2p:** mp 159-161 °C. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.79 (d, *J* = 15.6 Hz, 1H), 7.57-7.54 (m, 4H), 7.49 (d, *J* = 8.8 Hz, 2H), 7.43-7.41 (m, 3H), 7.34 (br, 1H), 6.55 (d, *J* = 15.2 Hz, 1H).^{13}C NMR (100MHz, $CDCl_3$, ppm): δ 164.1, 141.0, 138.0, 132.2, 130.1, 129.5, 129.3, 128.1, 121.5, 119.7. IR (KBr, cm^{-1}): *v* = 3291, 1660, 1623, 1597, 1535, 1487, 1442, 1394, 1339, 1247, 1177, 1071, 1010, 973, 818, 763, 693, 627, 496. HRMS m/z(ESI) calcd. for $C_{15}H_{12}BrNO$ $(M+Na)^+$: 324.0000, found 323.9998.



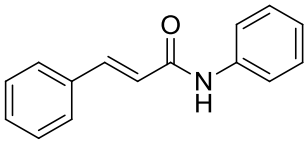
***N*-(4-chlorophenyl)cinnamamide (2q)[1c, 6d]**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (77% yield); **2q:** mp 181-183 °C (lit.[6d] 182-184 °C). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.78 (d, *J* = 15.6 Hz, 1H), 7.61 (d, *J* = 7.6 Hz, 3H), 7.54-7.52 (m, 2H), 7.41-7.40 (m, 3H), 7.33 (d, *J* = 8.4 Hz, 3H), 6.58 (d, *J* = 15.2 Hz, 1H).^{13}C NMR (100MHz, $CDCl_3$, ppm): δ 164.0, 142.9, 136.6, 134.5, 130.2, 129.1, 128.9, 128.0, 121.2, 120.4. IR (KBr, cm^{-1}): *v* = 3267, 1658, 1626, 1597, 1532, 1488, 1442, 1398, 1333, 1247, 1184, 1093, 1013, 973, 818, 745, 580, 504. HRMS m/z (ESI) calcd. for $C_{15}H_{12}ClNO$ $(M+Na)^+$: 280.0505, found 280.0501.



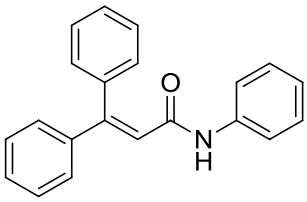
***N*-(*p*-Tolyl)cinnamamide (2r)[2, 6a]**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (67% yield); **2r:** mp 157-159 °C (lit.[6e] 159 °C). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ 7.76 (d, *J* = 15.6 Hz, 1H), 7.63 (br, 1H), 7.55-7.51 (m, 4H), 7.39-7.37(m, 3H), 7.16 (d, *J* = 8.0 Hz, 2H), 6.60 (d, *J* = 15.6 Hz, 1H), 2.34 (s, 1H).^{13}C NMR (100MHz, $CDCl_3$, ppm): δ 164.0, 142.1, 135.5, 134.7, 129.9, 129.6, 128.8, 127.9, 121.0, 120.1, 20.9. IR (KBr, cm^{-1}): *v* = 3277, 3047, 2920, 1657, 1626, 1595, 1535, 1487, 1419, 1338, 1260, 1185, 1090, 1015, 978, 753, 733 673, 509. HRMS m/z (ESI) calcd. for $C_{16}H_{15}NO$ $(M+Na)^+$: 260.1051, found 260.1041.



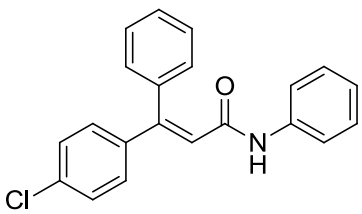
***N*-phenylcinnamamide (2s)[1c, 2, 4c]**

Eluent: petroleum ether/ethyl acetate (15:1). White solid (72% yield); **2s:** mp 170-172 °C (lit.[4c] 168-172 °C). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): 7.78 (d, *J* = 15.6 Hz, 1H), 7.70-7.66 (m, 3H), 7.53-7.50 (m, 2H), 7.40-7.35 (m, 5H), 7.16 (t, *J* = 7.6 Hz, 1H), 6.62 (d, J = 15.6 Hz, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 164.1, 142.4, 138.1, 134.6, 129.9, 129.1, 128.9, 128.0, 124.5, 120.9, 120.0. IR (KBr, cm^{-1}): *v* = 3237, 3032, 1661, 1617, 1541, 1496, 1442, 1351, 1250, 1189, 977, 865, 760, 620, 485. HRMS m/z (ESI) calcd. for $C_{15}H_{14}NO$ $(M+Na)^+$: 246.0895, found 246.0893.



***N*, 3, 3-triphenylacrylamide (4a)[7]**

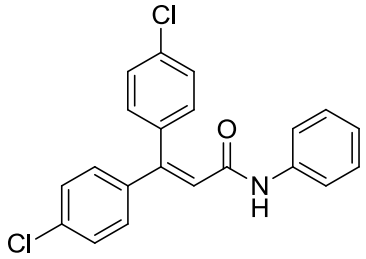
Eluent: petroleum ether/ethyl acetate (15:1). White solid (65% yield); **4a:** mp 130-132 °C (lit.[7] 129-130 °C). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): 7.52-7.50 (m, 3H), 7.38-7.30 (m, 7H), 7.23 (t, *J* = 8.0 Hz, 2H), 7.13 (d, *J* = 7.6 Hz, 2H), 7.05 (t, *J* = 7.6 Hz, 1H), 6.93 (br, 1H), 6.54 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 164.3, 150.4, 140.4, 138.1, 137.6, 129.5, 129.2, 129.1,129.0, 128.8, 128.5, 128.0, 124.1, 123.1, 119.5. IR (KBr, cm^{-1}): *v* = 3296, 3045, 1655, 1614, 1598, 1544, 1488, 1441, 1313, 1243, 1188, 1091, 1012, 884, 830, 758, 694, 490. HRMS m/z (ESI) calcd. for $C_{21}H_{17}NO$ $(M+Na)^+$: 322.1208, found 322.1213.



***(E)or (Z)*- 3-(4-chlorophenyl) –*N*, 3-diphenylacrylamide (4b)**

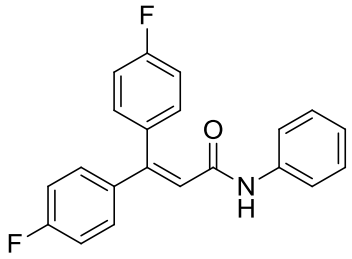
Eluent: petroleum ether/ethyl acetate (15:1). White solid (71% yield); **4b:** mp 189-191 °C. ^{1}H NMR

(400 MHz, $CDCl_3$, ppm): 7.43 (d, *J* = 8.0 Hz, 2H), 7.39-7.36(m, 3H), 7.31-7.28 (m, 8H), 7.11-7.07 (m, 1H), 7.06 (br, 1H), 6.48 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 164.0, 150.3, 140.4, 137.5, 136.7, 134.9, 130.9, 129.4, 129.0, 128.6, 128.1, 124.4, 122.7, 119.7. IR (KBr, cm^{-1}): *v* = 3269, 3074, 1646, 1598, 1549, 1487, 1439, 1357, 1317, 1239, 1195, 1085, 1014, 862, 829, 760, 695, 548. HRMS m/z (ESI) calcd. for $C_{21}H_{16}ClNO$ $(M+Na)^+$: 356.0818, found 356.0821.



3, 3-Bis(4-chlorophenyl)-*N*-phenylacrylamide (4c)

Eluent: petroleum ether/ethyl acetate (15:1). White solid (75% yield); **4c:** mp 184-186 °C. ^1H NMR (400 MHz, $CDCl_3$, ppm): 7.42 (d, *J* = 8.0 Hz, 2H), 7.34 (d, *J* = 8.4 Hz, 2H), 7.29-7.26 (m, 6H), 7.22 (d, *J* = 8.4 Hz, 2H), 7.12-7.09 (m, 2H), 6.45 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 163.7, 149.2, 138.9, 137.4, 136.3, 135.6, 135.2, 130.9, 129.4, 129.1, 129.0, 128.8, 124.5, 122.9, 119.7. IR (KBr, cm^{-1}): *v* = 3297, 1655, 1616, 1599, 1544, 1488, 1441, 1313, 1243, 1188, 1091, 1013, 883, 830, 757, 694, 615, 489. HRMS m/z (ESI) calcd. for $C_{21}H_{15}Cl_2NO$ $(M+Na)^+$: 390.0428, found 390.0422.



3, 3-Bis(4-fluorophenyl)-*N*-phenylacrylamide (4d)

Eluent: petroleum ether/ethyl acetate (15:1). White solid (80% yield); **4d:** mp 169-170 °C. ^1H NMR (400 MHz, $CDCl_3$, ppm): 7.34-7.26 (m, 8H), 7.15 (t, *J* = 8.4 Hz, 2H), 7.08-7.04 (m, 4H), 6.43 (s, 1H). ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ 164.0, 163.5 (d, *J* = 248.7 Hz), 163.0 (d, *J* = 248.1 Hz), 149.2, 137.5, 136.8, 134.0, 131.4 (d, *J* = 8.2 Hz), 130.0 (d, *J* = 8.4 Hz), 129.0, 124.4, 122.6, 119.7, 116.0 (d, *J* = 21.6 Hz), 115.6 (d, *J* = 21.6 Hz). ^{19}F NMR (376 MHz, $CDCl_3$, ppm): δ 111.55 (s, 1F), 111.56 (s, 1F). IR (KBr, cm^{-1}): *v* = 3266, 3072, 1645, 1600, 1550, 1506, 1441, 1316, 1238, 1197, 1159, 1101, 1004, 838, 826, 757, 697, 547. HRMS m/z (ESI) calcd. for $C_{21}H_{15}F_2NO$ $(M+Na)^+$: 358.1019, found 358.1005.

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5. NMR Charts