

SUPPLEMENTARY MATERIAL TO
**Synthesis of new derivatives of alepteroic acid via
click chemistry**

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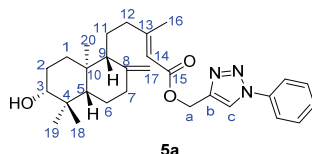
J. Serb. Chem. Soc. 86 (10) (2021) 917–925

SPECTRUM DATA OF THE COMPOUNDS

Prop-2-yn-1-yl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydro-naphthalen-1-yl)-3-methylpent-2-enoate (3)

¹H NMR (400 MHz, CDCl₃) δ 5.68 (s, 1H, 14-H), 4.86 (s, 1H, 17-H), 4.69 (d, *J* = 2.4 Hz, 2H, a-CH₂), 4.49 (s, 1H, 17-H), 3.25 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.47 (t, *J* = 2.4 Hz, 1H, c-H), 2.40 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.35 – 2.27 (m, 12-H), 2.17 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 2.01 – 1.90 (m, 2H), 1.81 – 1.52 (m, 7H), 1.37 (td, *J* = 12.9, 4.3 Hz, 1H, 6-H), 1.15 (td, *J* = 13.2, 3.8 Hz, 1H, 1-H), 1.07 (dd, *J* = 12.5, 2.8 Hz, 1H, 5-H), 0.99 (s, 3H, 18-CH₃), 0.77 (s, 3H, 19-CH₃), 0.68 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 165.86 (C-15), 163.05 (C-13), 147.71 (C-8), 114.32 (C-14), 106.94 (C-17), 78.86 (C-3), 78.30 (b-C), 74.63 (c-C), 55.94 (C-9), 54.64 (C-5), 51.26 (a-C), 39.92 (C-10), 39.52 (C-4), 39.25 (C-7), 38.21 (C-12), 37.15 (C-1), 28.42 (C-18), 27.99 (C-2), 24.09 (C-6), 21.71 (C-11), 19.26 (C-16), 15.54 (C-19), 14.61 (C-20).

(1-Phenyl-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (5a)

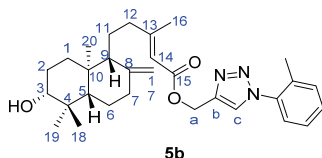


Chemical Formula: C₂₉H₃₉N₃O₃
Exact Mass: 477.2991
Molecular Weight: 477.6490

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35.6 mg, yield 90 %, white solid, m.p.= 50-52 °C; ¹H NMR (400 MHz, CDCl₃) δ 8.06 (s, 1H, c-H), 7.77 – 7.69 (m, 2H, 2×Ph-H), 7.58 – 7.40 (m, 3H, 3×Ph-H), 5.69 (q, *J* = 1.2 Hz, 1H, 14-H), 5.33 (s, 2H, a-CH₂), 4.85 (s, 1H, 17-H), 4.49 (s, 1H, 17-H), 3.24 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.39 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.34 – 2.25 (m, 1H, 12-H), 2.17 (d, *J* = 1.3 Hz, 3H, 16-CH₃), 2.01 – 1.88 (m, 2H, 7-H, 12-H), 1.80 – 1.46 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 12.9, 4.3 Hz, 1H, 6-H), 1.14 (td, *J* = 13.1, 3.6 Hz, 1H, 1-H), 1.07 (dd, *J* = 12.5, 2.7 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.67 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.62 (C-15), 162.52 (C-13), 147.73 (C-8), 144.10 (b-C), 137.02 (Ph-C), 129.91 (2×Ph-C), 129.07 (Ph-C), 122.16 (c-C), 120.76 (2×Ph-C), 114.73 (C-14), 106.92 (C-17), 78.85 (C-3), 56.83 (a-CH₂), 55.99 (C-9), 54.63 (C-5), 39.94 (C-10), 39.52 (C-4), 39.24 (C-7), 38.20 (C-12), 37.14 (C-1), 28.41 (C-18), 27.98 (C-2), 24.08 (C-6), 21.75 (C-11), 19.27 (C-16), 15.54 (C-19), 14.60 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₂₉H₃₉N₃O₃ + H⁺] 478.3064, observed 478.3052.

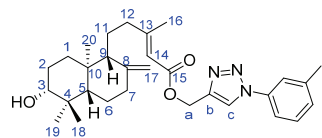
(1-(*o*-Tolyl)-1*H*-1,2,3-triazol-4-yl)methyl (*E*)-5-((1*R*,4*aS*,6*R*,8*aS*)-6-hydroxy-5,5,8*a*-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5b**)

**5b**

Chemical Formula: C₃₀H₄₁N₃O₃
Exact Mass: 491.3148
Molecular Weight: 491.6760

29.8 mg, yield 73 %, white solid, m.p.= 46-48 °C; ¹H NMR (400 MHz, CDCl₃) δ 7.81 (s, 1H, c-H), 7.49 – 7.30 (m, 4H, 4×Ph-H), 5.70 (q, *J* = 1.3 Hz, 1H, 14-H), 5.34 (s, 2H, a-CH₂), 4.85 (s, 1H, 17-H), 4.49 (s, 1H, 17-H), 3.24 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.39 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.36 – 2.24 (m, 1H, 12-H), 2.22 (s, 3H, Ph-CH₃), 2.17 (d, *J* = 1.3 Hz, 3H, 16-CH₃), 2.03 – 1.86 (m, 2H, 7-H, 12-H), 1.81 – 1.47 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.38 (qd, *J* = 12.9, 4.3 Hz, 1H, 6-H), 1.14 (td, *J* = 13.1, 3.7 Hz, 1H, 1-H), 1.07 (dd, *J* = 12.5, 2.7 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.67 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.61 (C-15), 162.45 (C-13), 147.73 (C-8), 143.16 (b-C), 136.38 (Ph-C), 133.75 (Ph-C), 131.66 (Ph-C), 130.13 (Ph-C), 127.00 (Ph-C), 126.08 (c-C), 125.43 (Ph-C), 114.74 (C-14), 106.91 (C-17), 78.85 (C-3), 56.82 (a-CH₂), 55.99 (C-9), 54.63 (C-5), 39.93 (C-10), 39.51 (C-4), 39.24 (C-7), 38.20 (C-12), 37.14 (C-1), 28.41 (C-18), 27.97 (C-2), 24.07 (C-6), 21.74 (C-11), 19.25 (C-16), 18.05 (Ph-CH₃), 15.54 (C-19), 14.60 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₃₀H₄₁N₃O₃ + H⁺] 492.3221, observed 492.3208.

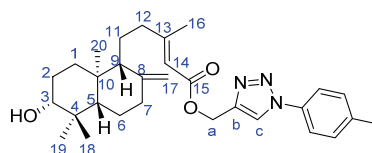
(1-(*m*-Tolyl)-1*H*-1,2,3-triazol-4-yl)methyl (*E*)-5-((1*R*,4*aS*,6*R*,8*aS*)-6-hydroxy-5,5,8*a*-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5c**)

**5c**

Chemical Formula: C₃₀H₄₁N₃O₃
Exact Mass: 491.3148
Molecular Weight: 491.6760

37.5 mg, yield 92 %, white solid, m.p.= 50-53 °C; ¹H NMR (400 MHz, CDCl₃) δ 8.04 (s, 1H, c-H), 7.56 (s, 1H, Ph-H), 7.52 – 7.46 (m, 1H, Ph-H), 7.41 – 7.33 (m, 1H, Ph-H), 7.26 – 7.19 (m, 1H, Ph-H), 5.68 (q, *J* = 1.3 Hz, 1H, 14-H), 5.31 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.24 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.44 (s, 3H, Ph-CH₃), 2.38 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.35 – 2.23 (m, 1H, 12-H), 2.17 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 2.00 – 1.87 (m, 2H, 7-H, 12-H), 1.79 – 1.47 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 12.9, 4.2 Hz, 1H, 6-H), 1.14 (td, *J* = 13.0, 3.5 Hz, 1H, 1-H), 1.06 (dd, *J* = 12.5, 2.6 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.75 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.60 (C-15), 162.47 (C-13), 147.70 (C-8), 143.92 (b-C), 140.15 (Ph-C), 136.91 (Ph-C), 129.80 (Ph-C), 129.66 (Ph-C), 122.21 (Ph-C), 121.38 (c-C), 117.78 (Ph-C), 114.72 (C-14), 106.89 (C-17), 78.81 (C-3), 56.81 (a-CH₂), 55.96 (C-9), 54.61 (C-5), 39.91 (C-10), 39.49 (C-4), 39.22 (C-7), 38.18 (C-12), 37.12 (C-1), 28.39 (C-18), 27.95 (C-2), 24.05 (C-6), 21.73 (C-11), 21.53 (Ph-CH₃), 19.25 (C-16), 15.52 (C-19), 14.57 (C-20). (+)ESI-HRMS (*m/z*): calculated for C₃₀H₄₁N₃O₃ [M+H⁺] 492.3221, observed 492.3208.

(1-(*p*-Tolyl)-1*H*-1,2,3-triazol-4-yl)methyl (*E*)-5-((1*R*,4*aS*,6*R*,8*aS*)-6-hydroxy-5,5,8*a*-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5d**)

**5d**

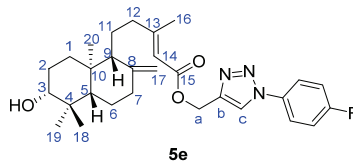
Chemical Formula: C₃₀H₄₁N₃O₃

Exact Mass: 491.3148

Molecular Weight: 491.6760

38.8 mg, yield 95 %, white solid, m.p.= 48-49 °C; ¹H NMR (400 MHz, CDCl₃) δ 8.02 (s, 1H, c-H), 7.64 – 7.56 (m, 2H, 2×Ph-H), 7.37 – 7.28 (m, 2H, 2×Ph-H), 5.68 (q, *J* = 1.3 Hz, 1H, 14-H), 5.31 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.86 (s, 3H, PhO-CH₃), 3.24 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.41 (s, 3H, Ph-CH₃), 2.38 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.35 – 2.23 (m, 1H, 12-H), 2.17 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 2.00 – 1.88 (m, 2H, 7-H, 12-H), 1.80 – 1.46 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 12.9, 4.2 Hz, 1H, 6-H), 1.14 (td, *J* = 13.2, 3.8 Hz, 1H, 1-H), 1.06 (dd, *J* = 12.5, 2.7 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.67 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.60 (C-15), 162.49 (C-13), 147.71 (C-8), 143.84 (b-C), 139.25 (Ph-C), 134.68 (Ph-C), 130.39 (2×Ph-C), 122.19 (c-C), 120.63 (2×Ph-C), 114.72 (C-14), 106.90 (C-17), 78.82 (C-3), 56.78 (a-CH₂), 55.97 (C-9), 54.61 (C-5), 39.92 (C-10), 39.50 (C-4), 39.23 (C-7), 38.18 (C-12), 37.13 (C-1), 28.39 (C-18), 27.96 (C-2), 24.06 (C-6), 21.73 (C-11), 21.25 (Ph-CH₃), 19.25 (C-16), 15.53 (C-19), 14.58 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₃₀H₄₁N₃O₄ + H⁺] 492.3221, observed 492.3207.

(1-(4-Fluorophenyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5e**)

**5e**

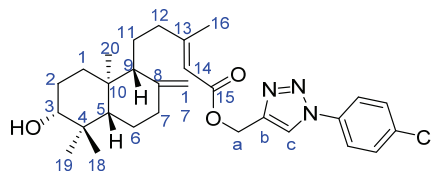
Chemical Formula: C₂₉H₃₈FN₃O₃

Exact Mass: 495.2897

Molecular Weight: 495.6394

37.4 mg, yield 91 %, colorless oil, white solid, m.p.= 50-52 °C; ¹H NMR (400 MHz, CDCl₃) δ 8.02 (s, 1H, c-H), 7.78 – 7.62 (m, 2H, 2×Ph-H), 7.41 – 7.02 (m, 2H, 2×Ph-H), 5.68 (q, *J* = 1.3 Hz, 1H, 14-H), 5.31 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.24 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.39 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.35 – 2.24 (m, 1H, 12-H), 2.17 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 2.00 – 1.88 (m, 2H, 7-H, 12-H), 1.79 – 1.44 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 12.9, 4.3 Hz, 1H, 6-H), 1.14 (td, *J* = 13.1, 3.6 Hz, 1H, 1-H), 1.06 (dd, *J* = 12.5, 2.7 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.67 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.59 (C-15), 162.64 (C-13), 162.61 (d, *J* = 249.3 Hz, Ph-C), 147.71 (C-8), 144.22 (b-C), 133.27 (d, *J* = 6.1 Hz, Ph-C), 122.74 (d, *J* = 8.6 Hz, 2×Ph-C), 122.35 (c-C), 116.89 (d, *J* = 23.4 Hz, 2×Ph-C), 114.65 (C-14), 106.89 (C-17), 78.83 (C-3), 56.75 (a-CH₂), 55.98 (C-9), 54.62 (C-5), 39.93 (C-10), 39.50 (C-4), 39.23 (C-7), 38.18 (C-12), 37.13 (C-1), 28.40 (C-18), 27.96 (C-2), 24.06 (C-6), 21.74 (C-11), 19.26 (C-16), 15.53 (C-19), 14.60 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₂₉H₃₈FN₃O₃ + H⁺] 496.2970, observed 496.2958.

(1-(4-Chlorophenyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5f**)

**5f**

Chemical Formula: C₂₉H₃₈ClN₃O₃

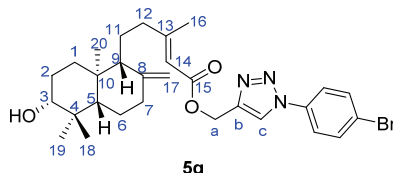
Exact Mass: 511.2602

Molecular Weight: 512.0910

38.3 mg, yield 90 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 8.04 (s, 1H, c-H), 7.72 – 7.65 (m, 2H, 2×Ph-H), 7.57 – 7.45 (m, 2H, 2×Ph-H), 5.67 (q, *J* = 1.3 Hz, 1H, 14-H), 5.31 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.23 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.39 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.35 – 2.23 (m, 1H, 12-H), 2.16 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 1.94 (m, 2H, 7-H, 12-H), 1.80 – 1.46 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 12.9, 4.2 Hz, 1H, 6-H), 1.14 (td, *J* = 13.1, 3.6 Hz, 1H, 1-H), 1.06 (dd, *J* = 12.5, 2.6 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.58 (C-15), 162.64 (C-13), 147.72 (C-8), 144.41 (b-C), 135.50 (Ph-C), 134.80 (Ph-C), 130.08 (2×Ph-C), 122.02 (c-C), 121.86 (2×Ph-C), 114.65 (C-14), 106.90 (C-17), 78.83 (C-3), 56.77 (a-CH₂), 55.99 (C-9), 54.63 (C-5), 39.94 (C-10), 39.50 (C-4), 39.23 (C-7), 38.19 (C-12), 37.14 (C-1), 28.40 (C-18), 27.96 (C-2), 24.07 (C-6), 21.75

(C-11), 19.26 (C-16), 15.53 (C-19), 14.59 (C-20). (+)ESI-HRMS (m/z): calculated for $[C_{29}H_{38}ClN_3O_3 + H^+]$ 512.2674, observed 512.2668.

(1-(4-Bromophenyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (5g)

**5g**

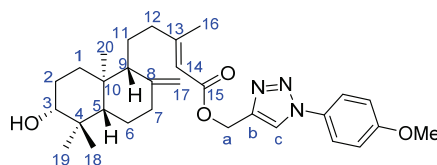
Chemical Formula: $C_{29}H_{38}BrN_3O_3$

Exact Mass: 555.2097

Molecular Weight: 556.5450

41.6 mg, yield 90 %, white solid, m.p.= 66-68 °C; 1H NMR (400 MHz, $CDCl_3$) δ 8.05 (s, 1H, c-H), 7.70 – 7.55 (m, 4H, 4×Ph-H), 5.67 (q, $J = 1.2$ Hz, 1H, 14-H), 5.31 (s, 2H, a- CH_2), 4.84 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.23 (dd, $J = 11.7, 4.4$ Hz, 1H, 3-H), 2.38 (ddd, $J = 12.8, 4.3, 2.4$ Hz, 1H, 7-H), 2.29 (ddt, $J = 13.0, 8.7, 1.5$ Hz, 1H, 12-H), 2.16 (d, $J = 1.2$ Hz, 3H, 16- CH_3), 1.93 (m, 2H, 7-H, 12-H), 1.80 – 1.43 (m, 7H, 1-H, 2- CH_2 , 6-H, 9-H, 11- CH_2), 1.37 (qd, $J = 12.9, 4.3$ Hz, 1H, 6-H), 1.13 (td, $J = 13.0, 3.6$ Hz, 1H, 1-H), 1.06 (dd, $J = 12.5, 2.7$ Hz, 1H, 5-H), 0.97 (s, 3H, 18- CH_3), 0.75 (s, 3H, 19- CH_3), 0.66 (s, 3H, 20- CH_3). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.57 (C-15), 162.64 (C-13), 147.71 (C-8), 144.42 (b-C), 135.97 (Ph-C), 133.02 (2×Ph-C), 122.66 (2×Ph-C), 122.07 (2×Ph-C), 121.95 (c-C), 114.64 (C-14), 106.89 (C-17), 78.81 (C-3), 56.76 (a- CH_2), 55.99 (C-9), 54.62 (C-5), 39.93 (C-10), 39.50 (C-4), 39.23 (C-7), 38.18 (C-12), 37.14 (C-1), 28.40 (C-18), 27.96 (C-2), 24.06 (C-6), 21.74 (C-11), 19.26 (C-16), 15.53 (C-19), 14.58 (C-20). (+)ESI-HRMS (m/z): calculated for $[C_{29}H_{38}BrN_3O_3 + H^+]$ 556.2169, observed 556.2183.

(1-(4-Methoxyphenyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (5h)

**5h**

Chemical Formula: $C_{30}H_{41}N_3O_4$

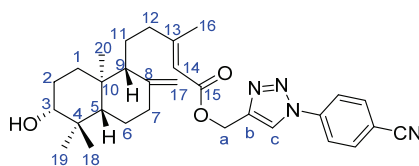
Exact Mass: 507.3097

Molecular Weight: 507.6750

34.1 mg, yield 81 %, white solid, m.p.= 48-49 °C; 1H NMR (400 MHz, $CDCl_3$) δ 7.98 (s, 1H, c-H), 7.66 – 7.57 (m, 2H, 2×Ph-H), 7.06 – 6.97 (m, 2H, 2×Ph-H), 5.68 (q, $J = 1.3$ Hz, 1H, 14-H), 5.32 (s, 2H, a- CH_2), 4.85 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.86 (s, 3H, PhO- CH_3), 3.24 (dd, $J = 11.7, 4.4$ Hz, 1H, 3-H), 2.39 (ddd, $J = 12.8, 4.3, 2.4$ Hz, 1H, 7-H), 2.34 – 2.25 (m, 1H, 12-H), 2.17 (d, $J = 1.2$ Hz, 3H, 16- CH_3), 2.00 – 1.89 (m, 2H, 7-H, 12-H), 1.81 – 1.45 (m, 7H, 1-H, 2- CH_2 , 6-H, 9-H, 11- CH_2), 1.37 (qd, $J = 12.9, 4.2$ Hz, 1H, 6-H), 1.14 (td, $J = 13.1, 3.6$ Hz, 1H, 1-H), 1.07 (dd, $J = 12.5, 2.7$ Hz, 1H, 5-H), 0.98 (s, 3H, 18- CH_3), 0.76 (s, 3H, 19- CH_3), 0.67 (s, 3H, 20- CH_3). ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.62 (C-15), 162.50 (C-13), 160.09 (Ph-C), 147.72 (C-8), 143.77 (b-C), 130.40 (Ph-C), 122.41 (2×Ph-C), 122.36

(c-C), 114.92 (2×Ph-C), 114.74 (C-14), 106.92 (C-17), 78.84 (C-3), 56.78 (a-CH₂), 55.98 (C-9), 55.78 (Ph-OCH₃), 54.63 (C-5), 39.93 (C-10), 39.51 (C-4), 39.24 (C-7), 38.20 (C-12), 37.14 (C-1), 28.41 (C-18), 27.98 (C-2), 24.08 (C-6), 21.75 (C-11), 19.27 (C-16), 15.54 (C-19), 14.60 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₃₀H₄₁N₃O₄ + H⁺] 508.3170, observed 508.3158.

(1-(4-Cyanophenyl)-1*H*-1,2,3-triazol-4-yl)methyl (*E*)-5-((1*R*,4*aS*,6*R*,8*aS*)-6-hydroxy-5,5,8*a*-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5i**)

**5i**

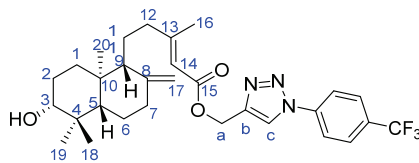
Chemical Formula: C₃₀H₃₈N₄O₃

Exact Mass: 502.2944

Molecular Weight: 502.6590

38.4 mg, yield 92 %, white solid, m.p.= 65-68°C; ¹H NMR (400 MHz, CDCl₃) δ 8.13 (s, 1H, c-H), 7.95 – 7.89 (m, 2H, 2×Ph-H), 7.88 – 7.81 (m, 2H, 2×Ph-H), 5.68 (q, *J* = 1.4 Hz, 1H, 14-H), 5.33 (s, 2H, a-CH₂), 4.85 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.24 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.40 (ddd, *J* = 13.0, 4.1, 2.4 Hz, 1H, 7-H), 2.35 – 2.25 (m, 1H, 12-H), 2.17 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 2.01 – 1.88 (m, 2H, 7-H, 12-H), 1.80 – 1.45 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.38 (qd, *J* = 97.0, 12.9, 4.3 Hz, 1H, 6-H), 1.15 (td, *J* = 13.0, 12.3, 3.7 Hz, 1H, 1-H), 1.07 (dd, *J* = 12.6, 2.6 Hz, 1H, 5-H), 0.99 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.67 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.58 (C-15), 162.98 (C-13), 147.74 (C-8), 145.02 (b-C), 139.82 (Ph-C), 134.10 (2×Ph-C), 121.85 (c-C), 120.76 (2×Ph-C), 117.80 (Ph-CN), 114.54 (C-14), 112.71 (Ph-C), 106.92 (C-17), 78.87 (C-3), 56.67 (a-CH₂), 56.02 (C-9), 54.65 (C-5), 39.98 (C-10), 39.54 (C-4), 39.26 (C-7), 38.21 (C-12), 37.17 (C-1), 28.42 (C-18), 27.98 (C-2), 24.08 (C-6), 21.77 (C-11), 19.31 (C-16), 15.54 (C-19), 14.61 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₃₀H₃₈N₃O₃ + H⁺] 503.3017, observed 503.3011.

(1-(4-(Trifluoromethyl)phenyl)-1*H*-1,2,3-triazol-4-yl)methyl (*E*)-5-((1*R*,4*aS*,6*R*,8*aS*)-6-hydroxy-5,5,8*a*-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5j**)

**5j**

Chemical Formula: C₃₀H₃₈F₃N₃O₃

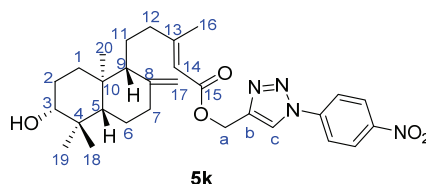
Exact Mass: 545.2865

Molecular Weight: 545.6472

40.3 mg, yield 89 %, white solid, m.p.= 56-58 °C; ¹H NMR (400 MHz, CDCl₃) δ 8.13 (s, 1H, c-H), 7.97 – 7.85 (m, 2H, 2×Ph-H), 7.84 – 7.77 (m, 2H, 2×Ph-H), 5.69 (q, *J* = 1.2 Hz, 1H, 14-H), 5.33 (s, 2H, a-CH₂), 4.85 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.24 (dd, *J* = 11.7, 4.4 Hz, 1H, 3-H), 2.39 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.36 – 2.24 (m, 1H, 12-H), 2.17 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 1.95 (m, 2H, 7-H, 12-H), 1.81 – 1.44 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.38 (qd, *J* = 13.0, 4.3 Hz, 1H, 6-H), 1.14 (td, *J* = 13.0, 3.7 Hz, 1H, 1-H), 1.07 (dd,

$J = 12.5, 2.6$ Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.67 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.60 (C-15), 162.82 (C-13), 147.73 (C-8), 144.72 (b-C), 139.41 (Ph-C), 130.98 (q, $J = 33.1$ Hz, Ph-C), 127.27 (q, $J = 3.6$ Hz, 2 \times Ph-C), 123.62 (q, $J = 272.2$ Hz, Ph-CF₃), 121.99 (c-C), 120.63 (2 \times Ph-C), 114.60 (C-14), 106.91 (C-17), 78.85 (C-3), 56.73 (a-CH₂), 56.00 (C-9), 54.64 (C-5), 39.96 (C-10), 39.52 (C-4), 39.24 (C-7), 38.20 (C-12), 37.15 (C-1), 28.41 (C-18), 27.97 (C-2), 24.07 (C-6), 21.76 (C-11), 19.29 (C-16), 15.53 (C-19), 14.60 (C-20). (+)ESI-HRMS (m/z): calculated for [C₃₀H₃₈F₃N₃O₃ + H⁺] 546.2938, observed 546.2941.

(1-(4-Nitrophenyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5k**)

**5k**

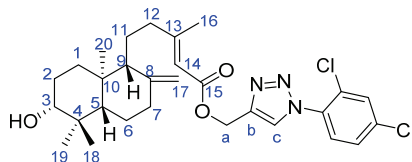
Chemical Formula: C₂₉H₃₈N₄O₅

Exact Mass: 522.2842

Molecular Weight: 522.6460

37.3 mg, yield 86 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 8.45 – 8.36 (m, 2H, 2 \times Ph-H), 8.19 (s, 1H, c-H), 8.02 – 7.94 (m, 2H, 2 \times Ph-H), 5.68 (q, $J = 1.3$ Hz, 1H, 14-H), 5.33 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.24 (dd, $J = 11.7, 4.4$ Hz, 1H, 3-H), 2.39 (ddd, $J = 12.8, 4.3, 2.4$ Hz, 1H, 7-H), 2.36 – 2.24 (m, 1H, 12-H), 2.17 (d, $J = 1.2$ Hz, 3H, 16-CH₃), 2.01 – 1.87 (m, 2H, 7-H, 12-H), 1.80 – 1.44 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, $J = 12.9, 4.3$ Hz, 1H, 6-H), 1.14 (td, $J = 13.0, 3.6$ Hz, 1H, 1-H), 1.06 (dd, $J = 12.5, 2.7$ Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.75 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.55 (C-15), 163.03 (C-13), 147.70 (C-8), 147.39 (Ph-C), 145.10 (b-C), 141.13 (Ph-C), 125.68 (2 \times Ph-C), 122.04 (c-C), 120.67 (2 \times Ph-C), 114.48 (C-14), 106.89 (C-17), 78.84 (C-3), 56.61 (a-CH₂), 55.99 (C-9), 54.62 (C-5), 39.96 (C-10), 39.50 (C-4), 39.22 (C-7), 38.18 (C-12), 37.14 (1-C), 28.40 (C-18), 27.94 (C-2), 24.05 (C-6), 21.75 (C-11), 19.29 (C-16), 15.53 (C-19), 14.58 (C-20). (+)ESI-HRMS (m/z): calculated for [C₂₉H₃₈N₄O₅ + H⁺] 523.2909, observed 523.2914.

(1-(2,4-Dichlorophenyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5l**)

**5l**

Chemical Formula: C₂₉H₃₇Cl₂N₃O₃

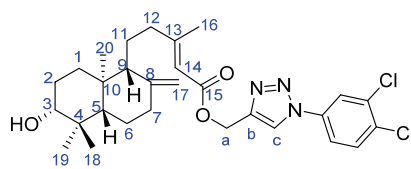
Exact Mass: 545.2212

Molecular Weight: 546.5330

32.7 mg, yield 72 %, white solid, m.p. = 49-52 °C; ¹H NMR (400 MHz, CDCl₃) δ 8.05 (s, 1H, c-H), 7.63 – 7.52 (m, 2H, 2 \times Ph-H), 7.47 – 7.39 (m, 1H, Ph-H), 5.68 (q, $J = 1.2$ Hz, 1H, 14-H), 5.33 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.48 (s, 1H, 17-H), 3.24 (dd, $J = 11.7, 4.4$ Hz,

1H, 3-H), 2.39 (ddd, $J = 12.8, 4.4, 2.5$ Hz, 1H, 7-H), 2.35 – 2.24 (m, 1H, 12-H), 2.16 (d, $J = 1.2$ Hz, 3H, 16-CH₃), 2.01 – 1.88 (m, 2H, 7-H, 12-H), 1.81 – 1.44 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, $J = 12.9, 4.3$ Hz, 1H, 6-H), 1.14 (td, $J = 13.1, 3.5$ Hz, 1H, 1-H), 1.06 (dd, $J = 12.5, 2.6$ Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.67 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.53, 166.51 (C-15), 162.54 (C-13), 147.71 (C-8), 143.47 (b-C), 136.46 (Ph-C), 133.50 (Ph-C), 130.74 (Ph-C), 129.4 (Ph-C), 128.62 (Ph-C), 128.44 (Ph-C), 125.81 (c-C), 114.68 (C-14), 106.91 (C-17), 78.83 (C-3), 56.74 (a-CH₂), 55.97 (C-9), 54.63 (C-5), 39.92 (C-10), 39.50 (C-4), 39.23 (C-7), 38.19 (C-12), 37.14 (C-1), 28.40 (C-18), 27.96 (C-2), 24.07 (C-6), 21.72 (C-11), 19.25 (C-16), 15.53 (C-19), 14.59 (C-20). (+)ESI-HRMS (m/z): calculated for [C₂₉H₃₇Cl₂N₃O₃ + H⁺] 546.2285, observed 546.2291.

(1-(3,4-Dichlorophenyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5m**)

**5m**

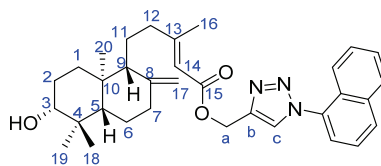
Chemical Formula: C₂₉H₃₇Cl₂N₃O₃

Exact Mass: 545.2212

Molecular Weight: 546.5330

41.7 mg, yield 92 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 8.06 (s, 1H, c-H), 7.94 – 7.84 (m, 1H, Ph-H), 7.66 – 7.55 (m, 2H, 2×Ph-H), 5.67 (q, $J = 1.3$ Hz, 1H, 14-H), 5.30 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.23 (dd, $J = 11.7, 4.3$ Hz, 1H, 3-H), 2.38 (ddd, $J = 12.8, 4.3, 2.4$ Hz, 1H, 7-H), 2.35 – 2.23 (m, 1H, 12-H), 2.16 (d, $J = 1.3$ Hz, 3H, 16-CH₃), 1.93 (m, 2H, 7-H, 12-H), 1.80 – 1.43 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.36 (qd, $J = 12.9, 4.3$ Hz, 1H, 6-H), 1.13 (td, $J = 13.0, 3.4$ Hz, 1H, 1-H), 1.06 (dd, $J = 12.5, 2.6$ Hz, 1H, 5-H), 0.97 (s, 3H, 18-CH₃), 0.75 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.55 (C-15), 162.80 (C-13), 147.69 (C-8), 144.65 (b-C), 135.98 (Ph-C), 134.10 (Ph-C), 133.09 (Ph-C), 131.59 (Ph-C), 122.37 (Ph-C), 121.97 (c-C), 119.56 (Ph-C), 114.55 (C-14), 106.88 (C-17), 78.78 (C-3), 56.68 (a-CH₂), 55.97 (C-9), 54.60 (C-5), 39.93 (C-10), 39.48 (C-4), 39.21 (C-7), 38.17 (C-12), 37.12 (C-1), 28.39 (C-18), 27.93 (C-2), 24.04 (C-6), 21.73 (C-11), 19.26 (C-16), 15.52 (C-19), 14.57 (C-20). (+)ESI-HRMS (m/z): calculated for [C₂₉H₃₇Cl₂N₃O₃ + H⁺] 546.2285, observed 546.2298.

(1-(Naphthalen-1-yl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5n**)

**5n**

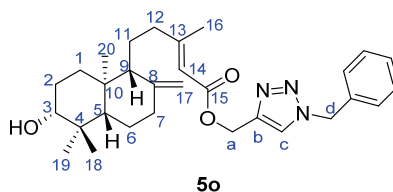
Chemical Formula: C₃₃H₄₁N₃O₃

Exact Mass: 527.3148

Molecular Weight: 527.7090

36.8 mg, yield 84 %, colorless oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 8.07 – 7.93 (m, 3H, c-H, 2 \times Ph-H), 7.66 – 7.47 (m, 5H, 5 \times Ph-H), 5.72 (q, $J = 1.2$ Hz, 1H, 14-H), 5.41 (s, 2H, a- CH_2), 4.85 (s, 1H, 17-H), 4.49 (s, 1H, 17-H), 3.23 (dd, $J = 11.7, 4.4$ Hz, 1H, 3-H), 2.39 (ddd, $J = 12.8, 4.3, 2.4$ Hz, 1H, 7-H), 2.37 – 2.24 (m, 1H, 12-H), 2.18 (d, $J = 1.2$ Hz, 3H, 16- CH_3), 2.01 – 1.90 (m, 2H, 7-H, 12-H), 1.81 – 1.45 (m, 7H, 1-H, 2- CH_2 , 6-H, 9-H, 11- CH_2), 1.37 (qd, $J = 12.9, 4.2$ Hz, 1H, 6-H), 1.14 (td, $J = 13.1, 3.6$ Hz, 1H, 1-H), 1.06 (dd, $J = 12.5, 2.7$ Hz, 1H, 5-H), 0.98 (s, 3H, 18- CH_3), 0.75 (s, 3H, 19- CH_3), 0.67 (s, 3H, 20- CH_3). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 166.59 (C-15), 162.49 (C-13), 147.71 (C-8), 143.38 (b-C), 134.23 (Ph-C), 133.61 (Ph-C), 130.63 (Ph-C), 128.50 (Ph-C), 128.41 (Ph-C), 128.05 (Ph-C), 127.22 (Ph-C), 126.44 (Ph-C), 125.07 (Ph-C), 123.69 (Ph-C), 122.36 (c-C), 114.72 (C-14), 106.89 (C-17), 78.79 (C-3), 56.92 (a- CH_2), 55.96 (C-9), 54.60 (C-5), 39.92 (C-10), 39.49 (C-4), 39.21 (C-7), 38.18 (C-12), 37.12 (C-1), 28.38 (C-18), 27.94 (C-2), 24.05 (C-6), 21.72 (C-11), 19.25 (C-16), 15.52 (C-19), 14.57 (C-20). (+)ESI-HRMS (m/z): calculated for $[\text{C}_{33}\text{H}_{41}\text{N}_3\text{O}_3 + \text{H}^+]$ 528.3221, observed 528.3213.

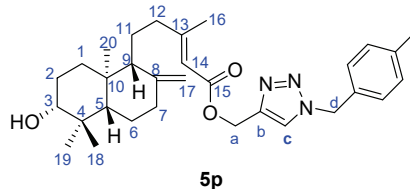
(1-Benzyl-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5o**)



Chemical Formula: $\text{C}_{30}\text{H}_{41}\text{N}_3\text{O}_3$
 Exact Mass: 491.3148
 Molecular Weight: 491.6760

35.5 mg, yield 87 %, colorless oil; $^1\text{H NMR}$ (400 MHz, CDCl_3) δ 7.54 (s, 1H, c-H), 7.42 – 7.32 (m, 3H, 3 \times Ph-H), 7.30 – 7.24 (m, 2H, 2 \times Ph-H), 5.63 (q, $J = 1.3$ Hz, 1H, 14-H), 5.52 (s, 2H, d- CH_2), 5.24 – 5.16 (s, 2H, a- CH_2), 4.84 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.24 (dd, $J = 11.7, 4.3$ Hz, 1H, 3-H), 2.38 (ddd, $J = 12.8, 4.3, 2.4$ Hz, 1H, 7-H), 2.33 – 2.21 (m, 1H, 12-H), 2.13 (d, $J = 1.3$ Hz, 3H, 16- CH_3), 2.00 – 1.86 (m, 2H, 7-H, 12-H), 1.79 – 1.45 (m, 7H, 1-H, 2- CH_2 , 6-H, 9-H, 11- CH_2), 1.37 (qd, $J = 12.9, 4.2$ Hz, 1H, 6-H), 1.13 (td, $J = 13.0, 3.5$ Hz, 1H, 1-H), 1.06 (dd, $J = 12.5, 2.7$ Hz, 1H, 5-H), 0.98 (s, 3H, 18- CH_3), 0.76 (s, 3H, 19- CH_3), 0.66 (s, 3H, 20- CH_3). $^{13}\text{C NMR}$ (100 MHz, CDCl_3) δ 166.51 (C-15), 162.36 (C-13), 147.71 (C-8), 143.55 (b-C), 134.29 (Ph-C), 129.30 (2 \times Ph-C), 129.03 (c-C), 128.30 (2 \times Ph-C), 123.82 (Ph-C), 114.70 (C-14), 106.89 (C-17), 78.81 (C-3), 56.66 (a- CH_2), 55.96 (C-9), 54.61 (C-5), 54.53 (d- CH_2), 39.89 (C-10), 39.49 (C-4), 39.23 (C-7), 38.18 (C-12), 37.12 (C-1), 28.40 (C-18), 27.96 (C-2), 24.06 (C-6), 21.71 (C-11), 19.20 (C-16), 15.53 (C-19), 14.58 (C-20). (+)ESI-HRMS (m/z): calculated for $[\text{C}_{30}\text{H}_{41}\text{N}_3\text{O}_3 + \text{H}^+]$ 492.3221, observed 492.3210.

(1-(4-Methylbenzyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5p**)

**5p**

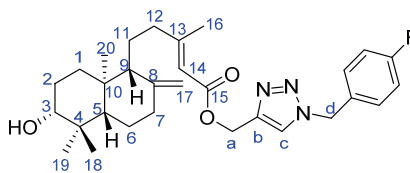
Chemical Formula: C₃₁H₄₃N₃O₃

Exact Mass: 505.3304

Molecular Weight: 505.7030

40.3 mg, yield 96 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 7.51 (s, 1H, c-H), 7.17 (s, 4H, 4×Ph-H), 5.63 (q, *J* = 1.2 Hz, 1H, 14-H), 5.47 (s, 2H, d-CH₂), 5.20 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.47 (d, *J* = 1.6 Hz, 1H, 17-H), 3.24 (dd, *J* = 11.7, 4.3 Hz, 1H, 3-H), 2.38 (ddd, *J* = 13.0, 4.3, 2.5 Hz, 1H, 7-H), 2.34 (s, 3H, Ph-CH₃), 2.32 – 2.21 (m, 1H, 12-H), 2.13 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 2.00 – 1.87 (m, 2H, 7-H, 12-H), 1.80 – 1.46 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 12.9, 4.2 Hz, 1H, 6-H), 1.13 (td, *J* = 13.0, 3.4 Hz, 1H, 1-H), 1.06 (dd, *J* = 12.5, 2.6 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, cdcl₃) δ 166.50 (C-15), 162.25 (C-13), 147.71 (C-8), 143.49 (b-C), 138.97 (Ph-C), 131.31 (Ph-C), 129.92 (2×Ph-C), 128.34 (2×Ph-C), 123.63 (c-C), 114.73 (C-14), 106.88 (C-17), 78.80 (C-3), 56.72 (a-CH₂), 55.95 (C-9), 54.60 (C-5), 54.27 (d-CH₂), 39.88 (C-10), 39.48 (C-4), 39.22 (C-7), 38.17 (C-12), 37.12 (C-1), 28.39 (C-18), 27.95 (C-2), 24.05 (C-6), 21.70 (C-11), 21.30 (Ph-CH₃), 19.19 (C-16), 15.53 (C-19), 14.57 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₃₁H₄₃N₃O₃ + H⁺] 506.3377, observed 506.3370.

(1-(4-Fluorobenzyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5q**)

**5q**

Chemical Formula: C₃₀H₄₀FN₃O₃

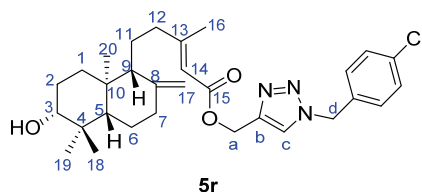
Exact Mass: 509.3054

Molecular Weight: 509.6664

33.4 mg, yield 79 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 7.53 (s, 1H, c-H), 7.34 – 7.23 (m, 2H, 2×Ph-H), 7.13 – 6.97 (m, 2H, 2×Ph-H), 5.63 (q, *J* = 1.2 Hz, 1H, 14-H), 5.48 (s, 2H, d-CH₂), 5.21 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.23 (dd, *J* = 11.7, 4.3 Hz, 1H, 3-H), 2.38 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.33 – 2.21 (m, 1H, 12-H), 2.13 (d, *J* = 1.3 Hz, 3H, 16-CH₃), 1.98 – 1.86 (m, 2H, 7-H, 12-H), 1.79 – 1.42 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 12.9, 4.3 Hz, 1H, 6-H), 1.13 (td, *J* = 12.9, 3.7 Hz, 1H, 1-H), 1.06 (dd, *J* = 12.5, 2.8 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.52 (C-15), 163.01 (d, *J* = 248.1 Hz, Ph-C), 162.35 (C-13), 147.72 (C-8), 143.79 (b-C), 130.29 (d, *J* = 3.2 Hz, Ph-C), 130.17 (d, *J* = 8.4 Hz, 2×Ph-C), 123.65 (c-C), 116.29 (d, *J* = 21.7 Hz, 2×Ph-C), 114.70 (C-14), 106.88 (C-17),

78.81 (C-3), 56.74 (a-CH₂), 55.98 (C-9), 54.62 (C-5), 53.67 (d-CH₂), 39.90 (C-10), 39.49 (C-4), 39.23 (C-7), 38.18 (C-12), 37.14 (C-1), 28.40 (C-18), 27.96 (C-2), 24.06 (C-6), 21.72 (C-11), 19.19 (C-16), 15.53 (C-19), 14.58 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₃₀H₄₀FN₃O₃ + H⁺] 510.3126, observed 510.3115.

(1-(4-Chlorobenzyl)-1*H*-1,2,3-triazol-4-yl)methyl (E)-5-((1*R*,4*aS*,6*R*,8*aS*)-6-hydroxy-5,5,8*a*-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5r**)

**5r**

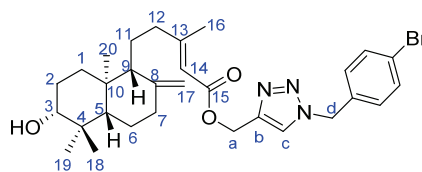
Chemical Formula: C₃₀H₄₀ClN₃O₃

Exact Mass: 525.2758

Molecular Weight: 526.1180

34.9 mg, yield 80 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 7.54 (s, 1H, c-H), 7.40 – 7.31 (m, 2H, 2×Ph-H), 7.24 – 7.18 (m, 2H, 2×Ph-H), 5.63 (q, *J* = 1.2 Hz, 1H, 14-H), 5.48 (s, 2H, d-CH₂), 5.20 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.23 (dd, *J* = 11.7, 4.3 Hz, 1H, 3-H), 2.38 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.33 – 2.21 (m, 1H, 12-H), 2.13 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 1.99 – 1.86 (m, 2H, 7-H, 12-H), 1.79 – 1.45 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 13.0, 4.3 Hz, 1H, 6-H), 1.13 (td, *J* = 13.0, 3.7 Hz, 1H, 1-H), 1.06 (dd, *J* = 12.5, 2.8 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.51 (C-15), 162.34 (C-13), 147.71 (C-8), 143.90 (b-C), 135.02 (Ph-C), 132.96 (Ph-C), 129.57 (2×Ph-C), 129.46 (2×Ph-C), 123.68 (c-C), 114.70 (C-14), 106.87 (C-17), 78.80 (C-3), 56.77 (a-CH₂), 55.97 (C-9), 54.62 (C-5), 53.62 (d-CH₂), 39.89 (C-10), 39.49 (C-4), 39.22 (C-7), 38.18 (C-12), 37.13 (C-1), 28.39 (C-18), 27.96 (C-2), 24.06 (C-6), 21.72 (C-11), 19.19 (C-16), 15.52 (C-19), 14.58 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₃₀H₄₀ClN₃O₃ + H⁺] 526.2831, observed 526.2831.

(1-(4-Bromobenzyl)-1*H*-1,2,3-triazol-4-yl)methyl (E)-5-((1*R*,4*aS*,6*R*,8*aS*)-6-hydroxy-5,5,8*a*-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5s**)

**5s**

Chemical Formula: C₃₀H₄₀BrN₃O₃

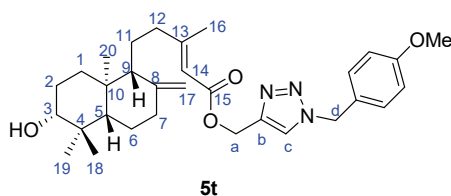
Exact Mass: 569.2253

Molecular Weight: 570.5720

37.9 mg, yield 80 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 7.54 (s, 1H, c-H), 7.52 – 7.47 (m, 2H, 2×Ph-H), 7.21 – 7.10 (m, 2H, 2×Ph-H), 5.64 (q, *J* = 1.3 Hz, 1H, 14-H), 5.47 (s, 2H, d-CH₂), 5.21 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.24 (dd, *J* = 11.7, 4.3 Hz, 1H, 3-H), 2.39 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.34 – 2.22 (m, 1H, 12-H), 2.14 (d, *J* = 1.2 Hz, 3H, 16-CH₃), 2.00 – 1.88 (m, 2H, 7-H, 12-H), 1.79 – 1.46 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 13.0, 4.4 Hz, 1H, 6-H), 1.14 (td, *J* = 13.0, 3.7 Hz, 1H, 1-H),

1.06 (dd, $J = 12.5, 2.8$ Hz, 1H, 5-H), 0.99 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.67 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.53 (C-15), 162.41 (C-13), 147.73 (C-8), 143.90 (b-C), 133.43 (Ph-C), 132.47 (2 \times Ph-C), 129.87 (2 \times Ph-C), 123.74 (c-C), 123.21 (Ph-C), 114.70 (C-14), 106.90 (C-17), 78.84 (C-3), 56.73 (a-CH₂), 56.00 (C-9), 54.64 (C-5), 53.75 (d-CH₂), 39.92 (C-10), 39.51 (C-4), 39.24 (C-7), 38.20 (C-12), 37.15 (C-1), 28.41 (C-18), 27.99 (C-2), 24.08 (C-6), 21.74 (C-11), 19.22 (C-16), 15.53 (C-19), 14.60 (C-20). (+)ESI-HRMS (m/z): calculated for [C₃₀H₄₀BrN₃O₃ + H⁺] 570.2326, observed 570.2346.

(1-(4-Methoxybenzyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5t**)

**5t**

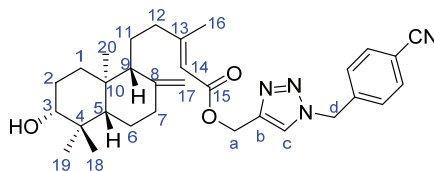
Chemical Formula: C₃₁H₄₃N₃O₄

Exact Mass: 521.3254

Molecular Weight: 521.7020

35.1 mg, yield 81 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 7.51 (s, 1H, c-H), 7.25 – 7.16 (m, 2H, 2 \times Ph-H), 6.94 – 6.81 (m, 2H, 2 \times Ph-H), 5.63 (q, $J = 1.3$ Hz, 1H, 14-H), 5.44 (s, 2H, d-CH₂), 5.20 (s, 2H, a-CH₂), 4.83 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.80 (s, 3H, Ph-OCH₃), 3.23 (dd, $J = 11.7, 4.3$ Hz, 1H, 3-H), 2.38 (ddd, $J = 12.2, 4.3, 2.4$ Hz, 1H, 7-H), 2.33 – 2.21 (m, 1H, 12-H), 2.12 (d, $J = 1.2$ Hz, 3H, 16-CH₃), 1.98 – 1.87 (m, 2H, 7-H, 12-H), 1.79 – 1.44 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, $J = 12.9, 4.1$ Hz, 1H, 6-H), 1.13 (td, $J = 13.0, 3.5$ Hz, 1H, 1-H), 1.06 (dd, $J = 12.5, 2.7$ Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.75 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.50 (C-15), 162.32 (C-13), 160.11 (Ph-C), 147.71 (C-8), 143.38 (b-C), 129.91 (2 \times Ph-C), 126.22 (Ph-C), 123.59 (c-C), 114.70 (C-14), 114.62 (2 \times Ph-C), 106.87 (C-17), 78.79 (C-3), 56.63 (a-CH₂), 55.94 (C-9), 55.46 (C-5), 54.60 (Ph-OCH₃), 54.09 (d-CH₂), 39.87 (C-10), 39.48 (C-4), 39.22 (C-7), 38.17 (C-12), 37.11 (C-1), 28.39 (C-18), 27.95 (C-2), 24.05 (C-6), 21.69 (C-11), 19.20 (C-16), 15.53 (C-19), 14.57 (C-20). (+)ESI-HRMS (m/z): calculated for [C₃₁H₄₃N₃O₄ + H⁺] 522.3326, observed 522.3320.

(1-(4-Cyanidebenzyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5u**)

**5u**

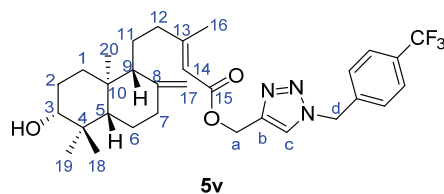
Chemical Formula: C₃₁H₄₀N₄O₃

Exact Mass: 516.3100

Molecular Weight: 516.6860

40.3 mg, yield 94 %, colorless oil; ^1H NMR (400 MHz, CDCl_3) δ 7.72 – 7.63 (m, 2H, 2 \times Ph-H), 7.60 (s, 1H, c-H), 7.38 – 7.32 (m, 2H, 2 \times Ph-H), 5.64 (q, $J = 1.3$ Hz, 1H, 14-H), 5.58 (s, 2H, d- CH_2), 5.23 (s, 2H, a- CH_2), 4.84 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.24 (dd, $J = 11.7$, 4.3 Hz, 1H, 3-H), 2.39 (ddd, $J = 12.8$, 4.3, 2.5 Hz, 1H, 7-H), 2.34 – 2.22 (m, 1H, 12-H), 2.14 (d, $J = 1.2$ Hz, 3H, 16- CH_3), 2.02 – 1.84 (m, 2H, 7-H, 12-H), 1.80 – 1.45 (m, 7H, 1-H, 2- CH_2 , 6-H, 9-H, 11- CH_2), 1.37 (qd, $J = 12.9$, 4.3 Hz, 1H, 6-H), 1.13 (td, $J = 13.1$, 3.6 Hz, 1H, 1-H), 1.06 (dd, $J = 12.5$, 2.7 Hz, 1H, 5-H), 0.98 (s, 3H, 18- CH_3), 0.76 (s, 3H, 19- CH_3), 0.67 (s, 3H, 20- CH_3). ^{13}C NMR (100 MHz, CDCl_3) δ 166.53 (C-15), 162.58 (C-13), 147.73 (C-8), 144.25 (b-C), 139.64 (Ph-C), 133.04 (2 \times Ph-C), 128.59 (2 \times Ph-C), 124.03 (c-C), 118.21 (Ph-CN), 114.63 (C-14), 113.02 (Ph-C), 106.89 (C-17), 78.84 (C-3), 56.73 (a- CH_2), 55.99 (C-9), 54.65 (C-5), 53.62 (d- CH_2), 39.93 (C-10), 39.51 (C-4), 39.24 (C-7), 38.19 (C-12), 37.16 (C-1), 28.41 (C-18), 27.98 (C-2), 24.07 (C-6), 21.74 (C-11), 19.22 (C-16), 15.53 (C-19), 14.60 (C-20). (+)ESI-HRMS (m/z): calculated for $[\text{C}_{31}\text{H}_{40}\text{N}_4\text{O}_3 + \text{H}^+]$ 517.3173, observed 517.3163.

(1-(4-Trifluorobenzyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5v**)

**5v**

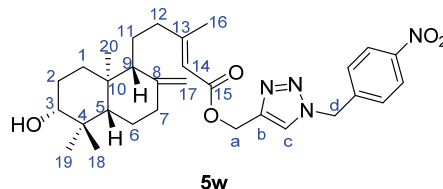
Chemical Formula: $\text{C}_{31}\text{H}_{40}\text{F}_3\text{N}_3\text{O}_3$

Exact Mass: 559.3022

Molecular Weight: 559.6742

40.1 mg, yield 88 %, colorless oil; ^1H NMR (400 MHz, CDCl_3) δ 7.66 – 7.60 (m, 2H, 2 \times Ph-H), 7.59 (s, 1H, c-H), 7.40 – 7.35 (m, 2H, 2 \times Ph-H), 5.64 (q, $J = 1.2$ Hz, 1H, 14-H), 5.58 (s, 2H, d- CH_2), 5.22 (s, 2H, a- CH_2), 4.84 (s, 1H, 17-H), 4.47 (s, 1H, 17-H), 3.24 (dd, $J = 11.7$, 4.3 Hz, 1H, 3-H), 2.38 (ddd, $J = 12.8$, 4.3, 2.4 Hz, 1H, 7-H), 2.34 – 2.21 (m, 1H, 12-H), 2.13 (d, $J = 1.3$ Hz, 3H, 16- CH_3), 2.01 – 1.88 (m, 2H, 7-H, 12-H), 1.80 – 1.45 (m, 7H, 1-H, 2- CH_2 , 6-H, 9-H, 11- CH_2), 1.37 (qd, $J = 12.9$, 4.3 Hz, 1H, 6-H), 1.13 (td, $J = 13.0$, 3.4 Hz, 1H, 1-H), 1.06 (dd, $J = 12.5$, 2.7 Hz, 1H, 5-H), 0.98 (s, 3H, 18- CH_3), 0.76 (s, 3H, 19- CH_3), 0.66 (s, 3H, 20- CH_3). ^{13}C NMR (100 MHz, CDCl_3) δ 166.52 (C-15), 162.55 (C-13), 147.72 (C-8), 143.99 (b-C), 138.32 (Ph-C), 131.26 (q, $J = 32.3$ Hz, Ph-C), 128.42 (c-C), 126.28 (q, $J = 3.7$ Hz, 2 \times Ph-C), 123.99 (2 \times Ph-C), 123.83 (q, $J = 273.7$ Hz, Ph- CF_3), 114.63 (C-14), 106.88 (C-17), 78.83 (C-3), 56.65 (a- CH_2), 55.98 (C-9), 54.62 (C-5), 53.76 (d- CH_2), 39.91 (C-10), 39.50 (C-4), 39.23 (C-7), 38.18 (C-12), 37.13 (C-1), 28.40 (C-18), 27.96 (C-2), 24.06 (C-6), 21.72 (C-11), 19.20 (C-16), 15.53 (C-19), 14.58 (C-20). (+)ESI-HRMS (m/z): calculated for $[\text{C}_{31}\text{H}_{40}\text{F}_3\text{N}_3\text{O}_3 + \text{H}^+]$ 560.3095, observed 560.3058.

(1-(4-Nitrobenzyl)-1H-1,2,3-triazol-4-yl)methyl (E)-5-((1R,4aS,6R,8aS)-6-hydroxy-5,5,8a-trimethyl-2-methylenedecahydronaphthalen-1-yl)-3-methylpent-2-enoate (**5w**)



Chemical Formula: C₃₀H₄₀N₄O₅
 Exact Mass: 536.2999
 Molecular Weight: 536.6730

43.2 mg, yield 97 %, colorless oil; ¹H NMR (400 MHz, CDCl₃) δ 8.28 – 8.16 (m, 2H, 2×Ph-H), 7.63 (s, 1H, c-H), 7.53 – 7.37 (m, 2H, 2×Ph-H), 5.64 (s, 3H, 14-H, d-CH₂), 5.23 (s, 2H, a-CH₂), 4.84 (s, 1H, 17-H), 4.46 (s, 1H, 17-H), 3.23 (dd, *J* = 11.7, 4.3 Hz, 1H, 3-H), 2.38 (ddd, *J* = 12.8, 4.3, 2.4 Hz, 1H, 7-H), 2.34 – 2.22 (m, 1H, 12-H), 2.13 (d, *J* = 1.0 Hz, 3H, 16-CH₃), 2.00 – 1.86 (m, 2H, 7-H, 12-H), 1.79 – 1.45 (m, 7H, 1-H, 2-CH₂, 6-H, 9-H, 11-CH₂), 1.37 (qd, *J* = 12.9, 4.3 Hz, 1H, 6-H), 1.13 (td, *J* = 13.0, 3.5 Hz, 1H, 1-H), 1.06 (dd, *J* = 12.5, 2.7 Hz, 1H, 5-H), 0.98 (s, 3H, 18-CH₃), 0.76 (s, 3H, 19-CH₃), 0.66 (s, 3H, 20-CH₃). ¹³C NMR (100 MHz, CDCl₃) δ 166.52 (C-15), 162.63 (C-13), 148.23 (Ph-C), 147.72 (C-8), 144.27 (b-C), 141.46 (Ph-C), 128.80 (2×Ph-C), 124.46 (2×Ph-C), 124.11 (c-C), 114.60 (C-14), 106.88 (C-17), 78.83 (C-3), 56.68 (a-CH₂), 55.98 (C-9), 54.63 (C-5), 53.34 (d-CH₂), 39.92 (C-10), 39.50 (C-4), 39.23 (C-7), 38.18 (C-12), 37.14 (C-1), 28.40 (C-18), 27.96 (C-2), 24.06 (C-6), 21.73 (C-11), 19.21 (C-16), 15.52 (C-19), 14.59 (C-20). (+)ESI-HRMS (*m/z*): calculated for [C₃₀H₄₀N₄O₅ + H⁺] 537.3071, observed 537.3060.

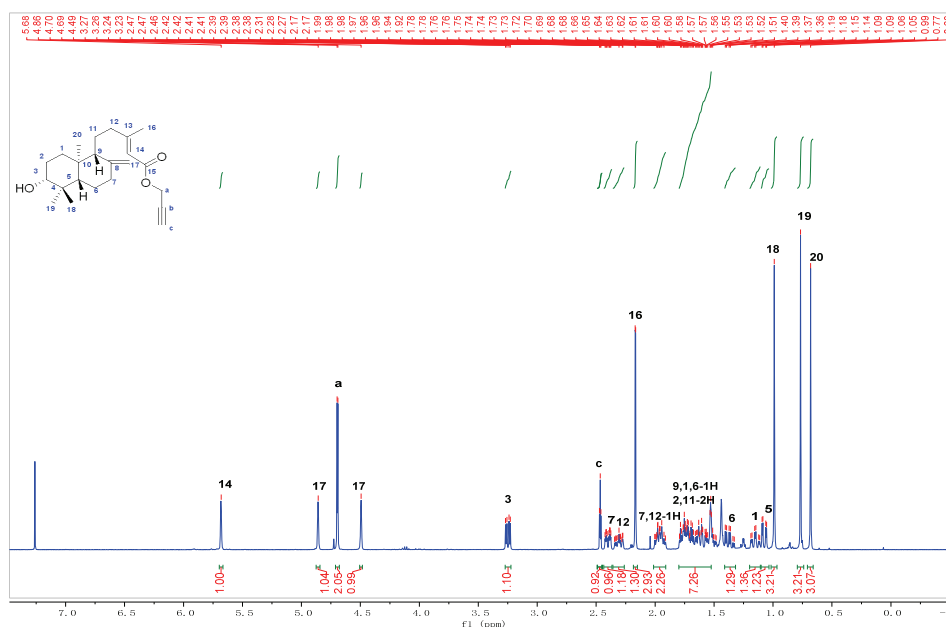
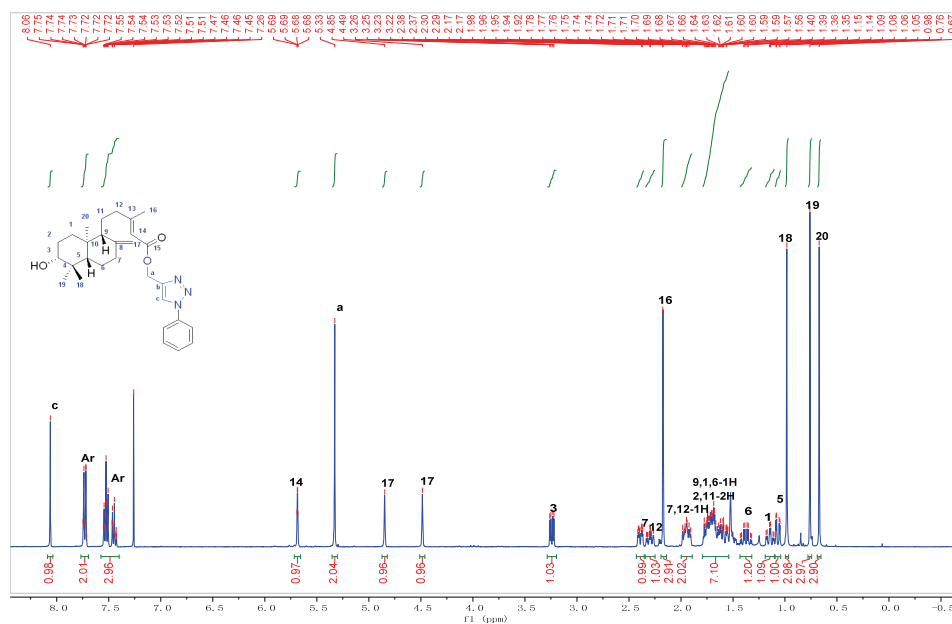
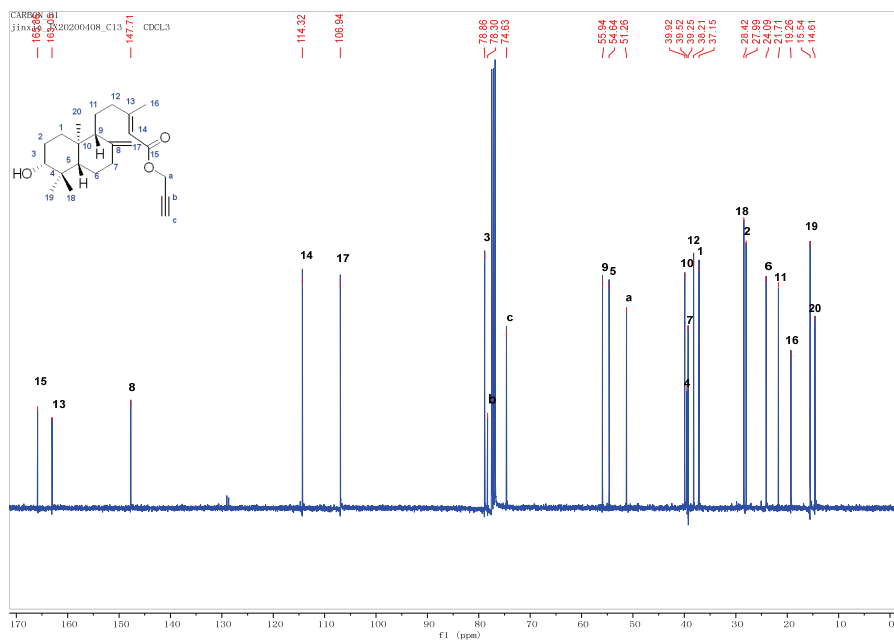


Fig. S-1. ¹H NMR spectrum of compound 3 (CDCl₃, 400 MHz).



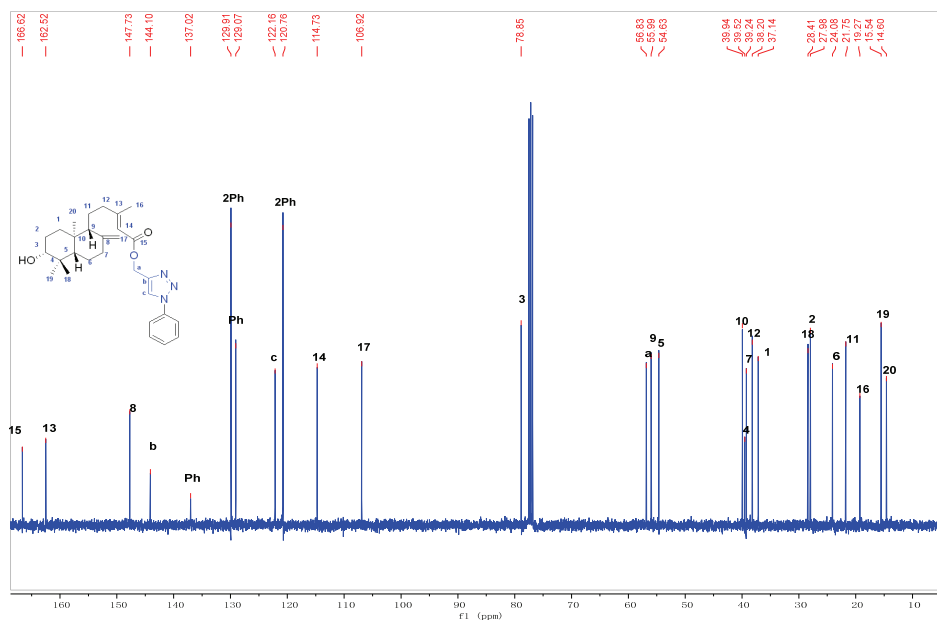


Fig. S-4. ¹³C NMR spectrum of compound 5a (CDCl₃, 100 MHz)

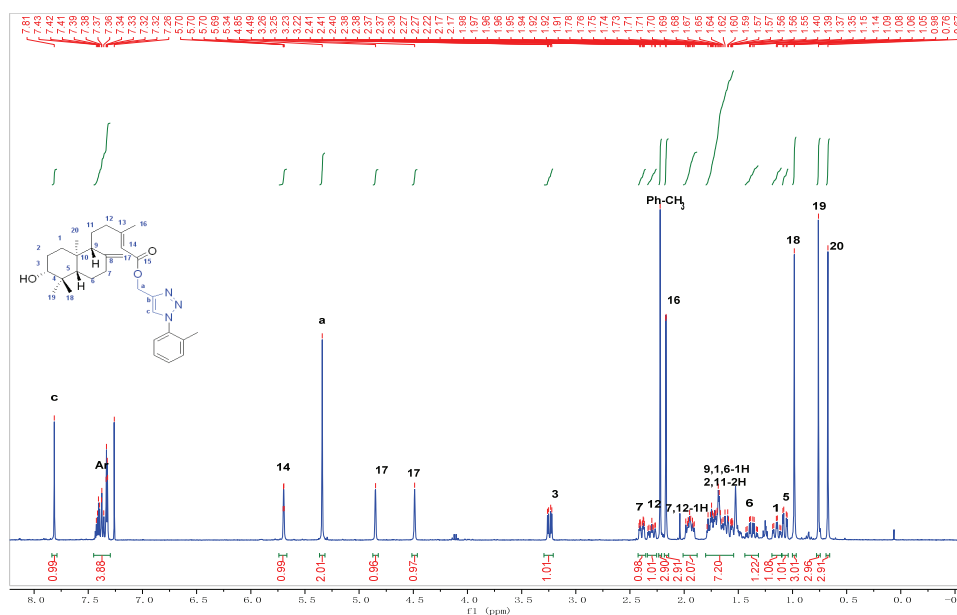
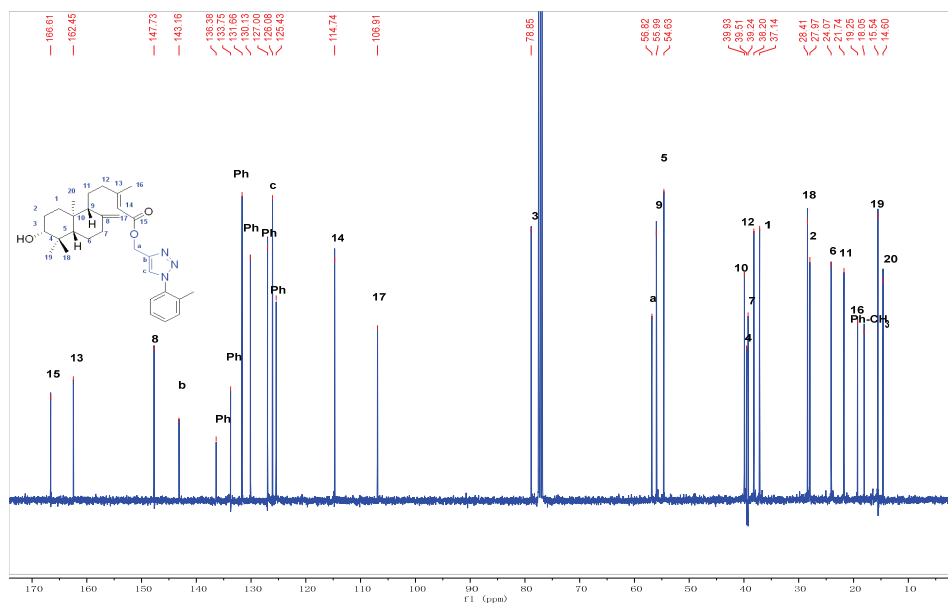
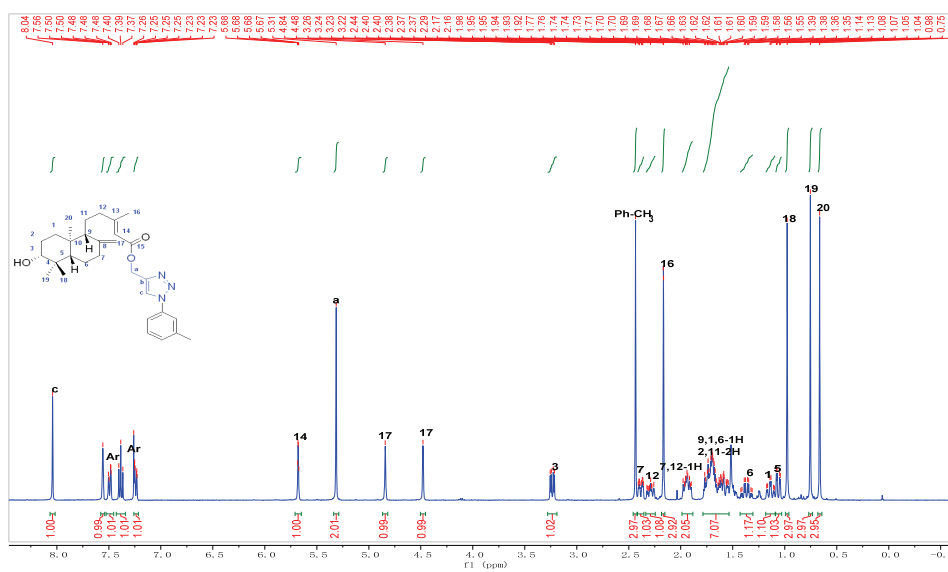


Fig. S-5. ¹H NMR spectrum of compound 5b (CDCl₃, 400 MHz)

Fig. S-6. ^{13}C NMR spectrum of compound 5b (CDCl_3 , 100 MHz)Fig. S-7. ^1H NMR spectrum of compound 5c (CDCl_3 , 400 MHz)

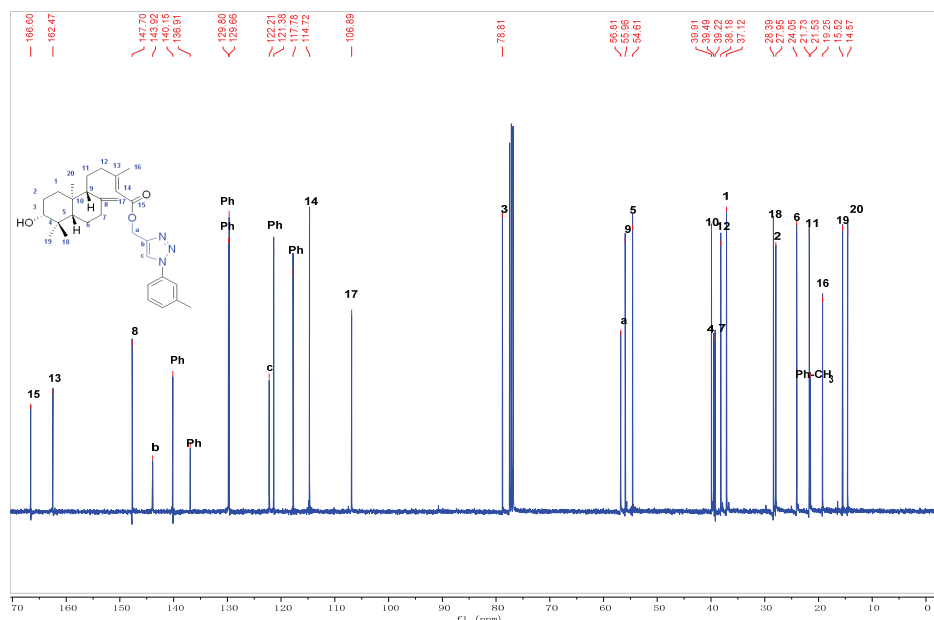


Fig. S-8. ¹³C NMR spectrum of compound 5c (CDCl₃, 100 MHz)

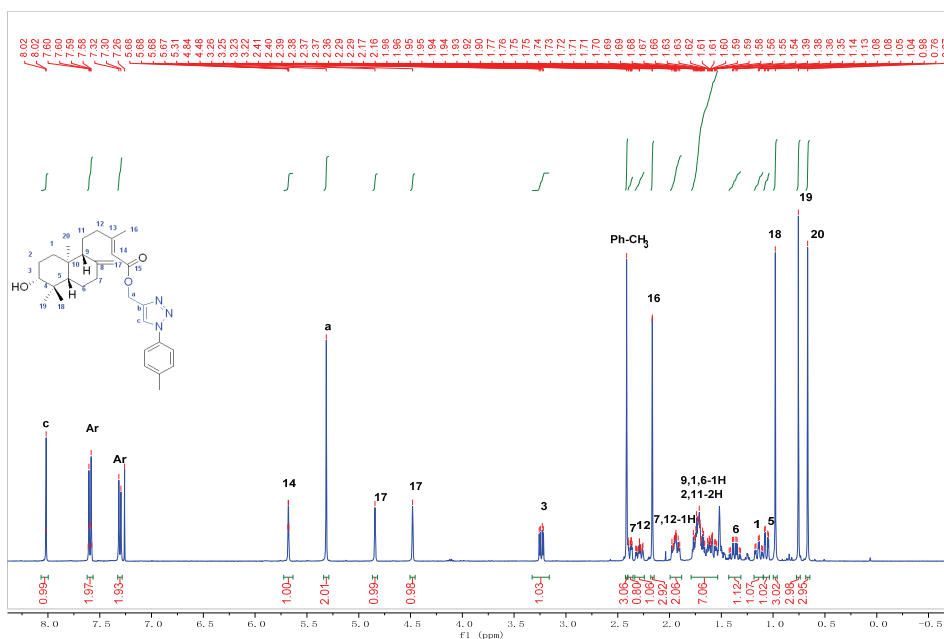


Fig. S-9. ¹H NMR spectrum of compound 5d (CDCl₃, 400 MHz)

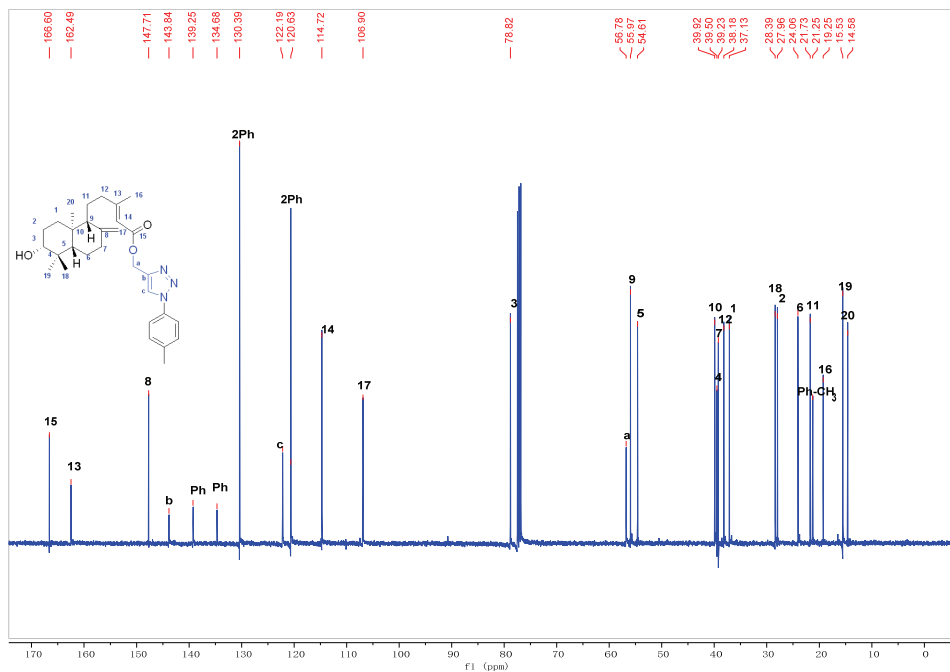
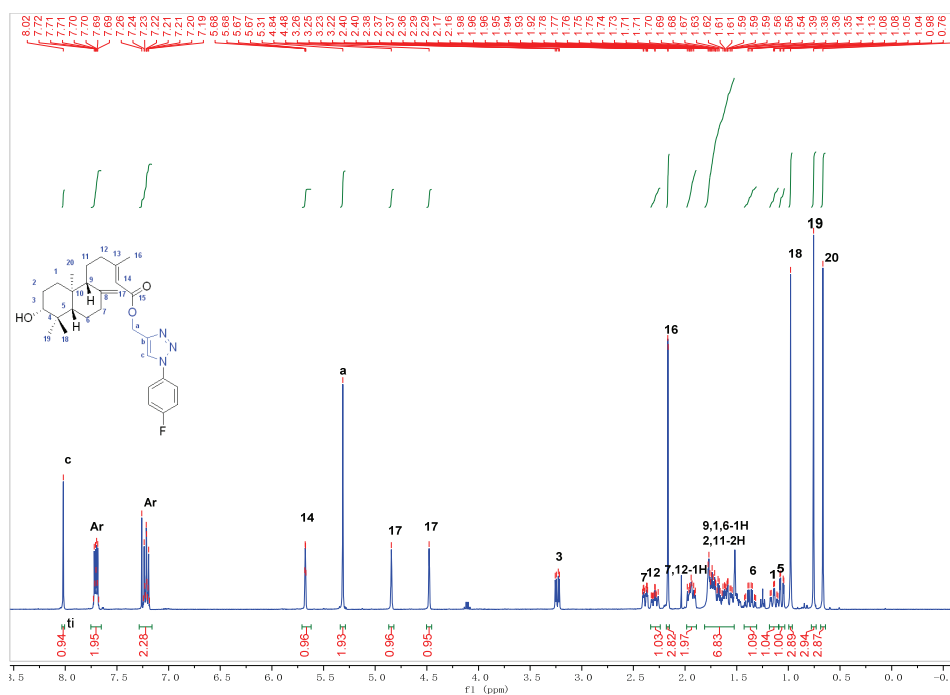
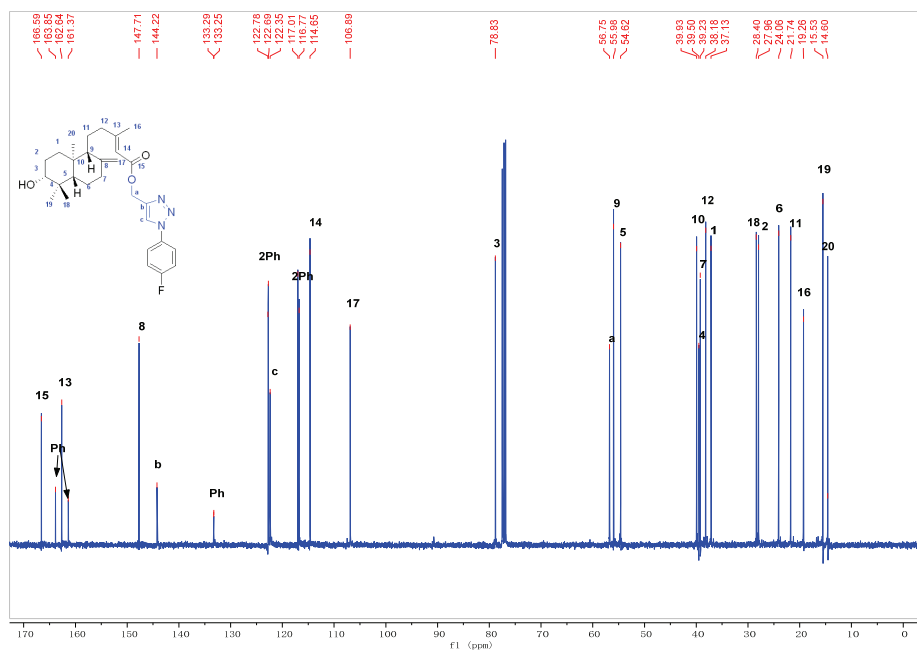
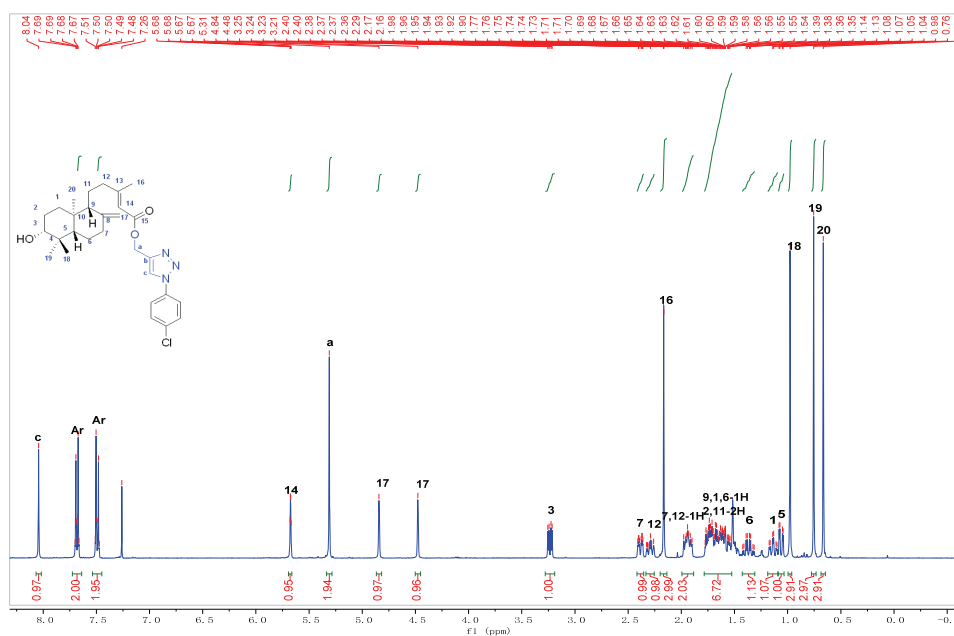
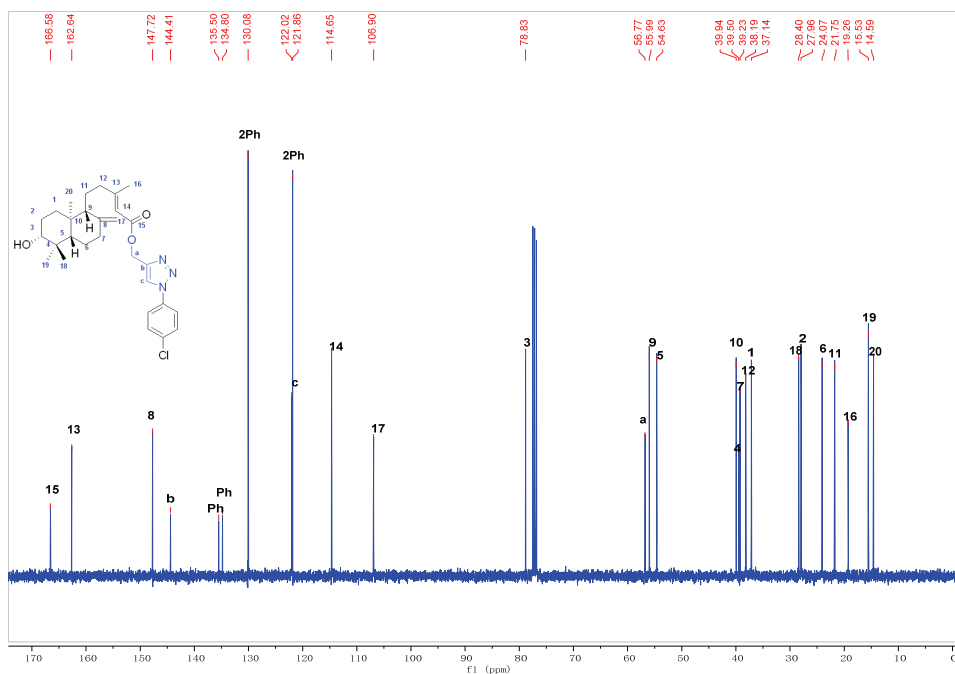
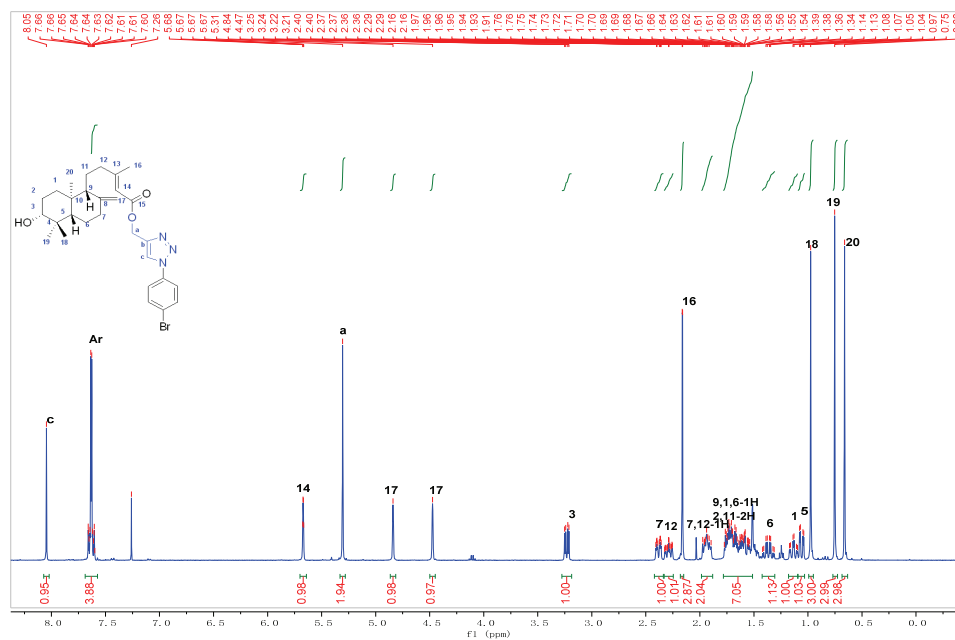
Fig. S-10. ^{13}C NMR spectrum of compound 5d (CDCl₃, 100 MHz)

Fig. S-11. ^1H NMR spectrum of compound 5e (CDCl_3 , 400 MHz)Fig. S-12. ^{13}C NMR spectrum of compound 5e (CDCl_3 , 100 MHz)Fig. S-13. ^1H NMR spectrum of compound 5f (CDCl_3 , 400 MHz)

Fig. S-14. ^{13}C NMR spectrum of compound 5f (CDCl_3 , 100 MHz)Fig. S-15. ^1H NMR spectrum of compound 5g (CDCl_3 , 400 MHz)

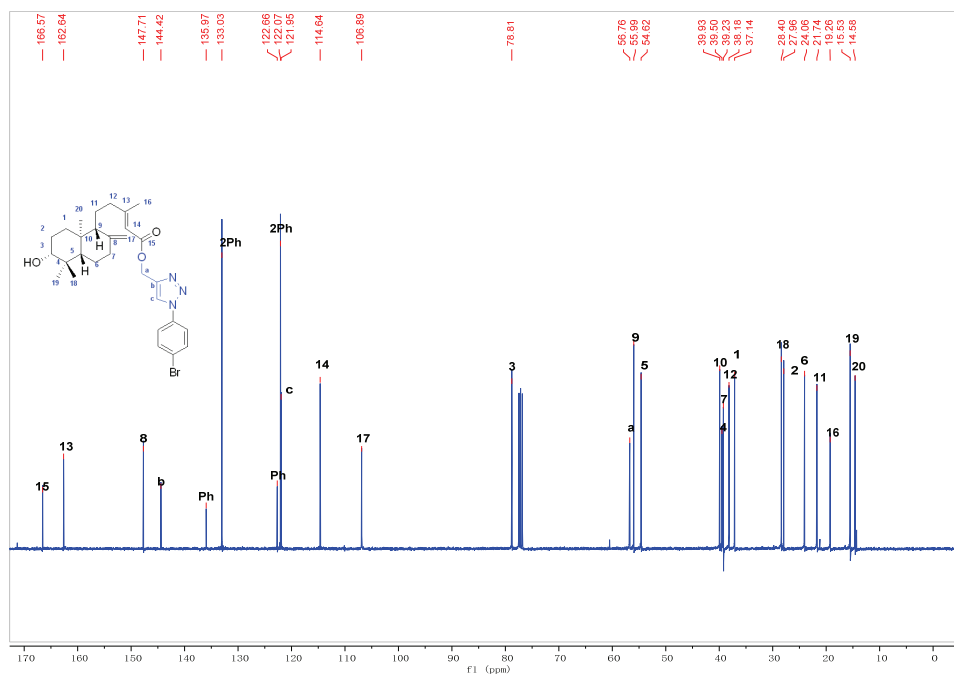


Fig. S-16. ^{13}C NMR spectrum of compound 5g (CDCl₃, 100 MHz)

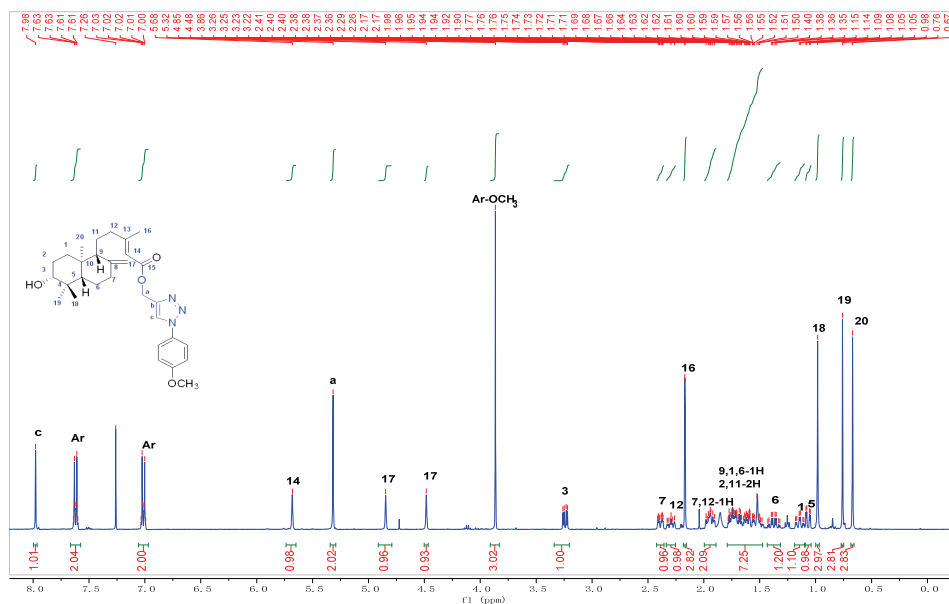
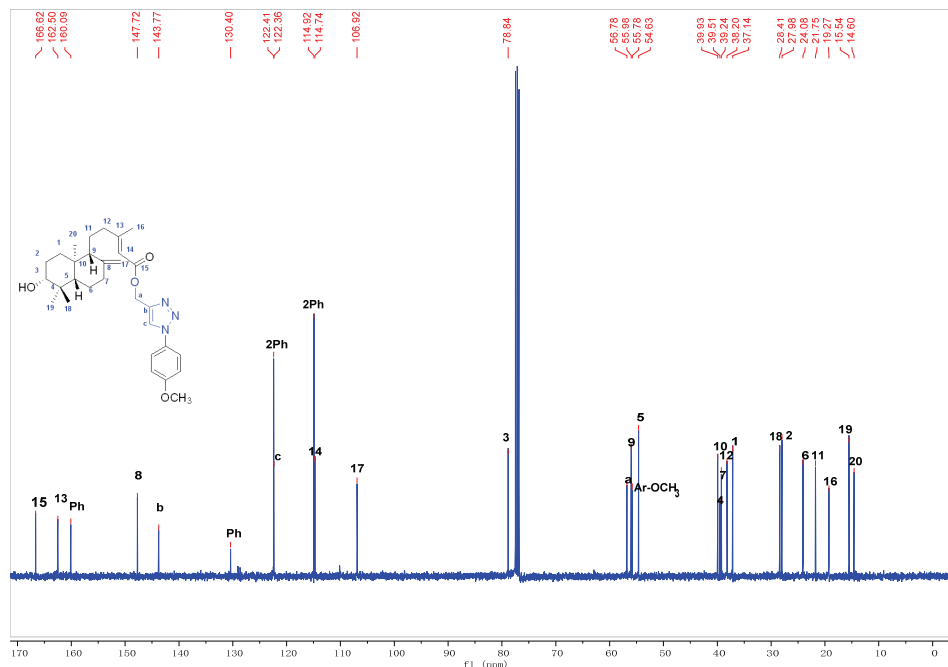
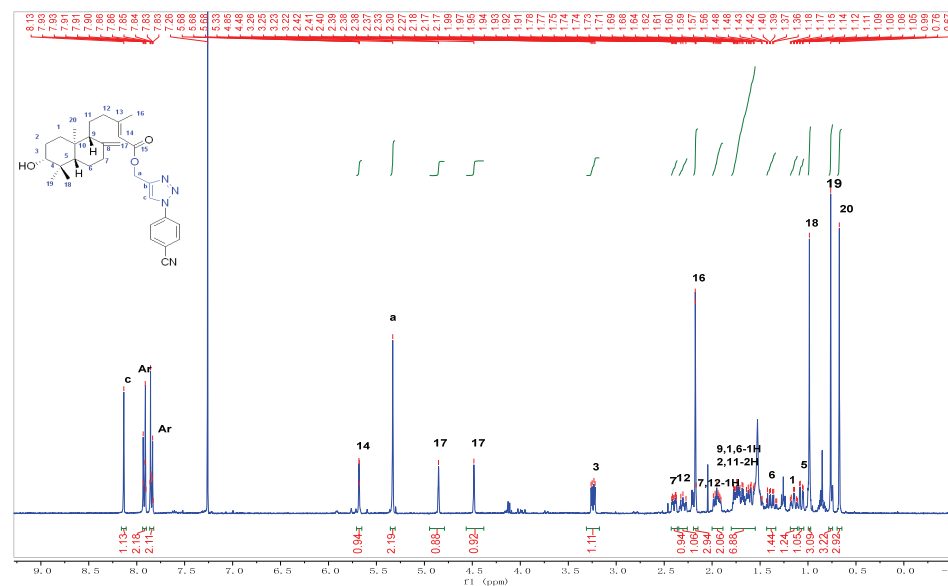


Fig. S-17. ^1H NMR spectrum of compound 5h (CDCl₃, 400 MHz)

Fig. S-18. ^{13}C NMR spectrum of compound 5h (CDCl_3 , 100 MHz)Fig. S-19. ^1H NMR spectrum of compound 5i (CDCl_3 , 400 MHz)

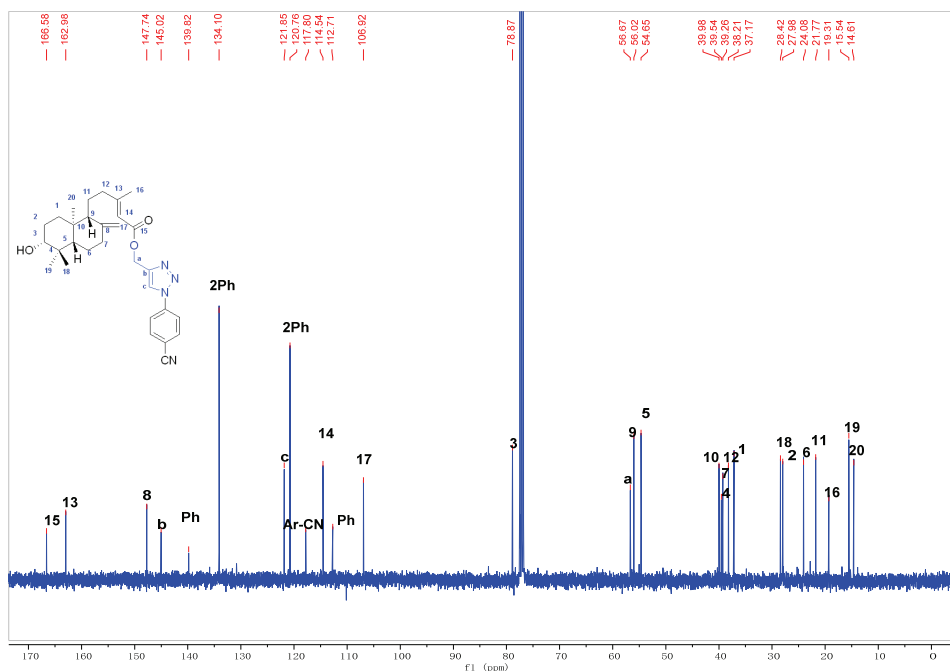


Fig. S-20. ^{13}C NMR spectrum of compound 5i (CDCl_3 , 100 MHz)

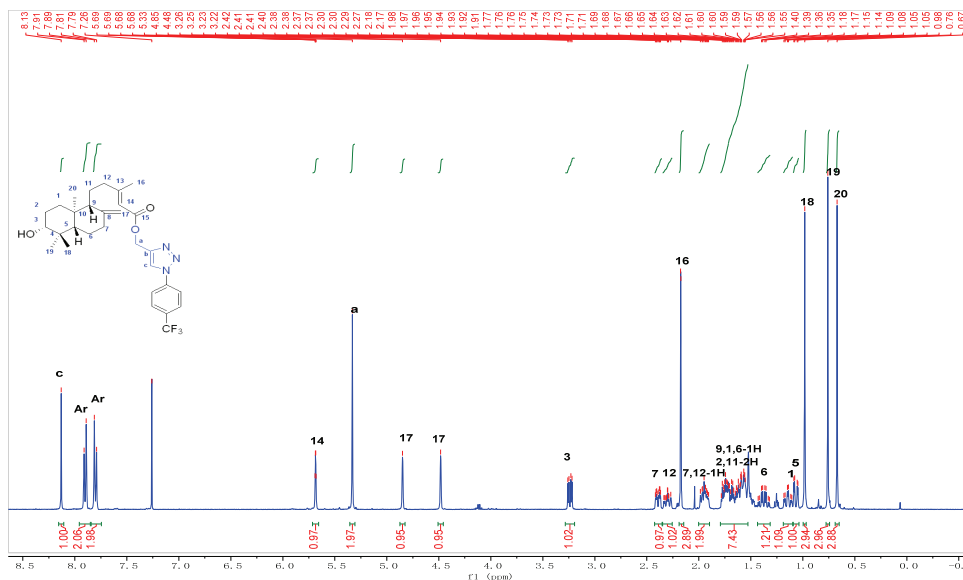
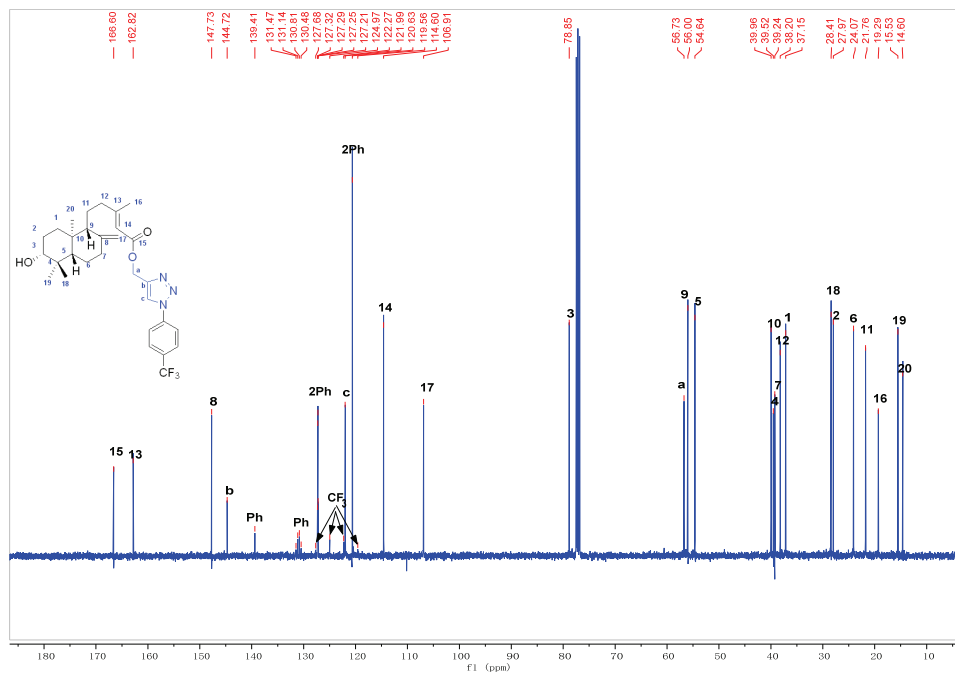


Fig. S-21. ^1H NMR spectrum of compound 5j (CDCl_3 , 400 MHz)

Fig. S-22. ¹³C NMR spectrum of compound 5j (CDCl₃, 100 MHz)

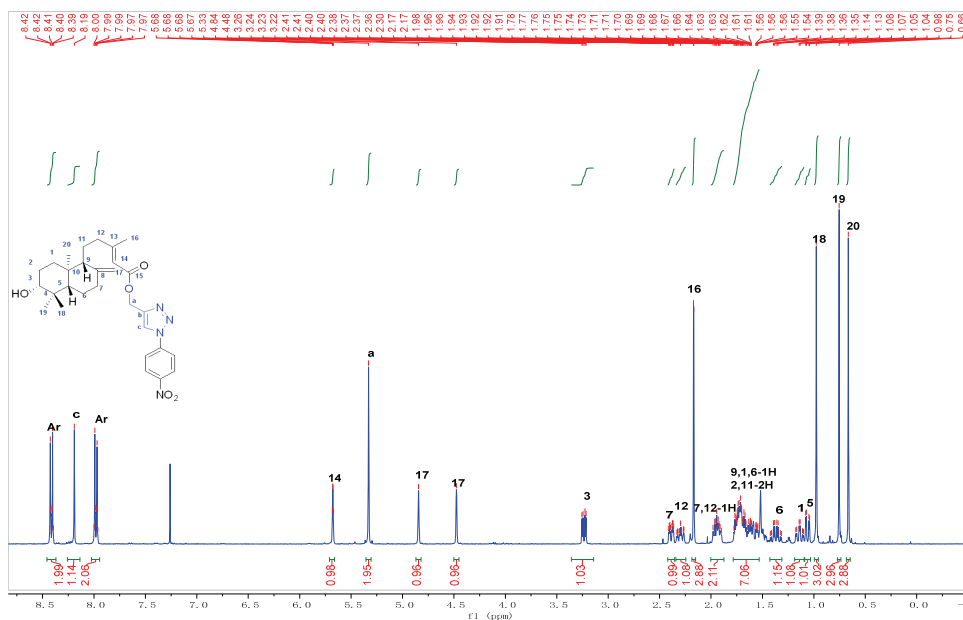


Fig. S-23. ^1H NMR spectrum of compound 5k (CDCl₃, 400 MHz)

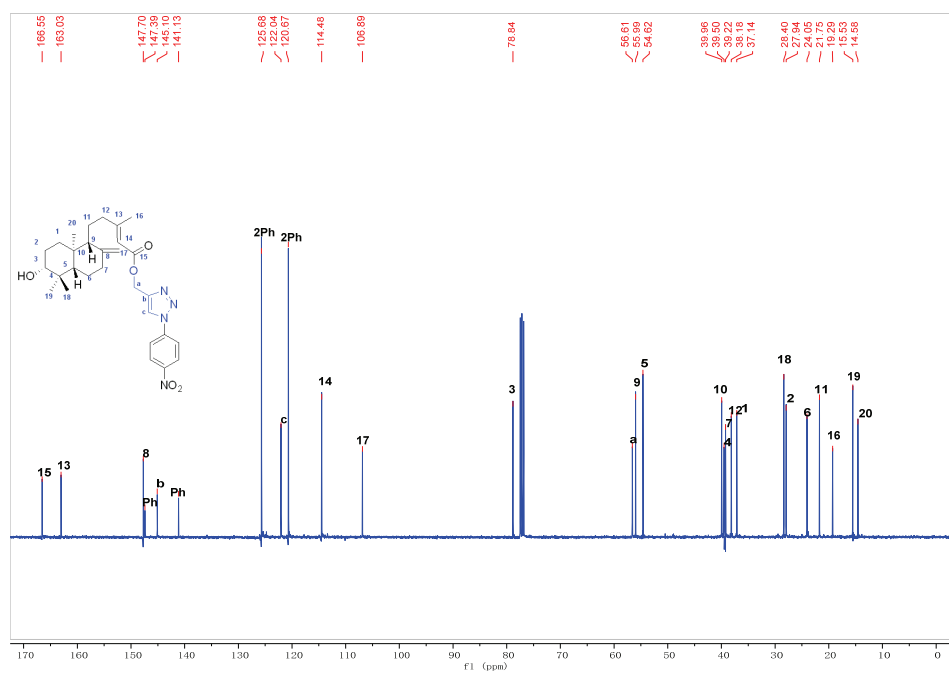
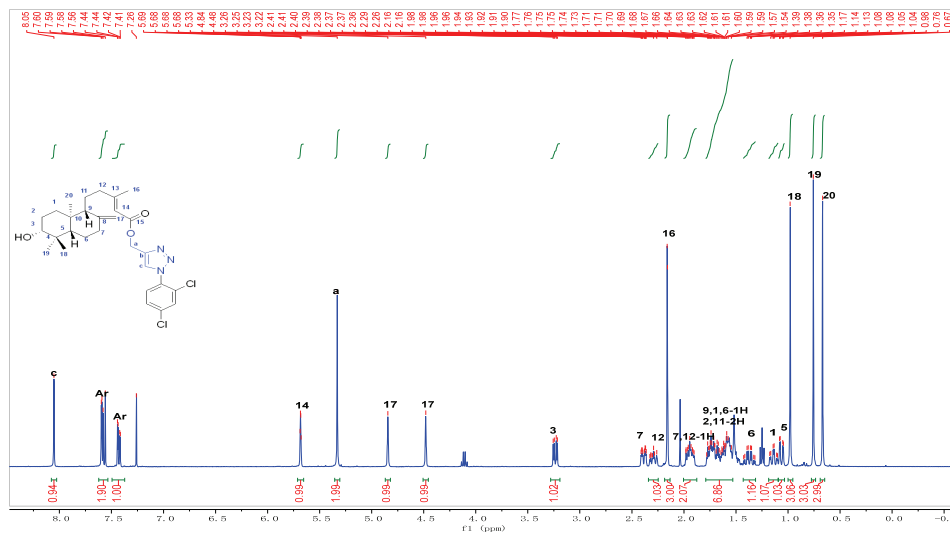
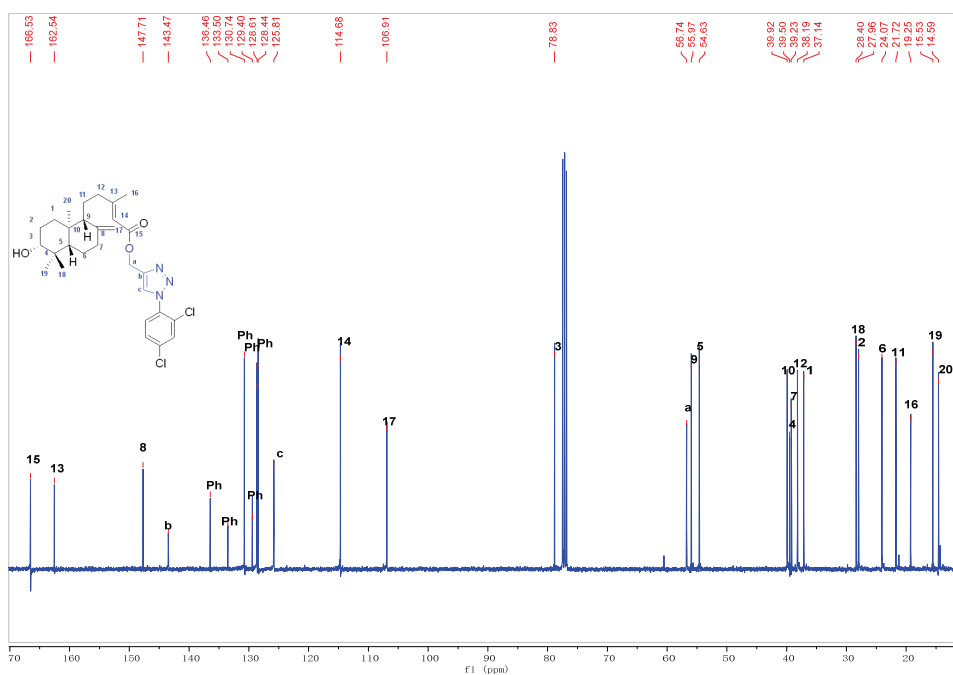


Fig. S-24. ^{13}C NMR spectrum of compound 5k (CDCl₃, 100 MHz)

Fig. S-25. ^1H NMR spectrum of compound 51 (CDCl₃, 400 MHz)Fig. S-26. ^{13}C NMR spectrum of compound 51 (CDCl₃, 100 MHz)

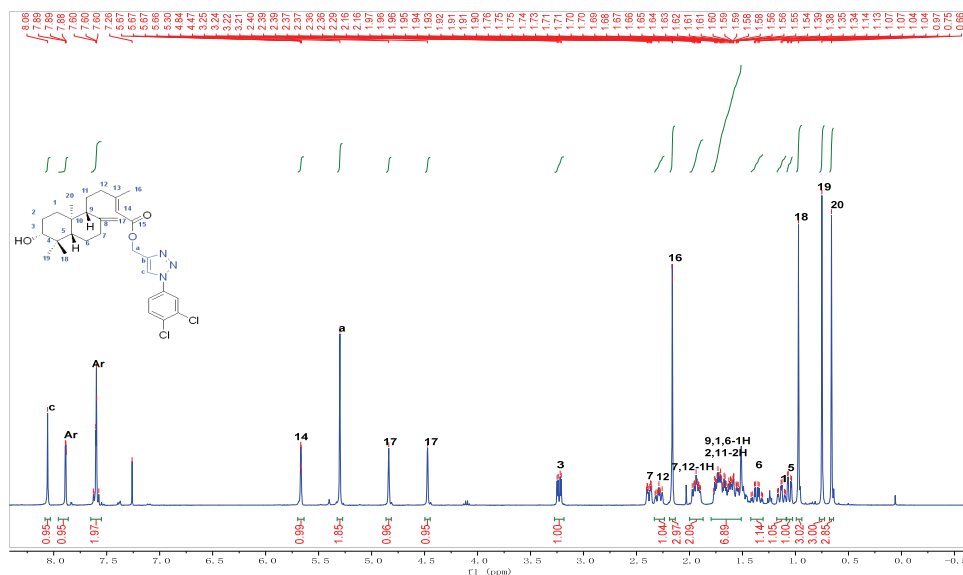


Fig. S-27. ^1H NMR spectrum of compound 5m (CDCl₃, 400 MHz)

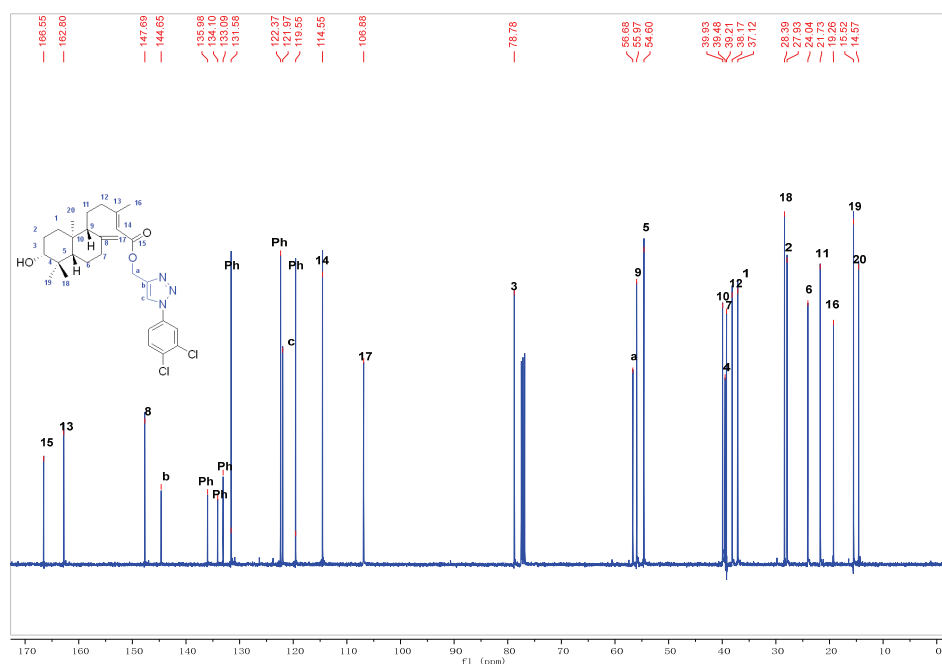
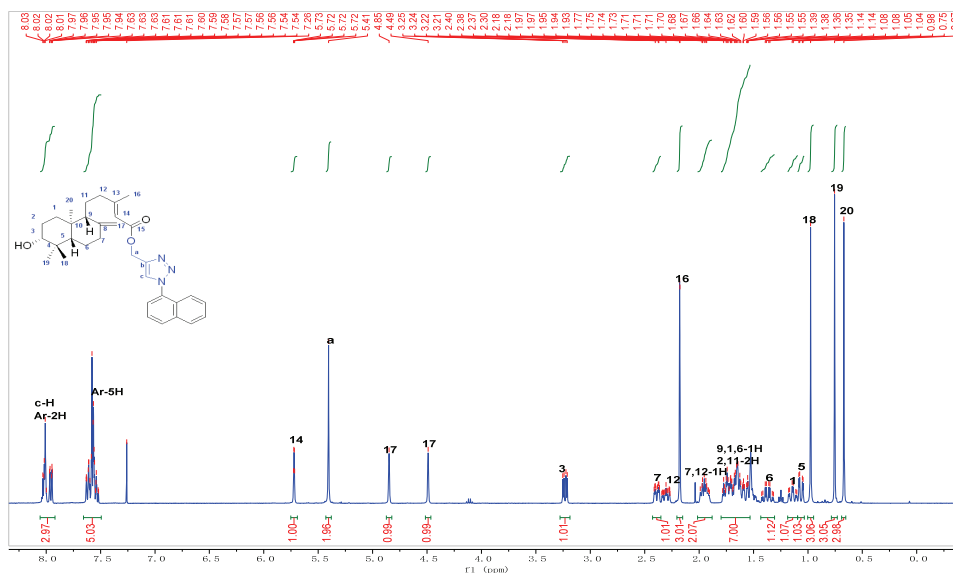
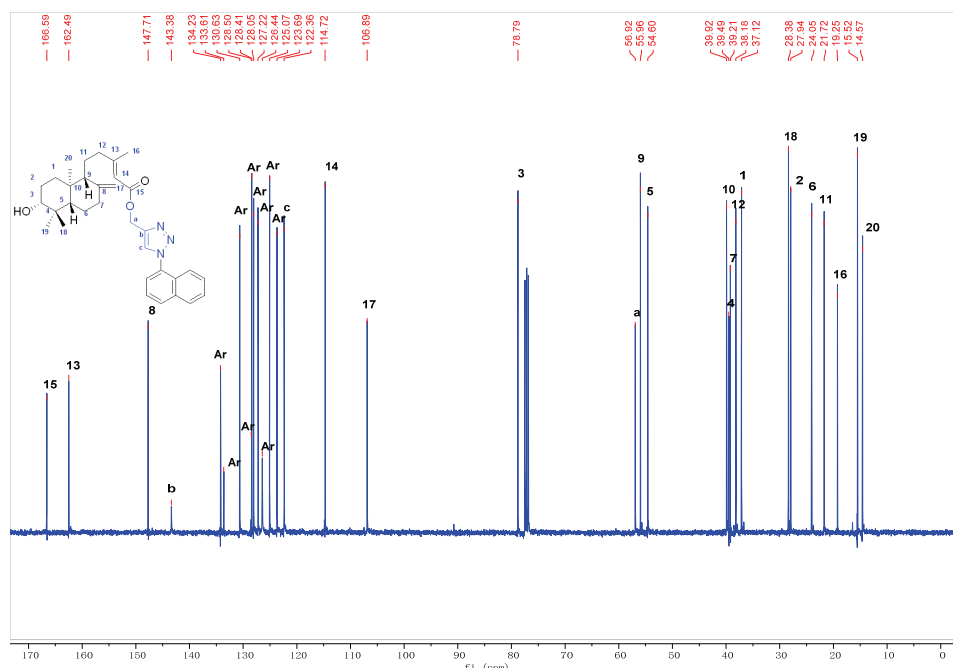


Fig. S-28. ^{13}C NMR spectrum of compound 5m (CDCl₃, 100 MHz)

Fig. S-29. ^1H NMR spectrum of compound 5n (CDCl₃, 400 MHz)Fig. S-30. ^{13}C NMR spectrum of compound 5n (CDCl₃, 100 MHz)

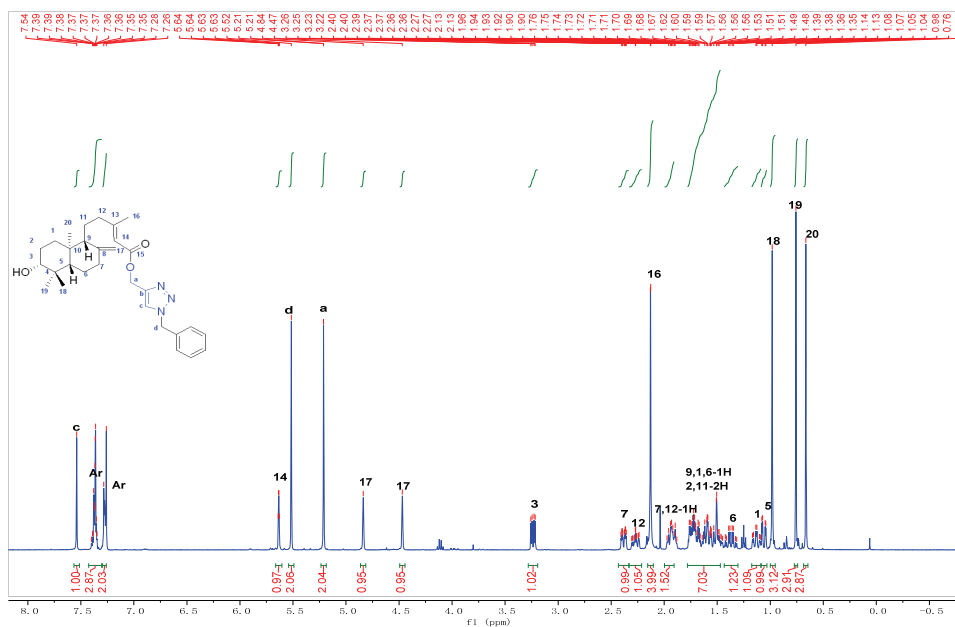


Fig. S-31. ¹H NMR spectrum of compound 5o (CDCl₃, 400 MHz)

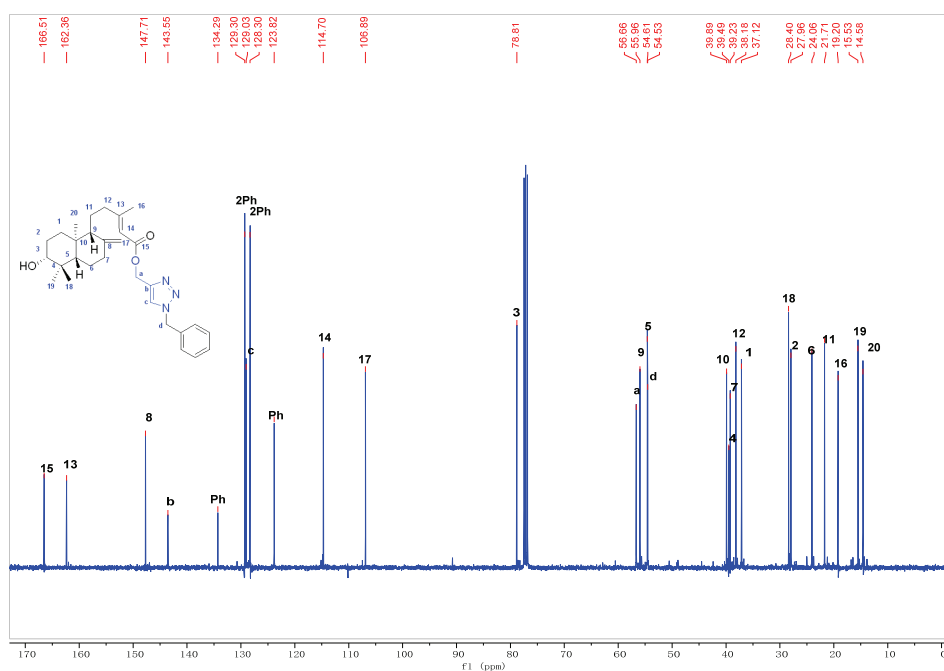
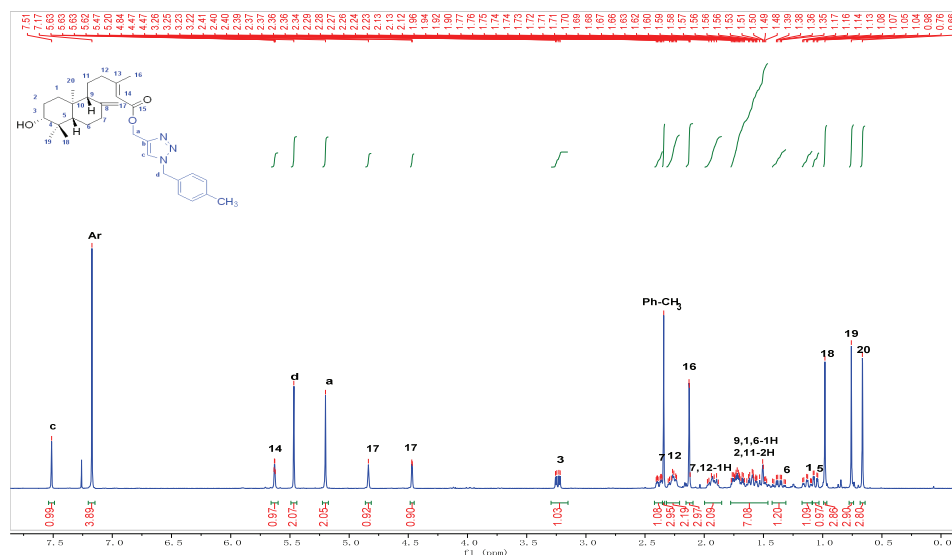
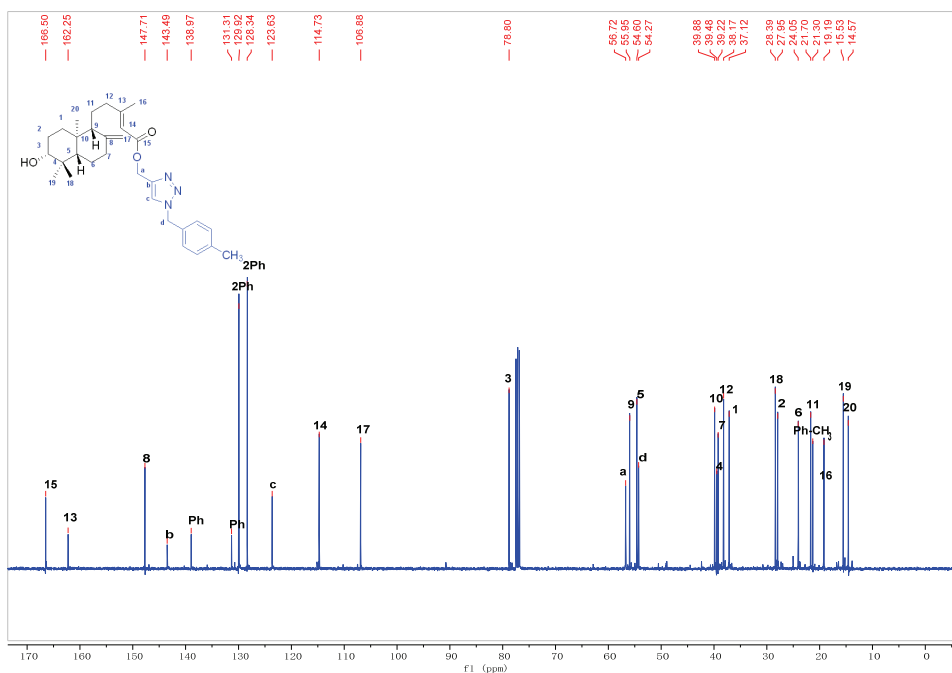


Fig. S-32. ¹³C NMR spectrum of compound 5o (CDCl₃, 100 MHz)

Fig. S-33. ^1H NMR spectrum of compound 5p (CDCl_3 , 400 MHz)Fig. S-34. ^{13}C NMR spectrum of compound 5p (CDCl_3 , 100 MHz)

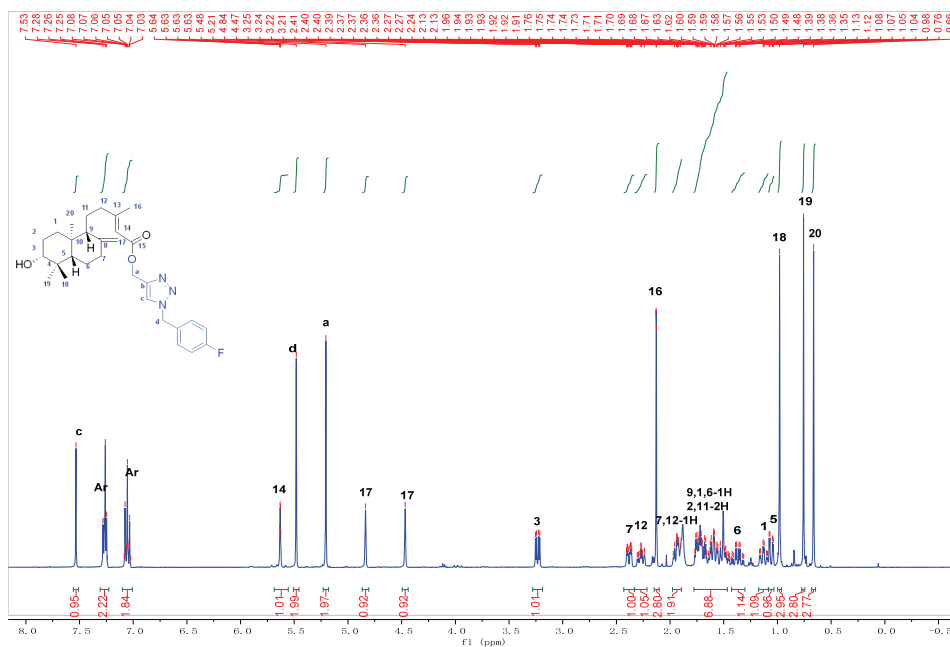


Fig. S-35. ¹H NMR spectrum of compound 5q (CDCl₃, 400 MHz)

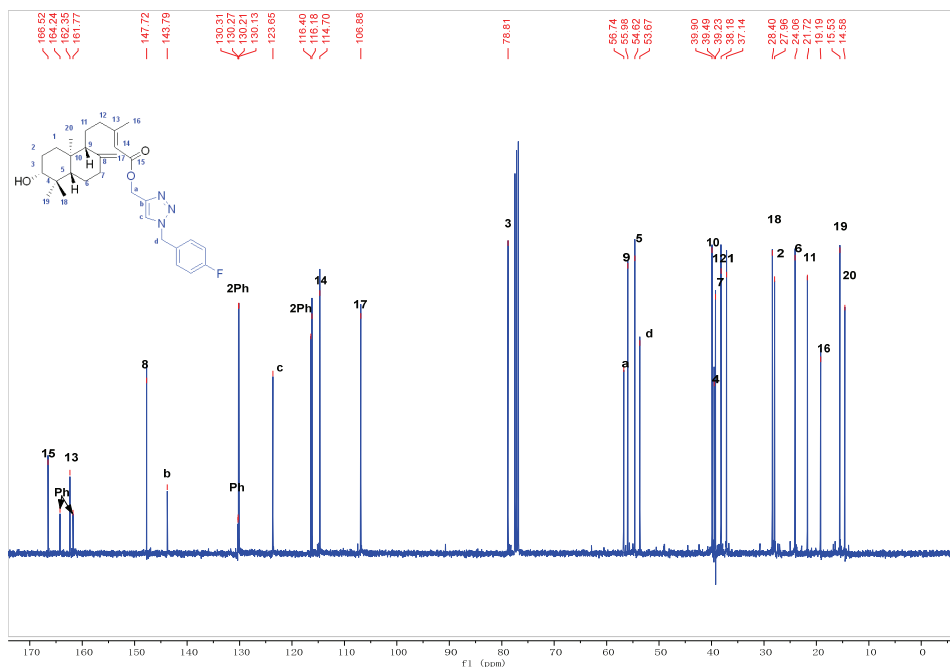
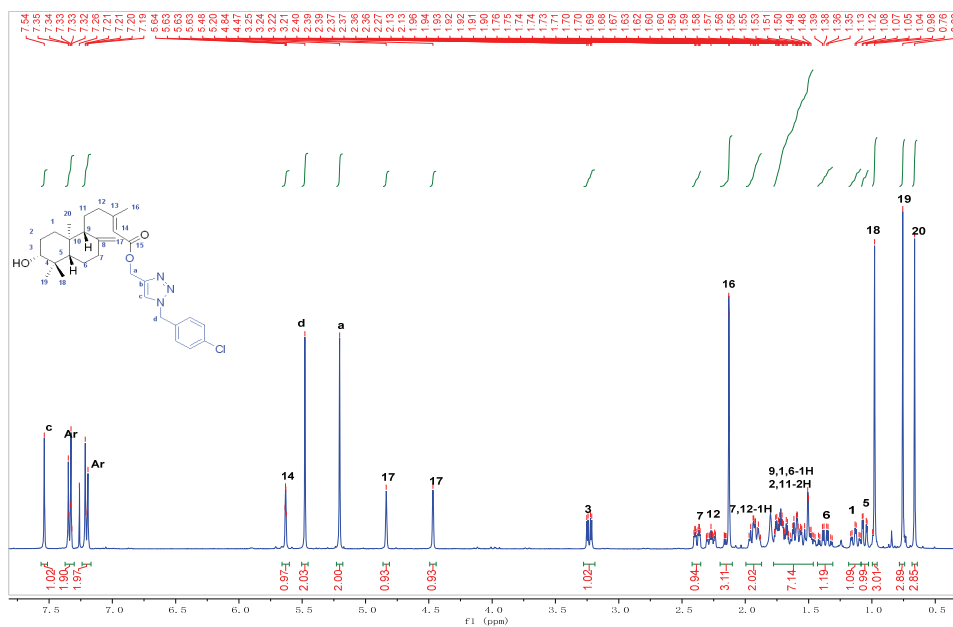
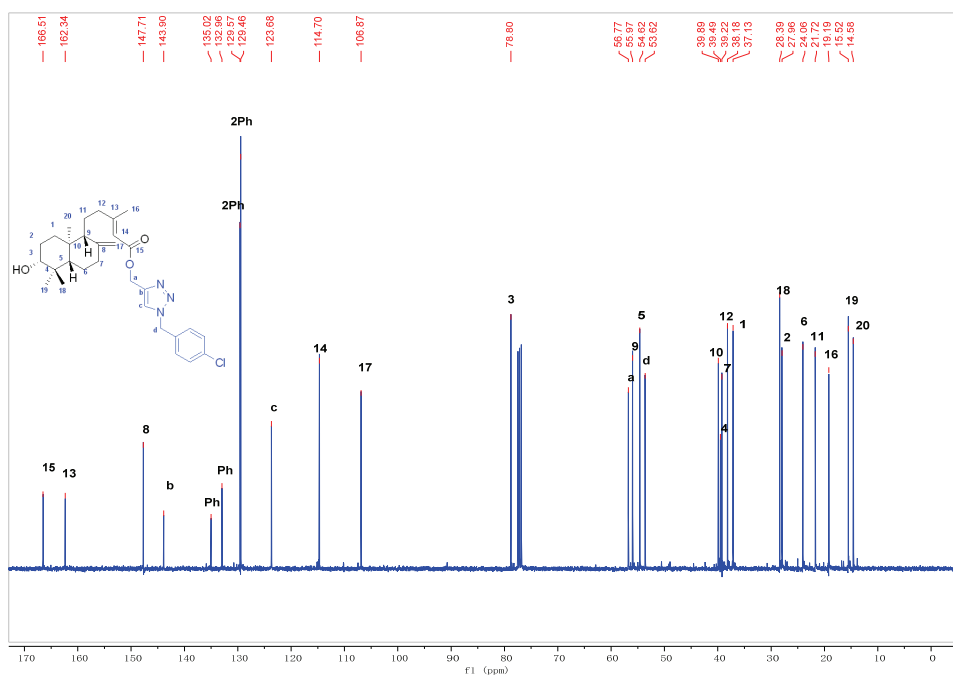


Fig. S-36. ¹³C NMR spectrum of compound 5q (CDCl₃, 100 MHz)

Fig. S-37. ^1H NMR spectrum of compound 5r (CDCl_3 , 400 MHz)Fig. S-38. ^{13}C NMR spectrum of compound 5r (CDCl_3 , 100 MHz)

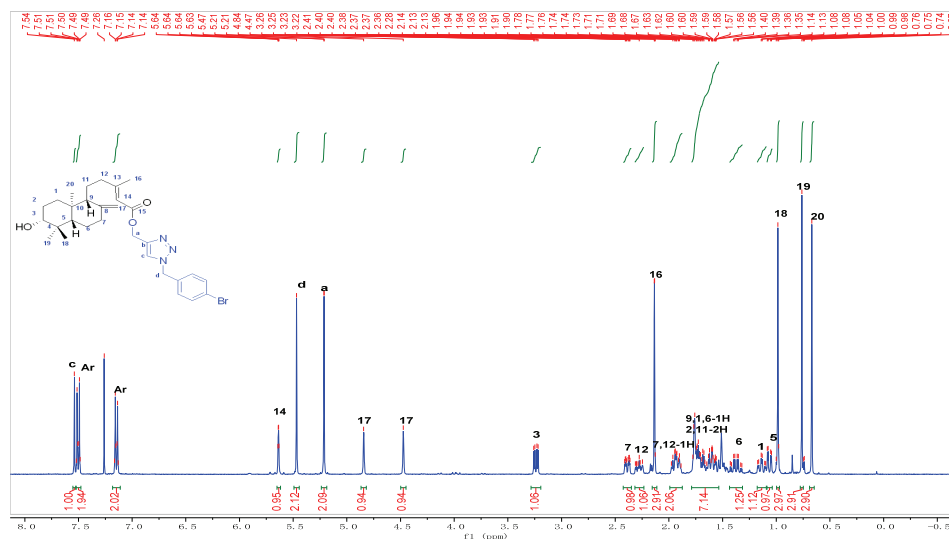


Fig. S-39. ¹H NMR spectrum of compound 5s (CDCl₃, 400 MHz)

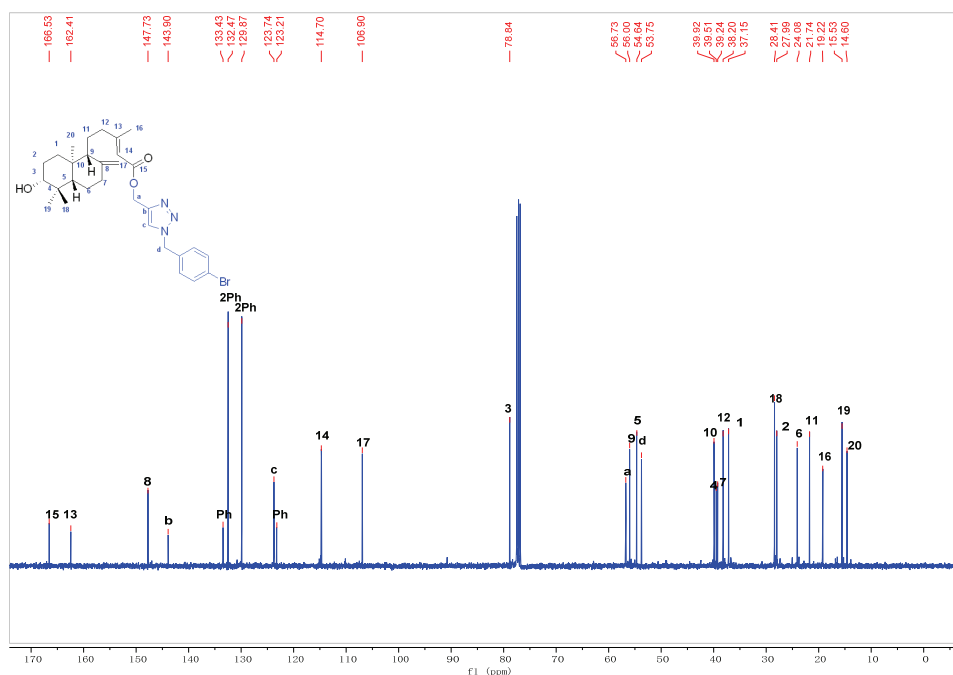
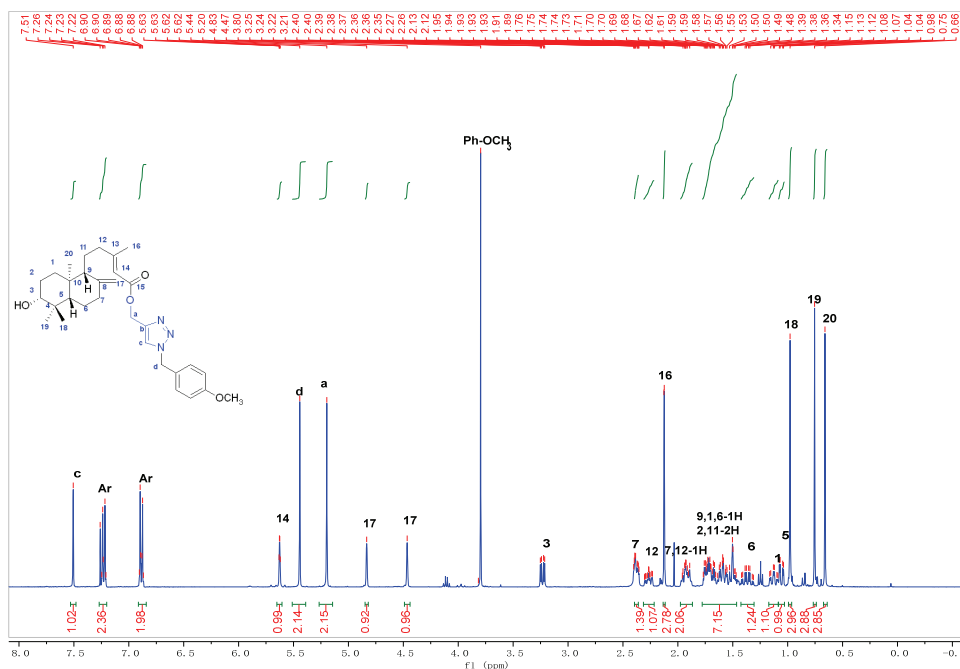
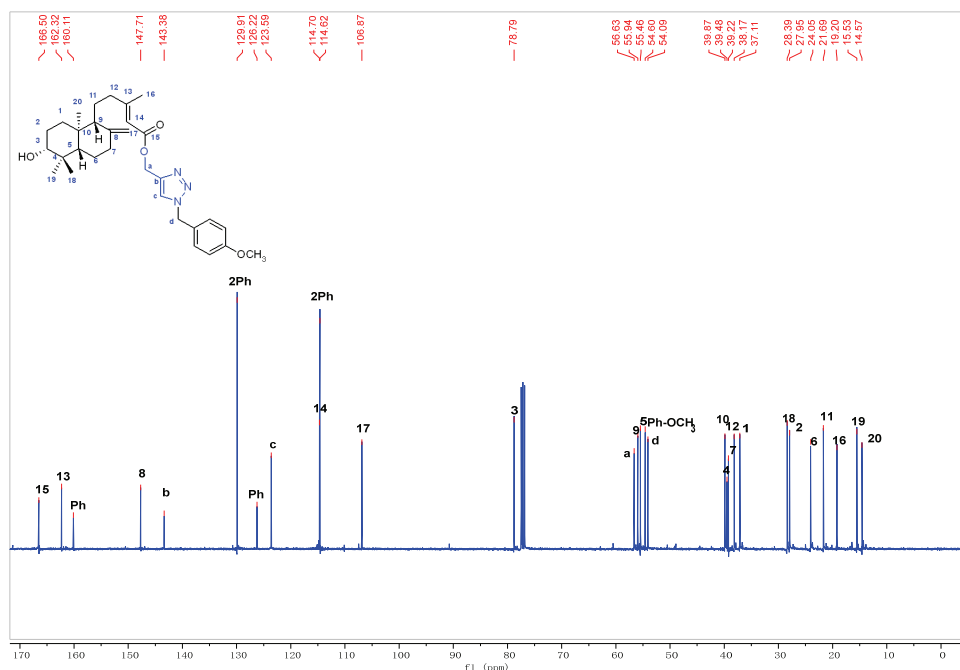


Fig. S-40. ¹³C NMR spectrum of compound 5s (CDCl₃, 100 MHz)

Fig. S-41. ^1H NMR spectrum of compound 5t (CDCl_3 , 400 MHz)Fig. S-42. ^{13}C NMR spectrum of compound 5t (CDCl_3 , 100 MHz)

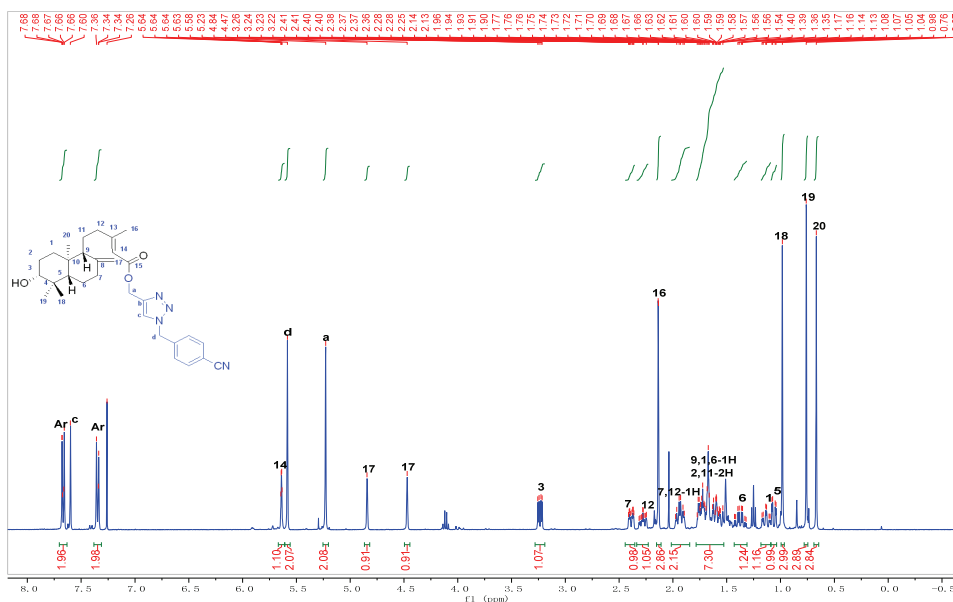


Fig. S-43. ^1H NMR spectrum of compound 5u (CDCl_3 , 400 MHz)

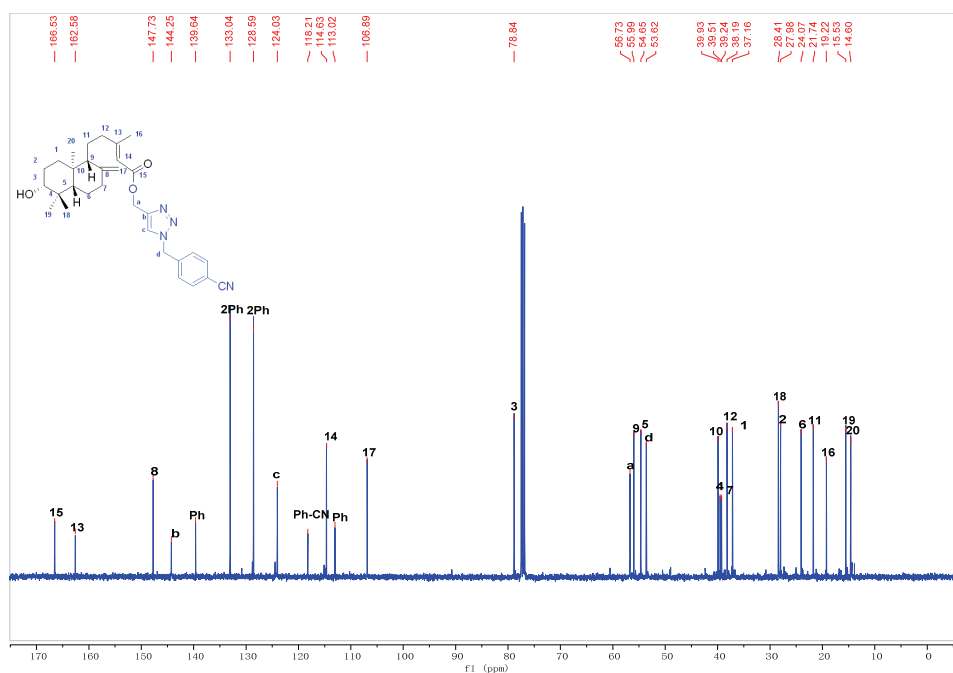
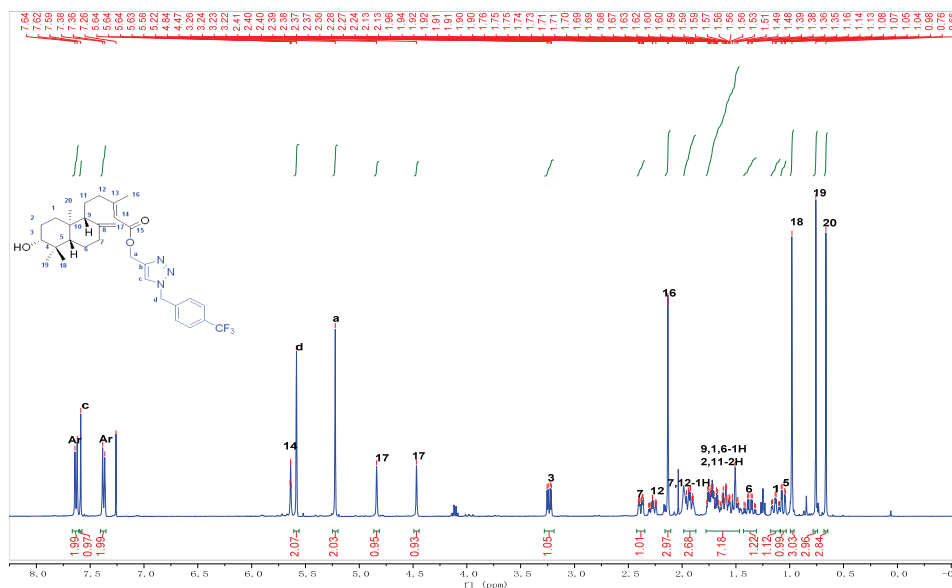
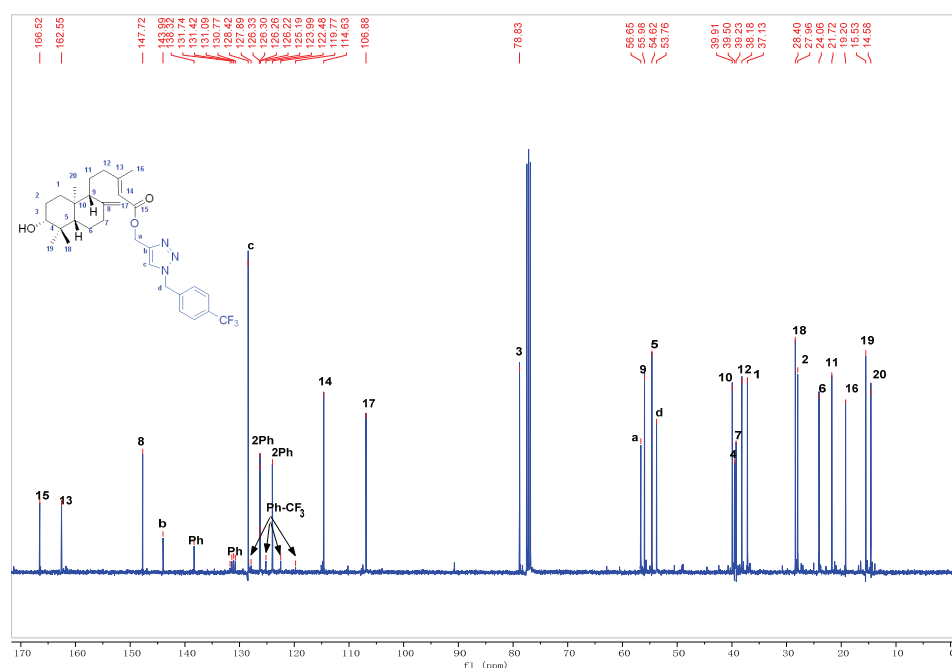


Fig. S-44. ^{13}C NMR spectrum of compound 5u (CDCl_3 , 100 MHz)

Fig. S-45. ^1H NMR spectrum of compound 5v (CDCl_3 , 400 MHz)Fig. S-46. ^{13}C NMR spectrum of compound 5v (CDCl_3 , 100 MHz)

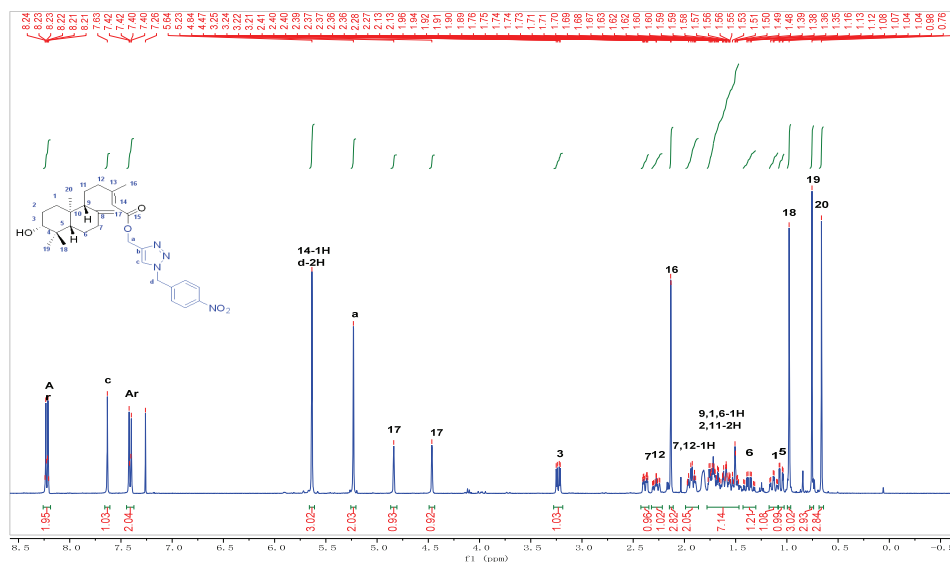


Fig. S-47. ¹H NMR spectrum of compound 5w (CDCl₃, 400 MHz)

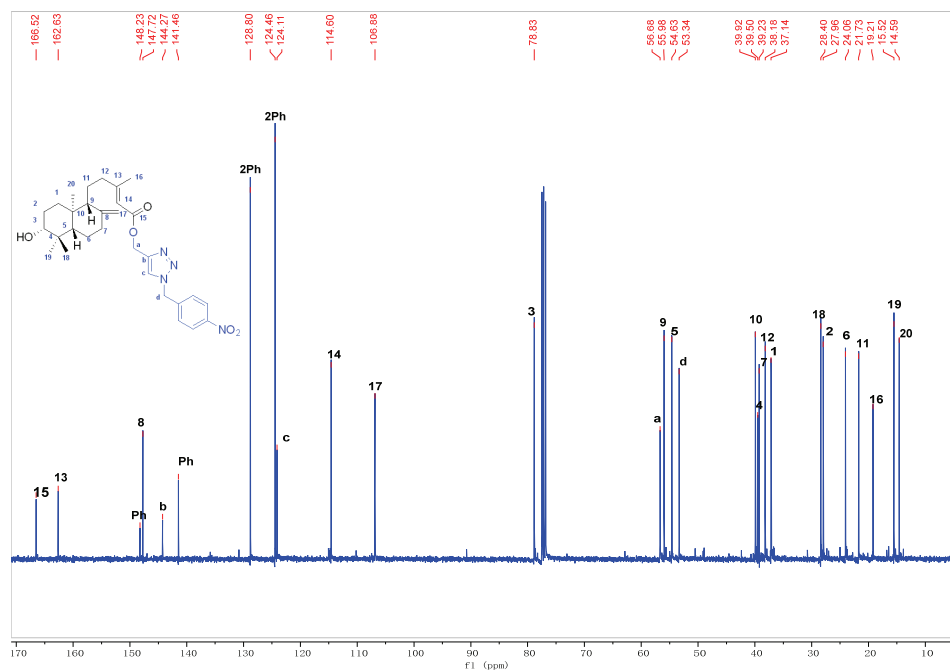


Fig. S-48. ¹³C NMR spectrum of compound 5w (CDCl₃, 100 MHz).