Investigation on the Transition Metal and Acid Catalyzed Reaction of β -(*N*-Tosyl)amine Diazo Carbonyl Compounds

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Table S1. Relative Migratory Aptitude in the Reaction Catalyzed by Rh₂(OAc)₄

$$\frac{k_X}{k_H} = \frac{\{[10+11]/[12]\}_X}{\{[10+11]/[12]\}_H}$$

Entry	<i>N</i> -Tosyl α-diazo-ketamines	Product ratio 10 : 11 : 12	<i>k_H</i> / <i>k_X</i>	log <i>k_H</i> / <i>k_X</i>
1	5a (C ₆ H ₅ -)	85 : 3 : 12	1	0
2	5b (<i>p</i> -MeOC ₆ H ₄ -)	84 : 9 : 7	1.83	0.26
3	5c (<i>m</i> -BrC ₆ H ₄ -)	73 : 5 : 22	0.046	-0.33
4	5d (<i>m</i> -CF ₃ C ₆ H ₄ -)	62 : 5 : 33	0.27	-0.57
5	5e (<i>m</i> -CNC ₆ H ₄ -)	51 : 6 : 47	0.18	-0.75
6	5f (<i>p</i> -PhC ₆ H ₄ -)	92 : 4 : 4	2.92	0.47
7	5g (<i>p</i> -FC ₆ H ₄ -)	93 : 3 : 4	3.21	0.51
8	5h (<i>p</i> -ClC ₆ H ₄ -)	75 : 12 : 13	0.92	-0.038

Figure S1. Hammett correlation of relative migratory aptitude of Rh₂(OAc)₄-catalyzed reaction with σ^+

Figure S2. Hammett correlation of relative migratory aptitude of Rh₂(OAc)₄-catalyzed reaction with σ^-

Table S2. Relative Migratory Aptitude in the Reaction Catalyzed by AgO₂CPh/Et₃N

$$\frac{k_X}{k_H} = \frac{\{[10+11]/[12]\}_X}{\{[10+11]/[12]\}_H}$$

Entry	<i>N</i> -Tosyl α -diazo-ketamines	Product ratio 10 : 11 : 12	k_H/k_X	$\log k_H/k_X$
1	5a (C ₆ H ₅ -)	27 : 16 : 57	1	0
2	5b (<i>p</i> -MeOC ₆ H ₄ -)	16 : 25 : 59	0.92	-0.036
3	5c (<i>m</i> -BrC ₆ H ₄ -)	14 : 25 : 61	0.96	-0.018
4	5d (<i>m</i> -CF ₃ C ₆ H ₄ -)	10 : 27 : 63	0.96	-0.018
5	5e (<i>m</i> -CNC ₆ H ₄ -)	10 : 22 : 68	0.85	-0.072
6	5f (<i>p</i> -PhC ₆ H ₄ -)	21 : 21 : 58	0.77	-0.11
7	5g (<i>p</i> -FC ₆ H ₄ -)	17 : 25 : 58	0.62	-0.20

Figure S3. Hammett correlation of relative migratory aptitude of AgO₂CPh/Et₃N-catalyzed reaction with σ^+ **Figure S4.** Hammett correlation of relative migratory aptitude of AgO₂CPh/Et₃N-catalyzed reaction with σ^-

Current Data Parameters
NAME H13294
EXPNO 1
PROCNO 1

F2 - Acquisition Parameters

Date_ 20010601
Time 16.40
INSTRUM arx400
PROBHD 5 mm Multinu
PULPROG zg
TD 32768
SOLVENT CDCl3
NS 64
DS 0
SWH 6024.096 Hz
FIDRES 0.183841 Hz
AQ 2.7197940 sec
RG 360
DW 83.000 usec
DE 118.57 usec
TE 300.0 K
D1 2.00000000 sec
P1 2.00 usec
DE 118.57 usec
SFO1 400.1322000 MHz
NUCLEUS 1H

F2 - Processing parameters

SI 16384
SF 400.1300094 MHz
WDW no
SSB 0
LB 0.00 Hz
GB 0
PC 4.00

1D NMR plot parameters

CX 20.00 cm
F1P 10.000 ppm
F1 4001.30 Hz
F2P -0.500 ppm
F2 -200.07 Hz
PPMCM 0.52500 ppm/cm
HZCM 210.06825 Hz/cm

MM2 Calculations on Dirhodium Carbene Complex:

The catalyst, $\text{Rh}_2(\text{OAc})_4$, was first built and optimized. Bond length between O and Rh was ensured to be equal for all coordination. The rest of the molecule was then added, optimized, and its chemical conformation search conducted. The results indicate the preferred conformation as shown in the table below. Ph migration appears to be favored, however, this led to *cis*-isomer. The conformation required for *trans*-isomer formation would put NHTs on the side of Rh and its ligands, an apparently sterically hindered situation. Nevertheless, the C-Rh bond length in this case was preset by the MM2 parameter at $2.03\text{\AA}$, which may not be true for the actual intermediate. It is conceivable that during the actual reaction, Rh may have departed to some extent in the transition state thus allowing more space for NHTs.

<p>-9.0 kcal/mol (H-C-C-Rh dihedral angle is 44 degree). The lowest energy conformation.</p> <p>-8.2 kcal/mol (H-C-C-Rh angle of 30 degree), Ph migration, <i>cis</i> product.</p> <p>-7.1 kcal/mol (H-C-C-Rh 90 degree), H <i>cis</i> migration.</p> <p>-7.1 kcal/mol (H-C-C-C 30 degree), Ph migration, <i>trans</i> product.</p>
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The lowest energy conformation, 9.0 kcal/mol (H-C-C-Rh dihedral angle is 44 degree).

Ph migration, *cis* product, -8.2 kcal/mol (H-C-C-Rh angle of 30 degree).

H *cis* migration, -7.1 kcal/mol (H-C-C-Rh 90 degree).

Ph migration, *trans* product., -7.1 kcal/mol (H-C-C-C 30 degree).

Characterization data for compounds **5a-p** and **10a-n**

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-phenylpropanoate (5a) 74 % (condition A); 72 % (condition B); mp 90 °C (decomposed); IR 3207, 3057, 2112, 1679 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.16 (t, *J* = 7.2 Hz, 3H), 2.43 (s, 3H), 4.06 (q, *J* = 7.2 Hz, 2H), 5.34 (d, *J* = 6.0 Hz, 1H), 5.62 (s, 1H), 7.22-7.31(m, 7H), 7.74 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.07, 21.31, 53.50, 60.87, 126.12, 126.94, 128.11, 128.63, 129.41, 136.83, 137.52, 143.44, 165.09; MS *m/z* (FAB) 380 [(M+Li)⁺, 30 %], 354 (58), 197 (38), 115 (100), 91 (57). Anal. Calcd for C₁₈H₁₉N₃O₄S: C, 57.89; H, 5.13; N, 11.25. Found: C, 57.93; H, 5.31; N, 11.20.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*p*-methoxy)phenylpropanoate (5b) 85 % (condition A); 77 % (condition B); mp 99 °C (decomposed); IR 3234, 2108, 1675 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.18 (t, *J* = 7.2 Hz, 3H), 2.43 (s, 3H), 3.78 (s, 3H), 4.07 (q, *J* = 7.2 Hz, 2H), 5.27 (d, *J* = 7.2 Hz, 1H), 5.45 (s, 1H), 6.82 (d, *J* = 9.0 Hz, 2H), 7.18 (d, *J* = 9.0 Hz, 2H), 7.30 (d, *J* = 8.2 Hz, 2H), 7.73 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.16, 21.40, 53.22, 55.14, 60.90, 114.04, 127.05, 127.48, 129.48, 129.59, 136.86, 143.50, 159.38, 165.20; MS *m/z* (FAB) 410 [(M+Li)⁺, 58 %], 384 (18), 205 (88), 177 (63), 115 (100). Anal. Calcd for C₁₉H₂₁N₃O₅S : C, 56.57; H, 5.25; N, 10.42. Found : C, 56.52; H, 5.16; N, 10.34.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*m*-bromo)phenylpropanoate (5c) 83 % (condition A); 70 % (condition B); mp 123 °C (decomposed); IR 3238, 2977, 2103, 1670 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.18 (t, *J* = 7.2 Hz, 3H), 2.44 (s, 3H), 4.08 (q, *J* = 7.2 Hz 2H), 5.30 (d, *J* = 8.2 Hz, 1H), 5.60 (s, 1H), 7.18-7.43 (m, 6H), 7.71 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.15, 21.45, 53.29, 61.15, 122.72, 124.94, 126.94, 129.40, 129.61, 130.26, 131.30, 136.74, 139.86, 143.78, 164.98; MS *m/z* (FAB) 452 [M+Li]⁺, %], 205 (7), 115 (100), 91 (12), 49 (25). Anal. Calcd for C₁₈H₁₈BrN₃O₄S: C, 47.80; H, 4.01; N, 9.29. Found: C, 47.55; H, 3.94; N, 9.17.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*m*-trifluoromethyl)phenylpropanoate (5d) 82 % (condition B); mp 140 °C (decomposed); IR 3213, 2990, 2107, 1678 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.15 (t, *J* = 7.2 Hz, 3H), 2.41 (s, 3H), 4.05 (q, *J* = 7.2 Hz 2H), 5.43 (d, *J* = 8.2 Hz, 1H), 6.14 (d, *J* = 8.2 Hz, 1H), 7.25 (d, *J* = 8.2 Hz, 2H), 7.45-7.53 (m, 4H), 7.70 (d, *J* = 7.8 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.12, 21.39, 53.63, 61.25, 123.16, 123.24, 125.11, 126.95, 129.33, 129.66, 129.83, 136.77, 138.81, 143.94, 165.02; MS *m/z* (FAB) 448 [M+Li]⁺, 23 %], 422 (36), 263 (81), 223 (100), 205 (96). Anal. Calcd for C₁₉H₁₈F₃N₃O₄S: C, 51.70; H, 4.11; N, 9.52. Found: C, 51.71; H, 4.17; N, 9.67.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*m*-cyano)phenylpropanoate (5e) 49 % (condition B); mp 132 °C (decomposed); IR 3221.6, 2233.3, 2105.4, 1681.6 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.15 (t, *J* = 7.2 Hz, 3H), 2.44 (s, 3H), 4.05 (q, *J* = 7.2 Hz 2H), 5.43 (d, *J* = 4.2 Hz, 1H), 6.32 (d, *J* = 4.2 Hz, 1H), 7.29 (d, *J* = 8.2 Hz, 2H), 7.38-7.61 (m, 4H), 7.71 (d, *J* = 8.6 Hz, 2H); ¹³C NMR (200 MHz, CDCl₃) δ 14.02, 21.33, 53.12, 61.18, 112.46, 118.09, 126.78, 129.59, 129.87, 130.93, 131.63, 136.62, 139.25, 143.91, 164.75; MS *m/z* (FAB) 405 [M+Li]⁺, 20 %], 325 (12), 223 (99), 217 (100), 109 (100). Anal. Calcd for C₁₉H₁₈N₄O₄S : C, 57.28; H, 4.55; N, 14.06. Found: C, 57.19; H, 4.55; N, 14.06.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*p*-phenyl)phenylpropanoate (5f) 79 % (condition A); 78 % (condition B); mp 143 °C (decomposed); IR 3448, 3226, 2110, 1678 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.19 (t, *J* = 7.0 Hz, 3H), 2.43 (s, 3H), 4.10 (q, *J* = 7.0 Hz, 2H), 5.38 (d, *J* = 7.6 Hz, 1H), 5.56 (s, 1H), 7.29-7.57 (m, 12H), 7.76 (d, *J* = 8.4 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.24, 21.46, 53.69, 61.06, 126.73, 126.96, 127.11, 127.47, 128.75, 129.59, 136.61, 136.93, 140.14, 141.22, 143.65, 165.25; MS *m/z* (FAB) 456 [(M+Li)⁺, 36], 430 (6), 157 (46), 115 (100), 49 (93). Anal. Calcd for C₂₄H₂₃N₃O₄S: C, 64.12; H, 5.16; N, 9.29. Found: C, 64.26; H, 5.30; N, 9.13.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*p*-fluoro)phenylpropanoate (5g) 63 % (condition B); mp 135 °C (decomposed); IR 3206.8, 2359.0, 2110.0, 1678.7 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.16 (t, *J* = 7.2 Hz, 3H), 2.43 (s, 3H), 4.05 (q, *J* = 7.2 Hz, 2H), 5.33 (d, *J* = 7.4 Hz, 1H), 5.61 (d, *J* = 7.4 Hz, 1H), 6.93-7.01 (t, 2H), 7.22-7.30 (m, 4H), 7.72 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.21, 21.47, 53.39, 61.10, 115.46, 115.89, 127.07, 128.07, 128.24, 129.62, 136.83, 143.78, 165.13; MS *m/z* (FAB) 398 [(M+Li)⁺, 29 %], 372 (20), 233 (100), 205 (60), 59 (74). Anal. Calcd for C₁₈H₁₈FN₃O₄S: C, 55.23; H, 4.64; N, 10.73. Found: C, 55.19; H, 4.65; N, 10.72.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*p*-chloro)phenylpropanoate (5h) 68 % (condition A); 70 % (condition B); mp 131 °C (decomposed); IR 3432, 3211, 2108, 1679 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.15 (t, *J* = 7.0 Hz, 3H), 2.43 (s, 3H), 4.04 (q, *J* = 7.0 Hz, 2H), 5.33 (d, *J* = 7.8 Hz, 1H), 5.96 (d, *J* = 7.8 Hz, 1H), 7.18-7.30 (m, 6H), 7.71 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.19, 21.46, 53.44, 61.13, 127.03, 127.75, 128.89, 129.62, 134.17, 136.23, 136.86, 143.80, 165.07; MS *m/z* (FAB) 414 [(M+Li)⁺, 27 %], 388 (14), 181 (26), 115 (100), 47 (46). Anal. Calcd for C₁₈H₁₈ClN₃O₄S: C, 53.01; H, 4.45; N, 10.30. Found: C, 52.92; H, 4.38; N, 10.26.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*o*-methyl)phenylpropanoate (5i) 87 % (condition A); 66 % (condition B); mp 107 °C (decomposed); IR 3242, 2987, 2092, 1693 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.20 (t, *J* = 7.2 Hz, 3H), 2.23 (s, 3H), 2.42 (s, 3H), 4.02-4.16 (m, 2H), 5.25 (d, *J* = 5.8 Hz, 1H), 5.51 (d, *J* = 5.8 Hz, 1H), 7.11-7.7.30 (m, 6H), 7.73 (d, *J* = 7.8 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.78, 18.96, 21.41, 50.17, 60.96, 125.87, 126.34, 127.17, 128.24, 129.43, 130.82, 135.12, 135.68, 136.62, 143.55, 165.22; MS *m/z* (FAB): 394 [(M+Li)⁺, 28 %], 372 (13), 368 (42), 115 (100), 91 (59). Anal. Calcd for C₁₉H₂₁N₃O₄S: C, 58.90; H, 5.46; N, 10.85. Found: C, 59.10; H, 5.42; N, 10.76.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(*o*-allyloxy)phenylpropanoate (5j) 73 % (condition B); mp 112 °C; IR 3457.1, 3270.4, 2097.8, 1684.1 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.14 (t, *J* = 7.2 Hz, 3H), 2.36 (s, 3H), 4.04 (q, *J* = 7.2 Hz, 2H), 4.48 (d, *J* = 5.4 Hz, 2H), 5.24-5.36 (m, 2H), 5.51 (d, *J* = 9.2 Hz, 1H), 5.90-6.07 (m, 1H), 6.22 (d, *J* = 9.6 Hz, 1H), 6.74-6.84 (m, 2H), 7.13-7.7.20 (m, 4H), 7.68 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.09, 21.21, 50.43, 60.62, 68.87, 111.53, 118.39, 120.55, 125.93, 126.79, 128.03, 129.07, 129.23, 132.29, 137.14, 143.16, 154.78, 165.28; MS *m/z* (FAB): 436 [(M+Li)⁺, 10 %], 223 (9), 115 (100), 59 (7), 43 (39). Anal. Calcd for C₂₁H₂₃N₃O₅S: C, 58.73; H, 5.40; N, 9.78. Found: C, 58.72; H, 5.40; N, 9.75.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(2,4-dichloro)phenylpropanoate (5k) 32 % (condition A); 69 % (condition B); mp 115 °C (decomposed); IR 3392, 3238, 2982, 2098, 1701 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.13 (t, *J* = 7.0 Hz, 3H), 2.40 (s, 3H), 4.02 (q, *J* = 7.0 Hz, 2H), 5.61 (d, *J* = 8.2 Hz, 1H), 6.42 (d, *J* = 8.2 Hz, 1H), 7.08-7.41 (m, 5H), 7.72 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.03, 21.33, 50.99, 61.03, 126.88, 127.00, 129.21, 129.39, 129.51, 132.65, 133.77, 134.24, 136.57, 143.75, 164.84; MS *m/z* (FAB) 448 [(M+Li)⁺, 43 %], 422 (27), 265 (26), 115 (43), 91 (100). Anal. Calcd for C₁₈H₁₇Cl₂N₃O₄S: C, 48.88; H, 3.87; N, 9.50. Found: C, 48.85; H, 3.79; N, 9.48.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(2,6-dichloro)phenylpropanoate (5l) 26 % (condition A); 77 % (condition B); mp 149 °C (decomposed); IR 3300, 2987, 2099, 1692 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.18 (t, *J* = 7.2 Hz, 3H), 2.36 (s, 3H), 4.10 (m, 2H), 5.91 (d, *J* = 7.2 Hz, 1H), 6.29 (d, *J* = 7.0 Hz, 1H), 7.07-7.20 (m, 5H), 7.69 (d, *J* = 7.8 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 14.18, 21.41, 48.14, 61.09, 127.05, 129.15, 129.40, 129.77, 129.51, 132.22, 134.74, 136.45, 143.71, 164.91; MS *m/z* (FAB): 448 [(M+Li)⁺, 30 %], 223 (22), 157 (31), 115 (100), 91 (11). Anal. Calcd for C₁₈H₁₇Cl₂N₃O₄S: C, 48.88; H, 3.87; N, 9.50. Found: C, 48.88; H, 3.80; N, 9.39.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-(3,5-dimethoxy)phenylpropanoate (5m) 70 % (condition A); 75 % (condition B); mp 108 °C (decomposed); IR 3214, 2964, 2108, 1675 cm⁻¹; ¹H NMR δ 1.17 (t, *J* = 7.2 Hz, 3H), 2.41 (s, 3H), 3.73 (s, 6H), 4.06 (q, *J* = 7.2 Hz, 2H), 5.29 (d, *J* = 7.6 Hz, 1H), 5.98 (d, *J* = 7.2 Hz, 1H), 6.33 (s, 1H), 6.38 (s, 2H), 7.26 (d, *J* = 8.2 Hz, 2H), 7.73 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz) δ 14.16, 21.36, 53.63, 55.18, 60.94, 100.06, 104.18, 127.04, 129.46, 136.83, 139.88, 143.54, 160.94, 165.09; MS *m/z* (FAB): 440 [(M+Li)⁺, 45 %], 414 (47), 257 (38), 178 (29), 115 (100). Anal. Calcd for C₂₀H₂₃N₃O₆S: C, 55.42; H, 5.35; N, 9.69. Found: C, 55.16; H, 5.36; N, 9.55.

Ethyl 2-Diazo-3-(*N*-tosyl)amino-3-phenylbutanoate (5n) 81 % (condition A); mp 134 °C (decomposed); IR 3242, 2921, 2092, 1693 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.19 (t, *J* = 7.2 Hz, 3H), 2.42 (s, 3H), 4.05-4.12 (m, 2H), 5.28 (d, *J* = 5.8 Hz, 1H), 5.51 (d, *J* = 5.8 Hz, 1H), 7.14-7.29 (m, 7H), 7.73 (d, *J* = 8.2 Hz, 2H); MS *m/z* (FAB): 394 [(M+Li)⁺, 59 %], 368 (26), 189 (39), 115 (68), 91 (100). Anal. Calcd for C₁₉H₂₁N₃O₄S: C, 58.90; H, 5.46; N, 10.85. Found: C, 58.86; H, 5.43; N, 10.75.

2-Diazo-3-(*N*-tosyl)amino-1,3-diphenylpropan-1-one (5o) 76 % (condition B); mp 107 °C (decomposed); IR 3647.9, 2363.8, 2084.9, 1595.0 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 2.35 (s, 3H), 5.58 (d, *J* = 7.2 Hz, 1H), 6.22 (d, *J* = 7.2 Hz, 1H), 7.21-7.46 (m, 12H), 7.76 (d, *J* = 8.2 Hz, 2H); ¹³C NMR (50 MHz, CDCl₃) δ 21.38, 54.01, 126.14, 126.97, 127.17, 128.39, 128.52, 128.89, 131.84, 136.53, 136.57, 137.42, 143.77, 187.69; MS *m/z* (FAB) 412 [(M+Li)⁺, 54 %], 384 (75), 179 (89), 105(100), 91(100). Anal. Calcd for C₂₂H₁₉N₃O₃S: C, 65.17; H, 4.72; N, 10.36. Found: C, 65.18; H, 4.77; N, 10.48.

3-Diazo-4-(*N*-tosyl)amino-4-phenylbutan-2-one (5p) 57 % (condition A); mp 131 °C (decomposed); IR 3456.2, 2079.1, 1618.4, 1329.9 cm⁻¹; ¹H NMR (200 MHz, CDCl₃) δ 1.98 (s, 3H),

2.43 (s, 3H), 5.36 (d, $J = 7.2$ Hz, 1H), 5.92 (d, $J = 6.8$ Hz, 1H), 7.19-7.31 (m, 7H), 7.72 (d, $J = 7.8$ Hz, 2H); ^{13}C NMR (50 MHz, CDCl_3) δ 21.49, 25.40, 53.41, 126.17, 127.22, 127.75, 128.45, 128.90, 129.65, 136.57, 137.50, 143.80; MS m/z (FAB) 350 $[(\text{M}+\text{Li})^+]$, 33%, 307 (30), 205 (89), 114 (100). Anal. Calcd for $\text{C}_{17}\text{H}_{17}\text{N}_3\text{O}_3\text{S}$: C, 59.46; H, 4.99; N, 12.24. Found: C, 59.54; H, 5.06; N, 12.13.

(E)-Ethyl 2-Phenyl-3-(N-tosyl)amino-2-propenoate (10a) Mp 96-99 °C; IR 3178, 2984, 1700 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.23 (t, $J = 7.0$ Hz, 3H), 2.44 (s, 3H), 4.20 (q, $J = 7.0$ Hz, 2H), 6.80 (d, $J = 12.6$ Hz, 1H), 7.07 (d, $J = 8.4$ Hz, 2H), 7.30-7.39 (m, 5H), 7.71 (d, $J = 12.6$ Hz, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.21, 21.52, 60.62, 114.24, 126.72, 128.28, 129.06, 129.61, 130.08, 131.89, 134.28, 136.41, 144.62, 166.17; MS m/z (EI) 345 (M^+ , 100 %), 299 (48), 235 (31), 118 (91), 91 (89). Anal. Calcd for $\text{C}_{18}\text{H}_{19}\text{NO}_4\text{S}$: C, 62.59; H, 5.54; N, 4.06. Found: C, 62.52; H, 5.45; N, 3.96.

(E)-Ethyl 2-(4-Methoxyphenyl)-3-(N-tosyl)amino-2-propenoate (10b) Mp 115-118 °C; IR 3267, 2972, 1696 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.25 (t, $J = 7.1$ Hz, 3H), 2.44 (s, 3H), 3.80 (s, 3H), 4.17 (q, $J = 7.1$ Hz, 2H), 6.80 (d, $J = 12.4$ Hz, 1H), 6.88 (d, $J = 8.7$ Hz, 2H), 6.99 (d, $J = 8.7$ Hz, 2H), 7.34 (d, $J = 8.4$ Hz, 2H), 7.68 (d, $J = 12.4$ Hz, 1H), 7.72 (d, $J = 8.4$ Hz, 2H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.19, 21.49, 55.11, 60.62, 113.83, 114.39, 123.81, 126.65, 129.99, 130.76, 134.11, 136.45, 144.50, 159.24, 166.38; MS m/z (EI) 375 (M^+ , 74 %), 329 (36), 147 (100), 132 (69), 91 (67). Anal. Calcd for $\text{C}_{19}\text{H}_{21}\text{NO}_5\text{S}$: C, 60.79; H, 5.64; N, 3.73. Found: C, 60.69; H, 5.54; N, 3.52.

(E)-Ethyl 2-(3-Bromophenyl)-3-(N-tosyl)amino-2-propenoate (10c) Mp 113-114 °C; IR 3129, 2982, 1677 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.25 (t, $J = 7.0$ Hz, 3H), 2.46 (s, 3H), 4.18 (m, 2H), 6.74 (d, $J = 12.4$ Hz, 1H), 7.26-7.37 (m, 4H), 7.49-7.6 (m, 2H), 7.72 (d, $J = 8.4$ Hz, 2H), 7.74 (d, $J = 12.4$ Hz, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.21, 21.57, 60.91, 112.89, 122.92, 126.73, 128.35, 130.17, 130.53, 131.38, 132.68, 134.03, 136.27, 144.80, 164.73; MS m/z (EI) 423 (M^+ , 48 %), 277 (21), 155 (26), 117 (54), 91 (100); HRMS calcd. for $\text{C}_{18}\text{H}_{18}\text{BrNO}_4\text{S}$: 423.01399, found: 423.01228.

(E)-Ethyl 2-(3-Trifluoromethylphenyl)-3-(N-tosyl)amino-2-propenoate (10d) Mp 107-109 °C

IR 3452, 3158, 2982, 1683, 1632 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.24 (t, $J = 7.1$ Hz, 3H), 2.46 (s, 3H), 4.17 (q, $J = 7.0$ Hz, 2H), 6.83 (d, $J = 12.4$ Hz, 1H), 7.27-7.38 (m, 4H), 7.45-7.59 (m, 2H), 7.72 (d, $J = 8.2$ Hz, 2H), 7.74 (d, $J = 12.6$ Hz, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.18, 21.55, 60.99, 113.01, 125.10, 125.17, 126.70, 126.75, 129.61, 130.22, 132.95, 133.21, 135.22, 136.32, 144.95, 165.68; MS m/z (EI) 413 (M^+ , 45 %), 367 (22), 166 (19), 155 (33), 91 (100); Anal. Calcd for $\text{C}_{19}\text{H}_{18}\text{F}_3\text{NO}_4\text{S}$: C, 55.20; H, 4.39; N, 3.39. Found: C, 55.18; H, 4.29; N, 3.29.

(E)-Ethyl 2-(3-Cyanophenyl)-3-(N-tosyl)amine-2-propenoate (10e) Mp 109-111 °C; IR 3448,

2228, 1669, 1621 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.25 (t, $J = 7.0$ Hz, 3H), 2.44 (s, 3H), 4.20 (m, 2H), 6.88 (d, $J = 12.6$ Hz, 1H), 7.15 (d, $J = 8.2$ Hz, 2H), 7.32-7.48 (m, 2H), 7.72 (d, $J = 8.4$ Hz, 2H), 7.74 (d, $J = 12.4$ Hz, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.18, 21.30, 60.45, 103.04, 123.08, 126.54, 128.53, 129.98, 130.11, 130.45, 132.14, 134.13, 136.01, 143.19, 150.87, 164.45; MS m/z (EI) 370 (M^+ , 73 %), 324 (20), 169 (33), 155 (48), 91 (100); Anal. Calcd for $\text{C}_{19}\text{H}_{18}\text{N}_2\text{O}_4\text{S}$: C, 61.61; H, 4.90; N, 7.56. Found: C, 61.39; H, 4.76; N, 3.27.

(E)-Ethyl 2-(4-Phenylphenyl)-3-(N-tosyl)amino-2-propenoate (10f) Mp 125-126 °C; IR 3449,

3171, 1698 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.25 (t, $J = 7.0$ Hz, 3H), 2.41 (s, 3H), 4.18 (q, $J = 7.0$ Hz, 2H), 7.03 (d, $J = 12.4$ Hz, 1H), 7.13 (d, $J = 8.2$ Hz, 2H), 7.30-7.44 (m, 5H), 7.56 (d, $J = 8.2$ Hz, 4H), 7.72 (d, $J = 8.2$ Hz, 2H), 7.74 (d, $J = 12.4$ Hz, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.24, 21.52, 60.78, 113.80, 126.74, 127.00, 127.51, 127.72, 128.77, 130.04, 130.07, 130.80, 134.46, 136.46, 140.31, 141.05, 144.62, 166.19; MS m/z (EI) 421 (M^+ , 100 %), 375 (64), 220 (49), 193 (82), 91 (54). Anal. Calcd for $\text{C}_{24}\text{H}_{23}\text{NO}_4\text{S}$: C, 68.39; H, 5.50; N, 3.32. Found: C, 68.24; H, 5.52; N, 3.09.

(E)-Ethyl 2-(4-Fluorophenyl)-3-(N-tosyl)amino-2-propenoate (10g) Mp 108-110 °C; IR 3451, 3229, 1710, 1638 cm^{-1} ; ^1H NMR (200 MHz) δ 1.22 (t, $J = 7.1$ Hz, 3H, CDCl_3), 2.43 (s, 3H), 4.14 (q, $J = 7.1$ Hz, 2H), 6.96-7.13 (m, 5H), 7.63 (d, $J = 8.2$ Hz, 2H), 7.68-7.73 (3H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.10, 21.43, 60.69, 113.03, 115.70, 116.13, 126.65, 127.74, 130.00, 131.44, 134.72, 136.42, 144.60, 166.07; MS m/z (EI) 363 (M^+ , 93 %), 317 (35), 253 (29), 136 (79), 91 (100). Anal. Calcd for $\text{C}_{18}\text{H}_{18}\text{FNO}_4\text{S}$: C, 59.49; H, 4.99; N, 3.85. Found: C, 59.42; H, 4.96; N, 3.68.

(E)-Ethyl 2-(4-Chlorophenyl)-3-(N-tosyl)amino-2-propenoate (10h) Mp 116-118 °C; IR 3229, 2987, 1707 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.23 (t, $J = 7.0$ Hz, 3H), 2.44 (s, 3H), 4.13-4.19 (m, 2H), 6.87 (1H), 6.99-7.02 (m, 2H), 7.30-7.35 (m, 5H), 7.70 (d, $J = 6.3$ Hz, 1H), 7.71 (d, $J = 12.4$ Hz, 2H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.19, 21.58, 60.85, 112.83, 126.72, 129.24, 130.11, 130.33, 131.10, 134.22, 134.76, 136.29, 144.75, 165.89; MS m/z (EI) 379 (M^+ , 68 %), 333 (15), 152 (39), 117 (34), 91 (100). Anal. Calcd for $\text{C}_{18}\text{H}_{18}\text{ClNO}_4\text{S}$: C, 56.92; H, 4.78; N, 3.69. Found: C, 56.75; H, 4.74; N, 3.19.

(E)-Ethyl 2-(2-Methylphenyl)-3-(N-tosyl)amino-2-propenoate (10i) Mp 112-114 °C; IR 3155, 2984, 1697 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.20 (t, $J = 7.0$ Hz, 1H), 1.98 (s, 3H), 2.44 (s, 3H), 4.09-4.20 (m, 2H), 6.55 (d, $J = 12.4$ Hz, 1H), 7.13-7.22 (m, 3H), 7.32 (d, $J = 8.2$ Hz, 2H), 7.69 (d, $J = 8.2$ Hz, 2H), 7.71 (d, $J = 12.4$ Hz, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.16, 19.06, 21.46, 60.53, 113.96, 126.38, 126.60, 128.68, 129.86, 129.95, 130.57, 131.05, 134.57, 136.50, 137.36, 144.49, 166.01; MS m/z (EI) 359 (M^+ , 88 %), 313 (21), 158 (63), 130 (94), 91 (100). Anal. Calcd for $\text{C}_{19}\text{H}_{21}\text{NO}_4\text{S}$: C, 63.49; H, 5.89; N, 3.90. Found: C, 63.38; H, 5.82; N, 3.72.

(E)-Ethyl 2-(2-Allyloxyphenyl)-3-(N-tosyl)amino-2-propenoate (10j) Mp 116-118 °C; IR 3489, 3274, 1705, 1629 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.21 (t, $J = 7.0$ Hz, 1H), 2.42 (s, 3H),

4.15 (m, 2H), 4.38-4.42 (m, 2H), 5.09-5.26 (m, 2H), 5.72-5.81(m, 1 H), 6.74 (d, $J = 12.2$ Hz, 1H), 6.87-6.99 (m, 3H), 7.23-7.33 (3H), 7.67-7.73 (3H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.21, 21.47, 60.49, 69.09, 111.14, 113.17, 115.94, 117.03, 121.15, 121.23, 126.73, 129.92, 131.32, 132.75, 134.33, 136.83, 144.32, 155.93, 166.38; MS m/z (EI) 401 (M^+ , 14 %), 314 (13), 205 (61), 157 (70), 91 (100). Anal. Calcd for $\text{C}_{21}\text{H}_{23}\text{NO}_5\text{S}$: C, 62.83; H, 5.77; N, 3.49. Found: C, 62.72; H, 5.68; N, 3.37.

(*E*)-Ethyl 2-(2,4-Dichlorophenyl)-3-(*N*-tosyl)amino-2-propenoate (10k) Mp 111-114 °C; IR 3449, 3240, 2975, 1711 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.20 (t, $J = 7.2$ Hz, 3H), 2.45 (s, 3H), 4.14-4.22 (m, 2H), 6.68 (s, 1H), 7.00 (d, $J = 8.4$ Hz, 1H), 7.23-7.41 (m, 4H), 7.72 (d, $J = 8.4$ Hz, 2H), 7.76 (s, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.19, 21.60, 60.96, 110.55, 115.99, 126.85, 127.81, 129.40, 129.99, 130.09, 132.69, 135.30, 135.35, 135.92, 144.83, 165.31; MS m/z (EI) 413 (M^+ , 48 %), 378 (36), 155 (61), 91 (100), 65 (46). Anal. Calcd for $\text{C}_{18}\text{H}_{17}\text{Cl}_2\text{NO}_4\text{S}$: C, 52.19; H, 4.14; N, 3.38. Found: C, 52.17; H, 4.21; N, 3.14.

(*E*)-Ethyl 2-phenyl-3-(*N*-tosyl)amino-2-butenate (10n) Mp 131-134 °C; IR 3268, 3097, 2925, 1697 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.20 (t, $J = 7.0$ Hz, 3H), 1.98 (s, H), 2.43 (s, 3H), 4.07-4.21 (m, 2H), 6.54 (s, 1H), 6.87 (d, $J = 7.4$ Hz, 1H), 7.12-7.24 (m, 3H), 7.32 (d, $J = 8.4$ Hz, 2H), 7.67-7.71 (t, 3H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.17, 19.07, 21.47, 60.53, 113.99, 126.40, 126.61, 128.70, 129.85, 125.96, 130.59, 131.05, 134.55, 136.51, 137.36, 144.50, 165.98; MS m/z (EI): 359 (M^+ , 71 %), 313 (19), 158 (66), 130 (100), 91 (91). Anal. Calcd for $\text{C}_{19}\text{H}_{21}\text{NO}_4\text{S}$: C, 63.49; H, 5.89; N, 3.90. Found: C, 63.20; H, 6.02; N, 3.85.

(*Z*)-Ethyl 2-Phenyl-3-(*N*-tosyl)amino-2-propenoate (11a) Mp 66-69 °C; IR 3223, 2933, 1673 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.23 (t, $J = 7.0\text{Hz}$, 3H), 2.43 (s, 3H), 4.20 (q, $J = 7.0$ Hz, 2H),

7.11 (d, $J = 11.2$ Hz, 1H), 7.23-7.33 (m, 7H), 7.77 (d, $J = 8.2$ Hz, 2H), 10.53 (d, $J = 11.2$ Hz, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.06, 21.55, 60.90, 110.69, 126.68, 127.20, 128.01, 129.38, 130.01, 135.633, 137.10, 139.39, 144.35, 168.37; MS m/z (EI) 345 (M^+ , 100 %), 299 (42), 144 (67), 118 (79), 91 (99). Anal. Calcd for $\text{C}_{18}\text{H}_{19}\text{NO}_4\text{S}$: C, 62.59; H, 5.54; N, 4.06. Found: C, 62.50; H, 5.50; N, 3.94.

(Z)-Ethyl 3-Phenyl-3-(N-tosyl)amine-2-propenoate (12a) Mp 88-89 °C; IR 3132, 2927, 1660 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.26 (t, $J = 7.2$ Hz, 3H), 2.40 (s, 3H), 4.17 (q, $J = 7.2$ Hz, 2H), 5.20 (s, 1H), 7.18 (d, $J = 8.2$ Hz, 2H), 7.29-7.30 (m, 4H), 7.40 (d, $J = 8.2$ Hz, 2H), 10.68 (s, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.14, 21.55, 60.48, 102.17, 127.54, 127.82, 128.82, 129.30, 130.45, 134.02, 136.47, 143.97, 154.92, 168.35; MS m/z (EI) 345 (M^+ , 8 %), 300 (9), 178 (76), 155 (35), 91 (100). Anal. Calcd for $\text{C}_{18}\text{H}_{19}\text{NO}_4\text{S}$: C, 62.59; H, 5.54; N, 4.06. Found: C, 62.69; H, 5.46; N, 3.93.

(Z)-Ethyl 3-(4-Methoxyphenyl)-3-(N-tosyl)amino-2-propenoate (12b) Mp 68-71 °C; IR 3450, 2926, 1669, 1612 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.24 (t, $J = 7.0$ Hz, 3H), 2.40 (s, 3H), 3.84 (s, 3H), 4.15 (q, $J = 7.0$ Hz, 2H), 5.16 (s, 1H), 6.83 (d, $J = 9.0$ Hz, 2H), 7.18 (d, $J = 7.8$ Hz, 2H), 7.29 (d, $J = 8.8$ Hz, 2H), 7.42 (d, $J = 8.4$ Hz, 1H), 10.61 (s, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.17, 21.59, 55.32, 60.37, 101.30, 113.28, 115.99, 126.25, 127.54, 129.26, 130.43, 143.91, 154.67, 161.60, 168.46; MS m/z (EI) 375 (M^+ , 10 %), 311 (12), 178 (44), 57 (100), 43 (67). Anal. Calcd for $\text{C}_{19}\text{H}_{21}\text{NO}_5\text{S}$: C, 60.79; H, 5.64; N, 3.73. Found: C, 60.39; H, 5.56; N, 3.33.

(Z)-Ethyl 3-(3-Bromophenyl)-3-(N-tosyl)amino-2-propenoate (12c) Oil; IR 3152, 2927, 1673 cm^{-1} ; ^1H NMR (200 MHz, CDCl_3) δ 1.26 (t, $J = 7.0$ Hz, 3H), 2.42 (s, 3H), 4.18 (q, $J = 7.0$ Hz, 2H), 5.19 (s, 1H), 7.20-7.23 (m, 3H), 7.30-7.32 (m, 1H), 7.42 (d, $J = 8.4$ Hz, 2H), 10.65 (s, 1H); ^{13}C NMR (50 MHz, CDCl_3) δ 14.11, 21.58, 60.67, 102.67, 121.81, 127.49, 127.63, 129.45, 129.50, 131.35,

133.24, 135.96, 136.44, 144.31, 153.07, 168.10; MS m/z (EI) 424 (M^+ , 4 %), 378 (3), 178 (68), 155 (27), 91 (100). Anal. Calcd for $C_{18}H_{18}BrNO_4S$: C, 50.95; H, 4.28; N, 3.30. Found: C, 50.81; H, 4.19; N, 3.93.

(Z)-Ethyl 3-(3-Trifluoromethylphenyl)-3-(N-tosyl)amino-2-propenoate (12d) Oil; IR 3148, 2984, 1675, 1632 cm^{-1} ; 1H NMR (200 MHz, $CDCl_3$) δ 1.27 (t, $J = 7.0$ Hz, 3H), 2.40 (s, 3H), 4.19 (q, $J = 7.0$ Hz, 2H), 5.22 (s, 1H), 7.19 (d, $J = 7.8$ Hz, 2H), 7.33-7.68 (m, 6H); ^{13}C NMR (50 MHz, $CDCl_3$) δ 14.03, 21.44, 60.71, 102.91, 125.29, 126.89, 126.97, 127.31, 128.44, 129.47, 132.42, 134.68, 136.16, 144.46, 153.07, 168.02; MS m/z (EI) 413 (M^+ , 7 %), 349 (11), 178 (59), 105 (20), 91 (100). Anal. Calcd for $C_{19}H_{18}F_3NO_4S$: C, 55.20; H, 4.39; N, 3.39. Found: C, 54.91; H, 4.22; N, 3.20.

(Z)-Ethyl 3-(3-Cyanophenyl)-3-(N-tosyl)amino-2-propenoate (12e) Oil; IR 3251, 2986, 2249, 1699 cm^{-1} ; 1H NMR (200 MHz, $CDCl_3$) δ 1.27 (t, $J = 7.2$ Hz, 3H), 2.44 (s, 3H), 4.19 (q, $J = 7.2$ Hz, 2H), 5.23 (s, 1H), 7.24 (d, $J = 8.2$ Hz, 2H), 7.36-7.67 (m, 6H), 10.66 (s, 1H); ^{13}C NMR (50 MHz, $CDCl_3$) δ 14.03, 21.54, 60.84, 103.56, 112.27, 127.30, 128.87, 129.60, 131.80, 133.17, 133.52, 135.31, 136.21, 144.70, 152.01, 167.81; MS m/z (EI) 370 (M^+ , 11 %), 306 (8), 178 (38), 155 (27), 105 (63), 91 (100). Anal. Calcd for $C_{19}H_{18}N_2O_4S$: C, 61.61; H, 4.90; N, 7.56. Found: C, 61.08; H, 5.08; N, 7.45.

(E)-Ethyl 3-(2,6-Dichlorophenyl)-3-(N-tosyl)amino-2-propenoate (12l) Mp 144-146 $^{\circ}C$; IR 3219, 2978, 1717, 1646 cm^{-1} ; 1H NMR (200 MHz, $CDCl_3$) δ 1.02 (t, $J = 7.0$ Hz, 3H), 2.45 (s, 3H), 3.90 (m, 2H), 6.08 (s, 1H), 7.08 (s, 1H), 7.22 (m, 3H), 7.35 (d, $J = 7.8$ Hz, 2H), 7.84 (d, $J = 7.8$ Hz, 2H); ^{13}C NMR (50 MHz, $CDCl_3$) δ 14.03, 21.54, 60.84, 103.56, 112.27, 127.30, 128.87, 129.59,

131.80, 133.17, 133.52, 135.31, 136.21, 144.70, 152.01, 167.51; MS m/z (EI): 413 (M^+ , 10 %), 378 (49), 178 (33), 155 (23), 91 (100). Anal. Calcd for $C_{18}H_{17}Cl_2NO_4S$: C, 52.19; H, 4.14; N, 3.38. Found: C, 52.30; H, 4.13; N, 3.16.

(E)-Ethyl 2-(3,5-Dimethoxyphenyl)-3-(N-tosyl)amino-2-propenoate (12m) Mp 113-116 °C; IR 3218, 2970, 1703 cm^{-1} ; 1H NMR (200 MHz, $CDCl_3$) δ 1.25 (t, J = 7.0 Hz, 3H), 2.43 (s, 3H), 3.69(s, 6H), 4.18 (q, J = 7.0Hz, 2H), 6.19 (d, J = 2.2 Hz, 2H), 6.34 (t, J = 2.2 Hz, 1H), 7.06 (d, J = 12.4 Hz, 1H), 7.32 (d, J = 8.4Hz, 2H), 7.70 (d, J = 12.4Hz, 1H), 7.72 (d, J = 8.4 Hz, 2H); ^{13}C NMR (50 MHz, $CDCl_3$) δ 14.24, 21.49, 55.17, 60.68, 100.28, 107.45, 114.02, 126.72, 130.03, 133.72, 134.50, 136.52, 144.55, 161.05, 165.97; MS m/z (EI): 405 (M^+ , 100 %), 359 (12), 250 (73), 205 (77), 204 (100), 91 (92). Anal. Calcd for $C_{20}H_{23}NO_6S$: C, 59.25; H, 5.72; N, 3.45. Found: C, 59.38; H, 5.58; N, 3.26.

(Z)-2,6-Ditert-butyl-4-methylphenyl 2-phenyl-3-(N-tosyl)amino-2-propenoate (17) Mp 158-161 °C; IR 3369, 3052, 2953, 1743, 1694 cm^{-1} ; 1H NMR (200 MHz, $CDCl_3$) δ 1.16 (s, 18H), 2.29 (s, 3H), 2.44 (s, 3H), 7.07 (s, 2H), 7.15-7.41 (m, 8H), 7.70 (d, J = 8.2 Hz, 2H), 10.59 (d, J = 11.4 Hz, 1H); ^{13}C NMR (50 MHz, $CDCl_3$) δ 21.44, 21.55, 31.22, 35.05, 111.27, 115.94, 126.54, 126.91, 127.82, 128.13, 129.96, 130.42, 134.71, 134.88, 136.97, 141.49, 141.74, 144.38, 169.60; MS m/z (EI): 519 (M^+ , 5 %), 300 (100), 139 (45), 155 (77), 91 (96). Anal. Calcd for $C_{31}H_{37}NO_4S$: C, 71.65; H, 7.18; N, 2.70. Found: C, 71.41; H, 7.22; N, 2.37.

(Z)-1,2-Diphenyl-3-(N-tosyl)aminopropan-1-one (27) Mp 154-155 °C; IR 3445, 3061, 1622, 1597 cm^{-1} ; 1H NMR (200 MHz, $CDCl_3$) δ 2.2-4.3 (s, 3H), 6.23-7.41 (m, 13H), 7.85 (d, J = 7.8 Hz, 2H), 11.56 (d, J = 11.0 Hz, 1H); ^{13}C NMR (50 MHz, $CDCl_3$) δ 21.49, 104.78, 127.46, 127.85,

128.59, 128.73, 129.05, 129.37, 130.58, 132.87, 134.06, 136.89, 138.04, 144.05, 157.11, 191.39;

MS m/z (EI) 377 (M^+ , 35 %), 222 (39), 165 (7), 84 (100), 47 (33). HRMS calcd for $C_{22}H_{19}NO_3S$: 377.10857, found: 377.10842.