Supporting Information for

CO-Retentive Addition Reactions of Fluorinated Acid Chlorides to Alkynes

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General Procedures

All manipulations involving air and moisture-sensitive compounds were carried out under atmosphere of dry argon or nitrogen, by using standard Schlenk tube techniques. All solvents were distilled over appropriate drying agents prior to use. IR spectra were recorded on a HORIBA FT/IR 730 spectrometer. ¹H NMR (300 MHz), ¹³C{¹H} NMR (75 MHz), ¹⁹F NMR (282 MHz) spectra were recorded on a Bruker DPX300 spectrometer at ambient temperature. ³¹P{¹H} NMR (162 MHz) spectra were recorded on a JEOL JNM-Ex400 spectrometer. ¹H and ¹³C{¹H} NMR chemical shifts were reported in ppm relative to internal Me₄Si. ¹⁹F NMR chemical shift was reported in ppm relative to external CFCl₃. ³¹P{¹H} NMR chemical shift was reported in ppm relative to external aq 85% H₃PO₄. GC was run on a GLScience Ltd. GC390B (silicone OV17 5% on Chromosorb W (60/80 mesh) SUS column 2.0 mmφ × 2.0 m). GCMS was run on a Shimadzu GC-MS 17A/QP-5000 mass spectrometer. High resolution mass spectra were obtained with JEOL JMS-700 mass spectrometer at an ionization potential of 70 eV. Melting points were measured on Micro melting point apparatus IA9100 (Iuchi-Seieido Ltd.).

1-Octyne (Tokyo Kasei, Ltd.), phenylacetylene (Aldrich), trimethylsilylacetylene (Tokyo Kasei, Ltd.), ethynylcyclohexene (Aldrich), heptafluorobuthrylchloride (Aldrich),

pentafluorobenzoylchloride (Aldrich), 2,3,5,6-tetrafluorobenzoylchloride (Tokyo Kasei, Ltd.), 3,5-difluorobenzoylchloride (Aldrich) were distilled before use. Ethynylthiophene was prepared according to the literature method.¹⁾ $[\text{RhCl}(\text{CO})_2]_2$,²⁾ $\text{RhCl}(\text{CO})(\text{PR}_3)_2$ ($\text{R} = \text{PPh}_3$, PMePh_2 , PMe_2Ph , PMe_3 , PCy_3 , $(\text{RR}_3)_2 = \text{dppe}$, dppb),³⁾ $[\text{Rh}(\text{acac})(\text{CO})]_2$,⁴⁾ $\text{Rh}(\text{acac})(\text{CO})(\text{PR}_3)$ ⁵⁾ ($\text{R} = \text{PPh}_3$, PMePh_2 , PCy_3), $\text{RhCl}(\text{cod})(\text{PPh}_3)$,⁶⁾ were also prepared according to the literature methods.

Typical procedure for the catalytic addition reaction: the reaction of 1-octyne with heptafluorobutyryl chloride.

Into a 5 mL Schlenk tube equipped with a three way stopcock and a magnetic stirring bar were placed $\text{Rh}(\text{acac})(\text{CO})(\text{PPh}_3)$ (19.87 mg, 0.0404 mmol), toluene (2 mL), heptafluorobutyryl chloride (560.2 mg, 2.41 mmol), 1-octyne (218.7 mg, 1.98 mmol) and n-tetradecane (48.68 mg) as an internal standard for GC analysis under argon. The mixture was stirred at 110 °C for 1 h. After GC analysis of the reaction mixture, volatiles were removed under a reduced pressure. The residue was subjected to silica gel column chromatography, eluting with hexane, and then with an ethyl acetate-hexane mixture (5 : 95), to afford (Z)-6-chloro-1,1,1,2,2,3,3-heptafluoro-5-dodecene-4-one (**3aa**) as a colorless oil and purified by Kugelrohr distillation.

(Z)-6-Chloro-1,1,1,2,2,3,3-heptafluoro-5-dodecen-4-one ((Z)-3aa)

Colorless liquid, bp 100 °C/18 mmHg (Kugelrohr). ^1H NMR (CDCl_3 , 300 MHz) δ 6.68 (s, 1H, $\text{C}^5\text{-H}$), 2.55 (t, 2H, $J = 7.5$ Hz, $\text{C}^7\text{-H}$), 1.66 (quin, 2H, $J = 7.5$ Hz, $\text{C}^8\text{-H}$), 1.34–1.24 (m, 6H, $\text{C}^{9-11}\text{-H}$), 0.88 (t, 3H, $J = 6.7$ Hz, $\text{C}^{12}\text{-H}$). ^{13}C NMR (CDCl_3 , 75 MHz) δ 178.7 (t, $J_{\text{C-F}} = 25.3$ Hz, C^4), 160.4 (C^6), 117.3 (tq, $J_{\text{C-F}} = 33.5$, 287.7 Hz, C^1), 115.3 (C^5), 108.8 (tt, $J_{\text{C-F}} = 32.1$, 268.1 Hz, C^3), 108.5 (ttq, $J_{\text{C-F}} = 265.7$, 33.2, 38.4 Hz, C^2), 42.5 (C^7), 31.3 (C^{10}), 28.1 (C^9), 27.3 (C^8), 22.4 (C^{11}), 14.0 (C^{12}). ^{19}F NMR (CDCl_3 , 282 MHz) δ -80.3 (t, 3F, $J = 8.5$ Hz, $\text{C}^1\text{-F}$), -121.7 (q, 2F, $J = 8.5$ Hz, $\text{C}^2\text{-F}$), -126.4 (s, 2F, $\text{C}^3\text{-F}$). IR (neat) 1713 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 343 (2, M^+), 307 (16), 249 (100), 238 (50), 231 (55), 173 (100), 137 (25), 109 (100). Anal. Calcd for $\text{C}_{12}\text{H}_{14}\text{ClF}_7\text{O}$: C, 42.06; H, 4.12; Cl, 10.35; F, 38.81. Found: C, 41.92; H, 4.16; Cl, 10.22; F, 39.09.

Reduction of (Z)-6-chloro-1,1,1,2,2,3,3-heptafluoro-5-dodecen-4-one ((Z)-3aa) to 6-chloro-1,1,1,2,2,3,3-heptafluoro-5-dodecen-4-ol ((Z)-3aa-red)

A solution of (*Z*)-6-chloro-1,1,1,2,2,3,3-heptafluoro-5-dodecen-4-one (475 mg, 1.4 mmol) in ether (15 mL) was slowly added over 5 min to a suspension of lithium aluminum hydride (28 mg, 0.737 mmol) in ether (15 mL) placed in a 50 mL flask at -20°C . After further stirring for 90 min at the temperature, the mixture was hydrolyzed with 1M aq HCl (5 mL). The ether layer was washed with water (20 mL $\times$ 2), dried over sodium sulfate and was filtered. Evaporation of the filtrate afforded 6-chloro-1,1,1,2,2,3,3-heptafluoro-dodec-5-en-4-ol, 447 mg (1.30 mmol, 93%). ^1H NMR(400 MHz, CDCl_3) δ 5.66 (d, J = 8.5 Hz, 1H, $\text{C}^5\text{-H}$), 5.13 (br-m, 1H, $\text{C}^4\text{-H}$), 2.42 (t, J = 7.3 Hz, 2H, $\text{C}^7\text{-H}$), 2.13 (br-s, 1H, OH), 1.58 (m, 2H, $\text{C}^8\text{-H}$), 1.28–1.33 (br-m, 6H, $\text{C}^{9-11}\text{-H}$), 0.88 (t, J = 7.1 Hz, 3H, $\text{C}^{12}\text{-H}$). $^{13}\text{C}\{^1\text{H}\}$ NMR δ 144.2 (C^6), 117.5 (C^5), 128–114 (m, C_3F_7), 67.6 (dd, $^3J_{\text{CF}}$ = 22.9 Hz, $^2J_{\text{CF}}$ = 27.7 Hz, C^4), 39.7 (C^7), 31.4 (C^{10}), 28.0 (C^9), 27.0 (C^8), 22.5 (C^{11}), 14.0 (C^{12}). $^{19}\text{F}\{^1\text{H}\}$ NMR (282 MHz, CDCl_3) δ -80.2 (t, 3F, J = 8.4 Hz, $\text{C}^1\text{-F}$), -121.4 (m, 2F, $\text{C}^2\text{-F}$), -126.2 (m, 2F, $\text{C}^3\text{-F}$). GCMS m/z (% relative intensity) 344 (1, $[\text{M}]^+$), 309 (4), 238 (7), 175 (100), 121 (11), 95 (19), 69 (55). HRMS calcd for $\text{C}_{12}\text{H}_{16}\text{F}_7\text{OCl}$ 344.0778, found 344.0775. H-H COSY revealed correlation between $\text{C}^4\text{-H}$ and $\text{C}^5\text{-H}$, confirming the structure. For NMR spectra of the compound, see appendixes 1-3.

(*Z*)-6-Chloro-1,1,1,2,2,3,3-heptafluoro-7,7-dimethyl-5-octen-2-one ((*Z*)-3ab)

Colorless liquid, bp $70^{\circ}\text{C}/38$ mmHg (Kugelrohr). ^1H NMR (CDCl_3 , 300 MHz) δ 6.72 (s, 1H, $\text{C}^5\text{-H}$), 1.27 (s, 9H, $\text{C}^7\text{-H}$). ^{13}C NMR (CDCl_3 , 75 MHz) δ 179.3 (t, $J_{\text{C-F}}$ = 25.1 Hz, C^4), 169.0 (C^6), 117.4 (tq, $J_{\text{C-F}}$ = 33.5, 287.8 Hz, C^1), 112.6 (C^5), 108.8 (tt, $J_{\text{C-F}}$ = 32.2, 267.6 Hz, C^3), 108.5 (ttq, $J_{\text{C-F}}$ = 265.7, 33.2, 38.4 Hz, C^2), 41.7 (C^7), 27.5 (C^8). ^{19}F NMR (CDCl_3 , 282 MHz) δ -81.1 (3F, $\text{C}^1\text{-F}$), -122.1 (2F, $\text{C}^2\text{-F}$), -127.1 (2F, $\text{C}^3\text{-F}$). IR (neat) 1726 (ν_{CO}) cm^{-1} . Anal. Calcd for $\text{C}_{10}\text{H}_{10}\text{ClF}_7\text{O}$: C, 38.17; H, 3.20. Found: C, 37.94; H, 3.25.

1-Chloro-4,4,5,5,6,6,6-heptafluoro-1-trimethylsilylhex-1-en-3-one ((*Z*)-3ac)

Pale yellow oil. ^1H NMR (CDCl_3 , 300 MHz) δ 7.00 (s, 1H, olefine-H), 0.30 (s, 9H, $\text{Si}(\text{CH}_3)_3$). $^{13}\text{C}\{^1\text{H}\}$ NMR (CDCl_3 , 75 MHz) δ 178.0 (t, $^2J_{\text{C-F}}$ = 25.3 Hz), 166.2, 124.4, 115.4 (m), 108.9 (m), 108.6 (m), -2.8. $^{19}\text{F}\{^1\text{H}\}$ NMR (CDCl_3 , 282 MHz) δ -80.86 (t, 3F, J = 11.3 Hz, $\text{C}^6\text{-F}$), -122.02 (t, 2F, J = 11.3 Hz, $\text{C}^5\text{-F}$), -126.92 (s, 2F, $\text{C}^4\text{-F}$). $^{29}\text{Si}\{^1\text{H}\}$ NMR (CDCl_3 , 60 MHz) δ 4.11 (s, $\text{Si}(\text{CH}_3)_3$). IR (neat) 1724 (ν_{CO}) cm^{-1} . GSMS (EI, 70eV)

m/z (% relative intensity) 222 (60), 151 (28), 117 (100), 91 (25). HRMS (EI, 70 eV) calcd for C_6HClF_7O (value for $[M-SiMe_3]^+$) m/z 256.9604, found 256.9605. For 1H and ^{13}C NMR spectra of the compound, see appendixes 4 and 5.

(Z)-1-Chloro-1-(cyclohex-1-enyl)-4,4,5,5,6,6,6-heptafluoro-hex-1-en-3-one ((Z)-3ad)

Pale yellow oil. 1H NMR ($CDCl_3$, 300 MHz) δ 7.10 (t, 1H, $J = 4.3$ Hz cyclohexenyl C^2-H), 6.74 (s, 1H, C^2-H), 2.28–2.35 (m, 4H, cyclohexenyl), 1.62–1.80 (m, 4H, cyclohexenyl). ^{13}C NMR ($CDCl_3$, 75 MHz) δ 179.3 (t, $^2J_{C-F} = 24.6$ Hz), 154.3, 142.3, 134.2, 119.4 (m), 115.5 (m), 110.8, 108.8 (m), 26.9, 26.2, 22.2, 21.2. $^{19}F\{^1H\}$ NMR ($CDCl_3$, 282 MHz) δ -80.04 (t, 3F, $J = 11.3$ Hz, C^6-F), -121.78 (q, 2F, $J = 11.3$ Hz, C^5-F), -126.88 (s, 2F, C^4-F). IR (neat) 1715 (ν_{CO}) cm^{-1} . GSMS (70eV) m/z (% relative intensity) 338 (M^+ , 27), 311 (60), 303 (100), 163 (100), 133 (50), 105 (100). HRMS (EI, 70 eV) calcd for $C_{12}H_{10}ClF_7O$ m/z 338.0308, found 338.0315. For 1H and ^{13}C NMR spectra of the compound, see appendixes 6 and 7.

(Z)-1-Chloro-4,4,5,5,6,6,6-heptafluoro-1-phenyl-1-hexen-3-one ((Z)-3ae)

Colorless liquid, bp 55 °C/12 mmHg (Kugelrohr). 1H NMR ($CDCl_3$, 300 MHz) δ 7.79–7.76 (m, 2H, *o*-H(C_6H_4)), 7.57–7.44 (m, 3H, *m*- and *p*-H(C_6H_4)), 7.20 (s, 1H, C^2-H). $^{13}C\{^1H\}$ NMR ($CDCl_3$, 75 MHz) δ 178.9 (t, $J_{C-F} = 25.2$ Hz, C^3), 154.5 (C^1), 136.4 (*ipso*- C_6H_5), 132.5 (*p*- C_6H_5), 129.0 (*m*- C_6H_5), 127.9 (*o*- C_6H_5), 117.4 (ttq, $J_{C-F} = 33.4$, 287.7 Hz, C^6), 114.1 (C^2), 108.8 (tt, $J_{C-F} = 31.2$, 263.7 Hz, C^4), 108.5 (ttq, $J_{C-F} = 265.7$, 33.2, 38.4 Hz, C^5). ^{19}F NMR ($CDCl_3$, 282 MHz) δ -81.1 (t, 3F, $J = 8.5$ Hz, C^6-F), -122.2 (q, 2F, $J = 8.5$ Hz, C^5-F), -127.1 (s, 2F, C^4-F). IR (neat) 1714 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 335 (20, M^+), 299 (3), 251 (4), 198 (10), 165 (100), 137 (68), 102 (100), 75 (42). Anal. Calcd for $C_{12}H_6ClF_7O$: C, 43.07; H, 1.81; Cl, 10.60; F, 39.74. Found: C, 43.11; H, 1.85; Cl, 10.50; F, 38.84.

(Z)-1-Chloro-4,4,5,5,6,6,6-heptafluoro-1-(*p*-methylphenyl)-1-hexen-3-one ((Z)-3af)

Pale yellow liquid, bp 55 °C/12 mmHg (Kugelrohr). 1H NMR ($CDCl_3$, 300 MHz) δ 7.68 (d, 2H, $J = 8.28$ Hz, *o*-H(C_6H_3)), 7.26 (d, 2H, $J = 8.28$ Hz, *m*-H(C_6H_3)), 7.18 (s, 1H, C^2-H), 2.41 (s, 3H, $C_6H_4CH_3$). ^{13}C NMR ($CDCl_3$, 75 MHz) δ 178.9 (t, $J_{C-F} = 25.1$ Hz, C^3), 154.6 (C^1), 143.7 (*ipso*- C_6H_4), 133.6 (*p*- C_6H_4), 129.7 (*m*- C_6H_4), 127.9 (*o*- C_6H_4), 117.4 (ttq, $J_{C-F} = 33.5$, 287.8 Hz, C^6), 113.1 (C^2), 108.8 (tt, $J_{C-F} = 32.2$, 268.1 Hz, C^4), 108.5

(ttq, $J_{\text{C-F}} =$, 265.7, 33.2, 38.4 Hz C^5), 21.5 ($\text{C}_6\text{H}_4\text{CH}_3$). ^{19}F NMR (CDCl_3 , 282 MHz) δ -81.1 (t, 3F, $J = 8.5$ Hz, $\text{C}^6\text{-F}$), -122.2 (q, 2F, $J = 8.5$ Hz, $\text{C}^5\text{-F}$), -127.1 (s, 2F, $\text{C}^4\text{-F}$). IR (neat) 1713 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 348 (18, M^+), 312 (1), 179 (100), 151 (9), 115 (9), 89 (15), 57 (12). Anal. Calcd for $\text{C}_{13}\text{H}_8\text{ClF}_7\text{O}$: C, 44.78; H, 2.31; Cl, 10.17; F, 38.14. Found: C, 44.58; H, 2.38; Cl, 9.92; F, 38.61.

(Z)-1-Chloro-4,4,5,5,6,6,6-heptafluoro-1-(p-fluorophenyl)-1-hexen-3-one ((Z)-3ag)

Pale yellow liquid, bp 62 °C/12 mmHg (Kugelrohr). ^1H NMR (CDCl_3 , 300 MHz) δ 7.79 (2H, dddd, $J_{\text{H-F}} = 5.1$ Hz, $J_{\text{H-H}} = 2.0, 3.0, 9.0$ Hz, $o\text{-H}(\text{C}_6\text{H}_3\text{F})$), 7.16 (2H, dddd, $J_{\text{H-F}} = 8.1$ Hz, $J_{\text{H-H}} = 2.0, 3.2, 9.0$ Hz, $m\text{-H}(\text{C}_6\text{H}_3\text{F})$), 7.14 (s, 1H, vinyl-H). ^{13}C NMR (CDCl_3 , 75 MHz) δ 178.8 (t, $J_{\text{C-F}} = 25.4$ Hz, C^3), 165.2 (d, $J_{\text{C-F}} = 255.5$ Hz, $p\text{-C}_6\text{H}_4\text{F}$), 153.1 (C^1), 132.6 (d, $J_{\text{C-F}} = 3.2$ Hz, $ipso\text{-C}_6\text{H}_4\text{F}$), 130.2 (d, $J_{\text{C-F}} = 8.9$ Hz, $o\text{-C}_6\text{H}_4\text{F}$), 117.4 (tq, $J_{\text{C-F}} = 33.5, 287.7$ Hz, C^6), 116.3 (d, $J_{\text{C-F}} = 22.4$ Hz, $m\text{-C}_6\text{H}_4\text{F}$), 113.9 (C^2), 108.8 (tt, $J_{\text{C-F}} = 32.1, 268.1$ Hz, C^4), 108.5 (ttq, $J_{\text{C-F}} = 265.7, 33.2, 38.4$ Hz, C^5). ^{19}F NMR (CDCl_3 , 282 MHz) δ -81.1 (t, 3F, $J = 8.5$ Hz, $\text{C}^6\text{-F}$), -106.2 (tt, 1F, $J_{\text{F-H}} = 5.1, 8.1$ Hz, $p\text{-FC}_6\text{H}_4$), -122.2 (q, 2F, $J = 8.5$ Hz, $\text{C}^5\text{-F}$), -127.1 (s, 2F, $\text{C}^4\text{-F}$). IR (neat) 1716 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 352 (4, M^+), 317 (1), 216 (3), 183 (100), 155 (31), 120 (82), 99 (11), 69 (22). Anal. Calcd for $\text{C}_{15}\text{H}_{15}\text{ClF}_4\text{O}$: C, 40.88; H, 1.43; Cl, 10.05; F, 43.10. Found: C, 40.83; H, 1.52; Cl, 10.04; F, 42.67.

1-Chloro-4,4,5,5,6,6,6-heptafluoro-1-(2-thienyl)-1-hexen-3-one ((Z)-3ah)

Pale yellow oil. ^1H NMR (300 MHz, CDCl_3) δ 7.78 (dd, 1H, $J = 1.08, 3.85$ Hz, thiophene), 7.62 (dd, 1H, $J = 1.08, 5.07$ Hz, thiophene), 7.17 (dd, 1H, $J = 3.85, 5.07$ Hz, thiophene), 7.14 (s, 1H, C^2). $^{13}\text{C}\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) δ 178.5 (t, $J = 25.3$ Hz, C^3), 117.4 (tq, $J = 33.5, 267.6$ Hz, C^6), 108.8 (tt, $J = 43.1, 267.6$ Hz, C^4), 108.5 (ttq, $J = 33.5, 43.1, 267.6$ Hz, C^5), 110.45 (thiophene). $^{19}\text{F}\{^1\text{H}\}$ NMR (282 MHz, CDCl_3) δ -80.8 (t, 3F, $J = 8.46$ Hz, C^6), -121.7 (quart, $J = 8.46$ Hz, 2F, C^5), -121.8 (s, 2F, C^4). IR (neat): 1705 (ν_{CO}) cm^{-1} . GCMS (70 eV) m/z (% relative intensity) 305 ($[\text{M-Cl}]^+$, 25), 173 (40), 171 (100), 149 (25), 108 (50). Anal. Calcd for $\text{C}_{10}\text{H}_4\text{ClF}_7\text{OS}$: C, 35.26; H, 1.18. Found: C, 35.27; H, 1.41.

7,15-Dichloro-10,10,11,11,12,12-hexafluoro-heneicos-7,14-diene-9,13-dione ((Z)-3ba)

Pale yellow oil. ^1H NMR (300 MHz, CDCl_3) δ 6.70 (s, 2H, C^8 , C^{14}), 2.56 (t, J = 7.46 Hz, 4H, C^6 , C^{16}), 1.67 (quint, 4H, J = 6.89 Hz, C^5 , C^{17}), 1.31 (br, 12H, C^{2-4} , C^{12-14}), 0.89 (t, 6H, J = 6.75 Hz, C^1 , C^{15}). $^{13}\text{C}\{^1\text{H}\}$ NMR (75 MHz, CDCl_3): δ 179.3 (t, J = 13.7 Hz, C^9 , C^{13}), 159.7 (C^7 , C^{15}), 115.7 (C^8 , C^{14}), 109.2 (t, J = 31.8 Hz, C^{10} , C^{12}), 105.7 (t, J = 26.8 Hz, C^{11}), 42.5 (C^6 , C^{16}), 31.3 (C^3 , C^{19}), 28.2 (C^4 , C^{18}), 27.4 (C^5 , C^{17}), 22.4 (C^2 , C^{20}), 13.9 (C^1 , C^{21}). $^{19}\text{F}\{^1\text{H}\}$ NMR (282 MHz, CDCl_3): δ -120.9 (s, 4F, C^{10} , C^{12}), -123.5 (s, 2F, C^{11}). IR (neat): 1720.19 (ν_{CO}) cm^{-1} . GCMS (70 eV) m/z (% relative intensity) 461 ($[\text{M}-\text{Cl}]^+$, 33), 426 (54), 356 (21), 316 (50), 233 (72), 173 (100), 99 (86). HRMS calcd for $\text{C}_{21}\text{H}_{28}\text{Cl}_2\text{F}_6\text{O}_2$ ($[\text{M}]^+$) m/z 496.1371, found 496.1367. For ^1H and ^{13}C NMR spectra of the compound, see appendixes 8 and 9.

(Z)-3-Chloro-1-oxo-1-pentafluorophenyl-2-nonene ((Z)-3ca)

Colorless liquid, bp 103 °C/18 mmHg (Kugelrohr). ^1H NMR (CDCl_3 , 300 MHz) δ 6.51 (s, 1H, $\text{C}^2\text{-H}$), 2.50 (t, 2H, J = 7.4 Hz, $\text{C}^4\text{-H}$), 1.63 (quin, 2H, J = 7.4 Hz, $\text{C}^5\text{-H}$), 1.37–1.23 (m, 6H, $\text{C}^{6-8}\text{-H}$), 0.87 (t, 3H, J = 6.8 Hz, $\text{C}^9\text{-H}$). ^{13}C NMR (CDCl_3 , 75 MHz) δ 180.9 (C^1), 153.5 (C^3), 145.8 (arom), 142.5 (arom), 139.2 (arom), 135.9 (arom), 123.8 (C^2), 41.7 (C^4), 31.4 (C^7), 28.1 (C^6), 27.2 (C^5), 22.4 (C^8), 14.0 (C^9). ^{19}F NMR (CDCl_3 , 282 MHz) δ -141.5 (dddd, J = 2.8, 2.8, 11.3, 22.6 Hz, $o\text{-F}(\text{C}_6\text{F}_4)$), -150.2 (tt, J = 2.8, 21.2 Hz, $p\text{-F}(\text{C}_6\text{F}_4)$), -160.8 (dddd, J = 2.8, 11.28, 21.2, 22.6 Hz, $m\text{-F}(\text{C}_6\text{F}_4)$). IR (neat) 1685 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 341 (1, M^+), 305 (22), 283 (7), 247 (20), 235 (61), 195 (100), 167 (24), 117 (10), 95 (12), 55 (19). Anal. Calcd for $\text{C}_{15}\text{H}_{14}\text{ClF}_5\text{O}$: C, 52.88; H, 4.14; Cl, 10.41; F, 27.88. Found: C, 52.53; H, 4.15; Cl, 10.32; F, 27.58.

(E)-3-Chloro-1-oxo-1-pentafluorophenyl-2-nonene ((E)-3ca)

Colorless oil. ^1H NMR (300 MHz, CDCl_3) δ 6.67 (s, 1H, $\text{C}^2\text{-H}$), 3.04 (t, 2H, J = 7.5 Hz, $\text{C}^4\text{-H}$), 1.68 (quin, 2H, J = 7.5 Hz, $\text{C}^5\text{-H}$), 1.41–1.25 (m, 6H, $\text{C}^{6-8}\text{-H}$), 0.86 (t, J = 6.5 Hz, 3H, $\text{C}^9\text{-H}$). $^{13}\text{C}\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) δ 180.1 (C^1), 162.7 (C^3), 145.9, 142.5, 139.2, 135.9 (arom), 125.7 (C^2), 37.0 (C^4), 31.0 (C^7), 28.5 (C^6), 27.8 (C^5), 22.5 (C^8), 14.1 (C^9). ^{19}F NMR (282 MHz, CDCl_3) δ -141.2 (dddd, 2F, J = 3.6, 5.4, 9.0, 20.0 Hz, $o\text{-Ph}$), -149.5 (tt, 1F, J = 3.6, 20.0 Hz, $p\text{-Ph}$), -160.1 (dddd, 2F, J = 3.6, 5.4, 9.0, 20.0 Hz, $m\text{-Ph}$). IR (neat) 1684 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 340 (1, M^+), 305 (25), 247 (20), 235 (25), 195 (100), 167 (25), 117 (8), 95 (5). For ^1H and ^{13}C NMR spectra of the compound, see appendixes 10 and 11.

1-Pentafluorophenyl-2-chloro-1-octene (4ca)

GCMS (% relative intensity) m/z 312 (M^+ , 18), 220 (51), 207 (100), 101 (69), 151 (14), 95 (72), 70 (74), 55 (69).

(Z)-3-Chloro-1-oxo-1-pentafluorophenyl-3-phenylpropene ((Z)-3ce)

Pale yellow solid. mp 68.2-69.1 °C. ^1H NMR (CDCl_3 , 300 MHz) δ 7.35 (m, 2H, *m*-Ph), 7.51-7.44 (m, 3H, *m*-Ph, *p*-Ph), 7.07 (s, 1H, C^2). $^{13}\text{C}\{^1\text{H}\}$ NMR (CDCl_3 , 75 MHz) δ 180.1 (CO), 148.3 (C^1), 146.0-133.5 (m, Ph^f), 136.6 (*ipso*-Ph), 131.7 (*p*-Ph), 128.8 (*m*-Ph), 127.6 (*o*-Ph), 122.9 (C^2). ^{19}F NMR (CDCl_3 , 282 MHz) δ -141.4 (m, 2F, *o*- Ph^f), -149.8 (tt, 1F, $J = 3.8$, 20.4 Hz, *p*- Ph^f), -160.3 (m, 2F, *m*- Ph^f). IR (nujol) 1676 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 332 (58, M^+), 331 (100), 195 (32), 165 (45), 129 (42), 102 (64). HRMS (EI, 70 eV) calcd for $\text{C}_{15}\text{H}_6\text{F}_5\text{O}$ (value for $[\text{M}-\text{Cl}]^+$) m/z 297.0339, found 297.0336. Anal. Calcd for $\text{C}_{15}\text{H}_6\text{ClF}_5\text{O}$: C, 54.16; H, 1.82. Found: C, 54.09; H, 1.86.

(Z)-3-Chloro-1-oxo-1-(2,3,5,6-tetrafluorophenyl)-2-nonene ((Z)-3da)

Pale yellow liquid, bp 145 °C/12 mmHg (Kugelrohr). ^1H NMR (CDCl_3 , 300 MHz) δ 7.14 (tt, 1H, $J = 7.25$, 9.43 Hz, *p*-H), 6.54 (s, 1H, C^2 -H), 2.49 (t, 2H, $J = 7.4$ Hz, C^4 -H), 1.64 (quin, 2H, $J = 7.40$ Hz, C^5 -H), 1.37-1.23 (m, 6H, C^{6-8} -H), 0.87 (t, 3H, $J = 6.8$ Hz, C^9 -H). ^{13}C NMR (CDCl_3 , 75 MHz) δ 182.0 (C^1), 153.2 (C^3), 145.9 (dddd, $J_{\text{C-F}} = 4.2$, 9.4, 14.3, 249.9 Hz, *m*- $\text{C}_6\text{F}_4\text{H}$), 143.3 (dddd, $J_{\text{C-F}} = 4.7$, 9.6, 14.8, 252.5 Hz, *o*- $\text{C}_6\text{F}_4\text{H}$), 123.8 (C^2), 121.3 (t, $J_{\text{C-F}} = 17.9$ Hz, *ipso*- $\text{C}_6\text{F}_4\text{H}$), 107.9 (t, $J_{\text{C-F}} = 22.6$ Hz, *p*- $\text{C}_6\text{F}_4\text{H}$), 41.7 (C^4), 31.4 (C^6), 28.1 (C^5), 27.2 (C^7), 22.4 (C^8), 13.9 (C^9). ^{19}F NMR (CDCl_3 , 282 MHz) δ -138.1 (m, arom), -143.0 (m, arom). IR (neat) 1687 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 323 (1, M^+), 287 (22), 265 (8), 229 (36), 217 (50), 177 (100), 149 (24). Anal. Calcd for $\text{C}_{12}\text{H}_5\text{ClF}_8\text{O}$: C, 55.82; H, 4.68; Cl, 10.99; F, 23.55. Found: C, 56.93; H, 4.73; Cl, 10.73; F, 22.66.

(Z)-2-Chloro-1-(2,3,5,6-tetrafluorophenyl)-1-octene ((Z)-4da)

GCMS (% relative intensity) m/z 294 (M^+ , 14), 224 (51), 202 (31), 189 (100), 163 (33), 151 (11), 95 (41).

(Z)-3-Chloro-1-oxo-1-(3,5-difluorophenyl)-2-nonene ((Z)-3ea)

Pale yellow liquid, ^1H NMR (CDCl_3 , 300 MHz) δ 7.41 (m, 2H, o-Ph), 7.00 (m, 1H, *p*-Ph), 6.75 (s, 1H, $\text{C}^2\text{-H}$), 2.55 (t, 2H, $J = 7.3$ Hz, $\text{C}^4\text{-H}$), 1.64 (quin, 2H, $J = 7.5$ Hz, $\text{C}^5\text{-H}$), 1.37–1.23 (m, 6H), 0.89 (t, 3H, $J = 7.0$ Hz). ^{13}C $\{^1\text{H}\}$ NMR (CDCl_3 , 75 MHz) δ 186.8 (CO), 162.7 (dd, $J = 11.6$, 250.1 Hz, m-Ph), 150.3 (C3), 140.7 (t, $J = 15.7$ Hz, ipso-Ph), 120.0 (C2), 111.2 (dd, $J = 8.3$, 17.4 Hz, o-Ph), 108.3 (t, $J = 25.4$ Hz, *p*-Ph), 41.4 (C4), 31.4 (C6), 28.3 (C5), 27.3 (C7), 22.5 (C8), 14.0 (C9). ^{19}F NMR (CDCl_3 , 282 MHz) δ -108.2 (t, $J = 5.6$ Hz). IR (neat) 1676 (ν_{CO}) cm^{-1} . GCMS m/z (% relative intensity) 287 (M^+ , 1), 251 (68), 229 (18), 193 (39), 181 (37), 169 (18), 95 (71), 94 (12). HRMS (EI, 70 eV) calcd for $\text{C}_{15}\text{H}_{17}\text{ClF}_2\text{O}$ m/z 286.0936, found 286.0931. For ^1H and ^{13}C NMR spectra of the compound, see appendixes 12 and 13.

(Z)-2-Chloro-1-(3,5-difluorophenyl)-1-octene ((Z)-4ea)

Pale yellow liquid, ^1H NMR (CDCl_3 , 300 MHz) δ 7.14 (d, 2H, $J = 8.0$ Hz), 6.72 (t, 1H, $J = 8.0$ Hz), 6.39 (s, 1H), 2.49 (t, 2H, $J = 7.4$ Hz, $\text{C}^4\text{-H}$), 1.64 (quin, 2H, $J = 7.40$ Hz, $\text{C}^5\text{-H}$), 1.37–1.23 (m, 6H), 0.87 (t, 3H, $J = 6.8$ Hz). ^{13}C NMR (CDCl_3 , 75 MHz) δ 162.7 (dd, $J = 14.1$, 249.1 Hz), 138.1 (t, $J = 15.5$ Hz), 137.9, 122.4 (t, $J = 2.6$ Hz), 111.7 (d, $J = 25.5$ Hz), 102.7 (t, $J = 25.5$ Hz), 41.2, 31.5, 28.2, 27.4, 22.5, 14.0. ^{19}F NMR (CDCl_3 , 282 MHz) δ -110.7 (t, $J = 8.5$ Hz). GCMS m/z (% relative intensity) 259 (3, M^+), 223 (1), 188 (12), 153 (30), 127 (7), 95 (6). HRMS (EI, 70 eV) calcd for $\text{C}_{14}\text{H}_{17}\text{ClF}_2$ m/z 258.0987, found 258.0993. For ^1H and ^{13}C NMR spectra of the compound, see appendixes 14 and 15.

Dimer of 1-octyne: isomer A

GCMS (% relative intensity) m/z 220 (M^+ , 4), 135 (44), 121 (54), 107 (60), 93 (82), 79 (84), 77 (32), 55 (34).

Dimer of 1-octyne: isomer B

GCMS (% relative intensity) m/z 220 (M^+ , 4), 135 (44), 121 (54), 107 (60), 93 (82), 91 (40), 81 (36), 79 (99), 77 (43), 55 (40).

Trimer of 1-octyne: isomer A

GCMS m/z (% relative intensity) m/z 330 (M^+ , 30), 260 (22), 189 (12), 175 (11).

Trimer of 1-octyne: isomer B

GCMS (% relative intensity) m/z 330 (M^+ , 33), 259 (24), 189 (55), 119 (19).

$\text{RhCl}_2(\text{CO})(\text{PMe}_3)_2(\text{COC}_6\text{F}_5)$ (**6-PMe₃**)

Pentafluorobenzoyl chloride (30 μL , 0.22 mmol) was added to a yellow solution of $\text{RhCl}(\text{CO})(\text{PMe}_3)_2$ (70 mg, 0.22 mmol) in CH_2Cl_2 (3.0 mL) placed in a Schlenk tube to cause color change to pale brown. The mixture was stirred for 1 h at room temperature while the color of the mixture changed back to yellow. Volatiles were removed and the residue was washed with hexane (3 mL $\times$ 2 times) to afford **6-PMe₃** as pale yellow solid in 81% yield, m.p.(under Ar) 165.0–166.0 °C. ^1H NMR (300 MHz, C_6D_6) δ 1.30 (virtual t, $J = 4.1$ Hz, 18H, PMe_3). $^{13}\text{C}\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) δ 209.8 (dt, $J_{\text{F-C}} = 4.8$, $J_{\text{Rh-C}} = 30.9$ Hz, COC_6F_5), 180.9 (dt, $J_{\text{C-P}} = 10.2$, $J_{\text{Rh-C}} = 66.7$ Hz, Rh-CO), 152.9, 139.1, 135.5 (m, arom), 14.3 (virtual t, $J_{\text{P-C}} = 15.3$ Hz). $^{31}\text{P}\{^1\text{H}\}$ NMR (162 MHz, C_6D_6) δ 4.71 (d, $J_{\text{Rh-P}} = 84$ Hz, PMe_3). $^{19}\text{F}\{^1\text{H}\}$ NMR (376 Hz, C_6D_6) δ -140.9 (d, $J = 19.6$ Hz, 2F, *o*-Ph), -153.7 (t, $J = 21.4$ Hz, 1F, *p*-Ph), -161.2 (tt, $J = 19.6$, 21.4 Hz, 2F, *m*-Ph). IR (KBr) 2075 (CO), 1680, 1651 (COC_6F_5) cm^{-1} . Anal. Calcd for $\text{C}_{14}\text{H}_{18}\text{Cl}_2\text{F}_5\text{O}_2\text{P}_2\text{Rh}$: C; 30.63, H; 3.30. Found: C; 30.92, H; 3.15.

$\text{RhCl}_2(\text{CO})(\text{PPh}_2\text{Me})_2(\text{COC}_6\text{F}_5)$ (**6-PPh₂Me**)

$\text{RhCl}(\text{CO})(\text{PPh}_2\text{Me})_2$ (45.78 mg, 0.0808 mmol) was treated with pentafluorobenzoyl chloride (92.31 mg, 0.400 mmol) in benzene- d_6 at 20 °C for 10 days. The mixture was evaporated and the residue was recrystallized from benzene-hexane to afford **6-PPh₂Me** (48.23 mg, 75% yield) as pale yellow powder, m.p. 166.2–167.5 °C. ^1H NMR (C_6D_6 , 300 MHz) δ 7.93–7.82 (8H, m), 6.99–6.81 (12H, m), 2.44 (virtual t, 6H, $J_{\text{P-H}} = 4.4$ Hz). ^{13}C NMR (C_6D_6 , 75 MHz) δ 215.4 (d, $J_{\text{C-Rh}} = 29.8$ Hz, COC_6F_5), 180.5 (dt, $J_{\text{C-Rh}} = 67.6$ Hz, $J_{\text{C-P}} = 8.0$ Hz, CO), 142.9–142.4 (m, C_6F_5), 139.6–139.1 (m, C_6F_5), 138.7–138.2 (m, C_6F_5), 135.4–134.9 (m, C_6F_5), 133.3 (t, $J = 5.5$ Hz, PPh), 132.8 (t, $J = 4.7$ Hz, PPh), 132.7 (t, $J = 23.2$ Hz, PPh), 131.2 (t, $J = 25.4$ Hz, PPh), 131.0 (s), 130.6 (s), 14.4 (virtual t, $J_{\text{C-P}} = 19.2$ Hz, PCH_3). ^{31}P NMR (C_6D_6 , 161 MHz) δ 5.13 (d, $J_{\text{Rh-P}} = 88.0$ Hz). IR (nujol) 2096 (CO), 1630 (COC_6F_5) cm^{-1} . Anal. Calcd for $\text{C}_{34}\text{H}_{26}\text{Cl}_2\text{F}_5\text{O}_2\text{P}_2\text{Rh}$: C, 51.22; H, 3.29. Found: C, 51.13; H, 3.18.

Reaction of C₆F₅CO-Rh complex with 1-octyne

A mixture of RhCl₂(CO)(PMe₃)₂(COC₆F₅) (16.8 mg, 0.031 mmol), C₆D₆ (0.5 mL) and 1-octyne (10 μL, 0.068 mmol) was heated in a sealed NMR tube at 110 °C for 3 h, while the progress of the reaction was monitored by ¹H NMR.

The reaction of RhCl₂(CO)(PPh₂Me)₂(COC₆F₅) was carried out similarly at 80 °C.

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Appendix 1: ^1H NMR spectrum of 6-chloro-1,1,1,2,2,3,3-heptafluoro-5-dodecen-4-ol

Appendix 2: ^{13}C NMR spectrum of 6-chloro-1,1,1,2,2,3,3-heptafluoro-5-dodecen-4-ol

Current Data Parameters

NAME	ksw
EXPNO	34804
PROCNO	1

F2 - Acquisition Parameters

Date_	500000
Time	9.30
INSTRUM	dp4300
PROBHD	5 mm QNP 1H
PULPROG	zgpg30
TD	65536
SOLVENT	CDCl3
NS	21966
DS	2
SWH	23809.553 Hz
FIDRES	0.363304 Hz
AQ	1.3763061 sec
RG	2048
DM	21.000 usec
DE	4.50 usec
TE	300.0 K
D12	0.00002000 sec
PL13	16.00 dB
D1	1.00000000 sec
CPDPRG2	waltz16
PCPD2	100.00 usec
SFO2	300.1312005 MHz
NUC2	1H
PL2	-6.00 dB
PL12	16.00 dB
P1	5.70 usec
DE	4.50 usec
SFO1	75.4772501 MHz
NUC1	13C
PL1	-6.00 dB
D11	0.03000000 sec

F2 - Processing parameters

S1	32768
SF	75.4677486 MHz
WDW	EM
SSB	0
LB	1.00 Hz
GB	0
PC	1.40

1D NMR plot parameters

CX	30.00 cm
F1P	208.100 ppm
F1	15705.00 Hz
F2P	-4.223 ppm
F2	-319.71 Hz
PRNOM	7.07751 ppm/cm
HZOM	534.12360 Hz/cm

**Appendix 3: H-H COSY of 6-chloro-1,1,1,2,2,3,3-heptafluoro-5-dodecen-4-ol
((Z)-3aa-red)**

Appendix 4: ^1H NMR spectrum of 1-chloro-4,4,5,5,6,6,6-heptafluoro-1-trimethylsilylhex-1-en-3-one ((**Z**)-**3ac**)

Appendix 5: ^{13}C NMR spectrum of spectrum of 1-chloro-4,4,5,5,6,6,6-heptafluoro-1-trimethylsilylhex-1-en-3-one ((**Z**)-**3ac**)

Current Data Parameters
NAME ksw
EXPNO 06
PROCNO 1

F2 - Acquisition Parameters
Date_ 500000
Time 11.08
INSTRUM dpz300
PROBHD 5 mm QNP 1H
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 4394
DS 2
SWH 23000.523 Hz
FIDRES 0.363304 Hz
AQ 1.3763061 sec
RG 32768
DM 21.000 usec
DE 4.50 usec
TE 300.0 K
D12 0.00002000 sec
PL13 16.00 dB
D1 1.00000000 sec
CPDPRG2 waltz16
PCPD2 100.00 usec
SF02 300.1312005 MHz
NUC2 1H
PL2 -6.00 dB
PL12 16.00 dB
P1 5.70 usec
DE 4.50 usec
SF01 75.4772501 MHz
NUC1 13C
PL1 -6.00 dB
D11 0.03000000 sec

F2 - Processing parameters
SI 32768
SF 75.4677486 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

ID NMR plot parameters
CX 30.00 cm
F1P 200.000 ppm
F1 15093.95 Hz
F2P -20.000 ppm
F2 -1509.35 Hz
P1MCM 7.33333 ppm/cm
HZCM 553.43016 Hz/cm

Appendix 6: ^1H NMR spectrum of (Z)-1-chloro-1-(cyclohex-1-enyl)-4,4,5,5,6,6,6-heptafluoro-hex-1-en-3-one ((Z)-3ad)

Appendix 7: ^{13}C NMR spectrum of (Z)-1-chloro-1-(cyclohex-1-enyl)-4,4,5,5,6,6,6-heptafluoro-hex-1-en-3-one ((Z)-3ad)

Current Data Parameters
NAME Ksw
EXPNO 75
PROCNO 1

F2 - Acquisition Parameters
Date_ 500000
Time 10.03
INSTRUM dp300
PROBHD 5 mm QNP 1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 10102
DS 2
SMH 23809.523 Hz
FIDRES 0.363304 Hz
AQ 1.3763361 sec
RG 6192
DW 21.000 usec
DE 4.50 usec
TE 300.0 K
D12 0.00020000 sec
PL13 16.00 dB
D1 1.00000000 sec
CPDPRG2 waltz16
PCPD2 100.00 usec
SF02 300.1312005 MHz
NUC2 1H
PL2 -8.00 dB
PL12 16.00 dB
P1 5.70 usec
DE 4.50 usec
SF01 75.4772901 MHz
NUC1 13C
PL1 -6.00 dB
D11 0.03000000 sec

F2 - Processing parameters
SI 32768
SF 75.4677479 MHz
WDW EM
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters
CX 30.00 cm
F1P 200.000 ppm
F1 15063.95 Hz
F2P -5.000 ppm
F2 -377.34 Hz
PPHCH 6.83333 ppm/cm
HZCH 515.69635 Hz/cm

Appendix 8: ^1H NMR spectrum of 7,15-dichloro-10,10,11,11,12,12-hexafluoro-heneicosa-7,14-diene-9,13-dione ((**Z**)-**3ba**)

Appendix 9: ^{13}C NMR spectrum of 7,15-dichloro-10,10,11,11,12,12-hexafluoro-heneicosa-7,14-diene-9,13-dione ((**Z**)-**3ba**)

Appendix 10: ^1H NMR spectrum of (*E*)-3-chloro-1-oxo-1-pentafluorophenyl-2-nonene ((*E*)-3ca)

Appendix 11: ^{13}C NMR spectrum of (*E*)-3-chloro-1-oxo-1-pentafluorophenyl-2-nonene ((*E*)-3ca)

Current Data Parameters
NAME ksw
EXPNO 25
PROCNO 1

F2 - Acquisition Parameters
Date_ 500000
Time 21.59
INSTRUM gp300
PROBHD 5 mm QNP 1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 16266
DS 2
SWH 23809.103 Hz
FIDRES 0.363304 Hz
AQ 1.3763061 sec
RG 8192
OW 21.000 usec
DE 4.50 usec
TE 300.0 K
D12 0.00000000 sec
RL13 16.00 dB
D1 1.00000000 sec
CPOPRG2 waltz16
PCPD2 100.00 usec
SF02 300.1312005 MHz
NUC2 1H
PL2 -6.00 dB
PL12 16.00 dB
P1 5.70 usec
DE 4.50 usec
SF01 75.4772501 MHz
NUC1 13C
RL1 -6.00 dB
D11 0.03000000 sec

F2 - Processing parameters
SI 32768
SF 75.4677501 MHz
WDW EH
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters
CX 30.00 cm
FIP 200.000 ppm
F1 15063.55 Hz
F2P 0.000 ppm
F2 0.00 Hz
PPHCH 6.66667 ppm/cm
HZCM 503.11629 Hz/cm

Appendix 12: ^1H NMR spectrum of (Z)-3-chloro-1-oxo-1-(3,5-difluorophenyl)-2-nonene ((Z)-3ea)

Appendix 13: ^{13}C NMR spectrum of (Z)-3-chloro-1-oxo-1-(3,5-difluorophenyl)-2-nonene ((Z)-3ea)

Current Data Parameters
NAME raw
EXPNO 3003
PROCNO 1

F2 - Acquisition Parameters
Date_ 506000
Time 16.15
INSTRUM gpc300
PROBHD 5 mm QNP 1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 3121
DS 2
SWH 23809.523 Hz
FIDRES 0.363304 Hz
AQ 1.3763551 sec
RG 32768
DW 21.000 usec
DE 4.50 usec
TE 300.0 K
D12 0.00002000 sec
PL13 16.00 dB
D1 1.00000000 sec
CPDPRG2 waltz16
PCPD2 100.00 usec
SF02 300.1312005 MHz
NUC2 1H
PL2 -8.00 dB
PL12 16.00 dB
P1 5.70 usec
DE 4.50 usec
SF01 75.4772501 MHz
NUC1 13C
PL1 -6.00 dB
D11 0.03000000 sec

F2 - Processing parameters
SI 32768
SF 75.4677501 MHz
WDW EN
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters
CX 30.00 cm
F1P 205.550 ppm
F1 15512.37 Hz
F2P -9.501 ppm
F2 -717.00 Hz
PPHOM 7.16851 ppm/cm
HZCM 540.99902 Hz/cm

Appendix 14: ^1H NMR spectrum of (Z)-2-chloro-1-(3,5-difluorophenyl)-1-octene ((Z)-4ea)

Appendix 15: ^{13}C NMR spectrum of (Z)-2-chloro-1-(3,5-difluorophenyl)-1-octene ((Z)-4ea)

Current Data Parameters
Date_ 500000
NAME kataboia
EXPNO 21013
PROCNO 1

F2 - Acquisition Parameters
Date_ 500000
Time_ 21.02
INSTRUM jnx300
PROBHD 5 mm QNP 1H
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 10286
DS 2
SWH 23809.523 Hz
FIDRES 0.363304 Hz
AQ 1.3763061 sec
RG 4096
DM 21.000 usec
DE 4.50 usec
TE 300.0 K
D12 0.0000000 sec
PL13 16.00 dB
D1 1.0000000 sec
CPDPRG2 waltz16
PCPD2 100.00 usec
SF02 300.1312005 MHz
NUC2 1H
PL2 -6.00 dB
PL12 16.00 dB
P1 6.70 usec
DE 4.50 usec
SF01 75.472501 MHz
NUC1 13C
PL1 -6.00 dB
D11 0.0300000 sec

F2 - Processing parameters
SI 32768
SF 75.4677545 MHz
WDM 6H
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters
CX 30.00 cm
F1P 200.025 ppm
F1 15699.19 Hz
F2P -5.631 ppm
F2 -424.98 Hz
FNUCH 7.12188 ppm/cm
HZCM 537.47241 Hz/cm