Supporting Information

DABCO Catalyzed Addition of Selenosulfonates to α,β-Unsaturated Ketones

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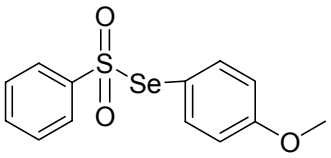
Experimental Procedures

General Remarks. Unless otherwise stated, all reactions were carried out under argon atmosphere. All solvents were purified by distillation. Other commercially obtained reagents were used without further purification. Selenosulfonates[1], phenyl vinyl ketone[2] and 4-methylpent-1-en-3-one[3] were prepared according to the literature. Infrared spectra were measured on a PERKIN-ELMER 983 spectrometer. ^{1}H-NMR spectra were recorded on a 300 MHz spectrometer in $CDCl_3$ using tetramethylsilane as the internal standard. Mass spectra were recorded with an HP-5989 instrument and HRMS was measured by a Finnigan MA+ mass spectrometer or an Ion Spec 4.7 Tesla FTMS mass spectrometer. Satisfactory CHN microanalyses were obtained with a Carlo-Erba 1106 analyzer. Melting points were obtained by means of a micro melting point apparatus and are uncorrected.

Typical Procedure for the Preparation of Selenosulfonates.

A suspension of $PhSO_2Na{\cdot}2H_2O$ (800 mg, 4.0 mmol) in CH_2Cl_2 (10 mL) containing 1,2-bis(4-methoxyphenyl)diselenide (372 mg, 1.0 mmol) was cooled at 0 ^oC and [bis(trifluoroacetoxy)iodo]benzene (475 mg, 1.1 mmol) in CH_2Cl_2 (4 mL) was added dropwise. The mixture was stirred at room temperature for 3 h. Then, the reaction mixture was washed with H_2O, dried over anhydrous $MgSO_4$. The solvent CH_2Cl_2 was removed under reduced pressure and the residue was purified by a flash chromatography (SiO_2, EtOAc:Petroleum ether = 1:6) to yield **3e** (479 mg, 63%) as a yellow solid.

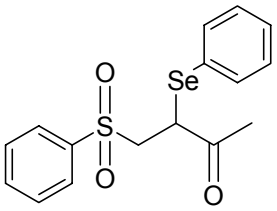


Se-4-methoxyphenyl benzeneselenosulfonate

a yellow solid: mp. 62-64 ^{o}C; IR (CH_2Cl_2) ν 3060, 3012, 1582, 1567, 1491, 1302, 1253, 1183, 1129, 1072 cm^{-1}; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 3.84 (3H, s, Me), 6.84 (2H, d, *J* = 9.0 Hz, Me), 7.37-7.44 (4H, m, Ar), 7.51-7.59 (3H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 55.4, 115.1, 118.7, 127.0, 128.7, 133.4, 139.0, 145.1, 161.9. MS (EI) m/e 328 (M^+, 19.3), 187 (M^+-141, 100). Anal. Calcd. for $C_{13}H_{12}O_3SSe$ requires C, 47.71; H, 3.70%. Found: C, 47.71; H, 3.81%.

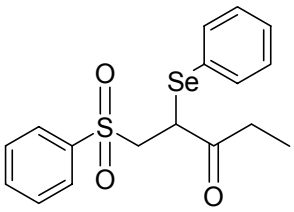
Typical Reaction Procedure for DABCO-catalyzed Reaction of Methyl vinyl ketone with Se-phenyl benzeneselenosulfonate.

To a solution of Se-phenyl benzeneselenosulfonate (74 mg, 0.25 mmol) and DABCO (9 mg, 0.06 mmol) in THF (1.0 mL) at room temperature was added methyl vinyl ketone **2a** (42 μL, 0.5 mmol) and the reaction mixture was further stirred at room temperature. The reaction was monitored by TLC plate. When the Se-phenyl benzeneselenosulfonate disappeared, the solvent was removed under reduced pressure and the residue was purified by a flash chromatography (SiO_2, EtOAc:Petroleum ether = 1:6) to yield **1a** (74 mg, 81 %) as a white solid.



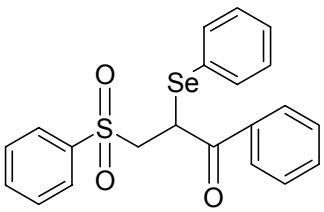
1a

3-(phenylselanyl)-4-(phenylsulfonyl)butan-2-one (1a): a white solid: mp. 103-105 ^{o}C; IR ($CHCl_3$) ν 2978, 1706 (C=O), 1446, 1306, 1170, 1145, 1130 cm^{-1}; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 2.34 (3H, s, Me), 3.48 (1H, dd, *J* = 13.8, 2.7 Hz), 3.93 (1H, dd, *J* = 13.8, 10.5 Hz), 4.17 (1H, dd, *J* = 10.5, 2.7 Hz), 7.27-7.31 (2H, m, Ar), 7.36-7.44 (3H, m, Ar), 7.51-7.56 (2H, m, Ar), 7.63-7.68 (1H, m, Ar), 7.81-7.84 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 27.9, 41.7, 57.4, 125.1, 128.0, 129.3, 129.5, 129.7, 134.0, 136.1, 139.0, 199.7. MS (EI) m/e 368 (M^+, 13.5), 77 (M^+-291, 100). Anal. Calcd. for $C_{16}H_{16}O_3SSe$ requires C, 52.32; H, 4.39%. Found: C, 52.30; H, 4.36%.



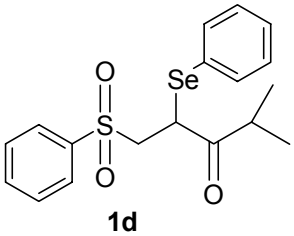
1b

2-(phenylselanyl)-1-(phenylsulfonyl)pentan-3-one (1b): a colorless liquid: IR ($CHCl_3$) ν 2978, 2937, 1709 (C=O), 1447, 1307, 1144, 1085 cm^{-1}; ^1H NMR ($CDCl_3$, TMS, 300 MHz) δ 1.05 (3H, t, *J* = 7.2 Hz, CH_3), 2.48 (1H, dq, *J* = 18.0, 7.2 Hz), 2.89 (1H, dq, *J* = 18.0, 7.2 Hz), 3.48 (1H, dd, *J* = 14.1, 2.4 Hz), 3.99 (1H, dd, *J* = 14.1, 10.8 Hz), 4.17 (1H, dd, *J* = 10.8, 2.4 Hz), 7.26-7.31 (2H, m, Ar), 7.36-7.43 (3H, m, Ar), 7.50-7.56 (2H, m, Ar), 7.62-7.67 (1H, m, Ar), 7.80-7.83 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 8.0, 33.9, 40.8, 57.5, 125.3, 128.0, 129.2, 129.4, 129.6, 133.9, 136.1, 139.0, 202.8. MS (EI) m/e 382 (M^+, 2.0), 184 (M^+-198, 100). HRMS Calcd. for $C_{17}H_{18}O_3SSeNa^+$ requires 405.0034, Found: 405.0029.



1c

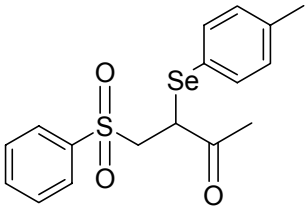
1-phenyl-2-(phenylselanyl)-3-(phenylsulfonyl)propan-1-one (1c): a colorless liquid: IR (CH_2Cl_2) ν 3059, 1675 (C=O), 1447, 1307, 1258, 1226, 1149 cm^{-1}; ^1H NMR ($CDCl_3$, TMS, 300 MHz) δ 3.68 (1H, dd, *J* = 13.8, 2.4 Hz), 4.21 (1H, dd, *J* = 13.8, 10.5 Hz), 5.05 (1H, dd, *J* = 10.5, 2.4 Hz), 7.24-7.46 (9H, m, Ar), 7.52-7.60 (2H, m, Ar), 7.74-7.83 (4H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 36.5, 58.2, 125.5, 128.2, 128.4, 128.6, 129.2, 129.4, 129.8, 133.4, 133.8, 134.8, 136.5, 138.8, 191.7. MS (EI) m/e 430 (M^+, 0.57), 105 (M^+-325, 100). HRMS Calcd. for $C_{21}H_{18}O_3SSeNa^+$ requires 453.0034, Found: 453.0029.



1d

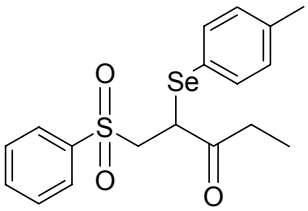
4-methyl-2-(phenylselanyl)-1-(phenylsulfonyl)pentan-3-one (1d): a colorless liquid: IR

(CH_2Cl_2) ν 2971, 2931, 1705 (C=O), 1447, 1307, 1144, 1086 cm^{-1}; ^1H NMR ($CDCl_3$, TMS, 300 MHz) δ 1.13 (3H, d, *J* = 7.2 Hz, Me), 1.19 (3H, d, *J* = 6.6 Hz, Me), 2.98-3.12 (1H, m, CH), 3.49 (1H, dd, *J* = 14.1, 2.4 Hz), 3.99 (1H, dd, *J* = 14.1, 10.8 Hz), 4.28 (1H, dd, *J* = 10.8, 2.4 Hz), 7.23-7.28 (2H, m, Ar), 7.32-7.39 (3H, m, Ar), 7.47-7.52 (2H, m, Ar), 7.58-7.63 (1H, m, Ar), 7.80-7.82 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 18.4, 19.4, 38.6, 39.5, 56.9, 124.9, 127.6, 129.1, 129.3, 129.4, 133.7, 135.9, 138.9, 205.0. MS (EI) m/e 255 (M^+-141, 2.97), 71 (M^+-325, 100). HRMS Calcd. for $C_{18}H_{20}O_3SSeNa^+$ requires 419.0191, Found: 419.0203.



1e

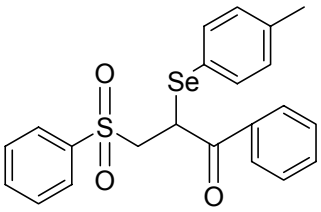
4-(phenylsulfonyl)-3-(p-tolylselanyl)butan-2-one (1e): a white solid: mp. 109-110 °C; IR (CH_2Cl_2) ν 2986, 2931, 1708 (C=O), 1446, 1306, 1144 cm^{-1}; ^1H NMR ($CDCl_3$, TMS, 300 MHz) δ 2.32 (3H, s, Me), 2.33 (3H, s, Me), 3.47 (1H, dd, *J* = 14.1, 2.7 Hz), 3.89 (1H, dd, *J* = 14.1, 11.1 Hz), 4.12 (1H, dd, *J* = 11.1, 2.7 Hz), 7.09 (2H, d, *J* = 7.8 Hz, Ar), 7.29 (2H, d, *J* = 7.8 Hz, Ar), 7.50-7.56 (2H, m, Ar), 7.61-7.67 (1H, m, Ar), 7.81-7.85 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 21.2, 27.8, 41.6, 57.4, 121.3, 128.0, 129.3, 130.3, 133.9, 136.4, 139.0, 140.1, 199.6. MS (EI) m/e 382 (M^+, 0.59), 43 (M^+-339, 100). Anal. Calcd. for $C_{17}H_{18}O_3SSe$ requires C, 53.54; H, 4.76%. Found: C, 53.36; H, 4.78%.



1f

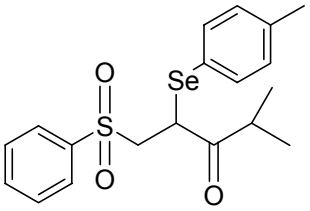
1-(phenylsulfonyl)-2-(p-tolylselanyl)pentan-3-one (1f): a colorless solid: mp. 76-78 °C; IR (CH_2Cl_2) ν 2977, 2937, 1709 (C=O), 1447, 1306, 1144 cm^{-1}; ^1H NMR ($CDCl_3$, TMS, 300 MHz) δ 1.04 (3H, t, *J* = 7.2 Hz, CH_3), 2.33 (3H, s, Me), 2.46 (1H, dq, *J* = 18.0, 7.2 Hz), 2.90 (1H, dq, *J* = 18.0, 7.2 Hz), 3.47 (1H, dd, *J* = 13.5, 2.4 Hz), 3.94 (1H, dd, *J* = 13.5, 10.8 Hz), 4.10 (1H, dd, *J* = 10.8, 2.4 Hz), 7.08 (2H, d, *J* = 8.4 Hz, Ar), 7.27 (2H, d, *J* = 8.4 Hz, Ar), 7.49-7.54 (2H, m, Ar), 7.60-7.65 (1H, m, Ar), 7.79-7.82 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 8.0, 21.2, 33.7, 40.6, 57.4, 121.3, 127.9, 129.2, 130.2, 133.8, 136.4, 138.9, 139.9,

202.6. MS (EI) m/e 396 (M^+, 24.1), 198 (M^+-198, 100). Anal. Calcd. for $C_{18}H_{20}O_3SSe$ requires C, 54.68; H, 5.10%. Found: C, 54.51; H, 5.10%.



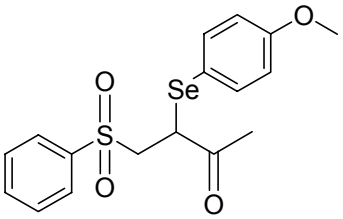
1g

1-phenyl-3-(phenylsulfonyl)-2-(p-tolylselanyl)propan-1-one (1g): a colorless solid: mp. 100-102 ^oC; IR (CH_2Cl_2) ν 3059, 1675 (C=O), 1447, 1307, 1258, 1226, 1149 cm^{-1}; ^1H NMR ($CDCl_3$, TMS, 300 MHz) δ 2.32 (3H, s, Me), 3.68 (1H, dd, *J* = 14.1, 2.4 Hz), 4.16 (1H, dd, *J* = 14.1, 10.5 Hz), 4.99 (1H, dd, *J* = 10.5, 2.4 Hz), 7.05 (2H, d, *J* = 7.8 Hz, Ar), 7.22 (2H, d, *J* = 7.8 Hz, Ar), 7.34-7.44 (4H, m, Ar), 7.49-7.57 (2H, m, Ar), 7.72-7.75 (2H, m, Ar), 7.80-7.83 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 21.2, 36.2, 58.0, 121.5, 128.0, 128.3, 128.5, 129.0, 130.2, 133.2, 133.7, 134.6, 136.6, 138.6, 140.1, 191.4. MS (EI) m/e 444 (M^+, 19.3), 105 (M^+-339, 100). HRMS Calcd. for $C_{22}H_{20}O_3SSe^+$ requires 444.0293, Found: 444.0285.



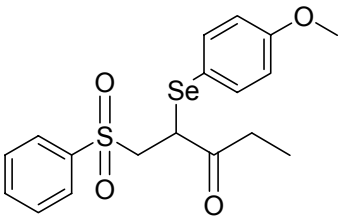
1h

4-methyl-1-(phenylsulfonyl)-2-(p-tolylselanyl)pentan-3-one (1h): a colorless liquid: IR (CH_2Cl_2) ν 2972, 2931, 1705 (C=O), 1447, 1307, 1144, 1086 cm^{-1}; ^1H NMR ($CDCl_3$, TMS, 300 MHz) δ 1.12 (3H, d, *J* = 7.2 Hz, Me), 1.19 (3H, d, *J* = 6.9 Hz, Me), 2.32 (3H, s, Me), 2.99-3.12 (1H, m, CH), 3.47 (1H, dd, *J* = 14.1, 2.4 Hz), 3.95 (1H, dd, *J* = 14.1, 10.8 Hz), 4.28 (1H, dd, *J* = 10.8, 2.4 Hz), 7.07 (2H, d, *J* = 7.8 Hz, Ar), 7.26 (2H, d, *J* = 7.8 Hz, Ar), 7.48-7.53 (2H, m, Ar), 7.59-7.64 (1H, m, Ar), 7.80-7.83 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 18.4, 19.5, 21.1, 38.6, 39.5, 57.0, 121.1, 127.7, 129.1, 130.2, 133.7, 136.3, 139.1, 139.9, 205.0. MS (EI) m/e 410 (M^+, 0.53), 71 (M^+-339, 100). HRMS Calcd. for $C_{19}H_{22}O_3SSeNa^+$ requires 433.0347, Found: 433.0357.



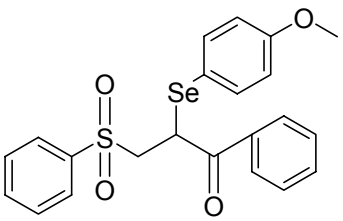
1i

3-(4-methoxyphenylselanyl)-4-(phenylsulfonyl)butan-2-one (1i): a white solid: mp. 105-106 ^{o}C; IR (CH_2Cl_2) ν 2986, 2931, 1708 (C=O), 1446, 1306, 1144 cm^{-1}; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 2.33 (3H, s, Me), 3.45 (1H, dd, *J* = 13.8, 2.7 Hz), 3.79 (3H, s, Me), 3.83 (1H, dd, *J* = 13.8, 10.8 Hz), 4.08 (1H, dd, *J* = 10.8, 2.7 Hz), 6.78-6.82 (2H, m, Ar), 7.31-7.34 (2H, m, Ar), 7.51-7.56 (2H, m, Ar), 7.62-7.68 (1H, m, Ar), 7.81-7.84 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 27.9, 41.5, 55.2, 57.3, 114.7, 115.1, 128.0, 129.3, 134.0, 138.5, 139.0, 161.0, 199.5. MS (EI) m/e 398 (M^+, 1.13), 43 (M^+-355, 100). Anal. Calcd. for $C_{17}H_{18}O_4SSe$ requires C, 51.39; H, 4.57%. Found: C, 51.30; H, 4.64%.



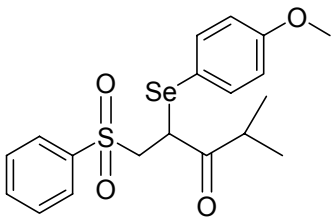
1j

2-(4-methoxyphenylselanyl)-1-(phenylsulfonyl)pentan-3-one (1j): a colorless liquid: IR (CH_2Cl_2) ν 2976, 2938, 1708 (C=O), 1588, 1491, 1447, 1306, 1290, 1251, 1175, 1144 cm^{-1}; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 1.04 (3H, t, *J* = 7.5 Hz, CH_3), 2.45 (1H, dq, *J* = 18.0, 7.5 Hz), 2.91 (1H, dq, *J* = 18.0, 7.5 Hz), 3.46 (1H, dd, *J* = 13.8, 2.4 Hz), 3.78 (3H, s, Me), 3.88 (1H, dd, *J* = 13.8, 10.5 Hz), 4.06 (1H, dd, *J* = 10.5, 2.4 Hz), 6.78-6.82 (2H, m, Ar), 7.28-7.32 (2H, m, Ar), 7.49-7.54 (2H, m, Ar), 7.61-7.66 (1H, m, Ar), 7.79-7.82 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 8.0, 33.7, 40.5, 55.1, 57.2, 114.8, 114.9, 127.9, 129.2, 133.8, 138.4, 138.8, 160.8, 202.4. MS (EI) m/e 412 (M^+, 0.68), 57 (M^+-355, 100). HRMS Calcd. for $C_{18}H_{20}O_4SSeNa^+$ requires 435.0140, Found: 435.0132.



1k

2-(4-methoxyphenylselanyl)-1-phenyl-3-(phenylsulfonyl)propan-1-one (1k): a colorless solid: mp. 133-134 ^{o}C; IR (CH_2Cl_2) ν 3062, 2937, 1674 (C=O), 1587, 1491, 1447, 1306, 1252, 1175, 1142 cm^{-1}; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 3.66 (1H, dd, *J* = 14.1, 2.4 Hz), 3.79 (3H, s, Me), 4.11 (1H, dd, *J* = 14.1, 10.5 Hz), 4.96 (1H, dd, *J* = 10.5, 2.4 Hz), 6.76-6.80 (2H, m, Ar), 7.24-7.28 (2H, m, Ar), 7.36-7.47 (4H, m, Ar), 7.51-7.59 (2H, m, Ar), 7.72-7.76 (2H, m, Ar), 7.80-7.83 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 36.3, 55.2, 58.0, 115.0, 115.3, 128.1, 128.4, 128.6, 129.1, 133.3, 133.8, 134.8, 138.70, 138.74, 161.1, 191.4. MS (EI) m/e 460 (M^+, 17.0), 105 (M^+-355, 100). Anal. Calcd. for $C_{22}H_{20}O_4SSe$ requires C, 57.52; H, 4.39%. Found: C, 57.44; H, 4.48%.

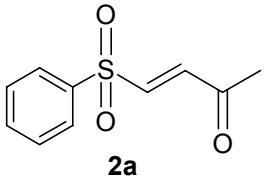


1l

2-(4-methoxyphenylselanyl)-4-methyl-1-(phenylsulfonyl)pentan-3-one (1l): a colorless liquid: IR (CH_2Cl_2) ν 2971, 2933, 1704 (C=O), 1588, 1491, 1307, 1289, 1251, 1175, 1144 cm^{-1}; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 1.12 (3H, d, *J* = 6.9 Hz, Me), 1.20 (3H, d, *J* = 6.0 Hz, Me), 2.98-3.13 (1H, m, CH), 3.46 (1H, dd, *J* = 14.1, 1.8 Hz), 3.77 (3H, s, Me), 3.89 (1H, dd, *J* = 14.1, 10.2 Hz), 4.19 (1H, dd, *J* = 10.2, 1.8 Hz), 6.79 (2H, d, *J* = 7.8 Hz, Ar), 7.29 (2H, d, *J* = 7.8 Hz, Ar), 7.49-7.54 (2H, m, Ar), 7.60-7.65 (1H, m, Ar), 7.82 (2H, d, *J* = 7.8 Hz, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 18.4, 19.5, 38.6, 39.5, 55.1, 56.9, 114.7, 114.9, 127.7, 129.1, 133.7, 138.4, 139.1, 160.8, 204.9. MS (EI) m/e 426 (M^+, 8.33), 125 (M^+-301, 100). HRMS Calcd. for $C_{19}H_{22}O_4SSe^+$ requires 426.0399, Found: 426.0406.

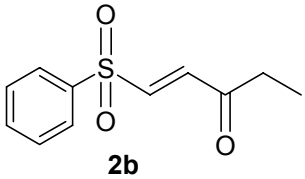
Typical Reaction Procedure for the Reaction of 3-(Phenylselanyl)-4-(phenylsulfonyl)butan-2-one with Hydrogen Peroxide.

To a solution of 3-(phenylselanyl)-4-(phenylsulfonyl)butan-2-one **1a** (88 mg, 0.24 mmol) in THF (1.0 mL) at room temperature was added hydrogen peroxide (30%, 59 μL, 0.58 mmol) and the reaction mixture was further stirred at room temperature. The reaction was monitored by TLC plate. When **1a** disappeared, the solvent was removed under reduced pressure and the residue was purified by a flash chromatography (SiO_2, EtOAc:Petroleum ether = 1:6) to yield **2a** (49 mg, 97%) as a colorless solid.



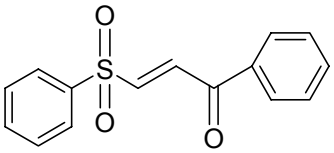
2a

***E*-4-(phenylsulfonyl)but-3-en-2-one (2a):** a colorless solid: This is a known compound; mp. 61-63 ^{o}C; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 2.36 (3H, s, Me), 7.02 (1H, d, *J* = 15.3 Hz, CH), 7.15 (1H, d, *J* = 15.3 Hz, CH), 7.57-7.63 (2H, m, Ar), 7.68-7.71 (1H, m, Ar), 7.91-7.94 (2H, m, Ar); The mp. and ^{1}H NMR spectroscopic data are consistent with those reported in literature.[4]



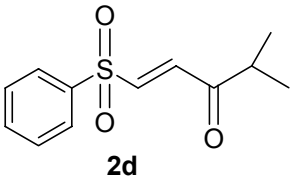
2b

***E*-1-(phenylsulfonyl)pent-1-en-3-one (2b):** a colorless solid: This is a known compound; mp. 86-88 ^{o}C; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 1.12 (3H, t, *J* = 7.2 Hz, CH_3), 2.68 (2H, q, *J* = 7.2 Hz, CH_2), 7.07 (1H, d, *J* = 15.6 Hz, CH), 7.18 (1H, d, *J* = 15.6 Hz, CH), 7.57-7.62 (2H, m, Ar), 7.67-7.73 (1H, m, Ar), 7.91-7.95 (2H, m, Ar); The mp. and ^{1}H NMR spectroscopic data are consistent with those reported in literature.[5]



2c

***E*-1-phenyl-3-(phenylsulfonyl)prop-2-en-1-one (2c):** a colorless solid: This is a known compound; mp. 115-117 ^{o}C; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz) δ 7.36 (1H, d, *J* = 15.0 Hz, CH), 7.51-7.70 (6H, m, Ar), 7.92-8.01 (5H, m, Ar); The mp. and ^{1}H NMR spectroscopic data are consistent with those reported in literature.[6,7]



2d

***E*-4-methyl-1-(phenylsulfonyl)pent-1-en-3-one (2d):** (Although this compound is a known one, yet no characterization data have been reported[8]) a colorless solid: mp. 59-60 ^{o}C; IR (CH_2Cl_2) ν 3048, 2974, 1701, 1448, 1311, 1152, 1085 cm^{-1}; ^{1}H NMR ($CDCl_3$, TMS, 300 MHz)

δ 1.15 (6H, d, *J* = 7.2 Hz), 2.75-2.89 (1H, m), 7.21 (2H, s), 7.56-7.62 (2H, m, Ar), 7.67-7.72 (1H, m, Ar), 7.91-7.94 (2H, m, Ar). ^{13}C NMR ($CDCl_3$, TMS, 75.44 MHz) δ 17.4, 40.7, 128.1, 129.5, 134.2, 134.3, 138.4, 140.4, 201.0. MS (EI) m/e 238 (M^+, 0.82), 125 (M^+-113, 100). Anal. Calcd. for $C_{12}H_{14}O_3S$ requires C, 60.48; H, 5.92%. Found: C, 60.37; H, 6.05%.

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