



Scheme 2

Table 1 Reaction of $\text{Bt}^1\text{CH}_2\text{Cl}$ with isocyanates RNCO promoted by Sml_2

Product	R	T/°C	Time/min	Yield*/%
3a	i-Pr	0	5	65
3b	n-Bu	0	5	68
3c	C_6H_5	0	8	81
3d	2- ClC_6H_4	5	10	83
3e	3- ClC_6H_4	10	15	79
3f	4- ClC_6H_4	10	8	86
3g	2-Et C_6H_4	5	10	80
3h	2,6-i-Pr $_2\text{C}_6\text{H}_3$	15	20	86
5	$\text{CH}_2(\text{C}_6\text{H}_4)_2$	15	30	78

* Isolated yields based on 1-(chloromethyl)benzotriazole.

3e (R = 3- ClC_6H_4): m.p. 179–180 °C; $^1\text{H NMR}$: δ 4.32 (2H, s, CH_2), 5.53 (1H, br s, NH), 6.96–7.62 (7H, m, ArH), 8.00–8.11 (1H, m, ArH); IR: ν_{max} 3441, 2997, 2913, 1665, 1544, 1052, 700 cm^{-1} ; MS m/z (%) 288 ($\text{M}^+ + 2$, 4), 287 ($\text{M}^+ + 1$, 3), 286 (M^+ , 12), 154 (7), 153 (23), 133 (11), 132 (61), 105 (40), 104 (58), 77 (100). Anal. found C 58.65, H 3.89, N 19.57%.

3f (R = 4- ClC_6H_4): m.p. 188–190 °C; $^1\text{H NMR}$: δ 4.30 (2H, s, CH_2), 5.40 (1H, br s, NH), 7.28–7.54 (7H, m, ArH), 8.03–8.11 (1H, m, ArH); IR: ν_{max} 3449, 3000, 2910, 1667, 1532, 1060, 694 cm^{-1} ; MS m/z (%) 288 ($\text{M}^+ + 2$, 4), 287 ($\text{M}^+ + 1$, 3), 286 (M^+ , 12), 153 (34), 133 (12), 132 (60), 105 (52), 104 (69), 77 (100). Anal. found C 58.67, H 3.80, N 19.54%.

3g (R = 2-Et C_6H_4): m.p. 181–182 °C; $^1\text{H NMR}$: δ 1.18 (3H, t, J = 6 Hz, CH_3), 2.70 (2H, m, J = 6 Hz, CH_2), 4.28 (2H, s, CH_2), 5.22 (1H, br s, NH), 7.27–7.68 (7H, m, ArH), 8.07–8.17 (1H, m, ArH); IR: ν_{max} 3452, 2982, 2877, 1664, 1530, 1455, 740 cm^{-1} ; MS m/z (%) 281 ($\text{M}^+ + 1$, 3), 280 (M^+ , 11), 133 (5), 132 (56), 106 (3), 105 (34), 104 (39), 77 (100). Anal. calcd for $\text{C}_{16}\text{H}_{16}\text{N}_4\text{O}$: C 68.57, H 5.71, N 20.00; found C 68.51, H 5.75, N 19.95%.

3h (R = 2,6-i-Pr $_2\text{C}_6\text{H}_3$): m.p. 202 °C; $^1\text{H NMR}$: δ 0.90 (12H, d, J = 6.8 Hz, $4 \times \text{CH}_3$), 2.56 (2H, m, J = 6.8 Hz, CH), 4.24 (2H, s, CH_2), 5.49 (1H, br s, NH), 6.95–7.61 (6H, m, ArH), 8.01–8.12 (1H, m, ArH); IR: ν_{max} 3408, 3035, 2961, 2867, 1665, 1533, 1457, 746 cm^{-1} ; MS m/z (%) 337 ($\text{M}^+ + 1$, 1), 336 (M^+ , 1), 204 (25), 133 (53), 132 (13), 106 (36), 105 (22), 104 (48), 77 (100). Anal. calcd for $\text{C}_{20}\text{H}_{24}\text{N}_4\text{O}$: C 71.43, H 7.14, N 16.67; found C 71.40, H 7.10, N 16.65%.

5: m.p. 266 °C; $^1\text{H NMR}$: δ 3.88 (2H, s, CH_2), 4.94 (4H, s, $2 \times \text{CH}_2$), 5.50 (2H, br s, NH), 7.19–7.76 (14H, m, ArH), 7.96–8.12 (2H, m, ArH); IR: ν_{max} 3455, 2992, 2896, 1664, 1550, 1116, 751 cm^{-1} ; MS m/z (%) 516 (M^+ , 3), 253 (2), 252 (13), 251 (3), 133 (7), 132 (40), 106 (12), 105 (33), 104 (58), 77 (100). Anal. calcd for $\text{C}_{29}\text{H}_{24}\text{N}_8\text{O}_2$: C 67.44, H 4.65, N 21.71; found C 67.47, H 4.69, N 21.69%.

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