Supporting Information


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General Information

All commercially available chemicals were used directly without purification unless otherwise stated. All reactions were carried out in flame-dried glassware under a nitrogen or argon atmosphere using standard Schlenk manifold techniques. $^1$H and $^{13}$C Nuclear Magnetic Resonance (NMR) spectra were acquired at various field strengths as indicated, and were referenced to CHCl$_3$ (7.27 and 77.0 ppm for $^1$H and $^{13}$C, respectively). Chemical shifts (δ) are quoted in parts per million (ppm) and coupling constants (J) are in Hertz (Hz). High resolution mass spectra were recorded using Electron Spray Ionization (ESI). All infrared (IR) data was obtained on a Perkin-Elmer Spectrum One FT-IR spectrometer. Flash column chromatography was performed using Aldrich Silica Gel 60 (40-63 μm). Anhydrous DMF was purchased from Acros.
General Procedures

General Procedure 1 (GP1): Coupling of allylic boronic esters with carbon- or oxygen-based nucleophiles

Allylic boronic ester (1.0 mmol), tris(dibenzyldieneacetone)dipalladium(0) (0.50 mol%), tri(2-furyl)phosphine (2.0 mol%) and the nucleophile (1.3 mmol) were weighed into a dry flask and placed under argon (if the nucleophile is a liquid it is added by syringe after placing under argon). A solution of 2,6-dimethylenbenzoquinone (1.3 mmol) in DMF (10 mL) was added in one portion and the mixture was stirred at r.t for 16 h, or until the reaction was complete as determined by GCMS analysis. 20% aq. NaHSO₃* (20 mL) was added and the mixture was stirred vigorously for 5 min. Et₂O (20 mL) was added and the layers were separated. The aqueous phase was extracted with Et₂O (2 x 20 mL) and the combined organic phases were washed with brine (20 mL), dried (MgSO₄) and concentrated in vacuo.

General Procedure 2 (GP2): Coupling of allylic boronic esters with a nitrogen-based nucleophile

As for GP1 except N,N-Diisopropylethylamine (0.05 mmol) was added to the reaction flask before the addition of the 2,6-dimethylbenzoquinone solution.

* Some of the products co-eluted with the excess of DMBQ. Quenching the reaction with NaHSO₃ removed any excess of DMBQ. For more details see: Howell, J. M.; Liu, W.; Young, A. J.; White, M. C. J. Am. Chem. Soc. 2014, 136, 5750 (supporting information pg. 3).
Carbon-Based Nucleophiles

**Dimethyl (E)-2-(4-phenylpent-2-en-1-yl)malonate (13)**

![Chemical Structure](image)

Prepared according to a slightly modified GP1 (2.5 mol% of Pd$_2$dba$_3$ and 10 mol% of tri(2-furyl)phosphine were used) from 4₁ (92 mg, 0.34 mmol) and dimethyl malonate (50 µL, 0.44 mmol). Purification by column chromatography (pentane/EtOAc 15:1) gave 13 as an oil (50 mg, 53%); $E/Z >95:5$; linear to branched >95:5:

$R_f$ 0.25 (pentane/EtOAc 15:1); $\nu_{\text{max}}$ (neat) 2958 (w), 1733 (s) cm$^{-1}$; $\delta_H$ (400 MHz, CDCl$_3$) 1.29 (3H, d, $J = 7.0$, CH$_3$CH), 2.56-2.62 (2H, m, =CHCH$_2$), 3.39 (1H, app p, $J = 7.0$, PhCH), 3.41 (1H, t, $J = 7.6$, CH(CO$_2$Me)$_2$), 3.65 (3H, s, OCH$_3$), 3.68 (3H, s, OCH$_3$), 5.40 (1H, dtd, $J = 15.3$, 7.0, 1.3, PhCHCH=CH), 5.68 (1H, ddt, $J = 15.3$, 7.0, 1.3, PhCHCH=CH), 7.10-7.21 (3H, m, ArH), 7.21-7.32 (2H, m, ArH); $\delta_C$ (100 MHz, CDCl$_3$) 21.3 (CH$_3$), 32.0 (CH$_2$), 42.3 (CH), 52.0 (CH$_3$), 52.5 (CH$_3$), 52.5 (CH), 124.1 (CH), 126.2 (CH), 127.3 (CH), 128.5 (CH), 138.8 (CH), 145.8 (C), 169.5 (C=O); HRMS (ESI$^+$) calcd. for C$_{16}$H$_{21}$O$_4$Na [M+Na$^+$] 299.1254, found 299.1246.

*(E)-1,3-Diphenyl-2-(4-phenylpent-2-en-1-yl)propane-1,3-dione (14)*

![Chemical Structure](image)

Prepared according to a slightly modified GP1 (2.5 mol% of Pd$_2$dba$_3$ and 10 mol% of tri(2-furyl)phosphine were used) from 4₁ (74 mg, 0.27 mmol) and dibenzoylmethane (79 mg, 0.35 mmol). Purification by column chromatography (pentane/EtOAc 20:1) gave 14 as an oil (63 mg, 63%); $E/Z >95:5$; linear to branched >95:5:
$R_f$ 0.25 (pentane/EtOAc 15:1); $v_{\text{max}}$ (neat) 2964 (w), 1694 (s), 1669 (s) cm$^{-1}$; $\delta$$_H$ (400 MHz, CDCl$_3$) 1.21 (3H, d, $J = 7.0$, CH$_3$), 2.78-2.90 (2H, m, =CHCH$_2$), 3.33 (1H, qd, $J = 7.0$, 6.6, CHCH$_3$), 5.26 (1H, t, $J = 6.8$, COCHCO), 5.49 (1H, dtd, $J = 15.3$, 7.1, 1.3, PhCHCH=CH), 5.65 (1H, ddt, $J = 15.3$, 6.6, 1.2, PhCHCH=), 7.03-7.07 (2H, m, ArH), 7.15 (1H, m, ArH), 7.20-7.26 (2H, m, ArH), 7.38-7.45 (4H, m, ArH), 7.52-7.57 (2H, m, ArH), 7.90-7.95 (4H, m, ArH); $\delta$$_C$ (100 MHz, CDCl$_3$) 21.2 (C$\text{H}_3$), 32.8 (C$\text{H}_2$), 42.2 (CH), 57.3 (CH), 125.3 (CH), 126.1 (CH), 127.2 (CH), 128.5 (CH), 128.7 (CH), 128.8 (CH), 129.0 (CH), 133.6 (CH), 136.3 (C), 136.3 (C), 138.3 (CH), 145.8 (C), 195.9 (C=O), 196.0 (C=O); HRMS (ESI$^+$) calcd. for C$_{26}$H$_{24}$O$_2$Na [M+Na$^+$] 391.1669, found 391.1672.

**Dimethyl (E)-2-(3-cyclohexylallyl)malonate (15)**

![Dimethyl (E)-2-(3-cyclohexylallyl)malonate](image)

Prepared according to GP1 from 5$^1$ (100 mg, 0.40 mmol) and dimethyl malonate (60 µL, 0.52 mmol). Purification by column chromatography (pentane/EtOAc 20:1) gave 15 as an oil (67 mg, 70%); E/Z $>$95:5; linear to branched $>$95:5:

$R_f$ 0.20 (pentane/EtOAc 15:1); $v_{\text{max}}$ (neat) 2923 (m), 2851 (w), 1735 (s) cm$^{-1}$; $\delta$$_H$ (400 MHz, CDCl$_3$) 0.94-1.30 (5H, m, Cy CH$_2$), 1.58-1.73 (5H, m, Cy CH$_2$), 1.89 (1H, m, CHCH=), 2.56 (2H, m, =CHCH$_2$), 3.40 (1H, t, $J = 7.6$, COCHCO), 3.72 (6H, s, 2 × OCH$_3$), 5.30 (1H, dtd, $J = 15.2$, 6.9, 1.2, CH=CHCH$_2$), 5.46 (1H, ddt, $J = 15.2$, 6.8, 1.2, CH=CHCH$_2$); $\delta$$_C$ (100 MHz, CDCl$_3$) 26.1 (CH$_2$), 26.2 (CH$_2$), 32.1 (CH$_2$), 33.0 (CH$_2$), 40.7 (CH), 52.2 (CH), 52.5 (CH$_3$), 122.6 (CH), 140.2 (CH), 169.5 (C=O); HRMS (ESI$^+$) calcd. for C$_{14}$H$_{22}$O$_4$Na [M+Na$^+$] 277.1410, found 277.1403.

**(E)-2-(3-Cyclohexylallyl)-1-phenylbutane-1,3-dione (16)**

![E-2-(3-Cyclohexylallyl)-1-phenylbutane-1,3-dione](image)
Prepared according to GP1 from $\mathbf{5}^1$ (113 mg, 0.45 mmol) and benzoylaceton (95 mg, 0.59 mmol). Purification by column chromatography (pentane/EtOAc 20:1) gave $\mathbf{16}$ as an oil (85 mg, 70%); $E/Z > 95:5$; linear to branched $> 95:5$:

Exists as a 93:7 mixture of keto and enol forms in CDCl$_3$ (product contaminated with 1 mol% benzoylaceton); $R_f$ 0.20 (pentane/EtOAc 15:1); $\nu_{\text{max}}$ (neat) 2922 (m), 2849 (w), 1718 (m), 1675 (s) cm$^{-1}$; HRMS (ESI$^+$) calcd. for C$_{19}$H$_{24}$O$_2$Na [M+Na$^+$] 307.1669, found 307.1662.

Keto form: $\delta_H$ (400 MHz, CDCl$_3$) 0.88-1.29 (5H, m, Cy CH$_2$), 1.53-1.75 (5H, m, Cy CH$_2$), 1.83 (1H, m, CHCH=), 2.13 (3H, s, CH$_3$CO), 2.65 (2H, m, =CHCH$_3$), 4.47 (1H, t, $J$ = 7.2, COCHCO), 5.28 (1H, dtt, $J$ = 15.4, 6.9, 1.1, =CHCH$_2$), 5.43 (1H, ddt, $J$ = 15.4, 6.7, 1.0, CH=CHCH$_2$), 7.34-7.60 (3H, m, Ar H), 7.93-7.99 (2H, m, Ar H); $\delta_C$ (100 MHz, CDCl$_3$) 26.0 (CH$_2$), 26.2 (CH$_2$), 28.3 (CH$_3$), 32.3 (CH$_2$), 32.9 (CH$_2$), 33.0 (CH$_2$), 40.6 (CH), 63.6 (CH), 123.1 (CH), 128.8 (CH), 128.9 (CH), 133.7 (CH), 136.7 (C), 139.9 (CH), 196.3 (C=O), 204.0 (C=O).

Enol form: $\delta_H$ (400 MHz, CDCl$_3$) 0.88-1.29 (5H, m, Cy CH$_2$), 1.53-1.75 (5H, m, Cy CH$_2$), 1.97 (1H, m, CHCH=), 2.23 (3H, s, CH$_3$CO), 2.95 (2H, m, =CHCH$_2$), 5.33-5.48 (2H, m, CH=CH), 7.34-7.60 (3H, m, Ar H), 7.93-7.99 (2H, m, Ar H).

$(E)$-5-Cyclohexyl-2-nitro-1-phenylpent-4-en-1-one (17)

Prepared according to GP1 from $\mathbf{5}^1$ (90 mg, 0.36 mmol) and benzylnitromethane (95 mg, 0.59 mmol). Purification by column chromatography (pentane/EtOAc 20:1) gave $\mathbf{17}$ as an oil (76 mg, 74%); $E/Z > 95:5$; linear to branched $> 95:5$:

$R_f$ 0.25 (pentane/EtOAc 20:1); $\nu_{\text{max}}$ (neat) 2923 (m), 2851 (w), 1695 (m), 1557 (s) cm$^{-1}$; $\delta_H$ (400 MHz, CDCl$_3$) 0.90-1.29 (5H, m, Cy CH$_2$), 1.54-1.73 (5H, m, Cy CH$_2$), 1.89 (1H, m, CHCH=), 2.83 (1H, m, =CHCHH'), 3.00 (1H, m, =CHCHH'), 5.32 (1H, dtt, $J$ = 15.4, 7.1, 1.3, =CHCH$_2$), 5.56 (1H, ddt, $J$ = 15.4, 6.7, 1.0, CH=CHCH$_2$), 6.06 (1H, dd, $J$ = 9.0, 5.2, CHNO$_2$), 7.49-7.55 (2H, m, Ar H), 7.65 (1H, m, Ar H), 7.92-7.96 (2H, m, Ar H); $\delta_C$ (100 MHz, CDCl$_3$) 26.0 (CH$_2$), 26.2 (CH$_2$), 32.7 (CH$_2$), 32.8 (CH$_2$), 33.9 (CH$_2$), 40.7 (CH),
89.7 (CH), 119.4 (CH), 128.9 (CH), 129.3 (CH), 134.3 (C), 134.8 (CH), 142.8 (CH), 188.8 (C=O); HRMS (ESI⁺) calcd. for C₁₇H₂₁O₃NNa [M+Na⁺] 310.1414, found 310.1400.

Data consistent with that reported in the literature²

Oxygen-Based Nucleophiles

(E)-4-Phenylpent-2-en-1-yl acetate (11)

Prepared according to GP1 from 4¹ (49 mg, 0.18 mmol) and acetic acid (13.4 µL, 0.23 mmol). Purification by column chromatography (pentane/EtOAc 30:1) gave 11 as an oil (30 mg, 82%); E/Z >95:5; linear to branched >95:5:

$R_f$ 0.30 (pentane/EtOAc 30:1); $\nu_{\text{max}}$ (neat) 2966 (w), 1736 (s) cm⁻¹; $\delta_H$ (400 MHz, CDCl₃) 1.38 (3H, d, $J = 6.9$, CH₃CH), 2.07 (3H, s, COCH₃), 3.50 (1H, app p, $J = 6.9$, CHCH₃), 4.55 (2H, app dt, $J = 6.4$, 1.3, CH₂O), 5.60 (1H, dtd, $J = 15.5$, 6.4, 1.5, =CHCH₂O), 5.95 (1H, ddt, 15.5, 6.6, 1.3, CH=CHCH₂), 7.19-7.24 (3H, m, ArH), 7.29-7.34 (2H, m, ArH); $\delta_C$ (100 MHz, CDCl₃) 21.1 (CH₃), 21.1 (CH₃), 42.1 (CH), 65.2 (CH₂), 122.9 (CH), 126.4 (CH), 127.3 (CH), 128.6 (CH), 140.4 (CH), 145.2 (C), 171.0 (C=O); HRMS (ESI⁺) calcd. for C₁₃H₁₆O₂Na [M+Na⁺] 227.1043, found 227.1042.

(E)-4-Phenylpent-2-en-1-yl benzoate (18)

Prepared according to GP1 from 4¹ (103 mg, 0.38 mmol) and benzoic acid (60 mg, 0.49 mmol). Purification by column chromatography (pentane/EtOAc 30:1) gave 18 as an oil (93 mg, 92%); E/Z >95:5; linear to branched >95:5:
$R_f$ 0.30 (pentane/EtOAc 30:1); $\nu_{\text{max}}$ (neat) 2966 (w), 1715 (s) cm$^{-1}$; $\delta_H$ (400 MHz, CDCl$_3$) 1.40 (3H, d, $J$ = 7.1, CH$_3$), 3.53 (1H, qd, $J$ = 7.1, 6.6, CHCH$_3$), 4.82 (2H, m, CH$_2$O), 5.73 (1H, dtd, $J$ = 15.5, 6.2, 1.4, =CHCH$_2$O), 6.05 (1H, ddt, $J$ = 15.5, 6.6, 1.3, PhCHCH=), 7.19-7.25 (3H, m, ArH), 7.29-7.35 (2H, m, ArH), 7.54 (1H, m, ArH), 8.05-8.09 (2H, m, ArH); $\delta_C$ (100 MHz, CDCl$_3$) 21.1 (CH$_3$), 42.1 (CH), 65.6 (CH$_2$), 123.0 (CH), 126.4 (CH), 127.3 (CH), 128.4 (CH), 128.6 (CH), 129.7 (CH), 130.5 (C), 133.0 (CH), 140.4 (CH), 145.2 (C), 166.5 (C=O); HRMS (ESI$^+$) calcd. for C$_{18}$H$_{18}$O$_2$Na [M+Na$^+$] 289.1199, found 289.1186.

**(E)-3-Cyclohexylallyl benzoate (19)**

\[\text{Cyclohexylallyl benzoate (19)}\]

Prepared according to GP1 (reaction time 24 h) from 5$^1$ (96 mg, 0.38 mmol) and benzoic acid (61 mg, 0.50 mmol). Purification by column chromatography (pentane/EtOAc 30:1) gave 19 as an oil (87 mg, 82%); $E/Z$ >95:5; linear to branched 87:13:

$R_f$ 0.30 (pentane/EtOAc 30:1); $\nu_{\text{max}}$ (neat) 2923 (m), 2851 (w), 1716 (s) cm$^{-1}$; HRMS (ESI$^+$) calcd. for C$_{16}$H$_{20}$O$_2$Na [M+Na$^+$] 267.1356, found 267.1351.

Linear isomer: $\delta_H$ (400 MHz, CDCl$_3$) 1.03-1.36 (5H, m, Cy CH$_2$), 1.61-1.82 (5H, m, Cy CH$_2$), 1.99 (1H, m, CHCH=), 4.77 (2H, app dt, $J$ = 6.3, 1.0, CH$_2$O), 5.64 (1H, dtd, $J$ = 15.5, 6.3, 1.3, =CHCH$_2$O), 5.81 (1H, ddt, $J$ = 15.5, 6.5, 1.0, CH=CHCH$_2$), 7.38-7.48 (2H, m, ArH), 7.55 (1H, m, ArH), 8.06 (2H, m, ArH); $\delta_C$ (100 MHz, CDCl$_3$) 26.1 (CH$_2$), 26.2 (CH$_2$), 32.7 (CH$_2$), 40.5 (CH), 66.1 (CH$_2$), 121.5 (CH), 128.4 (CH), 129.7 (CH), 130.6 (C), 132.9 (CH), 142.2 (CH), 166.5 (C=O).

Data for branched isomer consistent with that reported in the literature$^5$.
Nitrogen-Based Nucleophiles

**Methyl (E)-(4-phenylpent-2-en-1-yl)(tosyl)carbamate (20)**

![Structure of 20](image)

Prepared according to GP2 (reaction time 48 h) from 4\(^1\) (139 mg, 0.51 mmol) and 6\(^4\) (152 mg, 0.66 mmol). Purification by column chromatography (pentane/EtOAc 6:1) gave 20 as an oil (154 mg, 81%); E/Z >95:5; linear to branched >95:5: 

\[ R_f \text{ 0.30 (pentane/EtOAc 6:1); } v_{\text{max}} \text{ (neat) 2961 (w), 1732 (s) cm}^{-1}; \delta_H \text{ (400 MHz, CDCl}_3\text{) 1.38 (3H, d, } J = 7.0, \text{ CH}_3\text{CH), 2.42 (3H, s, CH}_3\text{), 3.50 (1H, app p, } J = 6.8, \text{ CHCH}_3\text{), 3.68 (3H, s, OCH}_3\text{), 4.47 (2H, app dt, } J = 6.4, 1.2, \text{ CH}_2\text{N), 5.58 (1H, dtd, } J = 15.4, 6.4, 1.4, =\text{CHCH}_2\text{N), 5.98 (1H, ddt, } J = 15.4, 6.9, 1.2, \text{ CH}=\text{CHCH}_2\text{), 7.19-7.25 (5H, m, ArH), 7.30-7.35 (2H, m, ArH), 7.73-7.83 (2H, m, ArH); } \delta_C \text{ (100 MHz, CDCl}_3\text{) 21.2 (CH}_3\text{), 21.7 (CH}_3\text{), 42.1 (CH), 48.5 (CH}_2\text{), 53.8 (CH}_3\text{), 123.3 (CH), 126.3 (CH), 127.2 (CH), 128.55 (CH). 128.57 (CH), 129.3 (CH), 136.5 (C), 140.1 (CH), 144.5 (C), 145.3 (C), 152.7 (C=O); HRMS (ESI\(^+\) ) calcd. for C\(_{20}\)H\(_{23}\)O\(_3\)N\(_2\)NaS [M+Na\(^+\)] 396.1240, found 396.1243.} 

**Methyl (E)-(3-cyclohexylallyl)(tosyl)carbamate (21)**

![Structure of 21](image)

Prepared according to GP2 (reaction time 48 h) from 5\(^1\) (103 mg, 0.41 mmol) and 6\(^4\) (123 mg, 0.54 mmol). Purification by column chromatography (pentane/EtOAc 6:1) gave 21 as an oil (82 mg, 57%); E/Z >95:5; linear to branched >95:5: 

\[ R_f \text{ 0.30 (pentane/EtOAc 6:1); } v_{\text{max}} \text{ (neat) 2923 (m), 2850 (w), 1732 (s) cm}^{-1}; \delta_H \text{ (400 MHz, CDCl}_3\text{) 1.01-1.33 (5H, m, Cy CH}_2\text{), 1.60-1.77 (5H, m, Cy CH}_2\text{), 2.00 (1H, m, CHCH=), 2.42 (3H, s, CH}_3\text{), 3.67 (3H, s, OCH}_3\text{), 4.39 (2H, app dt, } J = 6.4, 1.0, \text{ CH}_2\text{N), 5.45 (1H, dtd, } J = 15.5, 6.4, 1.3, =\text{CHCH}_2\text{N), 5.73 (1H, ddt, } J = 15.5, 6.6, 1.0, \text{ CH}=\text{CHCH}_2\text{), 7.26-7.30 (2H, m, ArH), 7.80-7.84 (2H, m, ArH); } \delta_C \text{ (100 MHz, CDCl}_3\text{) 21.7 (CH}_3\text{), 26.0 (CH}_2\text{), 26.2 (CH}_2, \text{.}}\]
32.7 (CH₂), 40.4 (CH), 48.9 (CH₂), 53.8 (CH₃), 121.9 (CH), 128.7 (CH), 129.3 (CH), 136.7 (C), 141.7 (CH), 144.5 (C), 152.8 (C=O); HRMS (ESI⁺) calcd. for C₁₈H₂₅O₄NNaS [M+Na⁺] 374.1396, found 374.1385.

Data consistent with that reported in the literature.⁵

**Mechanistic Study Shown in Scheme 5**

(±)-Methyl 3-(1SR, 3SR)-(bis(methoxycarbonyl)methyl)-4-cyclohexene carboxylate (9)

![Chemical Structure](image)

Prepared according to a slightly modified GP1 (3.0 equiv. dimethyl malonate was used) from ⁷ (trans/cis 83:17, 74 mg, 0.28 mmol) and dimethyl malonate (95 µL, 0.83 mmol). Purification by column chromatography (pentane/Et₂O 15:1) gave 9 as an oil (37 mg, 49%); trans/cis 19:81.

Rᵣ 0.15 (pentane/Et₂O 15:1); νₘₐₓ (neat) 1730 (s), 1435 (s), 1166 (w) cm⁻¹; δₜₜ (400 MHz, CDCl₃, syn isomer) 1.46 (1H, app q, J = 12.3, CHH’CHCO₂Me), 2.06-2.33 (3H, m, =CHCH₂ and CHH’CHCO₂Me), 2.62 (1H, m, CHCO₂CH₃), 3.00 (1H, m, CHCH=), 3.28 (1H, d, J = 8.6, CH(CO₂CH₃)₂), 3.68 (3H, s, CO₂CH₃), 3.74 (6H, s, CH(CO₂CH₃)₂), 5.52 (1H, m, CH=CH), 5.76 (1H, m, CH=CH); δₐ (100 MHz, CDCl₃, syn isomer) 27.8 (CH₂), 29.5 (CH₂), 36.2 (CH), 39.5 (CH), 51.9 (CH₃), 52.6 (CH₃), 52.7 (CH₃), 56.6 (CH), 127.4 (CH), 127.5 (CH), 168.7 (C=O), 168.7 (C=O), 175.6 (C=O); HRMS (ESI⁺) calcd. for C₁₃H₁₈O₆Na [M+Na⁺] 293.0996, found 293.0999.

Data consistent with that reported in the literature.⁷
Determination of trans/cis ratio of 9:
Spectra

Dimethyl \((E)-2-(4\text{-phenylpent-2-en-1-yl})\text{malonate} \((13)\)
(E)-1,3-Diphenyl-2-(4-phenylpent-2-en-1-yl)propane-1,3-dione (14)
Dimethyl (E)-2-(3-cyclohexylallyl)malonate (15)
(E)-2-(3-Cyclohexylallyl)-1-phenylbutane-1,3-dione (16)
(E)-5-Cyclohexyl-2-nitro-1-phenylpent-4-en-1-one (17)
(E)-4-Phenylpent-2-en-1-yl acetate (11)
(E)-4-Phenylpent-2-en-1-yl benzoate (18)
(E)-3-Cyclohexylallyl benzoate (19)
Methyl (E)-(4-phenylpent-2-en-1-yl)(tosyl)carbamate (20)
Methyl (E)-(3-cyclohexylallyl)(tosyl)carbamate (21)
(±)-Methyl 3-(1SR, 3SR)-(bis(methoxycarbonyl)methyl)-4-cyclohexene carboxylate (9)
References