# Supporting Information

**NHC-catalyzed Thioesterification of Aldehydes by External Redox Activation**

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**General.** All reactions were carried out under a positive atmosphere of argon in dried glassware unless otherwise noted. Solvents were dried and distilled according to standard protocols. All melting points were measured on YAMAMOTO micro melting point apparatus and are uncorrected. $^1$H and $^{13}$C NMR spectra were recorded in CDCl$_3$ at 500 MHz and at 125 MHz, respectively; Tetramethylsilane (TMS) was used as an internal standard. IR spectra were recorded on a JASCO FT/IR-410 or FT/IR-4100 Fourier-transform infrared spectrometer. Low and High resolution mass spectra were recorded on JEOL JMS-01SG-2 or JMS-HX/HX 110A mass spectrometer. Elemental analysis was performed on YANACO CHN CORDER MT-6 spectrometer. Column chromatography was performed on Merck silica gel 60 (230-400 mesh), Reactions and chromatography fraction were analyzed employing pre-coated silica gel plate (Merck Silica Gel F$_{254}$).

**Material.** Unless otherwise noted, materials were purchased from Tokyo Kasei Co., Aldrich Inc., and other commercial suppliers and were used without purification. Catalyst A was prepared according to the known procedure reported by Rovis, T. et al.$^1$, and catalyst B was purchased from Tokyo Kasei Co. Oxidants 3a$^2$ and 3b$^3$ were prepared according to the known procedure respectively. Other oxidants were purchased from commercial suppliers.

**Typical procedure for NHC-catalyzed thioesterification of aromatic aldehydes (Table 2, entry 1).**

![Chemical structure of the reaction](image)

To a screw-capped test tube equipped with a magnetic stir bar and charged with phenazine 3c (64.9 mg, 0.36 mmol, 1.2 equiv.) and NHC-precatalyst A (10.9 mg, 0.03 mmol, 10 mol%) was added THF (0.6 mL, 0.5 M). The aldehyde 1a (0.3 mmol) and benzyl mercaptan 2a (39 μL, 0.33 mmol, 1.1 equiv.) were added, followed by triethylamine (4.2 μL, 0.03 mmol, 10 mol%). After being stirred at ambient temperature for 6 hours under argon atmosphere, the reaction mixture was concentrated in vacuo. The resulting residue was purified by silica gel column chromatography (hexane : diethyl ether = 1 : 0 to 50 : 1) to give 4a (64.2 mg, 94% yield).

**Characterization data (Table 2)**

![Chemical structure of 4a](image)
**S-Benzyl benzothioate (4a)**:
Colorless oil; IR (neat) 1660, 1598, 1580, 1493, 1449, 1204, 1174, 908 cm⁻¹; ¹H NMR (500 MHz, CDCl₃) δ 7.96 (d, J = 7.8 Hz, 2H), 7.55 (t, J = 7.2 Hz, 1H), 7.43 (dt, J₁ = 7.8 Hz, J₂ = 7.2 Hz, 2H), 7.37 (m, 2H), 7.31 (t, J = 7.5 Hz, 2H), 7.24 (m, 1H), 4.32 (s, 2H); ¹³C NMR (126 MHz, CDCl₃) δ 189.8, 153.8, 148.5, 136.8, 134.6, 129.0, 128.7, 127.5, 123.5, 33.3; Anal. Calcd for C₁₄H₁₂O:S: C, 73.65; H, 5.30; Found: C, 73.74; H, 5.23.

![S-Benzyl benzothioate (4a)](image)

**S-Benzyl 4-methylbenzothioate (4b)**:
Colorless crystals; mp 42-42.5 °C; IR (neat) 1645, 1600, 1493, 1451, 1405, 1204, 1171, 904 cm⁻¹; ¹H NMR (500 MHz, CDCl₃) δ 7.86 (d, J = 7.5 Hz, 2H), 7.37 (d, J = 7.5 Hz, 2H), 7.31 (t, J = 7.5 Hz, 2H), 7.26-7.22 (m, 3H), 4.30 (s, 2H), 2.39 (s, 3H); ¹³C NMR (126 MHz, CDCl₃) δ 190.9, 144.3, 137.6, 134.2, 129.3, 129.0, 128.6, 127.3, 127.2, 33.2, 21.7; Anal. Calcd for C₁₅H₁₄O:S: C, 74.34; H, 5.82; Found: C, 74.21; H, 5.87.

![S-Benzyl 4-methylbenzothioate (4b)](image)

**S-Benzyl 4-methoxybenzothioate (4c)**:
Colorless crystals; mp 51-52 °C; IR (neat) 1646, 1597, 1502, 1453, 1306, 1254, 1212, 1166, 1025, 909 cm⁻¹; ¹H NMR (500 MHz, CDCl₃) δ 7.94 (d, J = 8.6 Hz, 2H), 7.37 (d, J = 7.5 Hz, 2H), 7.30 (t, J = 7.5 Hz, 2H), 7.25-7.22 (m, 1H), 6.90 (d, J = 8.6 Hz, 2H), 4.30 (s, 2H), 2.39 (s, 3H); ¹³C NMR (126 MHz, CDCl₃) δ 189.7, 163.8, 137.7, 129.6, 129.4, 128.9, 128.6, 127.2, 113.7, 55.5, 33.2; Anal. Calcd for C₁₅H₁₄O₂:S: C, 69.74; H, 5.46; Found: C, 69.53; H, 5.65.

![S-Benzyl 4-methoxybenzothioate (4c)](image)

**S-Benzyl 4-chlorobenzothioate (4d)**:
White solid; mp 53-54 °C (lit.⁶: 53-54.5 °C); IR (neat) 1660, 1584, 1486, 1452, 1398, 1201, 1087, 912 cm⁻¹; ¹H NMR (500 MHz, CDCl₃) δ 7.89 (d, J = 8.0 Hz, 2H), 7.40 (d, J = 8.0 Hz, 2H), 7.36 (d, J = 7.5 Hz, 2H), 7.31 (t, J = 7.5 Hz, 2H), 7.27-7.24 (m, 1H), 4.32 (s, 2H); ¹³C NMR (126 MHz, CDCl₃) δ 190.1, 139.8, 137.2, 135.1, 128.9, 128.9, 128.7, 128.6, 127.4, 33.4; Anal. Calcd for C₁₄H₁₁ClO:S: C, 64.00; H, 4.22; Found: C, 64.05; H, 4.33.
**S-Benzyl 3-chlorobenzothioate (4e):**
Pale yellow oil; IR (neat) 1660, 1571, 1495, 1454, 1419, 1198, 959, 935 cm⁻¹; ¹H NMR (500 MHz, CDCl₃) δ 7.94 (s, 1H), 7.83 (d, J = 7.8 Hz, 1H), 7.52 (d, J = 7.8 Hz, 1H), 7.39-7.36 (m, 3H), 7.32 (t, J = 7.2 Hz, 2H), 7.27-7.24 (m, 1H), 4.32 (s, 2H); ¹³C NMR (126 MHz, CDCl₃) δ 190.1, 138.3, 137.0, 134.9, 133.3, 129.9, 129.0, 128.7, 127.5, 127.3, 125.4, 33.5; Anal. Calcd for C₁₄H₁₁ClO₃S: C, 64.00; H, 4.22; Found: C, 64.22; H, 4.22.

**S-Benzyl 2-chlorobenzothioate (4f):**
Pale yellow oil; IR (neat) 1675, 1586, 1495, 1462, 1432, 1262, 1202, 966, 913 cm⁻¹; ¹H NMR (500 MHz, CDCl₃) δ 7.64 (m, 1H), 7.44-7.25 (m, 8H), 4.32 (s, 2H); ¹³C NMR (126 MHz, CDCl₃) δ 191.3, 137.1, 136.9, 132.3, 130.9, 129.3, 128.9, 128.7, 127.4, 126.7, 34.3; Anal. Calcd for C₁₄H₁₁ClO₃S: C, 64.00; H, 4.22; Found: C, 64.22; H, 4.26.

**S-Benzyl 4-nitrobenezothioate (4g):**
Colorless crystals; mp 81-82 °C; IR (neat) 1641, 1600, 1518, 1346, 1319, 1194, 922, 846 cm⁻¹; ¹H NMR (500 MHz, CDCl₃) δ 8.28 (d, J = 8.6 Hz, 2H), 8.10 (d, J = 8.6 Hz, 2H), 7.38-7.25 (m, 5H), 4.36 (s, 2H); ¹³C NMR (126 MHz, CDCl₃) δ 189.8, 150.5, 141.3, 136.6, 129.0, 128.8, 128.3, 127.6, 123.9, 33.8; Anal. Calcd for C₁₄H₁₁NO₃S: C, 61.52; H, 4.06; N, 5.12; Found: C, 61.27; H, 4.12; N, 5.07.

**Methyl [4-(benzylthio)carbonyl]benzoate (4h):**
Colorless needle; mp 87-88 °C; IR (neat) 1725, 1658, 1493, 1449, 1433, 1403, 1286, 1218, 1112, 917 cm⁻¹; ¹H NMR (500 MHz, CDCl₃) δ 8.10 (d, J = 8.3 Hz, 2H), 8.01 (d, J = 8.3 Hz, 2H), 7.37 (d, J = 7.4 Hz, 2H), 7.32 (t, J = 7.4 Hz, 2H), 7.27-7.24 (m, 1H), 4.34 (s, 2H), 3.94 (s, 3H); ¹³C NMR (126 MHz, CDCl₃) δ 190.7, 166.0, 140.0, 137.0, 134.2, 129.8, 129.0, 128.7, 127.4, 127.2, 52.4, 33.5; Anal. Calcd for C₁₆H₁₄O₃S: C, 67.11; H, 4.93; Found: C, 66.96; H, 4.87.
**S-Benzyl furan-2-carbothioate (4i)**:
Pale yellow oil; IR (neat) 1649, 1566, 1466, 1385, 1253, 1221, 1154, 1016, 955, 848 cm\(^{-1}\); \(^1\)H NMR (500 MHz, CDCl\(_3\)) \(\delta\) 7.55 (m, 1H), 7.35 (d, \(J = 7.2\) Hz, 2H), 7.30 (t, \(J = 7.2\) Hz, 2H), 7.26-7.23 (m, 1H), 7.19 (d, \(J = 3.4\) Hz, 1H), 6.51 (m, 1H), 4.29 (s, 2H); \(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) 179.8, 150.6, 146.2, 137.3, 128.9, 128.6, 127.3, 115.7, 112.2, 32.3; Anal. Calcd for C\(_{12}\)H\(_{10}\)O\(_2\)S: C, 66.03; H, 4.62; Found: C, 65.78; H, 4.42.

**S-Benzyl pyridine-3-carbothioate (4j)**:
Yellow oil; IR (neat) 1662, 1582, 1453, 1416, 1217, 915 cm\(^{-1}\); \(^1\)H NMR (500 MHz, CDCl\(_3\)) \(\delta\) 9.18 (s, 1H), 8.78 (m, 1H), 8.20 (d, \(J = 8.0\) Hz, 1H), 7.41-7.37 (m, 3H), 7.32 (t, \(J = 7.5\) Hz, 2H), 3.73 (m, 1H), 2.04-2.02 (m, 2H), 1.77-1.75 (m, 2H), 1.64-1.62 (m, 1H), 1.58-1.43 (m, 4H), 1.36-1.32 (m, 1H); \(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) 189.8, 153.8, 148.5, 136.8, 134.5, 132.3, 128.9, 128.7, 127.5, 123.5, 33.3; Anal. Calcd for C\(_{13}\)H\(_{11}\)NOS: C, 68.09; H, 4.84; N, 6.11; Found: C, 68.18; H, 5.11; N, 5.82.

**S-(Furan-2-ylmethyl) benzothioate (4k)**:
Pale yellow oil; IR (neat) 1658, 1597, 1502, 1447, 1214, 1176, 1152, 1011, 933, 911, 786, 763 cm\(^{-1}\); \(^1\)H NMR (500 MHz, CDCl\(_3\)) \(\delta\) 7.96 (d, \(J = 8.0\) Hz, 2H), 7.57 (t, \(J = 7.5\) Hz, 1H), 7.43 (dt, \(J_1 = 8.0\) Hz, \(J_2 = 7.5\) Hz, 2H), 7.35 (m, 1H), 6.30 (m, 2H), 4.35 (s, 2H); \(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) 190.7, 150.4, 142.3, 136.6, 133.5, 128.6, 127.3, 110.6, 108.1, 25.7; Anal. Calcd for C\(_{12}\)H\(_{10}\)O\(_2\)S: C, 66.03; H, 4.62; Found: C, 66.11; H, 4.54.

**S-Cyclohexyl benzothioate (4l)**:
Colorless oil; IR (neat) 2928, 2853, 1659, 1580, 1447, 1203, 1174, 911 cm\(^{-1}\); \(^1\)H NMR (500 MHz, CDCl\(_3\)) \(\delta\) 7.95 (d, \(J = 8.0\) Hz, 2H), 7.55 (t, \(J = 7.5\) Hz, 1H), 7.43 (dt, \(J_1 = 8.0\) Hz, \(J_2 = 7.5\) Hz, 2H), 3.73 (m, 1H), 2.04-2.02 (m, 2H), 1.77-1.75 (m, 2H), 1.64-1.62 (m, 1H), 1.58-1.43 (m, 4H), 1.36-1.32 (m, 1H); \(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) 191.8, 137.4, 133.1, 128.5, 127.1, 42.5, 33.1,
26.0, 25.6; Anal. Calcd for C_{13}H_{16}OS: C, 70.87; H, 7.32; Found: C, 70.95; H, 7.57.

**S-tert-Butyl benzothioate (4m)**:  
Colorless oil; IR (neat) 2962, 2921, 1656, 1580, 1477, 1450, 1364, 1202, 1160, 905 cm\(^{-1}\); \(^{1}H\) NMR (500 MHz, CDCl\(_3\)) \(\delta\) 7.92 (d, \(J = 7.8\) Hz, 2H), 7.53 (t, \(J = 7.5\) Hz, 1H), 7.41 (dt, \(J_1 = 7.8\) Hz, \(J_2 = 7.5\) Hz, 2H), 1.58 (s, 9H); \(^{13}C\) NMR (126 MHz, CDCl\(_3\)) 192.8, 138.3, 132.9, 128.4, 126.9, 48.1, 30.0; Anal. Calcd for C_{13}H_{16}OS: C, 70.95; H, 7.57; Found: C, 70.95; H, 7.57.

**S-Phenyl benzothioate (4n)**:  
White solid; mp 53.5-54 °C; IR (neat) 3060, 2924, 1664, 1579, 1477, 1442, 1391, 1307, 1295, 1287, 1274, 1273; \(^{1}H\) NMR (500 MHz, CDCl\(_3\)) \(\delta\) 8.03 (d, \(J = 7.5\) Hz, 2H), 7.62 (t, \(J = 7.5\) Hz, 1H), 7.53-7.45 (m, 7H); \(^{13}C\) NMR (126 MHz, CDCl\(_3\)) 190.2, 136.6, 135.1, 133.7, 129.5, 129.2, 128.7, 127.5, 127.3; Anal. Calcd for C_{13}H_{10}OS: C, 72.54; H, 4.69.

**S-(4-Methoxyphenyl) benzothioate (4o)**:  
White crystals; mp 94-95.5 °C; IR (neat) 3088, 3053, 3026, 2964, 2933, 2842, 1665, 1588, 1491, 1445, 1287, 1246, 1205, 1170, 1021, 899, 819 cm\(^{-1}\); \(^{1}H\) NMR (500 MHz, CDCl\(_3\)) \(\delta\) 8.02 (d, \(J = 7.5\) Hz, 2H), 7.51-7.48 (m, 4H), 3.84 (s, 3H); \(^{13}C\) NMR (126 MHz, CDCl\(_3\)) 191.0, 160.8, 136.7, 136.6, 133.5, 128.7, 127.4, 117.9, 114.9, 55.3; Anal. Calcd for C_{14}H_{12}O_{2}S: C, 68.63; H, 4.95; Found: C, 68.56; H, 5.20.

**S-(4-Fluorophenyl) benzothioate (4p)**:  
White crystals; mp 48-49 °C; IR (neat) 3071, 1673, 1585, 1485, 1446, 1396, 1223, 1203, 1174, 1155, 897, 823, 775, 683, 640 cm\(^{-1}\); \(^{1}H\) NMR (500 MHz, CDCl\(_3\)) \(\delta\) 8.01 (d, \(J = 7.7\) Hz, 2H), 7.51-7.48 (m, 4H), 7.16 (t, \(J = 8.3\) Hz, 2H); \(^{13}C\) NMR (126 MHz, CDCl\(_3\)) 190.1,
163.6 ($J_{C,F} = 250 \text{ Hz}$), 137.1 ($J_{C,F} = 9.6 \text{ Hz}$), 136.4, 133.8, 128.8, 127.5, 122.6, 116.5 ($J_{C,F} = 22.8 \text{ Hz}$); Anal. Calcd for C$_{13}$H$_9$FOS: C, 67.22; H, 3.91; Found: C, 66.96; H, 3.74.

**Typical Procedure for thioesterification of aliphatic aldehydes (Table 4, entry 1).**

![Chemical Structure](image)

To a screw-capped test tube equipped with a magnetic stir bar and charged with phenazine 3c (81.1 mg, 0.45 mmol, 1.5 equiv.) and NHC-precatalyst B (9.8 mg, 0.03 mmol, 10 mol%) was added THF (0.6 mL, 0.5 M). The aldehyde 6a (0.3 mmol) and dodecane thiol 2b (79 μL, 0.45 mmol, 1.5 equiv.) were added, followed by DBU (4.5 μL, 0.03 mmol, 10 mol%). After being stirred at ambient temperature for 12 hours under argon atmosphere, the reaction mixture was concentrated *in vacuo*. The resulting residue was purified by silica gel column chromatography (hexane : diethyl ether = 1 : 0 to 50 : 1) to give 7a (78.7 mg, 86% yield).

**Characterization data (Table 4)**

**S-Dodecyl 3-phenylpropanethioate (7a):**
Colorless oil; IR (neat) 2924, 2853, 1690, 1457, 1046, 972 cm$^{-1}$; $^1$H NMR (500 MHz, CDCl$_3$) δ 7.30-7.26 (m, 2H), 7.22-7.18 (m, 3H), 2.98 (t, $J = 7.2$ Hz, 2H), 2.88-2.84 (m, 4H), 1.56-1.52 (m, 3H), 1.26 (m, 17H), 0.88 (t, $J = 12.9$ Hz, 3H); $^{13}$C NMR (126 MHz, CDCl$_3$) δ 198.7, 140.1, 128.5, 128.3, 126.3, 45.5, 31.9, 31.5, 29.6, 29.6, 29.5, 29.5, 29.3, 29.1, 28.9, 28.8, 22.7, 14.1; Anal. Calcd for C$_{21}$H$_{34}$O: C, 75.39; H, 10.24; Found: C, 75.19; H, 10.40.

**S-Dodecyl 3,7-dimethyloct-6-enethioate (7b):**
Colorless oil; IR (neat) 2958, 2853, 1691, 1460, 1379, 1220, 1116, 1012 cm$^{-1}$; $^1$H NMR (500 MHz, CDCl$_3$) δ 5.08 (t, $J = 6.6$ Hz, 1H), 2.87 (t, $J = 7.4$ Hz, 2H), 2.56-2.52 (m, 2H), 2.37-2.33 (m, 2H), 2.06-1.92 (m, 3H), 1.68 (s, 3H), 1.60-1.52 (m, 5H), 1.25 (m, 20H), 0.94 (d, $J = 6.6$ Hz, 2H), 0.88 (t, $J = 6.6$ Hz, 3H); $^{13}$C NMR (126 MHz, CDCl$_3$) δ 199.3, 131.6, 124.2, 51.3, 36.7, 31.9, 30.8, 29.6, 29.6, 29.5, 29.5, 29.3, 29.1, 28.9, 28.8, 25.7, 25.4, 22.7, 19.4, 17.7, 14.1; Anal. Calcd for
$S$-Benzy1 2-(benzyloxy)ethanethioate (7c):
Colorless oil; IR (neat) 3062, 3030, 2925, 1684, 1453, 1129, 1089, 1008 cm$^{-1}$; $^1$H NMR (500 MHz, CDCl$_3$) $\delta$ 7.36-7.22 (m, 10H), 4.64 (s, 2H), 4.18 (s, 2H), 4.15 (s, 2H); $^{13}$C NMR (126 MHz, CDCl$_3$) $\delta$ 199.3, 137.3, 136.8, 128.9, 128.6, 128.5, 128.1, 127.9, 127.3, 74.8, 74.0, 32.2; Anal. Calcd for C$_{16}$H$_{16}$O$_2$S: C, 70.56; H, 5.92; Found: C, 70.65; H, 5.85.

$S$-Dodecyl cyclohexanecarbothioate (7d):
Colorless oil; IR (neat) 2925, 2853, 1687, 1454, 1374, 1219, 995, 945 cm$^{-1}$; $^1$H NMR (500 MHz, CDCl$_3$) $\delta$ 2.84 (t, $J$ = 7.2 Hz, 2H), 2.49-2.43 (m, 1H), 1.92-1.90 (m, 2H), 1.80-1.77 (m, 2H), 1.67-1.62 (m, 1H), 1.58-1.52 (m, 2H), 1.50-1.42 (m, 2H), 1.25 (m, 21H), 0.88 (t, $J$ = 6.6 Hz, 3H); $^{13}$C NMR (126 MHz, CDCl$_3$) $\delta$ 203.3, 52.7, 31.9, 29.6, 29.6, 29.5, 29.3, 29.1, 28.8, 28.4, 25.6, 25.5, 22.7, 14.1; Anal. Calcd for C$_{19}$H$_{36}$OS: C, 73.01; H, 11.61; Found: C, 73.17; H, 11.87.

$S$-Dodecyl 2-phenylpropanethioate (7e):
Colorless oil; IR (neat) 2924, 2853, 1687, 1454, 1374, 1219, 995, 945 cm$^{-1}$; $^1$H NMR (500 MHz, CDCl$_3$) $\delta$ 7.34-7.25 (m, 5H), 3.90-3.85 (m, 1H), 2.87-2.77 (m, 2H), 1.53-1.50 (m, 5H), 1.23 (m, 18H), 0.88 (t, $J$ = 6.6 Hz, 3H); $^{13}$C NMR (126 MHz, CDCl$_3$) $\delta$ 201.3, 140.0, 128.6, 127.9, 127.3, 54.2, 31.9, 29.6, 29.5, 29.4, 29.4, 29.3, 29.1, 28.8, 22.7, 18.4, 14.1; Anal. Calcd for C$_{21}$H$_{34}$OS: C, 75.39; H, 10.24; Found: C, 75.63; H, 10.35.

$S$-Benzy1 2-([tert-butoxy carbonyl]amino)-3-phenylpropanethioate (7f):
White crystals; mp 102 °C; IR (neat) 3357, 3060, 3030, 2906, 2979, 2933, 2907, 1684, 1516, 1448, 1314, 1250, 1220, 1168, 1070, 996 cm$^{-1}$; $^1$H NMR (500 MHz, CDCl$_3$) $\delta$ 7.31-7.23 (m, 8H), 7.07 (m, 2H), 7.04-7.01 (m, 5H), 5.03 (s, 2H), 4.17 (s, 2H), 3.98 (s, 2H), 2.77-2.74 (m, 2H), 1.68-1.62 (m, 2H), 1.49-1.45 (m, 2H), 1.38-1.34 (m, 28H), 0.88 (t, $J$ = 6.6 Hz, 3H); $^{13}$C NMR (126 MHz, CDCl$_3$) $\delta$ 201.3, 140.0, 128.6, 127.9, 127.3, 54.2, 31.9, 29.6, 29.5, 29.4, 29.4, 29.3, 29.1, 28.8, 22.7, 18.4, 14.1; Anal. Calcd for C$_{24}$H$_{38}$NO$_2$S: C, 75.27; H, 10.05; Found: C, 75.26; H, 10.05.

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2H), 4.88 (d, J = 8.0 Hz, 1H), 4.65 (m, 1H), 4.14-4.06 (m, 2H), 3.13-3.03 (m, 2H), 1.39 (s, 9H); \(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) 200.4, 154.9, 137.1, 135.5, 129.4, 128.9, 128.6, 128.5, 127.3, 127.0, 80.3, 60.8, 38.3, 33.3, 28.2; Anal. Calcd for C\(_{21}\)H\(_{25}\)NO\(_3\)S: C, 67.89; H, 6.78; N, 3.77; Found: C, 67.64; H, 6.70; N, 3.77.

(E)-S-tert-Butyl 2-methyl-3-phenylprop-2-enethioate (7g):
Colorless oil; IR (neat) 2961, 2921, 2864, 1648, 1450, 1362, 1219, 1158, 1016, 988, 953, 903 cm\(^{-1}\); \(^1\)H NMR (500 MHz, CDCl\(_3\)) \(\delta\) 7.58 (s, 1H), 7.39-7.31 (m, 5H), 2.11 (s, 3H), 1.54 (s, 9H); \(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) 195.4, 137.3, 136.1, 135.7, 129.7, 128.4, 128.3, 47.7, 29.9, 14.0; Anal. Calcd for C\(_{14}\)H\(_{18}\)OS: C, 71.75; H, 7.74; Found: C, 71.98; H, 8.00.

S-tert-Butyl 3,3-diphenylprop-2-enethioate (7h):
Pale yellow crystals; mp 111.5-112 °C; IR (neat) 3062, 3029, 2925, 1687, 1603, 1495, 1452, 1411, 1219, 1045, 974 cm\(^{-1}\); \(^1\)H NMR (500 MHz, CDCl\(_3\)) \(\delta\) 7.37-7.22 (m, 10H), 6.48 (s, 1H), 1.43 (s, 9H); \(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) 190.2, 151.8, 141.0, 138.7, 129.6, 129.3, 128.5, 128.3, 127.9, 124.9, 48.3, 29.7; HRMS (FAB\(^+\)): Calcd for C\(_{19}\)H\(_{20}\)OS (M\(^+\)) 296.1235, Found: 296.1236.

S-Benzyl 3-phenylpropanethioate (7i):
Colorless oil; IR (neat) 3062, 3029, 2925, 1687, 1603, 1495, 1452, 1411, 1219, 1045, 974 cm\(^{-1}\); \(^1\)H NMR (500 MHz, CDCl\(_3\)) \(\delta\) 7.30-7.15 (m, 10H), 4.11 (s, 2H), 2.98 (t, J = 7.2 Hz, 2H), 2.86 (t, J = 7.2 Hz, 2H); \(^{13}\)C NMR (126 MHz, CDCl\(_3\)) \(\delta\) 197.8, 139.9, 137.5, 128.8, 128.6, 128.5, 128.3, 127.2, 126.3, 45.2, 33.1, 31.4; Anal. Calcd for C\(_{16}\)H\(_{16}\)OS: C, 74.96; H, 6.29; Found: C, 74.72; H, 6.33.

S-(Furan-2-ylmethyl) 3-phenylpropanethioate (7j):
Yellow oil; IR (neat) 3120, 3061, 2931, 1662, 1582, 1501, 1448, 1398, 1206, 1175, 1151, 1009, 909
S-Cyclohexyl 3-phenylpropanethioate (7k)\textsuperscript{13}:
Colorless oil; IR (neat) 2928, 2853, 1684, 1449, 1344, 1263, 1219, 1045, 970, 698 cm\textsuperscript{-1}; \textsuperscript{1}H NMR (500 MHz, CDCl\textsubscript{3}) \(\delta\) 7.32-7.16 (m, 6H), 6.29 (m, 1H), 6.20 (m, 1H), 4.15 (s, 2H); 2.99 (t, \(J = 7.2\) Hz, 2H), 2.88 (t, \(J = 7.2\) Hz, 2H); \textsuperscript{13}C NMR (126 MHz, CDCl\textsubscript{3}) \(\delta\) 197.3, 150.4, 142.2, 139.9, 128.5, 128.3, 126.4, 110.6, 107.9, 45.3, 31.3, 25.6; Anal. Calcd for C\textsubscript{14}H\textsubscript{14}O\textsubscript{2}S: C, 68.26; H, 5.73; Found: C, 68.05; H, 5.76.

\[ \text{S-Cyclohexyl 3-phenylpropanethioate (7k)} \]

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\text{S-tert-Butyl 3-phenylpropanethioate (7l):}
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Colorless oil; IR (neat) 2963, 2925, 2865, 1681, 1454, 1364, 1219, 1160, 1043, 964, 909 cm\textsuperscript{-1}; \textsuperscript{1}H NMR (500 MHz, CDCl\textsubscript{3}) \(\delta\) 7.29-7.25 (m, 2H), 7.21-7.17 (m, 3H), 3.55-3.50 (m, 1H), 2.94 (t, \(J = 7.4\) Hz, 2H), 2.81 (t, \(J = 7.4\) Hz, 2H), 1.90-1.88 (m, 2H), 1.70-1.67 (m, 2H), 1.59-1.56 (m, 1H), 1.46-1.35 (m, 4H), 1.27-1.25 (m, 1H); \textsuperscript{13}C NMR (126 MHz, CDCl\textsubscript{3}) \(\delta\) 198.5, 140.2, 128.5, 128.3, 126.2, 45.6, 42.2, 33.0, 31.5, 25.9, 25.5; Anal. Calcd for C\textsubscript{15}H\textsubscript{20}O\textsubscript{2}S: C, 72.53; H, 8.12; Found: C, 72.24; H, 8.41.

\[ \text{S-tert-Butyl 3-phenylpropanethioate (7l)} \]

S-(4-Methoxyphenyl) 3-phenylpropanethioate (7m)\textsuperscript{14}:
White crystals; mp 58-58.5 °C; IR (neat) 3026, 2952, 2903, 2835, 1704, 1589, 1491, 1457, 1288, 1242, 1171, 1028, 970, 832, 814, 772, 735, 697 cm\textsuperscript{-1}; \textsuperscript{1}H NMR (500 MHz, CDCl\textsubscript{3}) \(\delta\) 7.31-7.28 (m, 4H), 7.23-7.20 (m, 3H), 6.93 (d, \(J = 5.8\) Hz, 2H), 3.82 (s, 3H), 3.01 (t, \(J = 7.4\) Hz, 2H), 2.94 (t, \(J = 7.4\) Hz, 2H); \textsuperscript{13}C NMR (126 MHz, CDCl\textsubscript{3}) \(\delta\) 197.7, 160.6, 140.0, 136.1, 128.5, 128.4, 126.3, 118.3, 114.8, 55.3, 44.8, 31.4; Anal. Calcd for C\textsubscript{16}H\textsubscript{16}O\textsubscript{2}S: C, 70.56; H, 5.92; Found: C, 70.51; H, 5.85.

\[ \text{S-(4-Methoxyphenyl) 3-phenylpropanethioate (7m)} \]
Reference

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