Synthesis of Thiazolo[2,3-*b*]quinazoline Derivatives via Base-Promoted Cascade Bicyclization of *o*-Alkenylphenyl Isothiocyanates with Propargylamines

Jiankang Miao, Xiaoyan Sang, Yi Wang, Shufeng Deng and Wenyan Hao*

Key Laboratory of Functional Small Organic Molecules, Ministry of Education, and College of Chemistry & Chemical Engineering, Jiangxi Normal University, 99 Ziyang Road, Nanchang, Jiangxi, 330022, P.R. China
Email :wenyanhao@jxnu.edu.cn

Support Information

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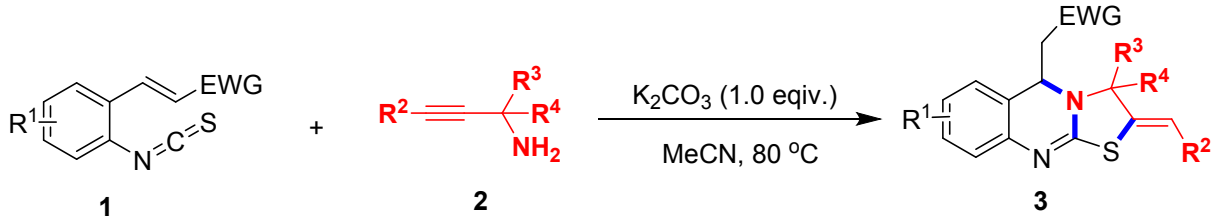
1. General Information

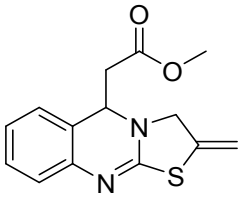
All reagents and metal catalysts were obtained from commercial sources without further purification, and commercially available solvents were purified before use. All reactions were performed in reaction tubes. All new compounds were fully characterized. Silica gel plate GF254 were used for thin layer chromatography (TLC) and silica gel H or 300-400 mesh were used for flash column chromatography. Thin layer chromatography plates were visualized by exposure to ultraviolet light. Nuclear magnetic resonance (NMR) spectra are recorded in parts per million from internal tetramethylsilane on the δ scale. The mass analyzer type used for the HRMS measurements is micro TOF. Yields refer to chromatographically and spectroscopically pure compounds, unless otherwise indicated.

2. Synthesis and Characterization for Compounds 3aa-3sa, 3ab-3an:



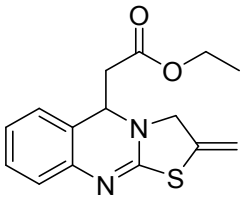
EGW= CO_2R; CN, $CON(CH_3)_2$

A mixture of *o*-alkenylphenyl isothiocyanate **1** (0.20 mmol) and propargylamine **2** (0.3 mmol) K_2CO_3 (0.20 mmol) was added into a tube. Subsequently MeCN (2 mL) was added. Then, the sealed tube was heated at 80 °C for 3 hours. After completion of reaction as indicated by TLC, the mixture was concentrated and directly purified by flash column chromatography (EtOAc/petroleum ether, 1:2) to give the desired product **3.**



methyl 2-(2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3aa)

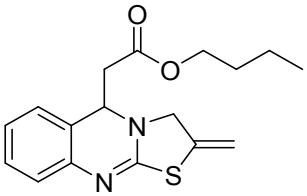
Yellow oil; (52.7 mg, 96%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.12 (t, *J* = 7.4 Hz, 1H), 6.94 (dd, *J* = 8.4, 17.2 Hz, 2H), 6.87 (d, *J* = 7.6 Hz, 1H), 5.20 (s, 1H), 5.11 (s, 1H), 5.04 (t, *J* = 4.8 Hz, 1H), 4.47 (d, *J* = 14.4 Hz, 1H), 4.23 (d, *J* = 14.4 Hz, 1H), 3.57 (s, 3H), 2.76-2.62 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.9, 160.0, 140.8, 134.3, 128.0, 124.5, 123.6, 122.6, 120.8, 105.1, 55.5, 53.2, 51.1, 39.3; HRMS calcd for $C_{14}H_{15}N_2O_2S^+$ (M + H^+): 275.0849; Found: 275.0851.



ethyl 2-(2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ba)

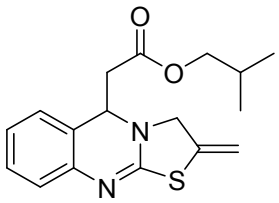
Yellow oil; (51.9 mg, 90%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.12 (t, *J* = 7.4 Hz, 1H), 6.95 (dd,

J = 8.0, 16.0 Hz, 2H), 6.88 (d, *J* = 7.2 Hz, 1H), 5.19 (d, *J* = 1.2 Hz, 1H), 5.11 (d, *J* = 1.6 Hz, 1H), 5.05 (t, *J* = 5.2 Hz, 1H), 4.50 (d, *J* = 14 Hz, 1H), 4.23 (d, *J* = 14 Hz, 1H), 4.06-3.99 (m, 2H), 2.74-2.62 (m, 2H), 1.11(t, *J* = 7.2 Hz, 3H) ; ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.4, 161.0, 141.9, 135.4, 128.9, 125.6, 124.6, 123.7, 121.8, 106.0, 61.1, 56.6, 54.4, 40.6, 14.0; HRMS calcd for $C_{15}H_{17}N_2O_2S^+$ (M + H^+): 289.1005; Found: 289.1016.



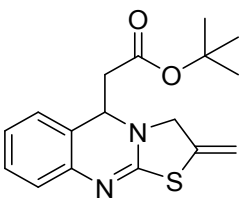
butyl 2-(2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ca)

Yellow oil; (49.4 mg, 78%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.12 (t, *J* = 7.6 Hz, 1H), 6.96 (dd, *J* = 8.0, 18.8 Hz, 2H), 6.88 (d, *J* = 7.6 Hz, 1H), 5.20 (d, *J* = 2.0 Hz, 1H), 5.12 (d, *J* = 2.0 Hz, 1H), 5.05 (t, *J* = 5.2 Hz, 1H), 4.50 (d, *J* = 14.0 Hz, 1H), 4.24 (d, *J* = 14.0 Hz, 1H), 3.99-3.95 (m, 2H), 2.77-2.63 (m, 2H), 1.49-1.42 (m, 2H), 1.24-1.15 (m, 2H), 0.81 (t, *J* = 7.2 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.6, 161.0, 141.8, 135.4, 128.9, 125.5, 124.6, 123.6, 121.8, 106.0, 65.0, 56.6, 54.4, 40.6, 30.4, 19.0, 13.6; HRMS calcd for $C_{17}H_{21}N_2O_2S^+$ (M + H^+): 317.1318; Found: 317.1295.



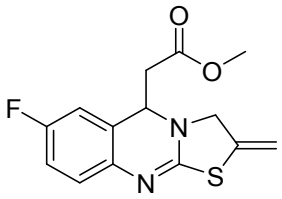
isobutyl 2-(2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3da)

Yellow oil; (58.2 mg, 92%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.19 (t, *J* = 7.6 Hz, 1H), 7.02 (dd, *J* = 7.6, 18.8 Hz, 2H), 6.96 (d, *J* = 7.6 Hz, 1H), 5.27 (d, *J* = 2.0 Hz, 1H), 5.19 (d, *J* = 2.0 Hz, 1H), 5.13 (t, *J* = 5.6 Hz, 1H), 4.58 (td, *J* = 2.0, 14.4 Hz, 1H), 4.32 (td, *J* = 2.0, 14.4 Hz, 1H), 3.82 (d, *J* = 8.8 Hz, 2H), 2.86-2.72 (m, 2H), 1.89-1.79 (m, 1H), 0.84 (dd, *J* = 2.8, 6.4 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.6, 161.0, 141.8, 135.4, 128.9, 125.5, 124.6, 123.7, 121.9, 106.0, 71.3, 56.6, 54.4, 40.5, 27.5, 19.0; HRMS calcd for $C_{17}H_{21}N_2O_2S^+$ (M + H^+): 317.1318; Found: 317.1324.



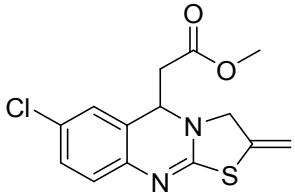
tert-butyl 2-(2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ea)

Pale green oil; (60.8 mg, 96%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.11 (t, *J* = 7.4 Hz, 1H), 6.97-6.89 (m, 3H), 5.19 (d, *J* = 2.0 Hz, 1H), 5.11 (d, *J* = 2.0 Hz, 1H), 5.02 (t, *J* = 5.2 Hz, 1H), 4.54 (d, *J* = 14.4 Hz, 1H), 4.22 (d, *J* = 14.4 Hz, 1H), 2.63 (d, *J* = 5.2 Hz, 2H), 1.29 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 168.5, 159.9, 140.8, 134.4, 127.8, 124.6, 123.4, 122.6, 120.7, 104.8, 80.5, 55.6, 53.6, 40.8, 26.8; HRMS calcd for $C_{17}H_{21}N_2O_2S^+$ (M + H^+): 317.1318; Found: 317.1314.



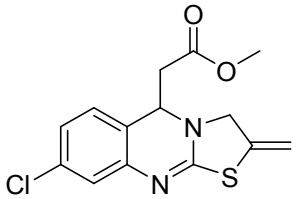
Methyl 2-(7-fluoro-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3fa)

Yellow oil; (57.3 mg, 98%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.95-6.89 (m, 1H), 6.82 (dt, *J* = 2.8, 8.4 Hz, 1H), 6.61 (dd, *J* = 2.8, 8.8 Hz, 1H), 5.21 (d, *J* = 2.0 Hz, 1H), 5.12 (d, *J* = 2.0 Hz, 1H), 5.01 (t, *J* = 5.2 Hz, 1H), 4.46 (d, *J* = 14 Hz, 1H), 4.23 (d, *J* = 14 Hz, 1H), 3.58 (s, 3H), 2.76-2.63 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.6, 160.5, 159.6 (d, $^1J_{CF}$ = 241 Hz), 138.2, 135.2, 125.0 (d, $^3J_{CF}$ = 8 Hz), 123.1 (d, $^3J_{CF}$ = 8 Hz), 115.7 (d, $^2J_{CF}$ = 22 Hz), 112.1 (d, $^2J_{CF}$ = 23 Hz), 106.2, 56.4, 54.1, 52.1, 39.9; HRMS calcd for $C_{14}H_{14}FN_2O_2S^+$ (M + H^+): 293.0755; Found: 293.0750.



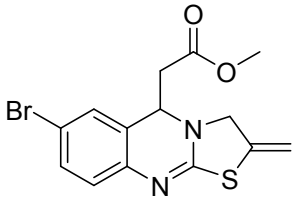
methyl 2-(7-chloro-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ga)

Pale yellow solid; (56.2 mg, 91%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.08 (dd, *J* = 2.4, 8.4 Hz, 1H), 6.91-6.86 (m, 2H), 5.22 (d, *J* = 1.6 Hz, 1H), 5.13 (d, *J* = 2.0 Hz, 1H), 5.01 (t, *J* = 5.2 Hz, 1H), 4.48 (td, *J* = 2.4, 14 Hz, 1H), 4.25 (td, *J* = 2.4, 14 Hz, 1H), 3.60 (s, 3H), 2.76-2.63 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.6, 161.4, 140.7, 135.1, 129.2, 129.0, 125.4, 125.0, 123.3, 106.4, 56.5, 53.9, 52.2, 40.2; HRMS calcd for $C_{14}H_{14}ClN_2O_2S^+$ (M + H^+): 309.0459; Found: 309.0463.



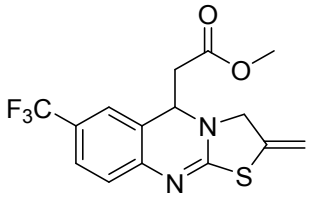
methyl 2-(8-chloro-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ha)

Yellow oil; (58.7 mg, 95%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.02 (d, *J* = 2.0 Hz, 1H), 6.97 (dd, *J* = 2.0, 8.0 Hz, 1H), 6.88 (d, *J* = 8.0 Hz, 1H), 5.30 (q, *J* = 2.0 Hz, 1H), 5.21 (q, *J* = 2.4 Hz, 1H), 5.09 (t, *J* = 5.2 Hz, 1H), 4.56 (td, *J* = 2.4, 14 Hz, 1H), 4.33 (td, *J* = 2.4, 14 Hz, 1H), 3.66 (s, 3H), 2.82-2.69 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.6, 162.2, 143.3, 135.0, 134.3, 126.6, 124.3, 123.5, 120.3, 106.5, 56.5, 53.9, 52.2, 40.1; HRMS calcd for $C_{14}H_{14}ClN_2O_2S^+$ (M + H^+): 309.0459; Found: 309.0456.



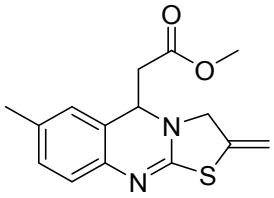
methyl 2-(7-bromo-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ia)

Yellow oil; (64.3 mg, 91%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 (dd, *J* = 2.0, 8.4 Hz, 1H), 7.08 (s, 1H), 6.91 (dd, *J* = 2.0, 8.4 Hz, 1H), 5.29 (t, *J* = 1.6 Hz, 1H), 5.21 (t, *J* = 2.0 Hz, 1H), 5.08 (t, *J* = 5.2 Hz, 1H), 4.55 (dd, *J* = 1.6, 14.0 Hz, 1H), 4.32 (dd, *J* = 1.6, 14.0 Hz, 1H), 3.67 (s, 3H), 2.83-2.70 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.6, 161.5, 141.2, 135.1, 132.0, 128.3, 125.4, 123.7, 116.7, 106.4, 56.5, 53.8, 52.2, 40.3; HRMS calcd for $C_{14}H_{14}BrN_2O_2S^+$ (M + H^+): 352.9954; Found: 352.9953;



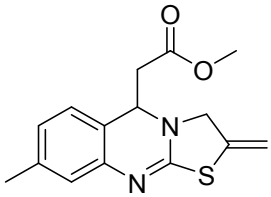
methyl2-(2-methylene-7-(trifluoromethyl)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ja)

White solid; (53.4 mg, 78%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 (d, *J* = 8.4 Hz, 1H), 7.20 (s, 1H), 7.11 (d, *J* = 8.4 Hz, 1H), 5.32 (q, *J* = 2.0 Hz, 1H), 5.23 (q, *J* = 2.0 Hz, 1H), 5.17 (t, *J* = 5.6 Hz, 1H), 4.61 (td, *J* = 2.4, 14.4 Hz, 1H), 4.38 (td, *J* = 2.4, 14.4 Hz, 1H), 3.66 (s, 3H), 2.88-2.72 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.4, 163.2, 145.0, 134.7, 126.2 (q, J_{CF_3} = 4 Hz), 125.9, 123.8, 122.8, 122.1, 106.7, 56.6, 54.1, 52.2, 40.2; HRMS calcd for $C_{15}H_{14}F_3N_2O_2S^+$ (M + H^+): 343.0723; Found: 343.0710.



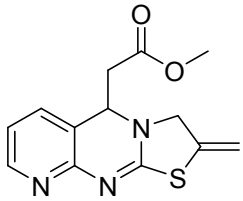
methyl 2-(7-methyl-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ka)

Yellow oil; (55.9 mg, 97%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.01 (d, *J* = 8.0 Hz, 1H), 6.95 (d, *J* = 8.0 Hz, 1H), 6.76 (s, 1H), 5.27 (d, *J* = 2.0 Hz, 1H), 5.18 (d, *J* = 2.0 Hz, 1H), 5.08 (t, *J* = 5.6 Hz, 1H), 4.54 (td, *J* = 2.0, 14.4 Hz, 1H), 4.30 (td, *J* = 2.0, 14.4 Hz, 1H), 3.66 (s, 3H), 2.84-2.70 (m, 2H), 2.27 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.1, 160.2, 139.5, 135.6, 134.3, 129.7, 125.9, 123.5, 121.7, 105.9, 56.6, 54.4, 52.1, 40.5, 21.0; HRMS calcd for $C_{15}H_{17}N_2O_2S^+$ (M + H^+): 289.1005; Found: 289.1004.



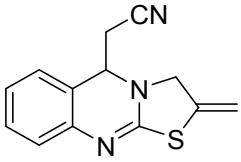
methyl 2-(8-methyl-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3la)

Yellow oil; (54.8 mg, 95%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.86 (d, *J* = 13.6 Hz, 3H), 5.27 (d, *J* = 1.6 Hz, 1H), 5.19 (d, *J* = 2.0 Hz, 1H), 5.10 (t, *J* = 5.4 Hz, 1H), 4.55 (d, *J* =14 Hz, 1H), 4.31 (d, *J* = 14.4 Hz, 1H), 3.66 (s, 3H), 2.83-2.69 (m, 2H), 2.28 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 160.9, 141.6, 138.8, 135.5, 125.4, 125.2, 124.2, 119.0, 105.9, 56.6, 54.2, 52.1, 40.4, 21.1; HRMS calcd for $C_{15}H_{17}N_2O_2S^+$ (M + H^+): 289.1005; Found: 289.1006.



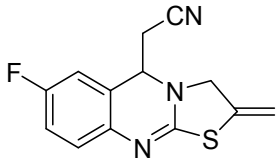
methyl 2-(2-methylene-2,3-dihydro-5H-pyrido[2,3-d]thiazolo[3,2-a]pyrimidin-5-yl)acetate(3ma)

Yellow solid; (41.9 mg, 76%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.23 (dd, *J* = 1.2, 4.8 Hz, 1H), 7.23 (d, *J* = 8.4 Hz, 1H), 6.85 (q, *J* = 4.8 Hz, 1H), 5.23 (d, *J* = 2.0 Hz, 1H), 5.14 (d, *J* = 2.0 Hz, 1H), 5.11 (t, *J* = 5.6 Hz, 1H), 4.53 (td, *J* = 2.0, 14.4 Hz, 1H), 4.30 (td, *J* = 2.0, 14.4 Hz, 1H), 3.59 (s, 3H), 2.80-2.66 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.5, 165.4, 154.2, 149.3, 135.0, 134.2, 119.6, 116.6, 106.6, 56.5, 54.3, 52.2, 40.1; HRMS calcd for $C_{13}H_{14}N_3O_2S^+$ (M + H^+): 276.0801; Found: 276.0809.



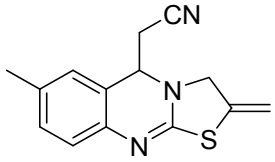
2-(2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetonitrile(3na)

White solid; (36.2 mg, 75%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.20 (t, *J* = 7.2 Hz, 1H), 7.04-6.97 (m, 3H), 5.26 (s, 1H), 5.17 (s, 1H), 4.94 (s, 1H), 4.65 (d, *J* = 14.0 Hz, 1H), 4.31 (d, *J* = 14 Hz, 1H), 2.77-2.64 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.6, 141.7, 134.4, 129.9, 125.7, 125.1, 124.2, 119.7, 116.8, 106.9, 56.6, 54.4, 24.2; HRMS calcd for $C_{13}H_{12}N_3S^+$ (M + H^+): 242.0746; Found: 242.0769.



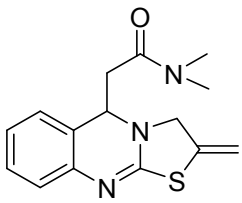
2-(7-fluoro-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetonitrile(3oa)

White solid; (78.2 mg, 95%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.08 (dd, *J* = 5.2, 8.4 Hz, 1H), 6.99 (dt, *J* = 2.4, 8.4 Hz, 1H), 6.79 (dd, *J* = 2.4, 8.4 Hz, 1H), 5.35 (d, *J* = 2.0 Hz, 1H), 5.26 (d, *J* = 2.0 Hz, 1H), 5.02 (t, *J* = 5.2 Hz, 1H), 4.73 (d, *J* = 13.6 Hz, 1H), 4.40 (d, *J* = 14.0 Hz, 1H), 2.87-2.73 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.1, 159.8 (d, $^{1}J_{CF}$ = 243 Hz), 138.2, 134.3, 125.8 (d, $^{3}J_{CF}$ = 8 Hz), 120.7 (d, $^{3}J_{CF}$ = 8 Hz), 116.8 (d, $^{2}J_{CF}$ = 23 Hz), 116.5, 112.3 (d, $^{2}J_{CF}$ = 24 Hz), 107.0, 56.5, 54.3, 24.0; HRMS calcd for $C_{13}H_{11}FN_3S^+$ (M + H^+): 260.0652; Found: 260.0654.



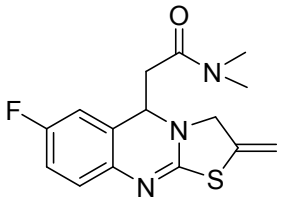
2-(7-methyl-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetonitrile(3pa)

White solid; (49.5 mg, 97%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.01 (d, *J* = 7.6 Hz, 1H), 6.93 (d, *J* = 8.0 Hz, 1H), 6,78 (s, 1H), 5.26 (s, 1H), 5.17 (s, 1H), 4.91 (t, *J* = 4.8 Hz, 1H), 4.66 (d, *J* = 14.0 Hz, 1H), 4.31 (d, *J* = 13.6 Hz, 1H), 2.77-2.63 (m, 2H), 2.24 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ159.7, 139.3, 134.9, 134.7, 130.6, 126.0, 124.1, 119.5, 116.9, 106.7, 56.6, 54.6, 24.2, 21.0; HRMS calcd for $C_{14}H_{14}N_3S^+$ (M + H^+): 256.0903; Found:256.0890.



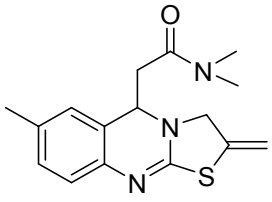
N,N-dimethyl-2-(2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetamide(3qa)

White oil; (50.6 mg, 88%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.15-7.11 (m, 1H), 6.99-6.88 (m, 3H), 5.20 (d, *J* = 2.0 Hz, 1H), 5.17 (t, *J* = 6.0 Hz, 1H), 5.11 (d, *J* = 2.0 Hz, 1H), 4.55 (td, *J* = 2.0, 14.8 Hz, 1H), 4.33 (td, *J* = 2.0, 14.8 Hz, 1H), 2.84 (s, 3H), 2.77 (dd, *J* = 6.0, 15.2 Hz, 1H), 2.63 (s, 3H), 2.58 (dd, *J* = 6.0, 15.2 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ169.6, 161.3, 142.1, 135.9, 128.8, 125.6, 124.4, 123.3, 122.8, 105.9, 56.9, 54.3, 39.2, 37.3, 35.6; HRMS calcd for $C_{15}H_{18}N_3OS^+$ (M + H^+): 288.1165; Found: 288.1202.



2-(7-fluoro-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)-N,N-dimethylacetamide(3ra)

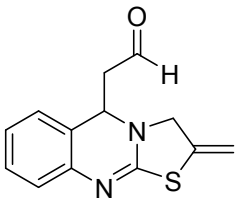
White oil; (60.5 mg, 99%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.13 (dd, *J* = 5.6, 8.8 Hz, 1H), 6.89 (dt, *J* = 2.8, 8.4 Hz, 1H), 6.73 (dd, *J* = 2.8, 8.8 Hz, 1H), 5.28 (d, *J* = 1.6 Hz, 1H), 5.24 (t, *J* = 6.0 Hz, 1H), 5.19 (d, *J* = 2.0 Hz, 1H), 4.59 (td, *J* = 2.4, 14.4 Hz, 1H), 4.39 (td, *J* = 2.4, 14.4 Hz, 1H), 2.94 (s, 3H), 2.85 (dd, *J* = 6.0, 15.6 Hz, 1H), 2.79 (s, 3H), 2.65 (dd, *J* = 6.0, 15.2 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ169.3, 160.7, 159.6 (d, $^{1}J_{CF}$ = 241 Hz), 138.4, 135.7, 124.6 (d, $^{3}J_{CF}$ = 8 Hz), 124.3(d, $^{3}J_{CF}$ = 8 Hz), 115.4 (d, $^{2}J_{CF}$ = 22 Hz), 112.2 (d, $^{2}J_{CF}$ = 24 Hz), 106.0, 56.7, 54.0, 39.0, 37.2, 35.6; HRMS calcd for $C_{15}H_{17}FN_3OS^+$ (M + H^+): 306.1071; Found: 306.1070.



N,N-dimethyl-2-(7-methyl-2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetamide(3sa)

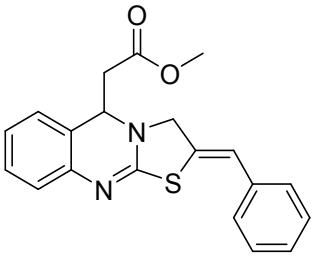
White oil; (52.5 mg, 87%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.01 (d, *J* = 8.0 Hz, 1H), 6.95 (d, *J* = 8.0 Hz, 1H), 6.78 (s, 1H), 5.27 (d, *J* = 1.6 Hz, 1H), 5.17-5.21 (m, 2H), 4.60 (td, *J* = 2.0, 14.8 Hz, 1H), 4.38 (td, *J* = 2.0, 14.4 Hz, 1H), 2.92 (s, 3H), 2.84 (dd, *J* = 6.0, 15.2 Hz, 1H), 2.71 (s,

3H), 2.64 (dd, *J* = 6.0, 15.2 Hz, 1H), 2.27 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ169.7, 160.5, 139.7, 136.0, 134.1, 129.4, 126.0, 123.1, 122.7, 105.8, 56.8, 54.4, 39.2, 37.3, 35.6, 20.9; HRMS calcd for $C_{16}H_{20}N_3OS^+$ ($M + H^+$): 302.1322; Found: 302.1324.



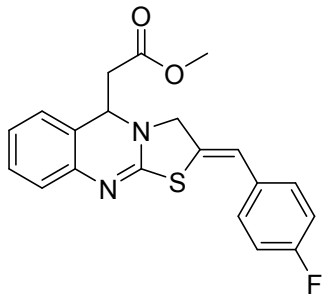
2-(2-methylene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetaldehyde(3ta)

Yellow solid; (26.9 mg, 55%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.63 (s, 1H), 7.15 (t, *J* = 7.4 Hz, 1H), 7.08 (d, *J* = 7.2 Hz, 1H), 7.00 (t, *J* = 7.6 Hz, 1H), 6.86 (d, *J* = 8.0 Hz, 1H), 5.38 (d, *J* = 1.6 Hz, 1H), 5.30 (d, *J* = 1.2 Hz, 1H), 5.25 (t, *J* = 4.6 Hz, 1H), 4.62 (d, *J* = 14.8 Hz, 1H), 4.38 (d, *J* = 14.8 Hz, 1H), 3.05-3.10 (m, 1H), 2.90-2.96 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 201.4, 142.4, 135.7, 128.9, 126.4, 124.7, 123.4, 123.1, 122.8, 106.8, 56.6, 52.4, 48.9; HRMS calcd for $C_{13}H_{13}N_2OS^+$ ($M + H^+$): 245.0743; Found: 245.0745.



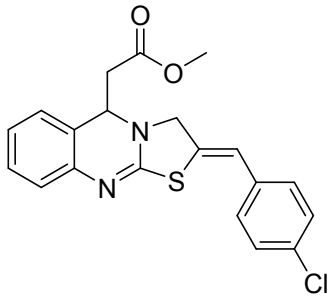
methyl (Z)-2-(2-benzylidene-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ab)

Yellow solid; (63.1 mg, 90%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38 (t, *J* = 7.6 Hz, 2H), 7.30 (d, *J* = 7.2 Hz, 2H), 7.27-7.20 (m, 2H), 7.09 (dd, *J* = 0.8, 8.0 Hz, 1H), 7.04 (dt, *J* = 1.2, 7.6 Hz, 1H), 6.98 (dd, *J* = 1.2, 7.6 Hz, 1H), 6.58 (s, 1H), 5.21 (t, *J* = 5.6 Hz, 1H), 4.76 (dd, *J* = 2.0, 14.4 Hz, 1H), 4.51 (dd, *J* = 2.0, 14.4 Hz, 1H), 3.67 (s, 3H), 2.89-2.74 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 160.9, 141.8, 135.5, 129.1, 128.7, 127.8, 127.4, 126.5, 125.5, 124.8, 123.8, 121.8, 120.6, 58.1, 54.3, 52.2, 40.5; HRMS calcd for $C_{20}H_{19}N_2O_2S^+$ ($M + H^+$): 351.1162; Found: 351.1168.



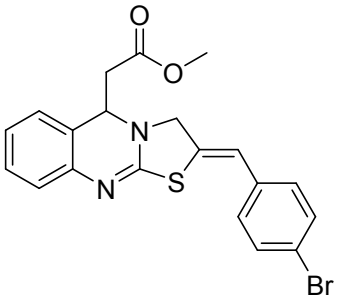
methyl (Z)-2-(2-(4-fluorobenzylidene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ac)

Yellow solid; (59.7 mg, 81%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.19-7.11 (m, 3H), 7.00-6.93 (m, 4H), 6.88 (d, *J* = 7.2 Hz, 1H), 6.44 (s, 1H), 5.09 (t, *J* = 5.6 Hz, 1H), 4.64 (d, *J* = 14.4 Hz, 1H), 4.38 (d, *J* = 14.4 Hz, 1H), 3.57 (s, 3H), 2.78-2.64 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 161.7 (d, $^{1}J_{CF}$ = 247 Hz), 160.4, 141.9, 131.8 (d, $^{4}J_{CF}$ = 3 Hz), 129.4 (d, $^{3}J_{CF}$ = 8 Hz), 129.1, 126.4, 125.6, 124.8, 123.9, 121.8, 119.4, 115.7 (d, $^{2}J_{CF}$ = 21 Hz), 58.0, 54.2, 52.2, 40.5; HRMS calcd for $C_{20}H_{18}FN_2O_2S^+$ (M + H^+): 369.1068; Found: 369.1067.



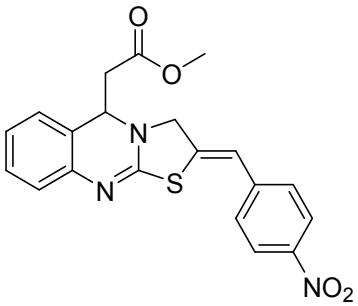
methyl (Z)-2-(2-(4-chlorobenzylidene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ad)

Yellow solid; (63.9 mg, 83%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24 (d, *J* = 8.4 Hz, 2H), 7.12 (d, *J* = 8.0 Hz, 3H), 7.00 (d, *J* = 7.6 Hz, 1H), 6.95 (t, *J* = 7.6 Hz, 1H), 6.88 (t, *J* = 7.6 Hz, 1H), 6.42 (s, 1H), 5.09 (t, *J* = 5.2 Hz, 1H), 4.64 (dd, *J* = 1.6, 14.4 Hz, 1H), 4.38 (dd, *J* = 1.6, 14.4 Hz, 1H), 3.57 (s, 3H), 2.78-2.64 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.9, 160.5, 141.7, 134.0, 132.9, 129.1, 129.0, 128.9, 127.5, 125.6, 124.9, 123.8, 121.8, 119.4, 58.0, 54.2, 52.2, 40.4; HRMS calcd for $C_{20}H_{18}ClN_2O_2S^+$ (M + H^+): 385.0772; Found: 385.0787.



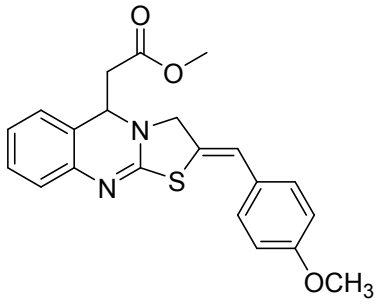
methyl (Z)-2-(2-(4-bromobenzylidene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ae)

Yellow solid; (61.0 mg, 81%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 (d, *J* = 8.8 Hz, 2H), 7.13 (t, *J* = 7.2 Hz, 1H), 7.06 (d, *J* = 8.4 Hz, 2H), 7.00 (d, *J* = 7.6 Hz, 1H), 6.95 (t, *J* = 7.6 Hz, 1H), 6.88 (d, *J* = 7.2 Hz, 1H), 6.39 (s, 1H), 5.08 (t, *J* = 5.2 Hz, 1H), 4.63 (dd, *J* = 1.6, 14.4 Hz, 1H), 4.36 (dd, *J* = 1.6, 14.8 Hz, 1H), 3.57 (s, 3H), 2.78-2.64 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.9, 160.5, 141.7, 134.5, 131.8, 129.3, 129.1, 127.6, 125.6, 124.9, 123.8, 121.8, 121.1, 119.4, 58.1, 54.2, 52.2, 40.4; HRMS calcd for $C_{20}H_{18}BrN_2O_2S^+$ (M + H^+): 429.0267; Found: 429.0293.



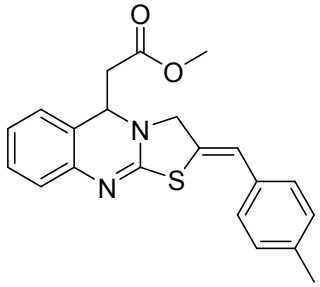
methyl (Z)-2-(2-(4-nitrobenzylidene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3af)

Yellow solid; (50.6 mg, 64%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.22 (d, *J* = 8.4 Hz, 2H), 7.42 (d, *J* = 8.8 Hz, 2H), 7.23 (t, *J* = 7.6 Hz, 1H), 7.05-7.10 (m, 2H), 6.99 (d, *J* = 7.6 Hz, 1H), 6.62 (s, 1H), 5.22 (t, *J* = 5.2 Hz, 1H), 4.83 (d, *J* = 15.2 Hz, 1H), 4.57 (d, *J* = 15.2 Hz, 1H), 3.67 (s, 3H), 2.89-2.76 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.9, 159.7, 146.1, 142.0, 141.6, 132.8, 129.2, 128.3, 125.6, 125.2, 124.1, 124.0, 121.7, 118.3, 58.4, 54.3, 52.2, 40.5; HRMS calcd for $C_{20}H_{18}N_3O_4S^+$ (M + H^+): 396.1013; Found: 396.1012.



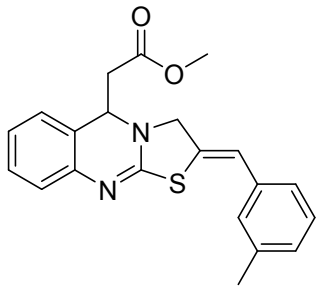
methyl (Z)-2-(2-(4-methoxybenzylidene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ag)

Yellow solid; (68.5 mg, 90%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.14 (q, *J* = 8.8 Hz, 3H), 6.99 (d, *J* = 7.6 Hz, 1H), 6.94 (t, *J* = 7.6 Hz, 1H), 6.87 (d, *J* = 7.2 Hz, 1H), 6.81 (d, *J* = 8.4 Hz, 1H), 6.41 (s, 1H), 5.07 (t, *J* = 5.2 Hz, 1H), 4.61 (d, *J* = 14.8 Hz, 1H), 4.34 (d, *J* = 14.0 Hz, 1H), 3.71 (s, 3H), 3.56 (s, 3H), 2.77-2.63 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.9, 160.1, 158.7, 142.0, 129.1, 129.0, 128.2, 125.5, 124.7, 123.8, 121.8, 120.2, 114.2, 58.0, 55.3, 54.2, 52.1, 40.4; HRMS calcd for $C_{21}H_{21}N_2O_3S^+$ (M + H^+): 381.1267; Found: 381.1288.



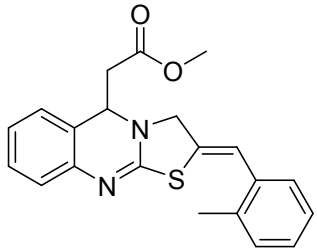
methyl (Z)-2-(2-(4-methylbenzylidene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ah)

Yellow solid; (68.2 mg, 94%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.16-7.09 (m, 5H), 7.01 (d, *J* = 6.8 Hz, 1H), 6.95 (dt, *J* = 0.8, 7.6 Hz, 1H), 6.89 (d, *J* = 7.2 Hz, 1H), 6.46 (s, 1H), 5.11 (t, *J* = 5.6 Hz, 1H), 4.65 (d, *J* = 14.8 Hz, 1H), 4.40 (d, *J* = 14.4 Hz, 1H), 3.58 (s, 3H), 2.80-2.65 (m, 2H), 2.27 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 161.1, 141.8, 137.3, 132.7, 129.5, 129.1, 127.8, 125.5, 125.2, 124.7, 123.8, 121.8, 120.6, 58.1, 54.2, 52.1, 40.5, 21.3; HRMS calcd for $C_{21}H_{21}N_2O_2S^+$ (M + H^+): 365.1318; Found: 365.1319



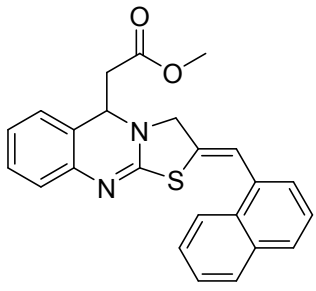
methyl (Z)-2-(2-(3-methylbenzylidene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ai)

Yellow solid; (67.1 mg, 92%); ^{1}H NMR (400 MHz, $CDCl_3$) δ7.19 (q, *J* = 7.6 Hz, 1H), 7.13 (d, *J* = 7.6 Hz, 1H), 7.04-6.94 (m, 5H), 6.89 (d, *J* = 7.2 Hz, 1H), 6.46 (s, 1H), 5.12 (t, *J* = 5.4 Hz, 1H), 4.66 (d, *J* = 14.4 Hz, 1H), 4.41 (d, *J* = 14.0 Hz, 1H), 3.59 (s, 3H), 2.80-2.65 (m, 2H), 2.28 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 161.0, 141.9, 138.4, 135.5, 129.1, 128.6, 128.5, 128.2, 126.3, 125.5, 124.9, 124.7, 123.9, 121.9, 120.7, 58.1, 54.2, 52.2, 40.5, 21.5; HRMS calcd for $C_{21}H_{21}N_2O_2S^+$ (M + H^+): 365.1318; Found: 365.1339.



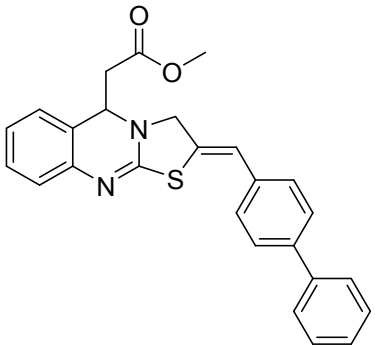
methyl (Z)-2-(2-(2-methylbenzylidene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3aj)

Yellow solid; (65.6 mg, 90%); ^{1}H NMR (400 MHz, $CDCl_3$) δ7.26 (d, *J* = 7.2 Hz, 1H), 7.19-7.11 (m, 4H), 7.02 (d, *J* = 7.6 Hz, 1H), 6.96 (t, *J* = 7.2 Hz, 1H), 6.91 (d, *J* = 7.2 Hz, 1H), 6.62 (s, 1H), 5.15 (t, *J* = 4.8 Hz, 1H), 4.70 (d, *J* = 14.4 Hz, 1H), 4.47 (d, *J* = 14.4 Hz, 1H), 3.60 (s, 3H), 2.84-2.68 (m, 2H), 2.22 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.1, 161.1, 149.4, 141.4, 136.0, 134.7, 130.3, 129.1, 127.8, 126.9, 126.2, 125.5, 124.8, 123.6, 121.7, 119.2, 57.7, 54.3, 52.2, 40.5, 19.9; HRMS calcd for $C_{21}H_{21}N_2O_2S^+$ (M + H^+): 365.1318; Found: 365.1349.



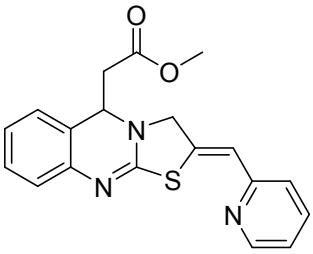
methyl (Z)-2-(2-(naphthalen-1-ylmethylene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3ak)

Yellow solid; (75.3 mg, 94%); ^{1}H NMR (400 MHz, $CDCl_3$) δ7.95-7.93 (m, 1H), 7.84-7.82 (m, 1H), 7.76 (d, *J* = 8.0 Hz, 1H), 7.51-7.44 (m, 4H), 7.19 (t, *J* = 8.4 Hz, 1H), 7.13 (s, 1H), 7.08 (d, *J* = 7.6 Hz, 1H), 7.02 (t, *J* = 7.6 Hz, 1H), 6.95 (d, *J* = 6.8 Hz, 1H), 5.15 (t, *J* = 5.6 Hz, 1H), 4.79 (dd, *J* = 2.0, 14.4 Hz, 1H), 4.50 (dd, *J* = 2.0, 14.4 Hz, 1H), 3.65 (s, 3H), 2.87-2.72 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 160.9, 141.9, 133.7, 133.0, 131.1, 130.0, 129.1, 128.7, 128.4, 126.3, 126.2, 125.6, 125.5, 125.3, 124.7, 123.8, 123.7, 121.9, 117.9, 57.5, 54.3, 52.2, 40.5; HRMS calcd for $C_{24}H_{21}N_2O_2S^+$ (M + H^+): 401.1318; Found: 401.1318.



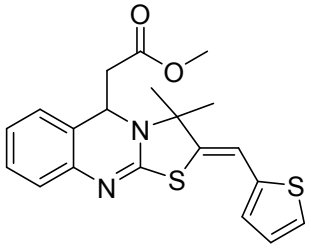
methyl (Z)-2-(2-([1,1'-biphenyl]-4-ylmethylene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate (3al)

Yellow solid; (69.1 mg, 81%); ^{1}H NMR (400 MHz, $CDCl_3$) δ7.61-7.58 (m, 4H), 7.42 (t, *J* = 7.6 Hz, 2H), 7.36-7.31 (m, 3H), 7.22 (t, *J* = 10.4 Hz, 1H), 7.10 (d, *J* = 7.6 Hz, 1H), 7.02 (t, *J* = 8.0 Hz, 1H), 6.94 (d, *J* = 7.2 Hz, 1H), 6.56 (s, 1H), 5.15 (t, *J* = 5.6 Hz, 1H), 4.72 (dd, *J* = 1.6, 14.4 Hz, 1H), 4.45 (dd, *J* = 1.6, 14.4 Hz, 1H), 3.64 (s, 3H), 2.84-2.71 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 171.0, 160.9, 141.9, 140.3, 139.9, 134.6, 129.1, 128.9, 128.3, 127.5, 127.3, 127.0, 126.6, 125.6, 124.8, 123.9, 121.9, 120.2, 58.1, 54.3, 52.2, 40.5; HRMS calcd for $C_{26}H_{23}N_2O_2S$+ (M + H+): 427.1475; Found: 427.1477.



methyl (Z)-2-(2-(pyridin-2-ylmethylene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3am)

Yellow solid; (49.2 mg,70%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.55 (s, 1H), 8.46 (d, *J* = 4.4 Hz, 1H), 7.64 (d, *J* = 7.6 Hz, 1H), 7.34-7.29 (m, 1H), 7.23 (t, *J* = 7.6 Hz, 1H), 7.07 (q, *J* = 8.0 Hz, 2H), 6.98 (d, *J* = 7.6 Hz, 1H), 6.54 (s, 1H), 5.21 (t, *J* = 5.2 Hz, 1H), 4.80 (d, *J* = 14.4 Hz, 1H), 4.54 (d, *J* = 1.6, 14.8 Hz, 1H), 3.67 (s, 3H), 2.89-2.75 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.9, 160.1, 149.6, 148.0, 141.7, 133.9, 131.5, 129.8, 129.1, 125.5, 125.0, 123.9, 123.5, 121.8, 116.8, 58.2, 54.3, 52.2, 40.5; HRMS calcd for $C_{19}H_{18}N_3O_2S$+ (M + H+): 352.1114; Found: 352.1114.



methyl (Z)-2-(3,3-dimethyl-2-(thiophen-2-ylmethylene)-2,3-dihydro-5H-thiazolo[2,3-b]quinazolin-5-yl)acetate(3an)

Yellow solid; (66.1 mg, 86%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27-7.26 (m, 1H), 7.18-7.13 (m, 1H), 7.07 (d, *J* = 7.6 Hz, 1H), 6.99-6.97 (m, 2H), 6.94 (d, *J* = 3.6 Hz, 2H), 6.67 (s, 1H), 5.07 (dd, *J* = 2.4, 9.2 Hz, 1H), 3.52 (s, 3H), 2.72-2.67 (m, 1H), 2.50 (dd, *J* = 5.2, 15.2 Hz, 1H), 1.68 (s, 3H), 1.46 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 170.5, 158.2, 142.8, 139.8, 136.5, 129.0, 127.5, 126.9, 126.1, 125.1, 124.4, 123.6, 123.1, 112.6, 70.3, 51.9, 51.2, 44.1, 29.4, 27.7; HRMS calcd for $C_{20}H_{21}N_2O_2S^+$ ($M + H^+$): 385.1039; Found: 385.1029.

3. X-Ray Crystal Structure for Compound 3ab

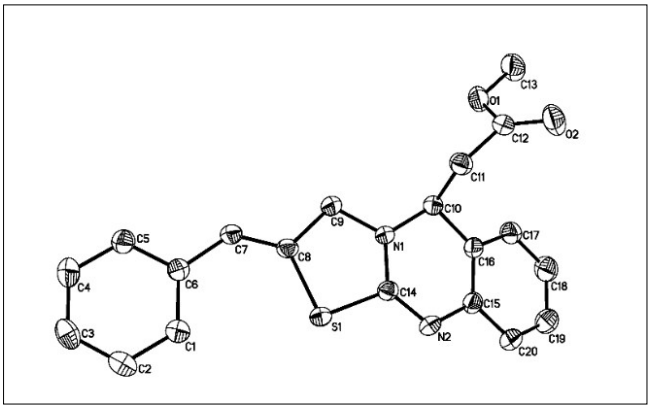
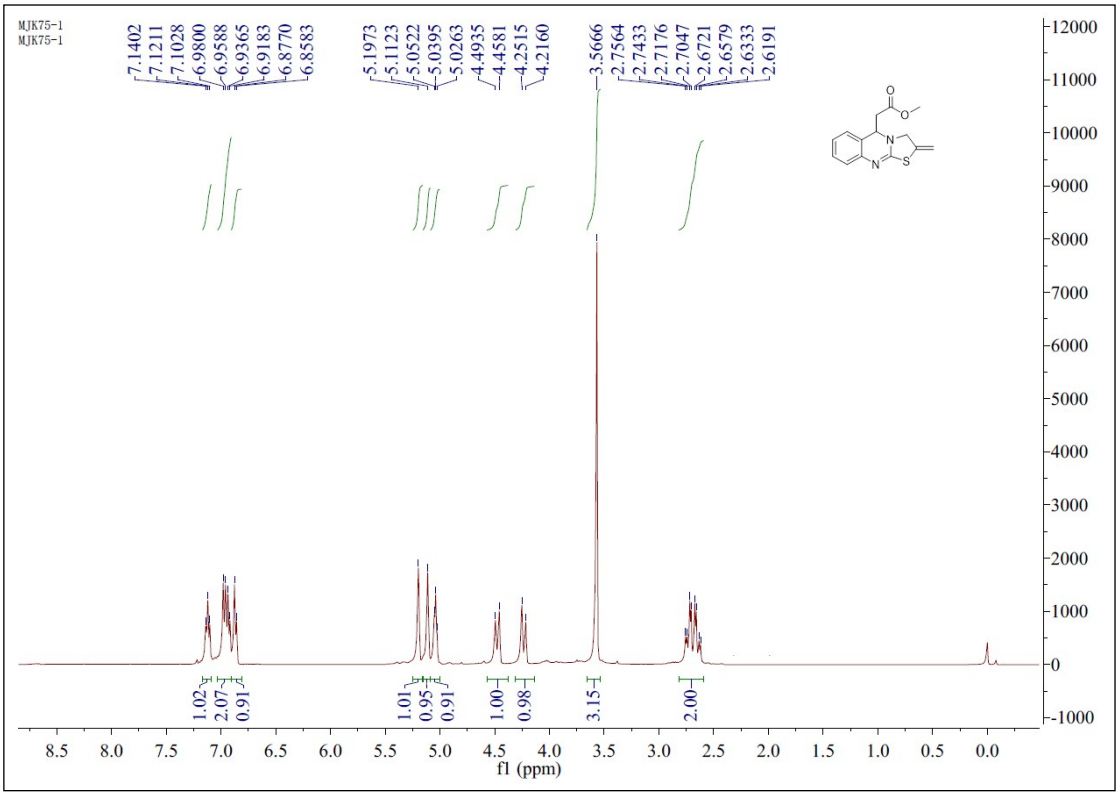


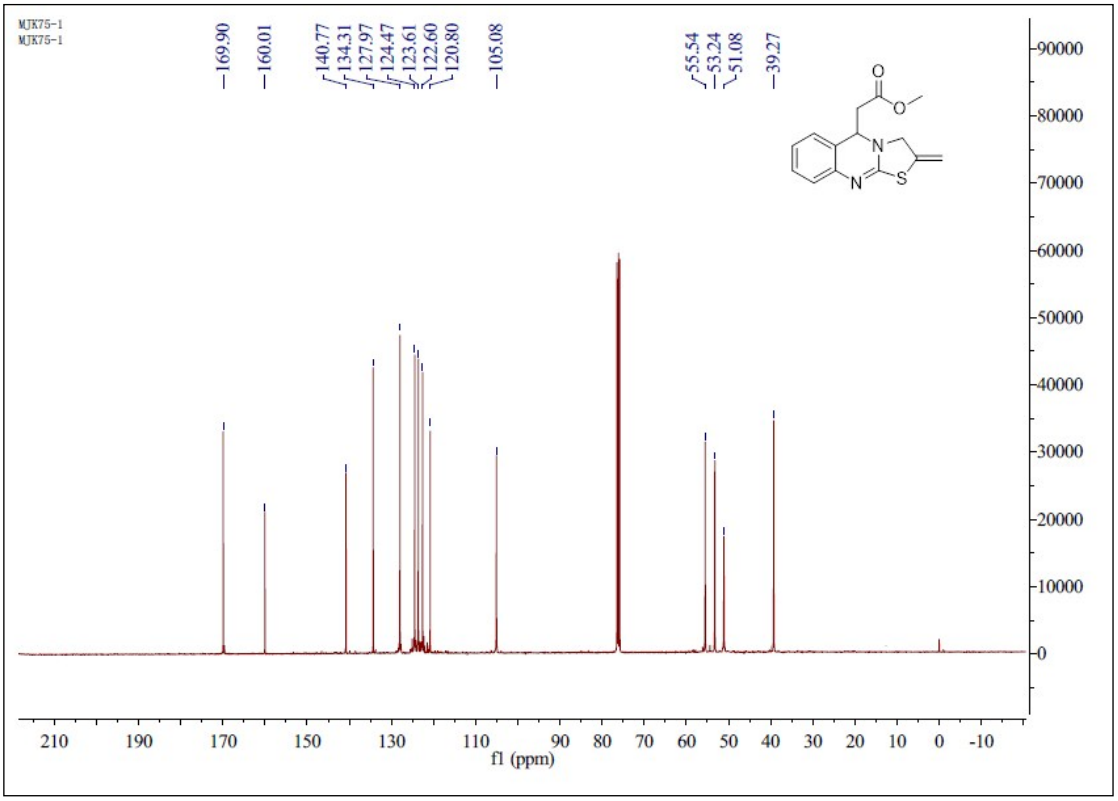
Figure 1. Single-crystal X-ray diffraction structure of **3ab,** the thermal ellipsoids are at the 30% probability level

CCDC: 1908021

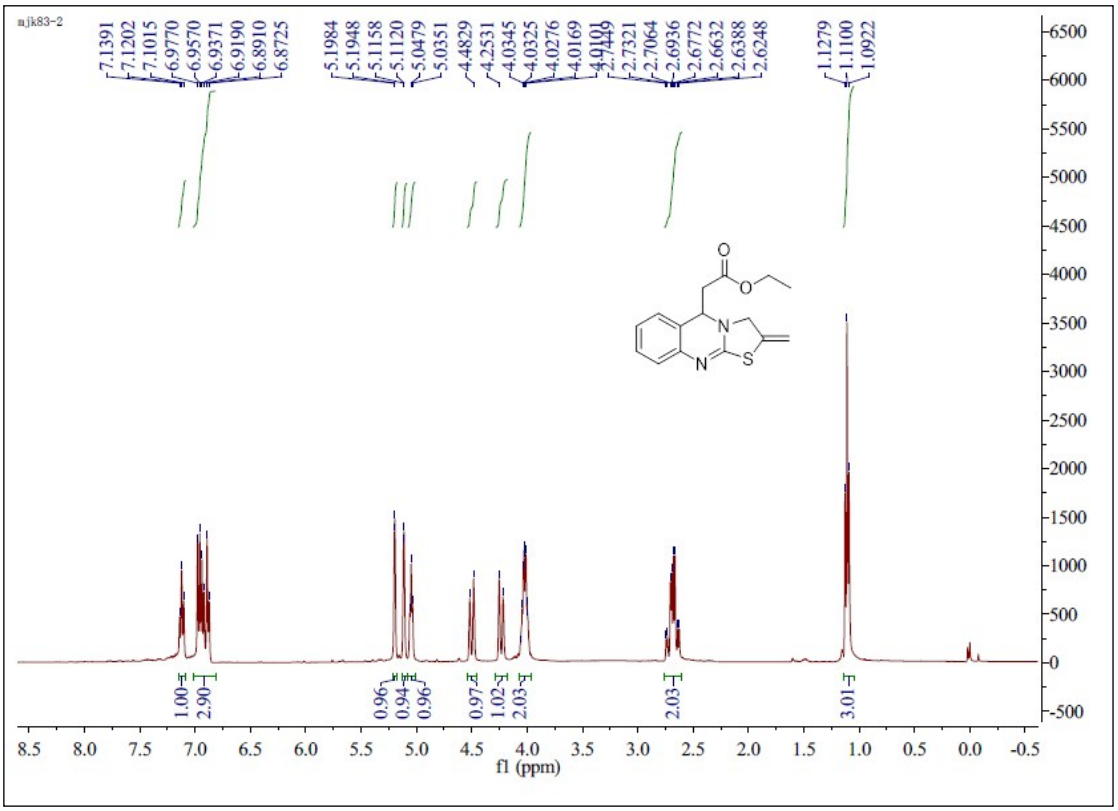
^{1}H NMR of **3aa**



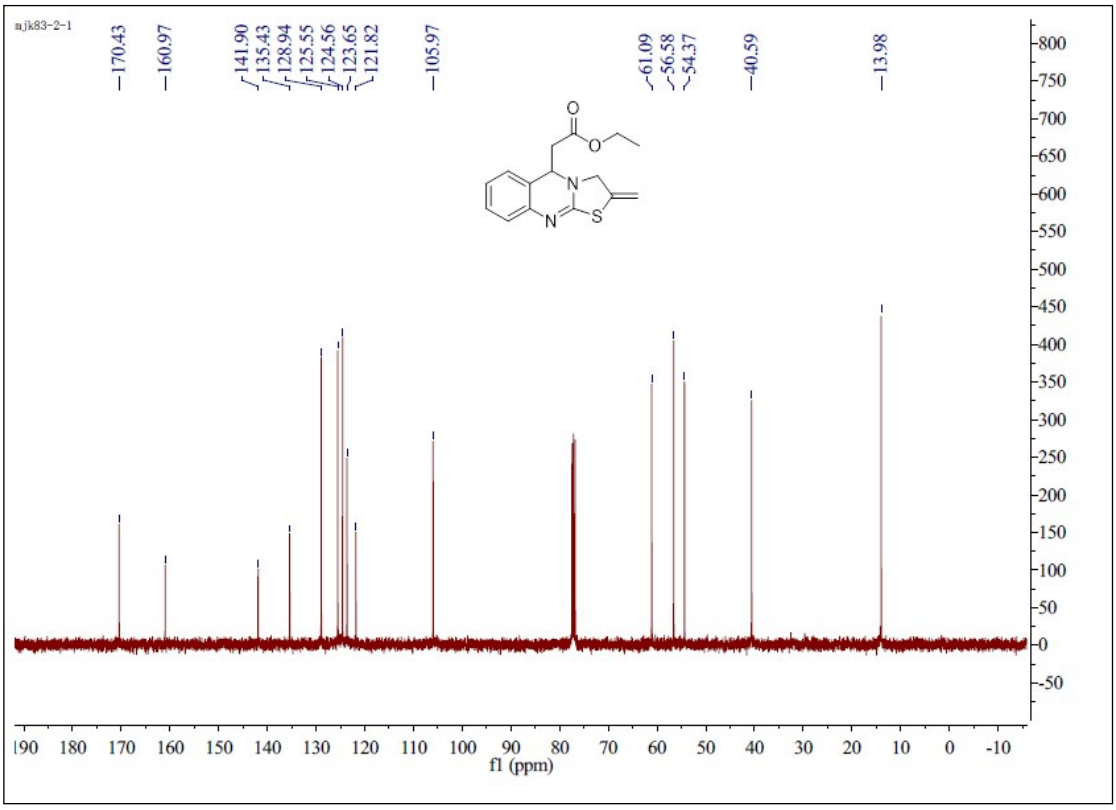
^{13}C NMR of **3aa**



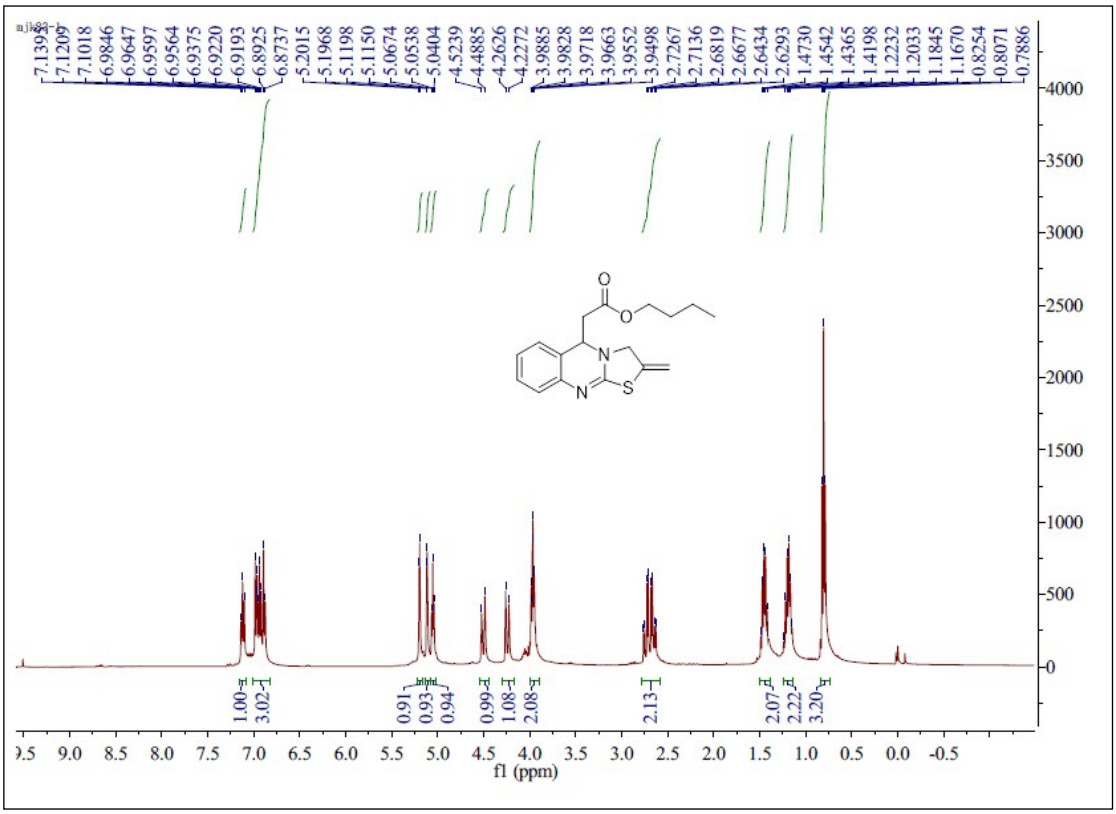
^{1}H NMR of **3ba**



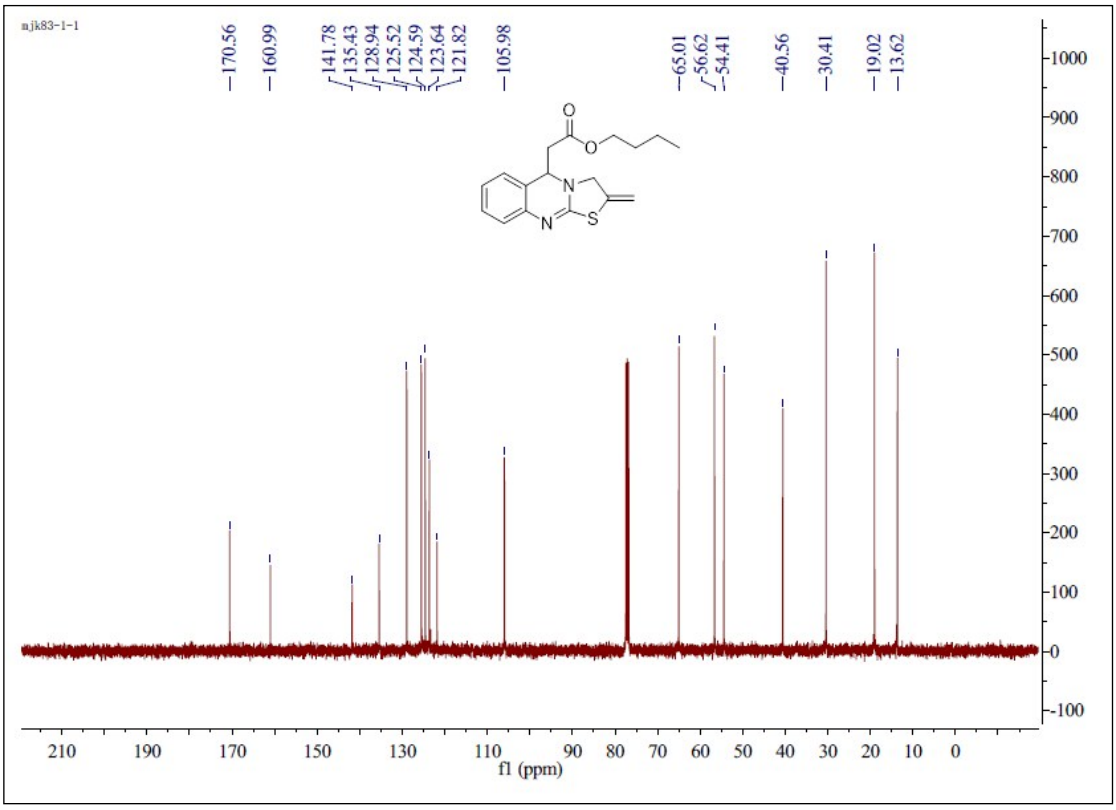
^{13}C NMR of **3ba**



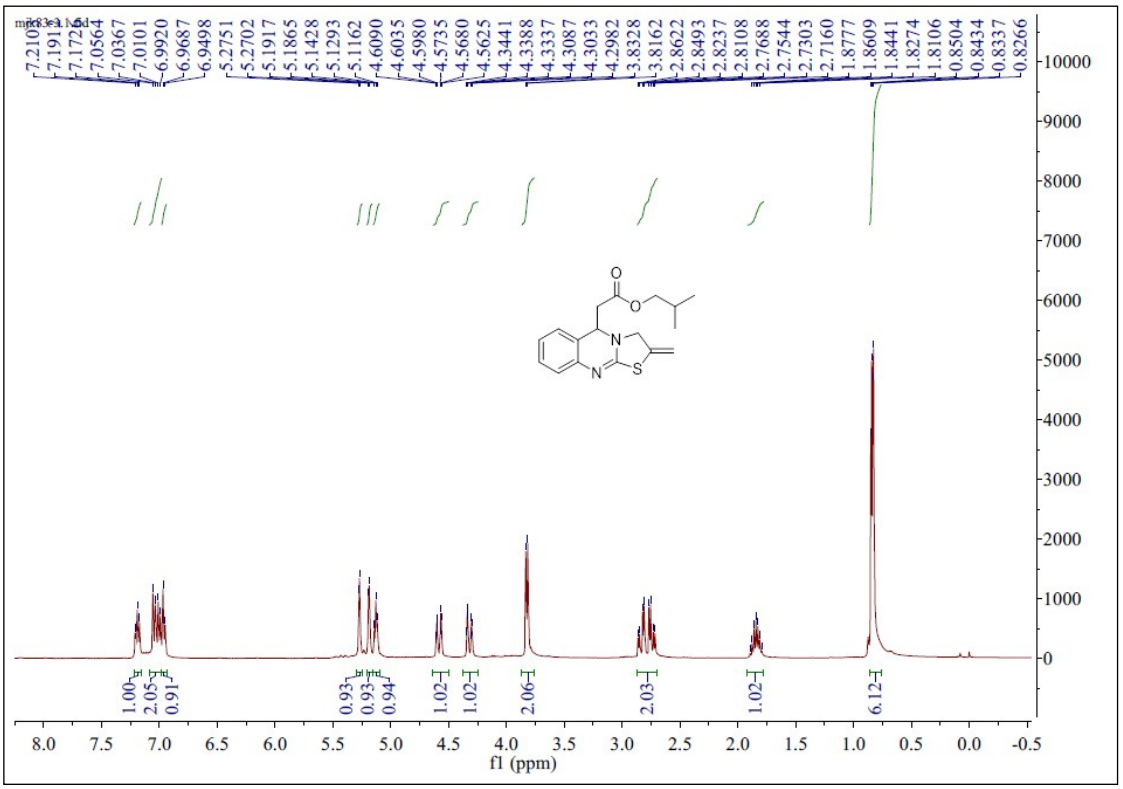
^{1}H NMR of **3ca**



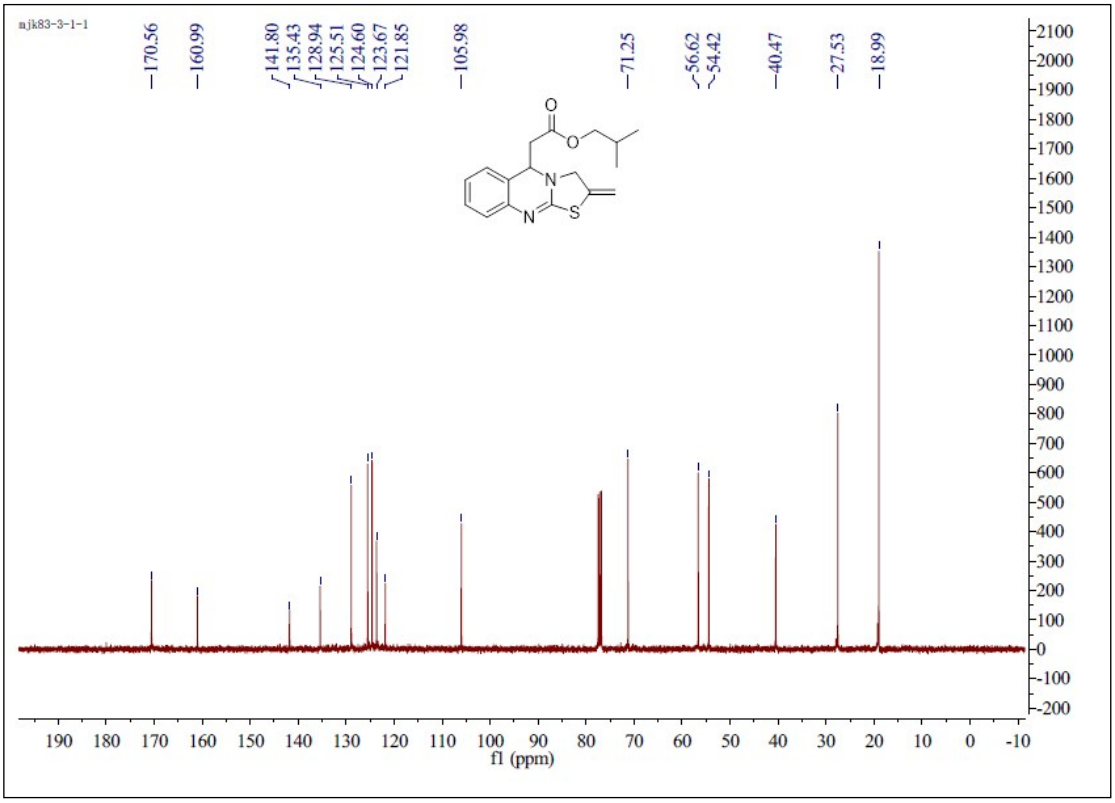
^{13}C NMR of **3ca**



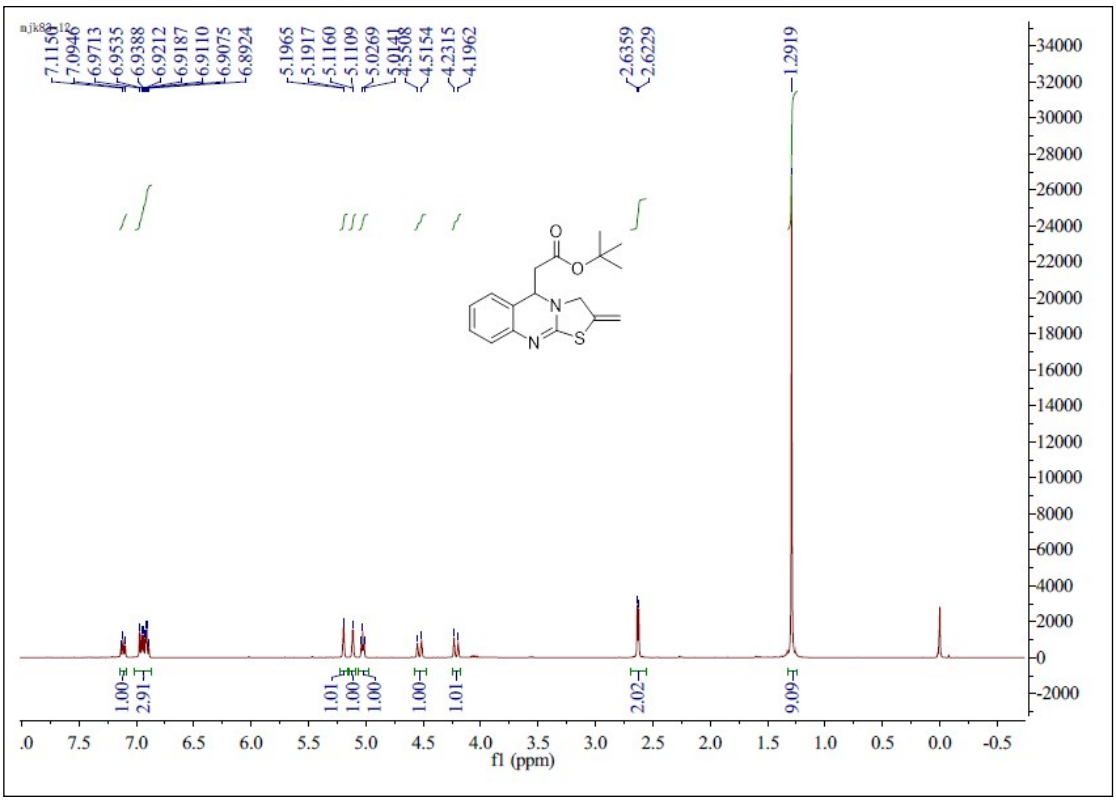
^{1}H NMR of **3da**



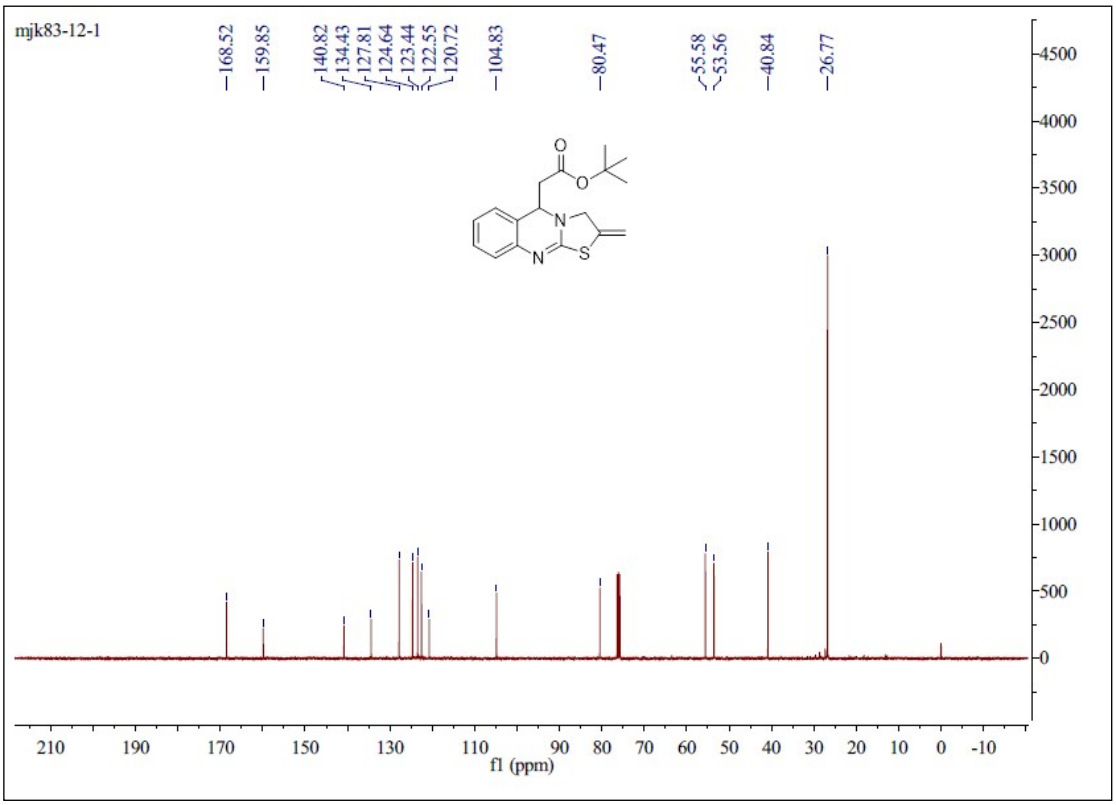
^{13}C NMR of **3da**


njk83-3-1-1
170.56
160.99
141.80
135.43
128.94
125.51
124.60
123.67
121.85
105.98
71.25
56.62
54.42
40.47
27.53
18.99
f1 (ppm)

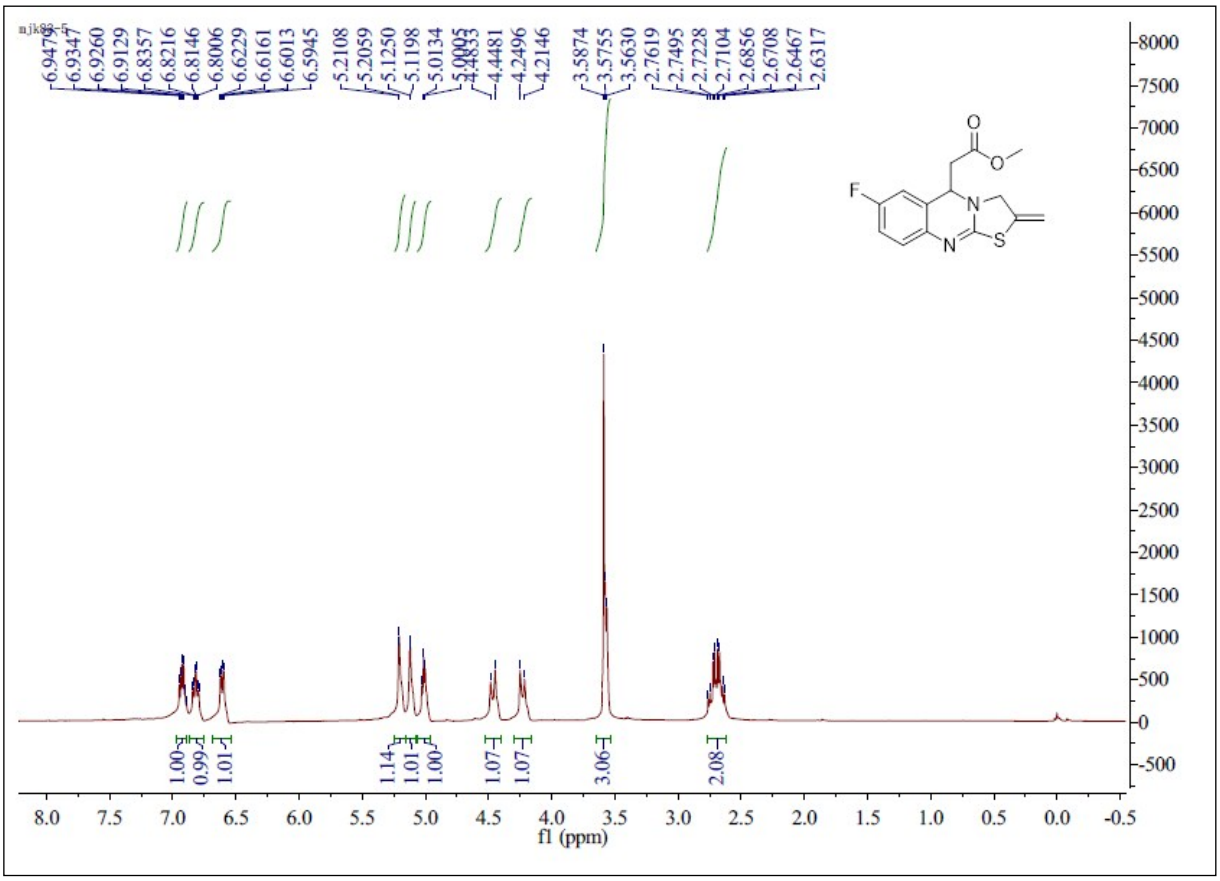
^{1}H NMR of **3ea**


7.1156
7.0946
6.9713
6.9535
6.9388
6.9212
6.9187
6.9110
6.9075
6.8924
5.1965
5.1917
5.1160
5.1109
5.0269
4.5508
4.5154
4.2315
4.1962
2.6359
2.6229
1.2919
1.00
2.91
1.01
1.00
1.00
1.00
1.01
2.02
9.09
f1 (ppm)

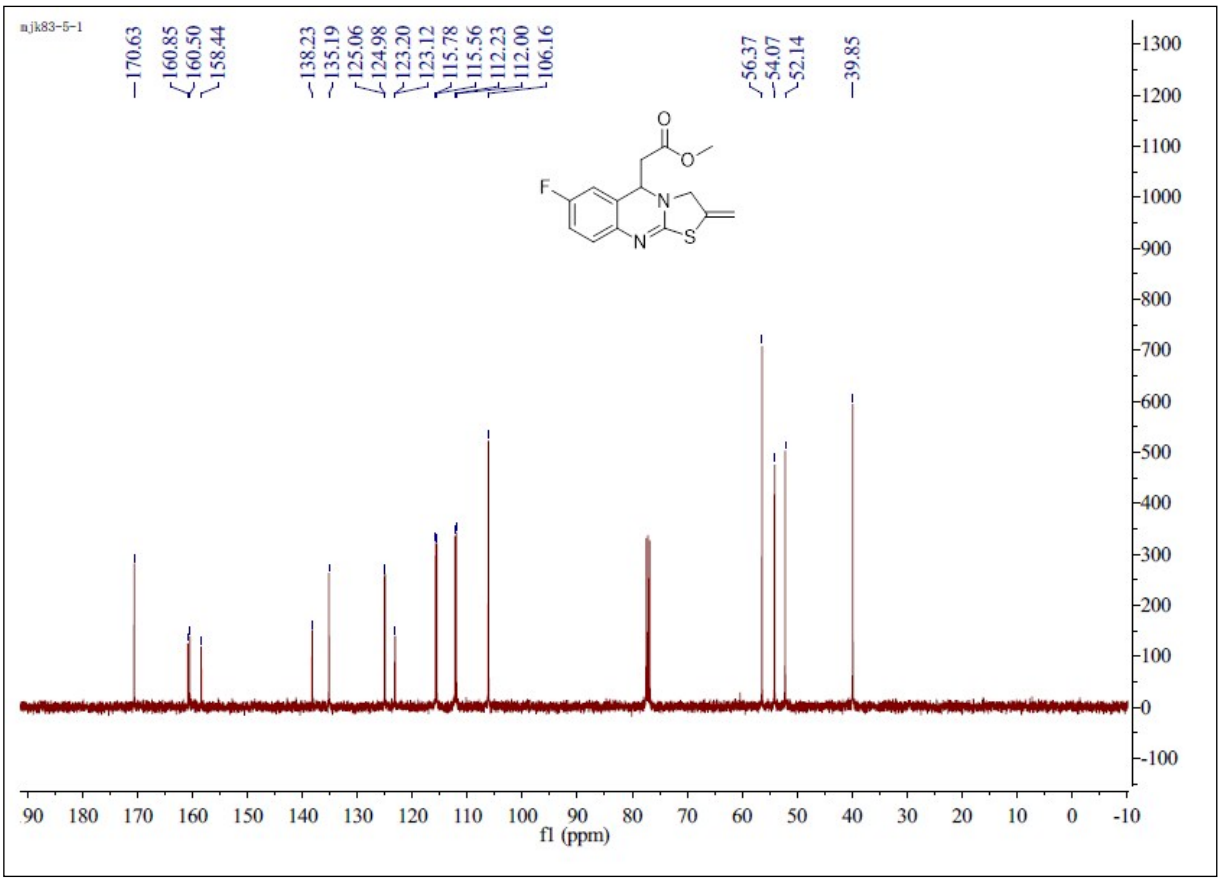
^{13}C NMR of **3ea**



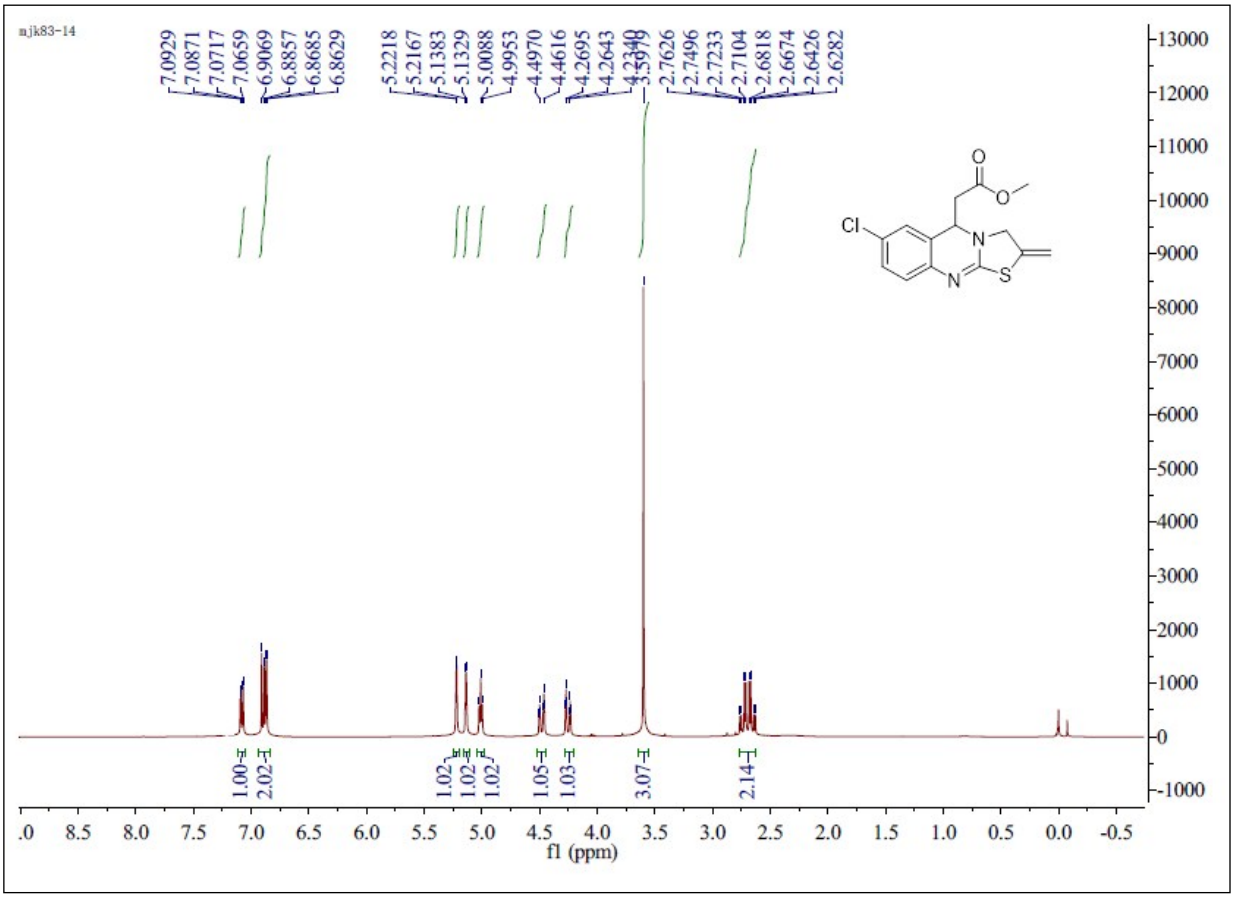
^{1}H NMR of **3fa**



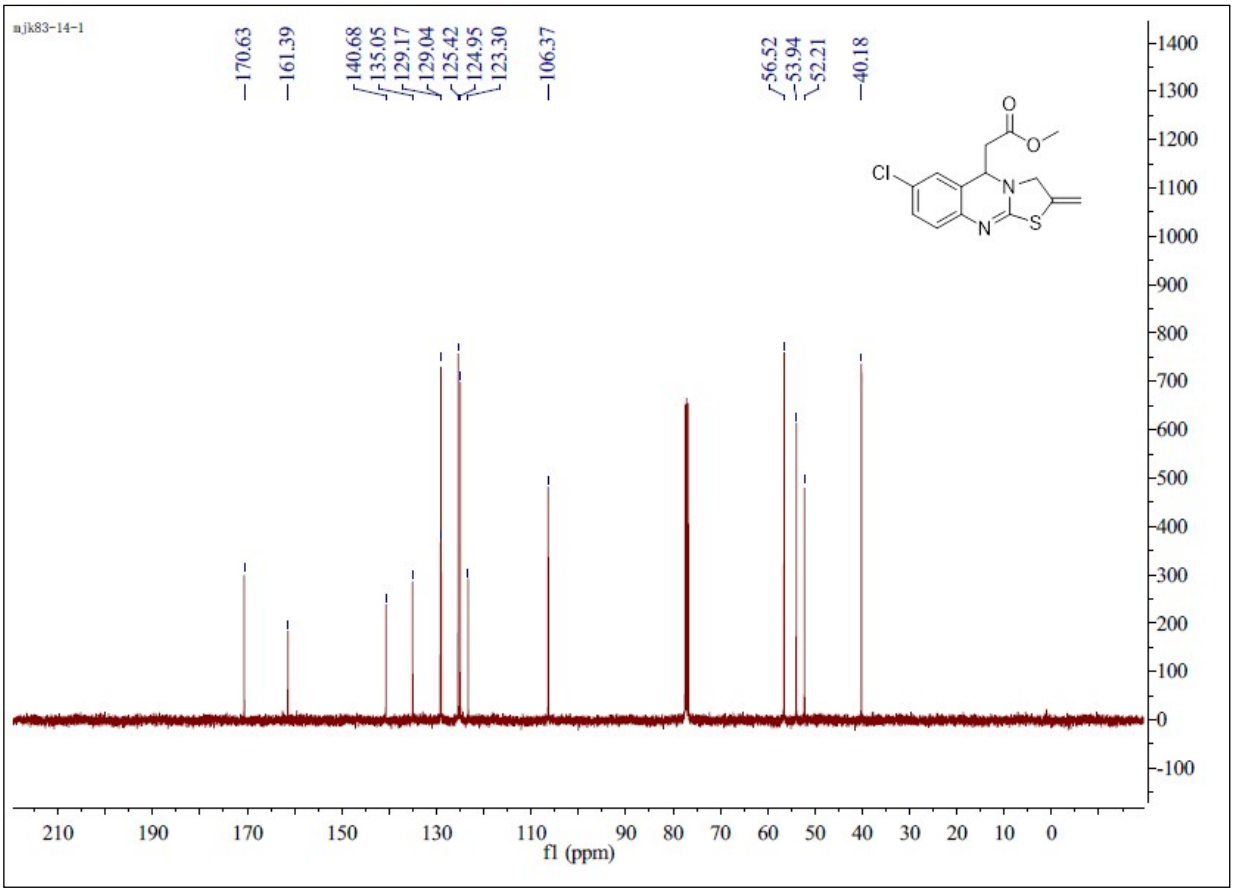
^{13}C NMR of **3fa**



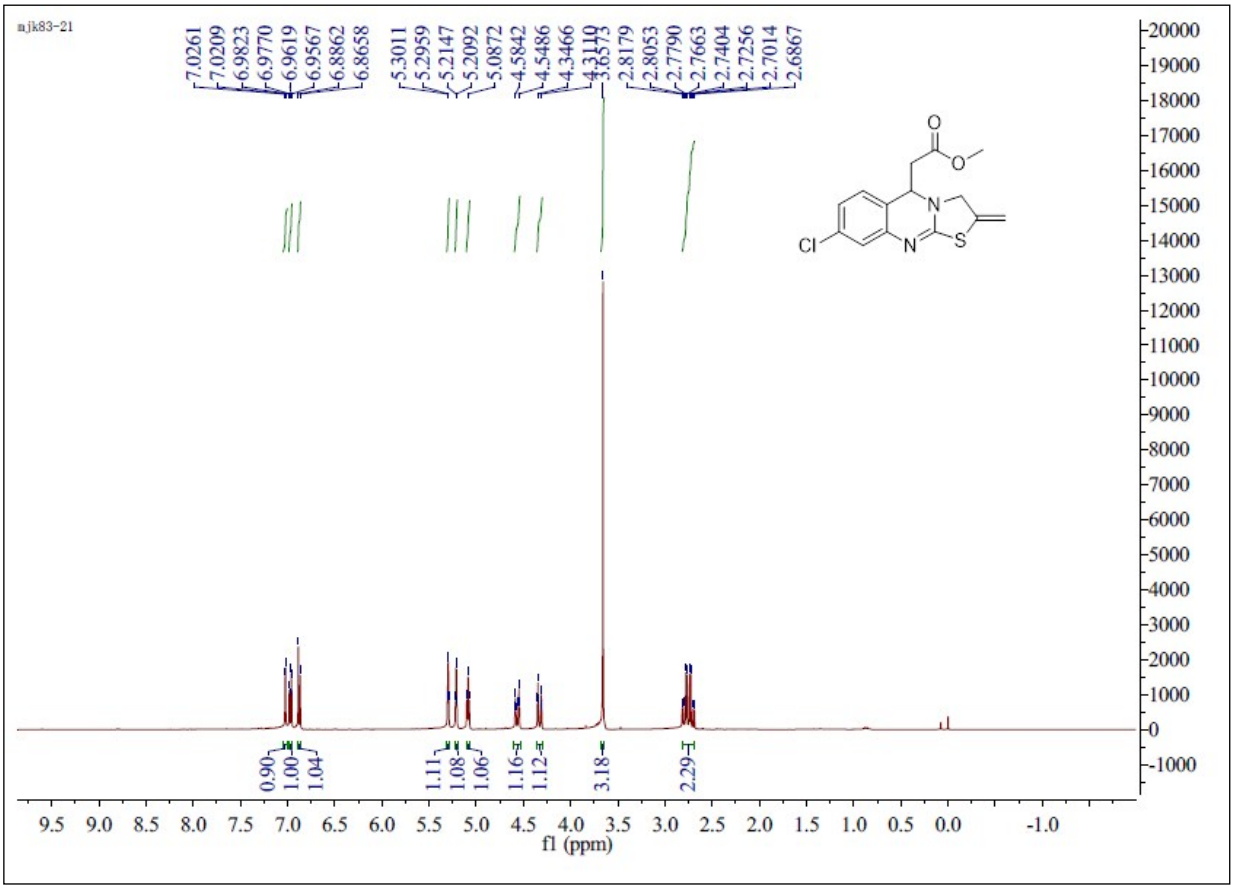
^{1}H NMR of **3ga**



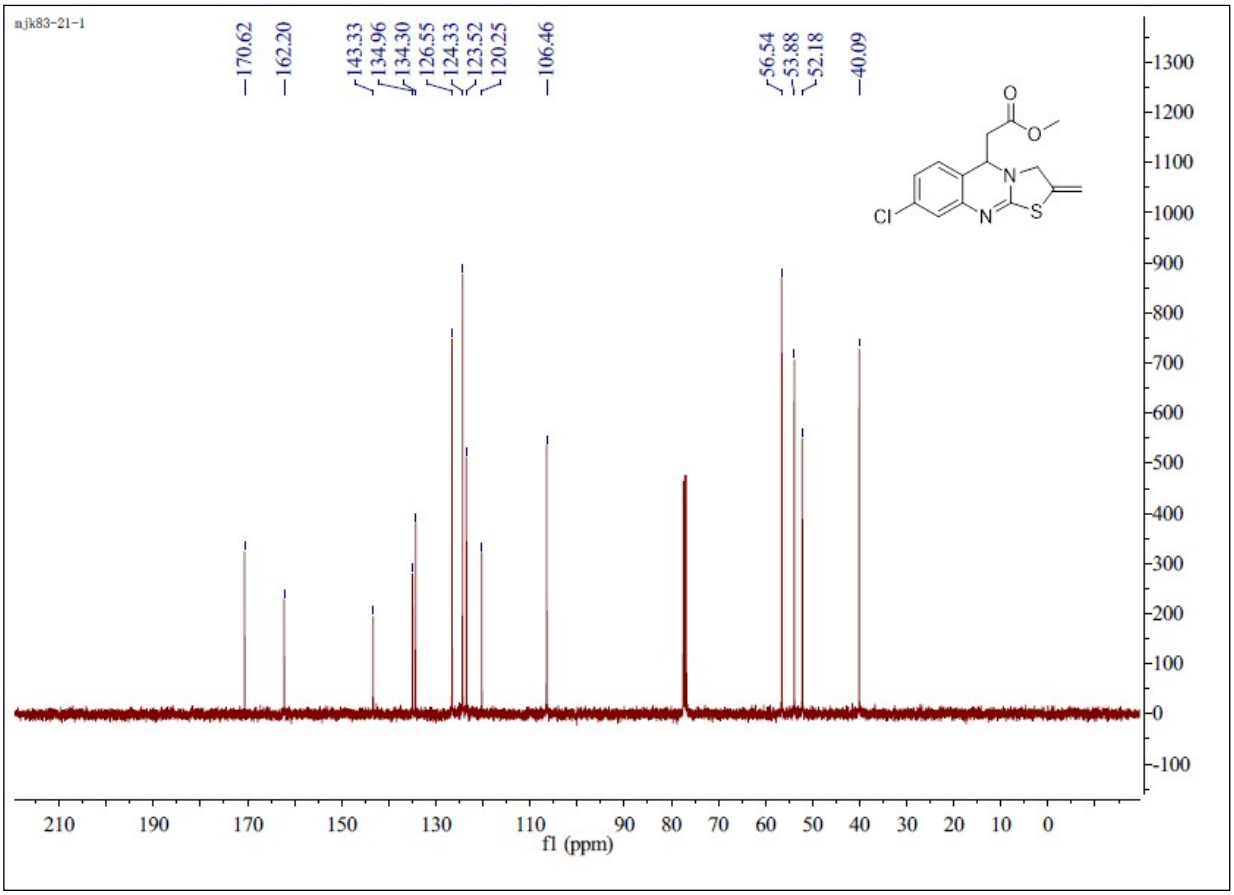
^{13}C NMR of **3ga**



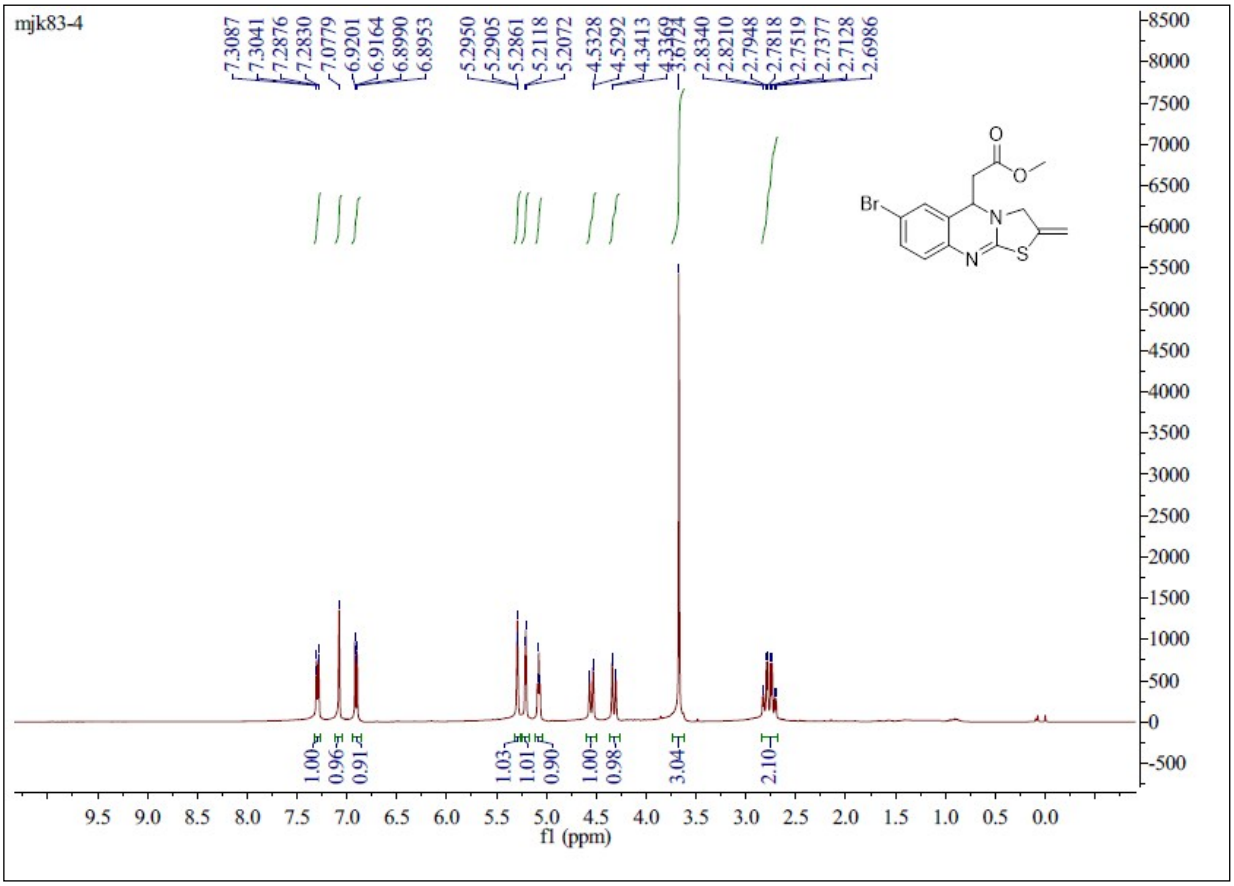
^{1}H NMR of **3ha**



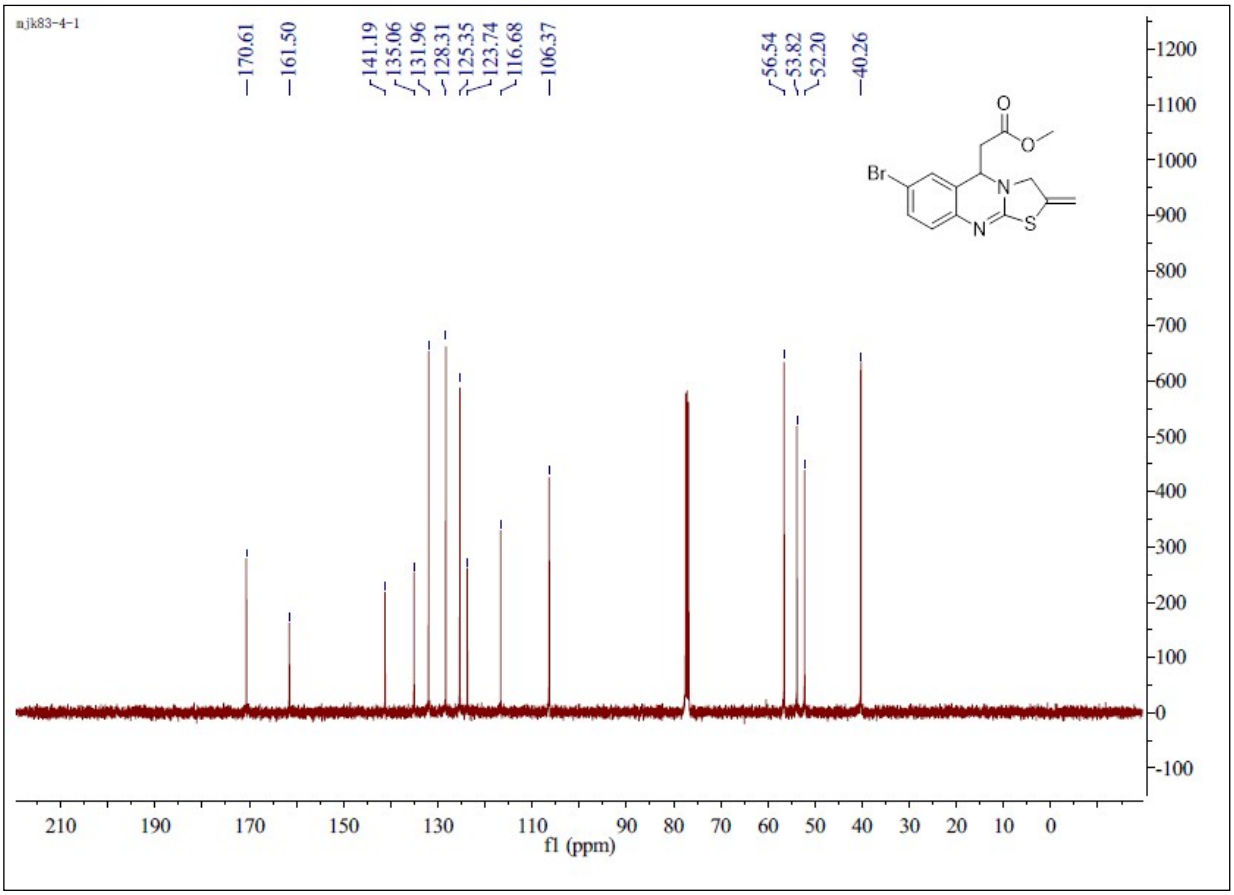
^{13}C NMR of **3ha**



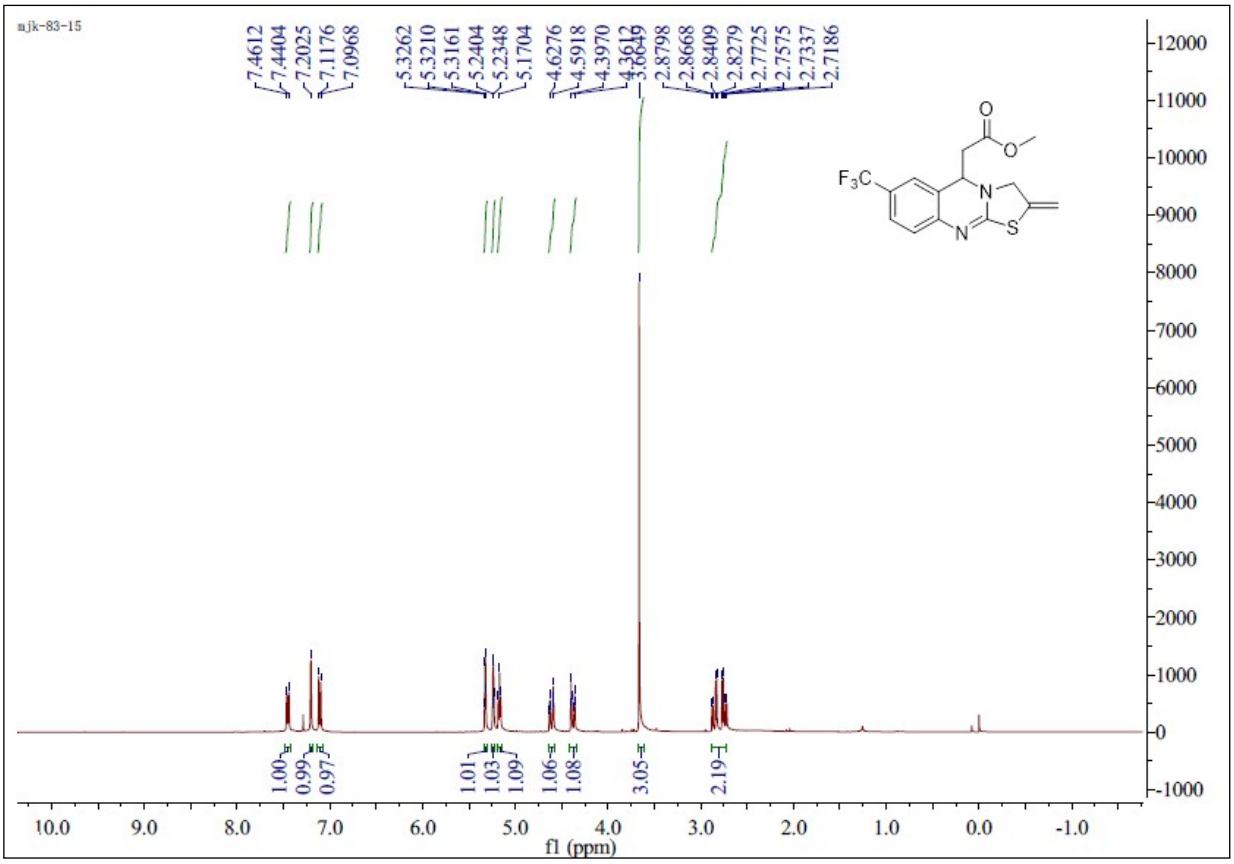
^{1}H NMR of **3ia**



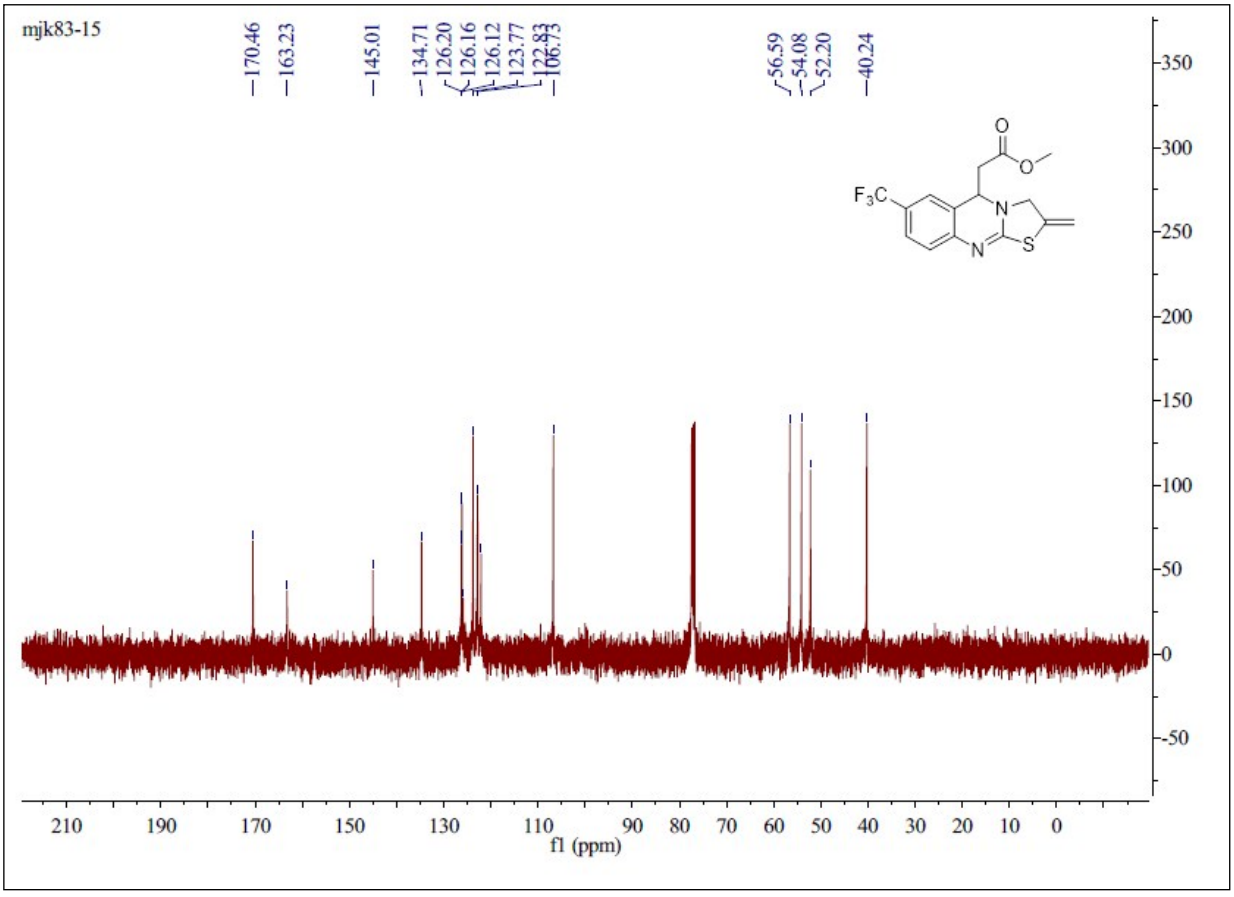
^{13}C NMR of **3ia**



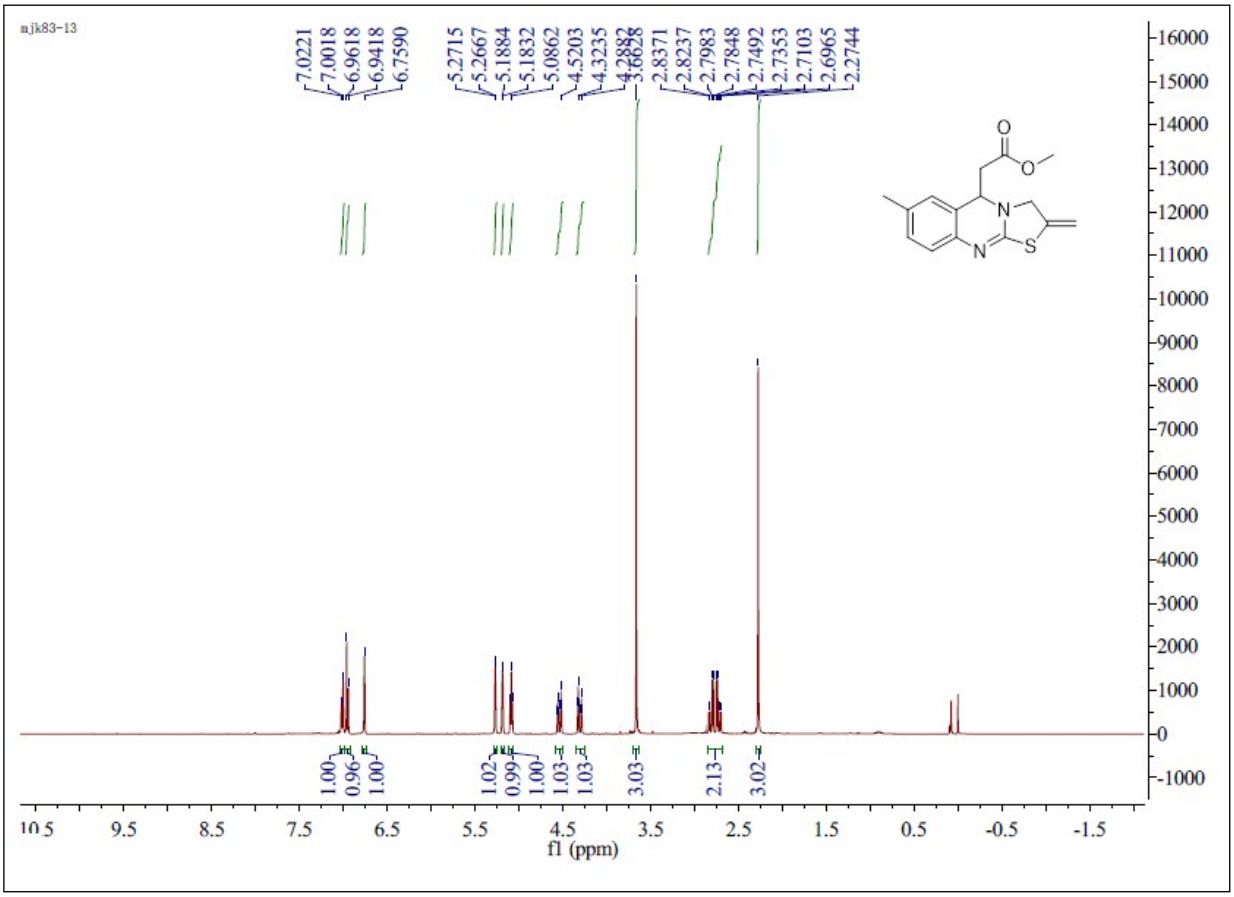
^{1}H NMR of **3ja**



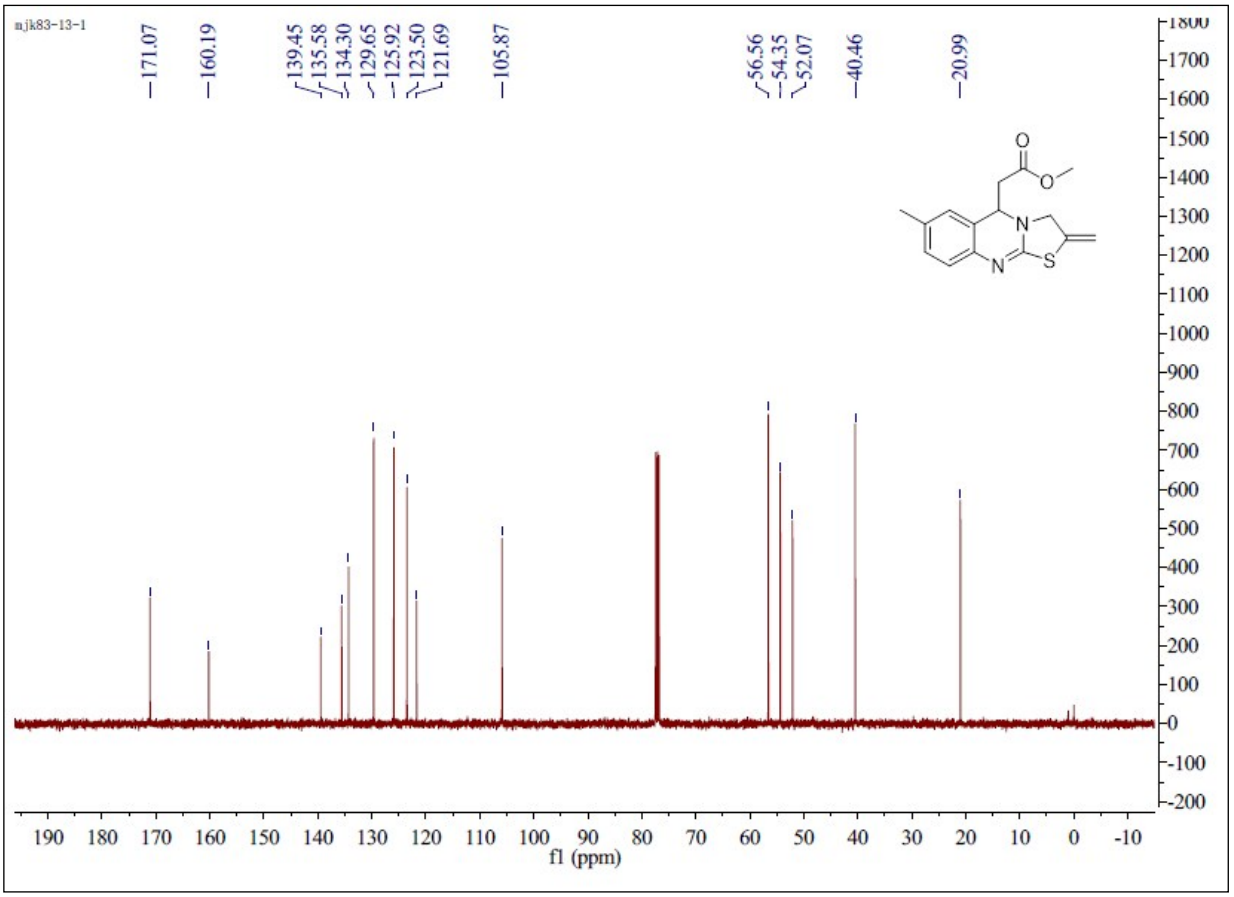
^{13}C NMR of **3ja**



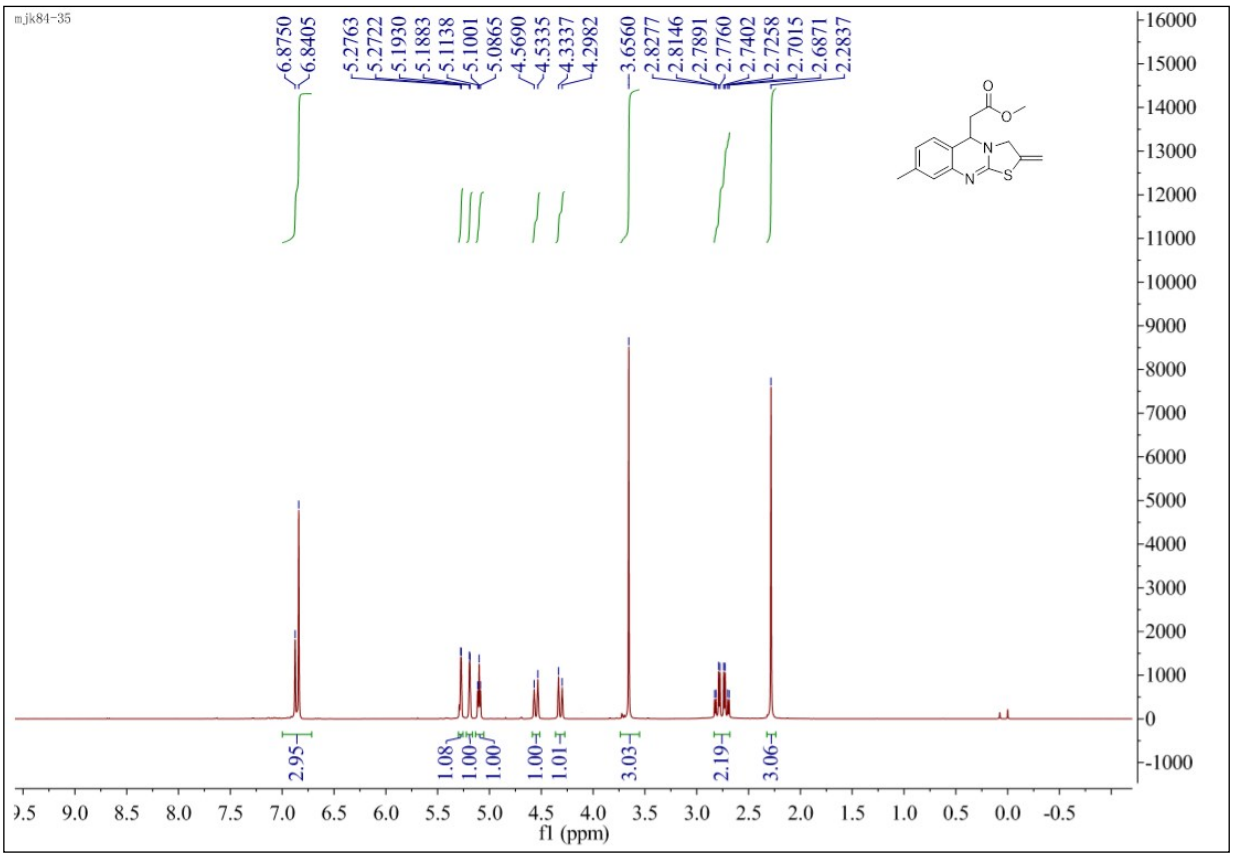
^{1}H NMR of **3ka**



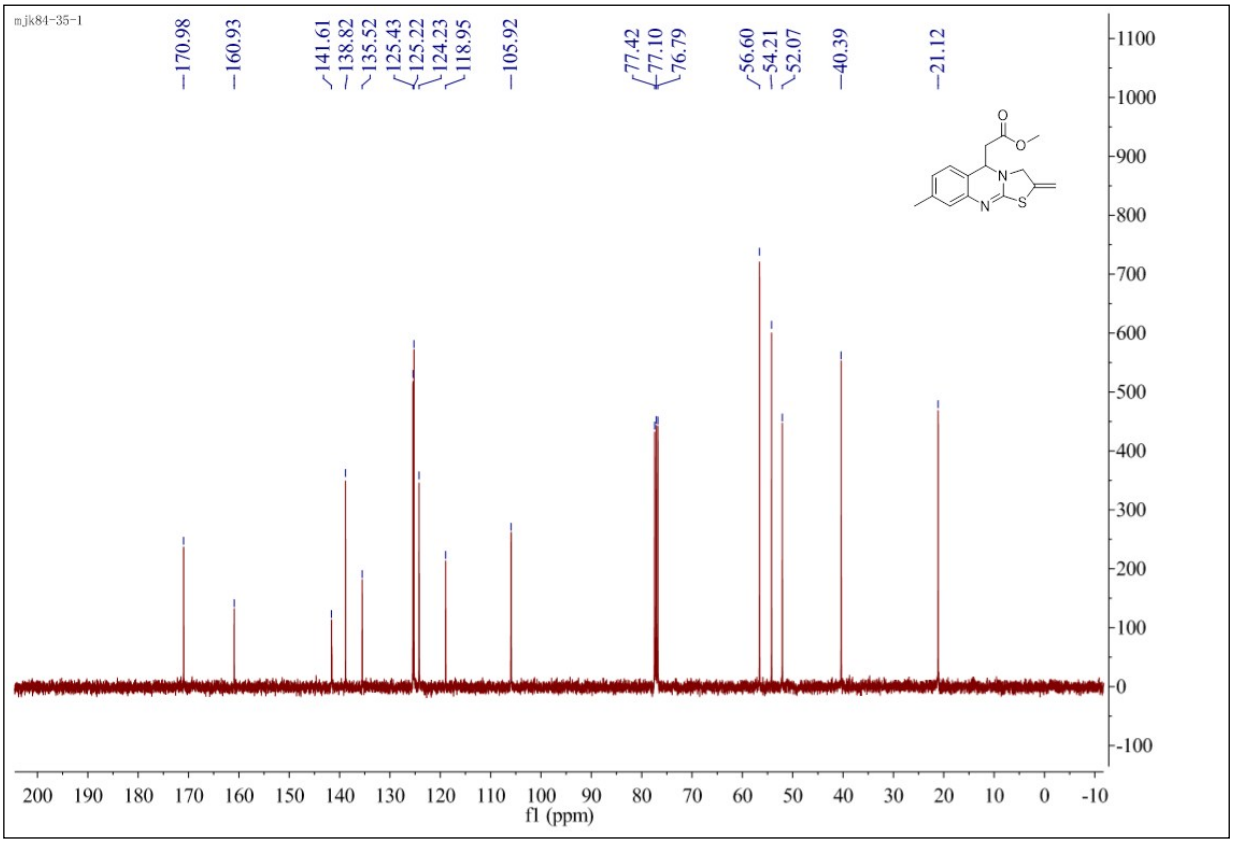
^{13}C NMR of **3ka**



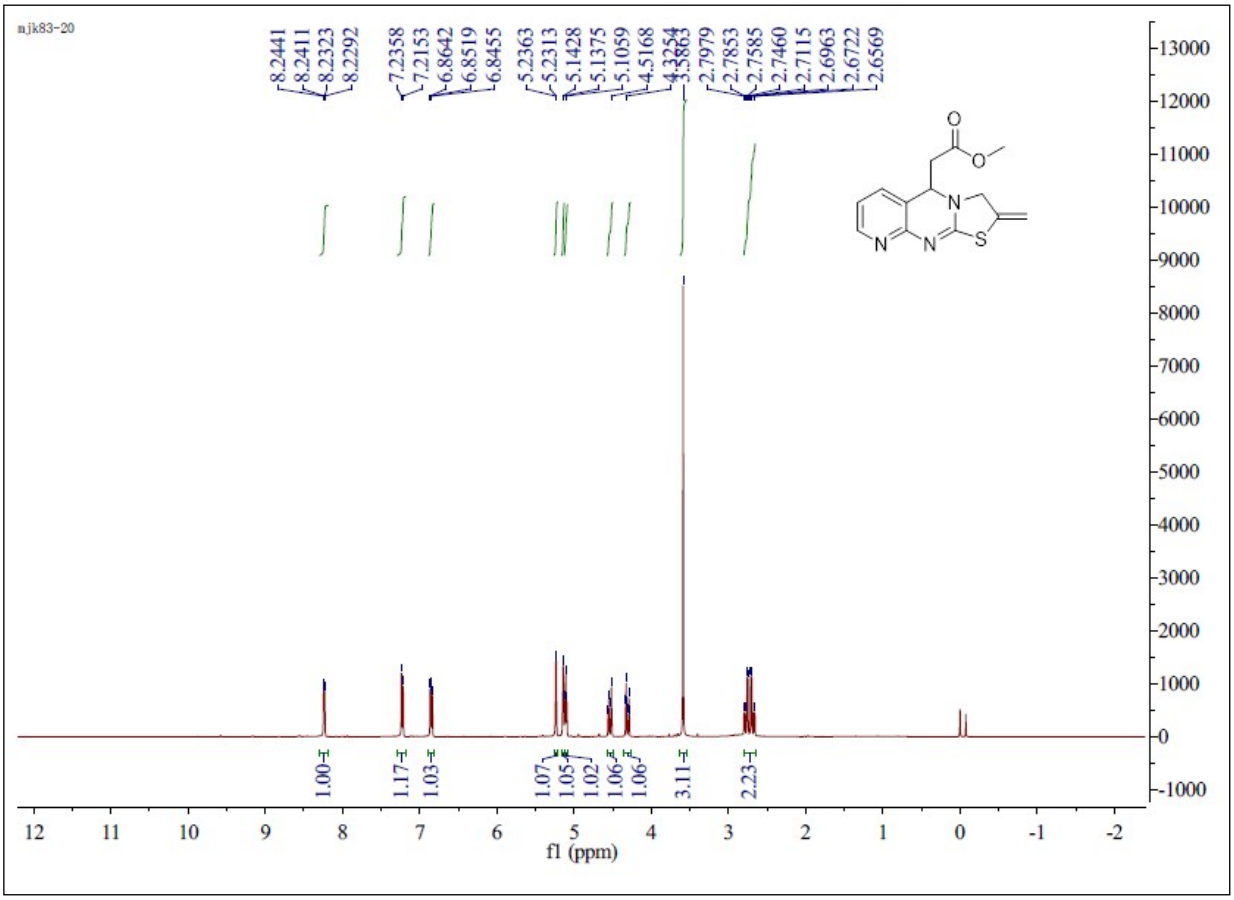
^{1}H NMR of **3la**



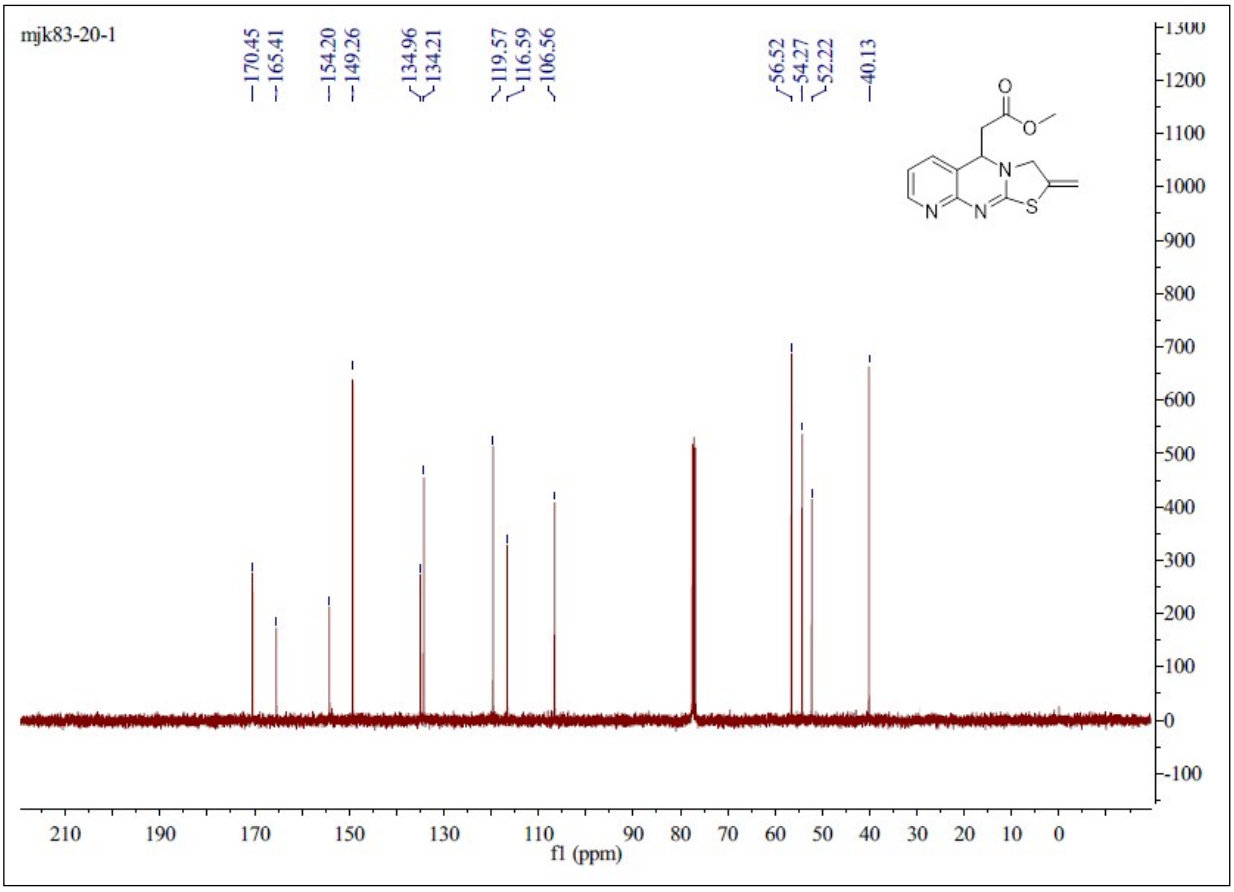
^{13}C NMR of **3la**



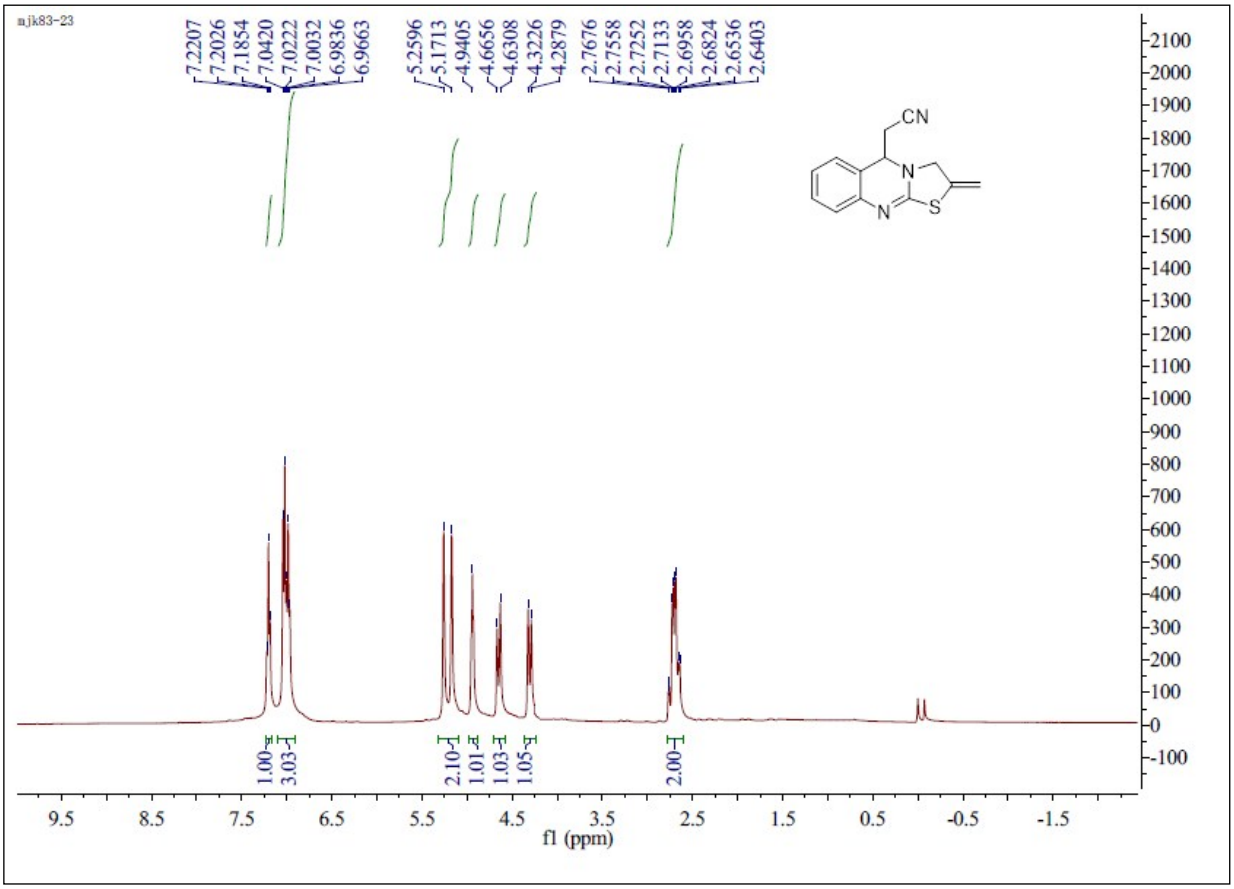
^{1}H NMR of **3ma**



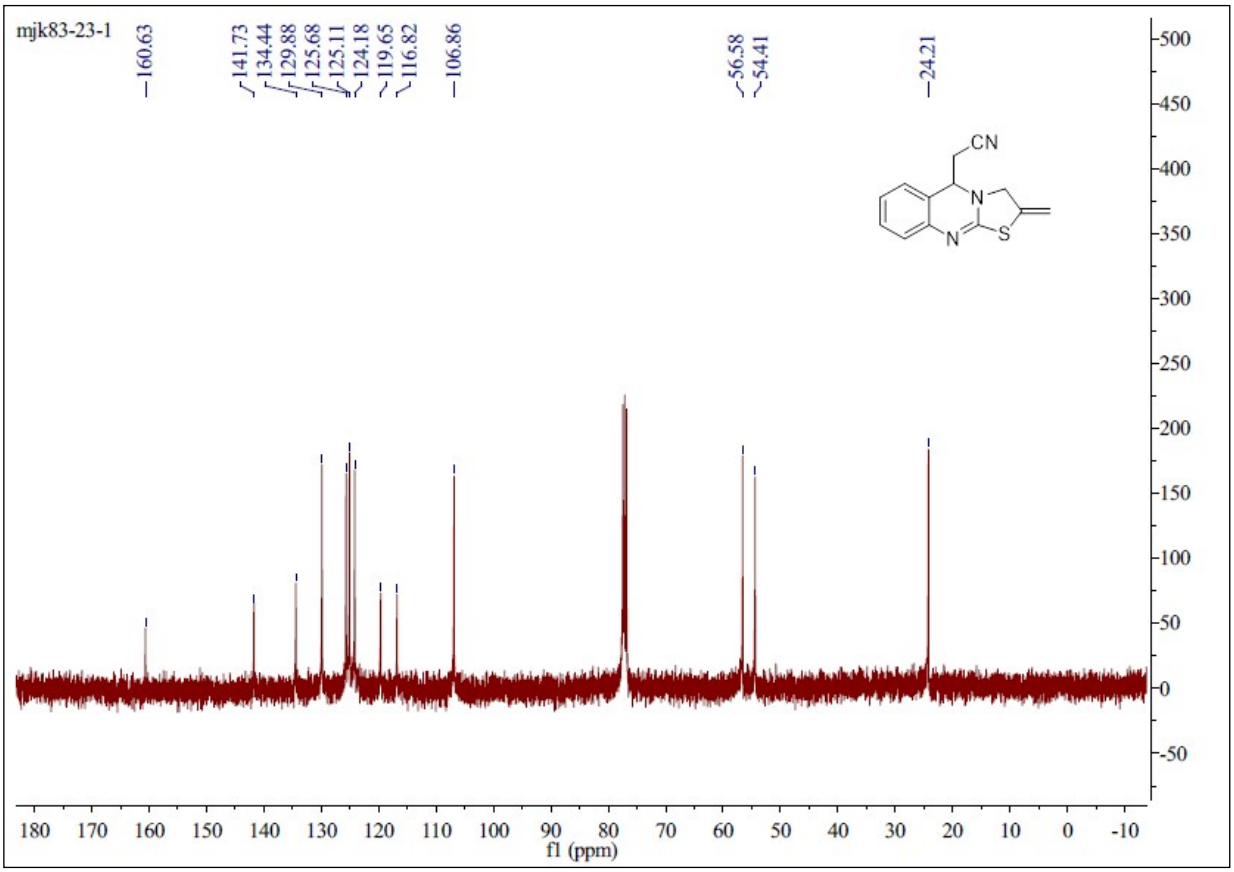
^{13}C NMR of **3ma**



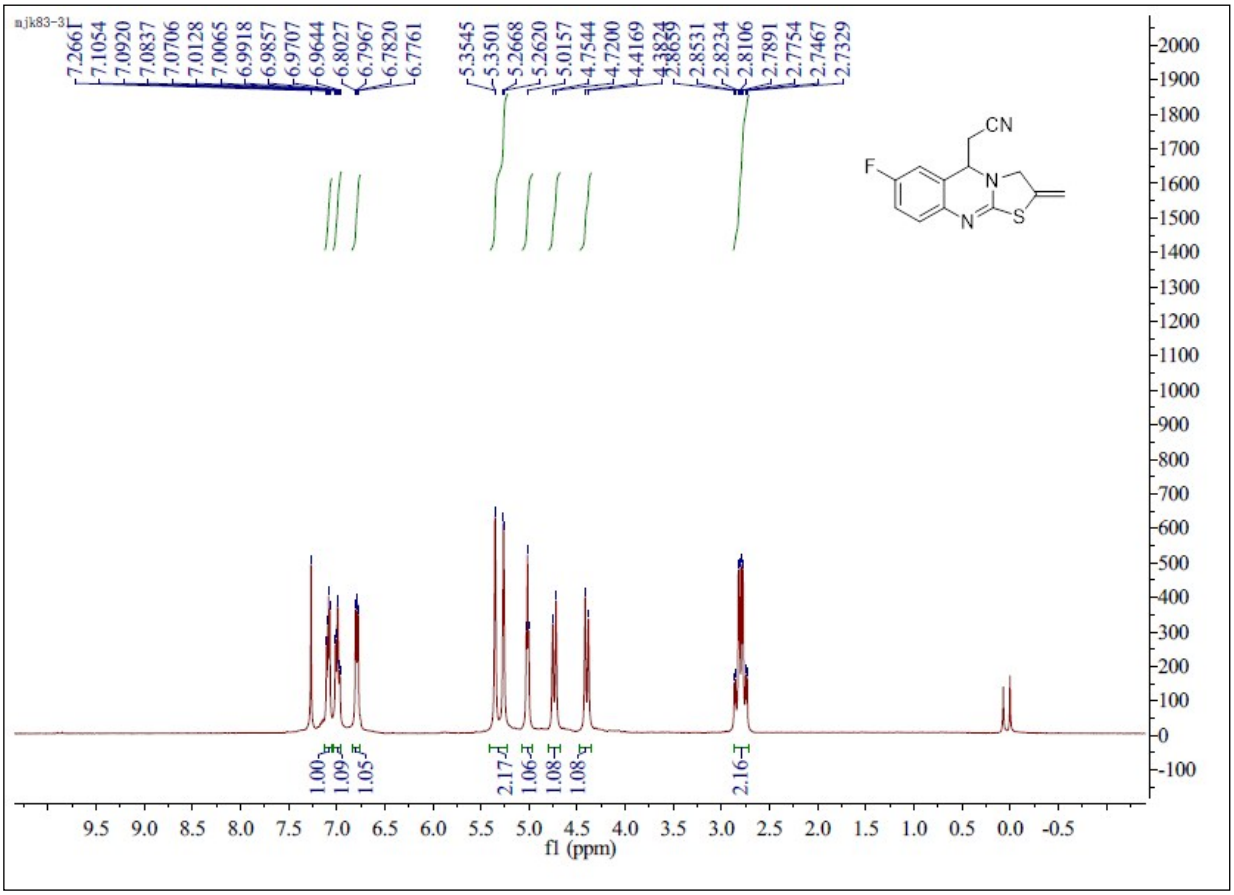
^{1}H NMR of **3na**



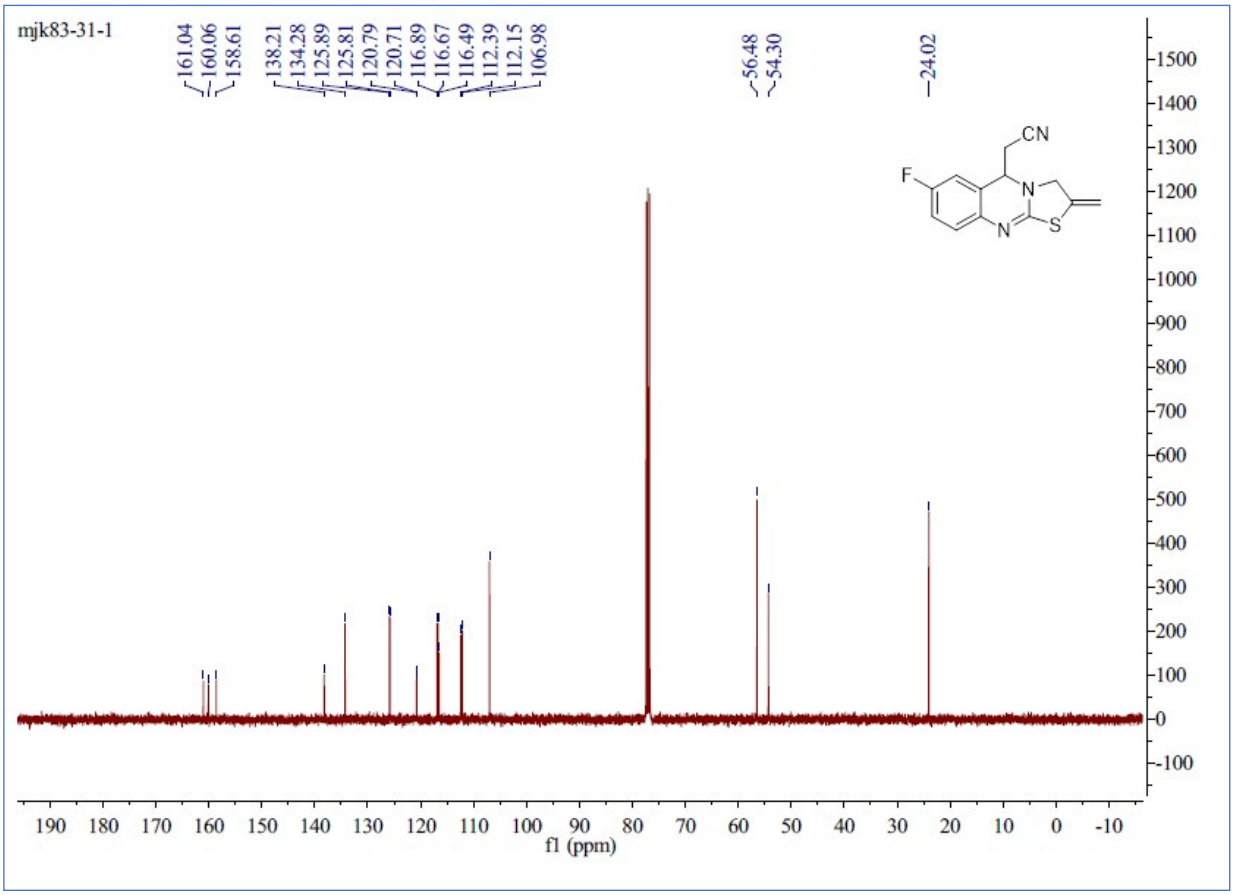
^{13}C NMR of **3na**



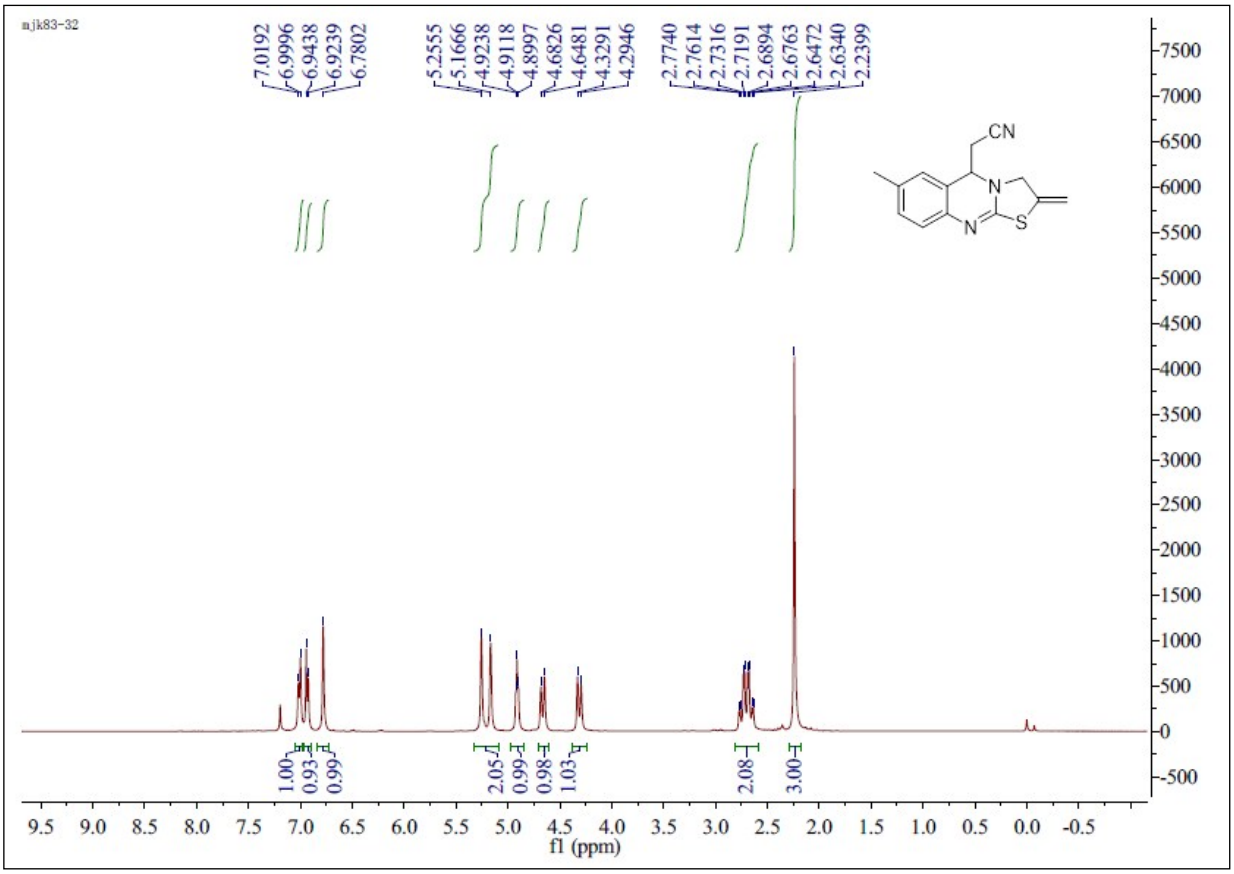
^{1}H NMR of **3oa**



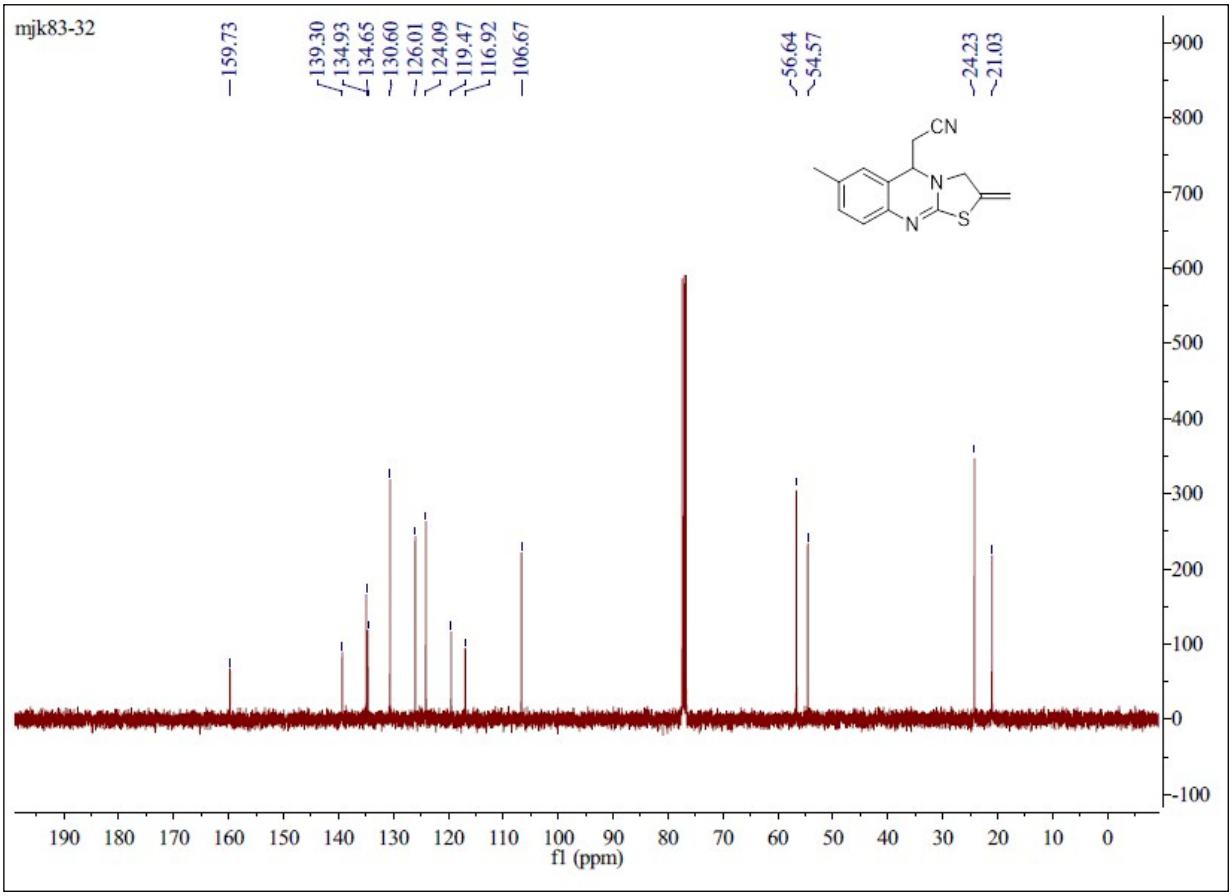
^{13}C NMR of **3oa**



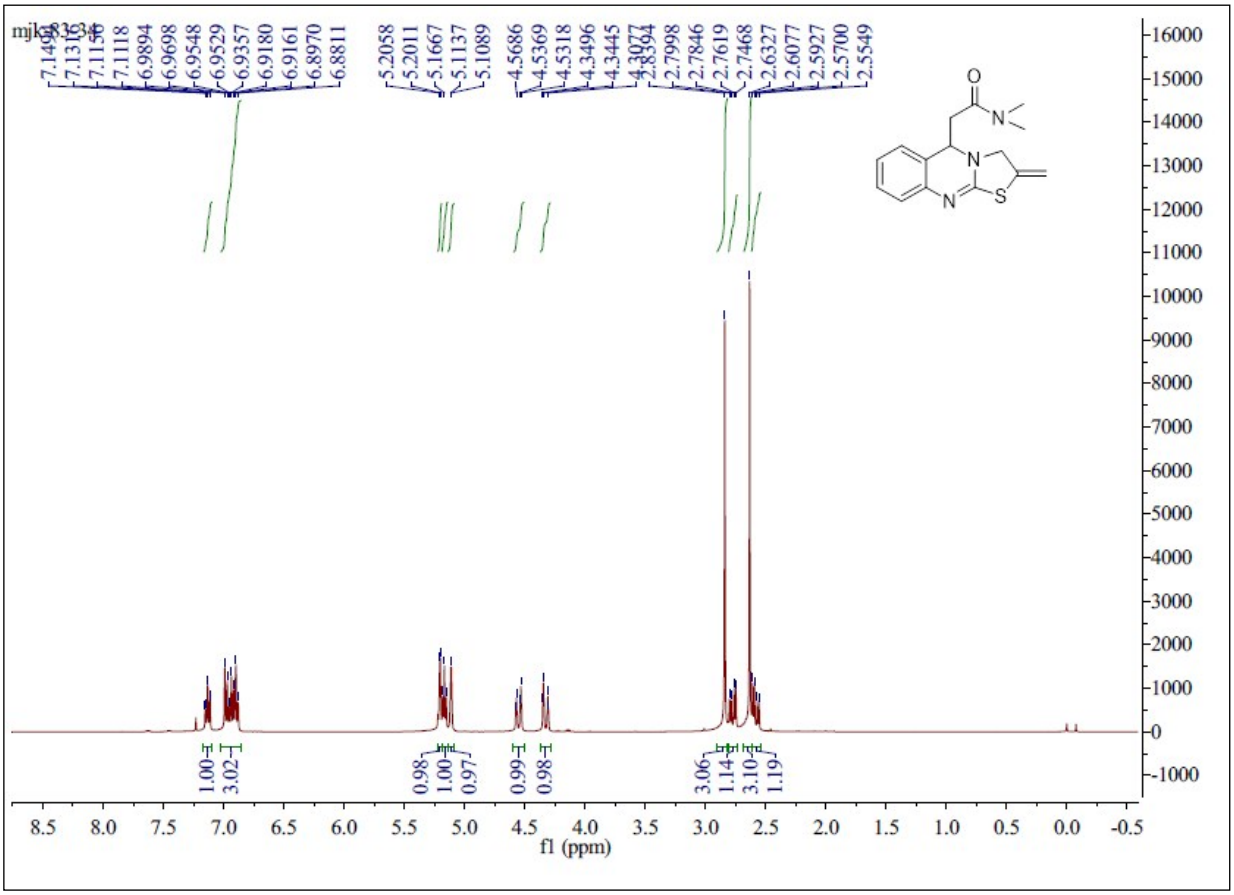
^{1}H NMR of **3pa**



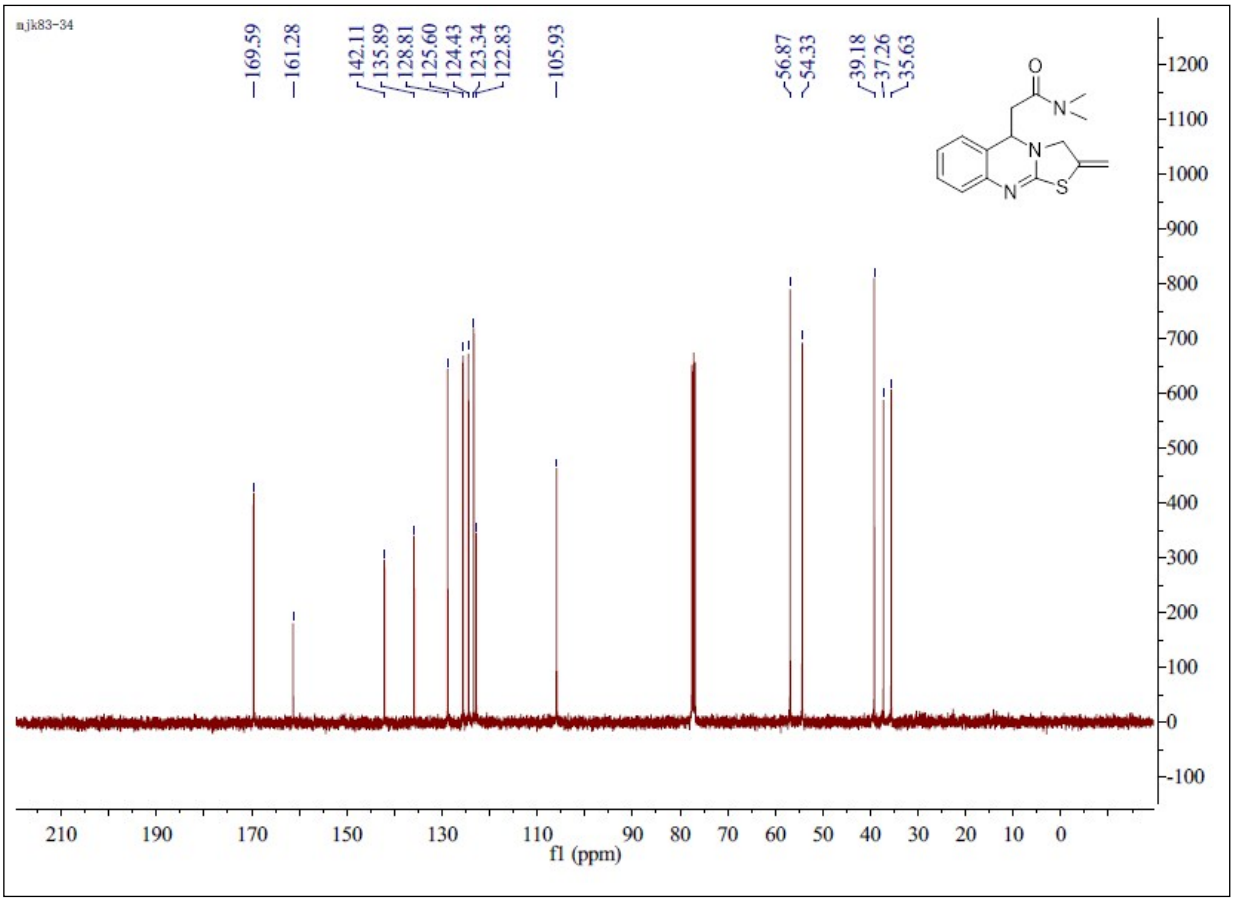
^{13}C NMR of **3pa**



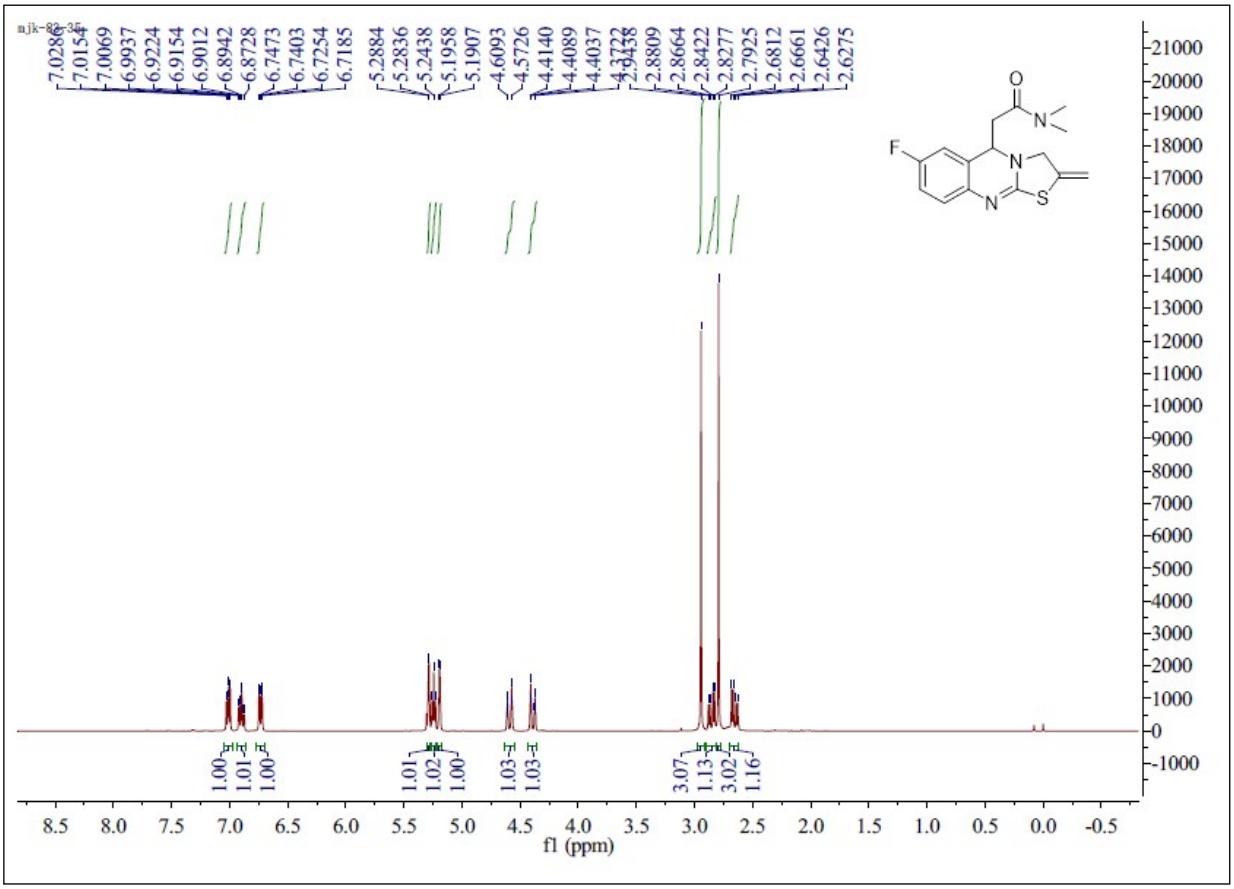
^{1}H NMR of **3qa**



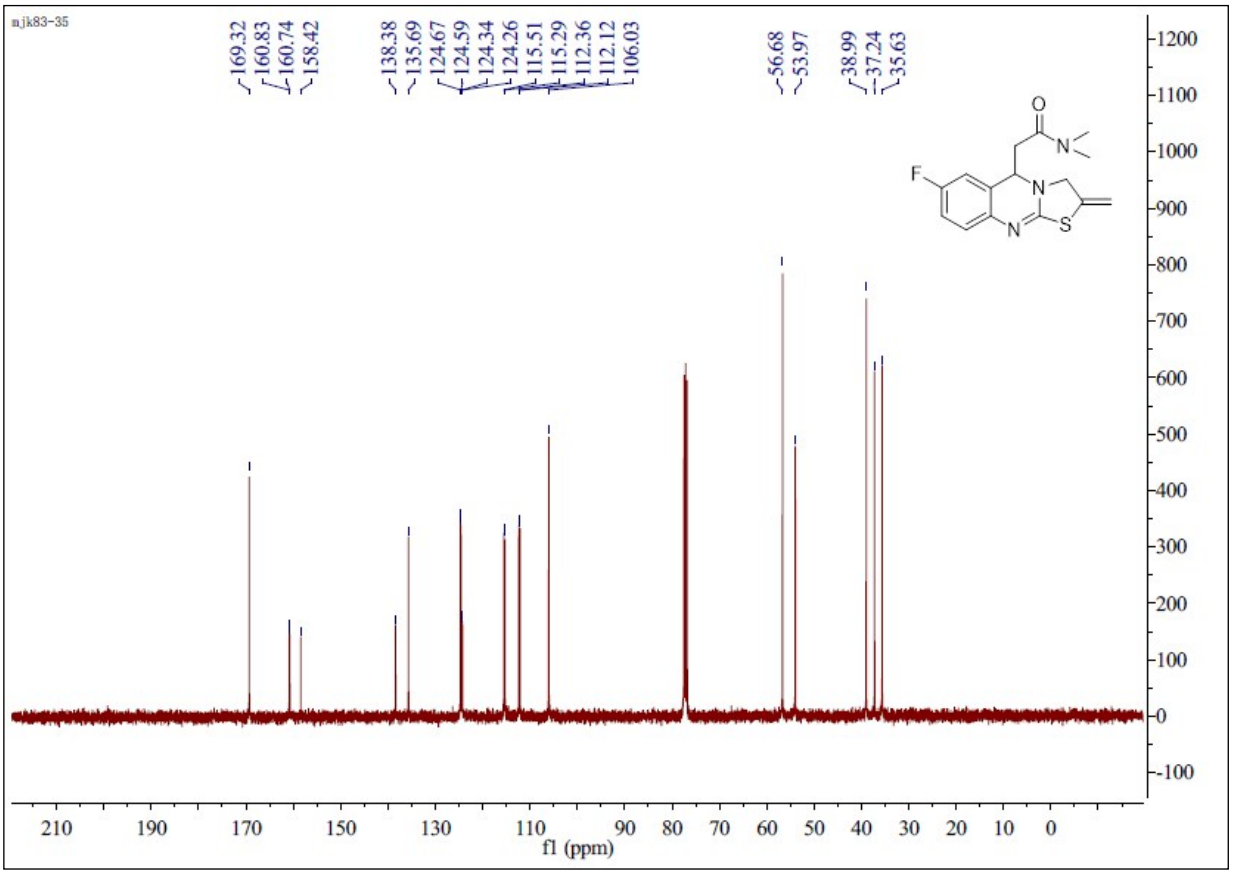
^{13}C NMR of **3qa**



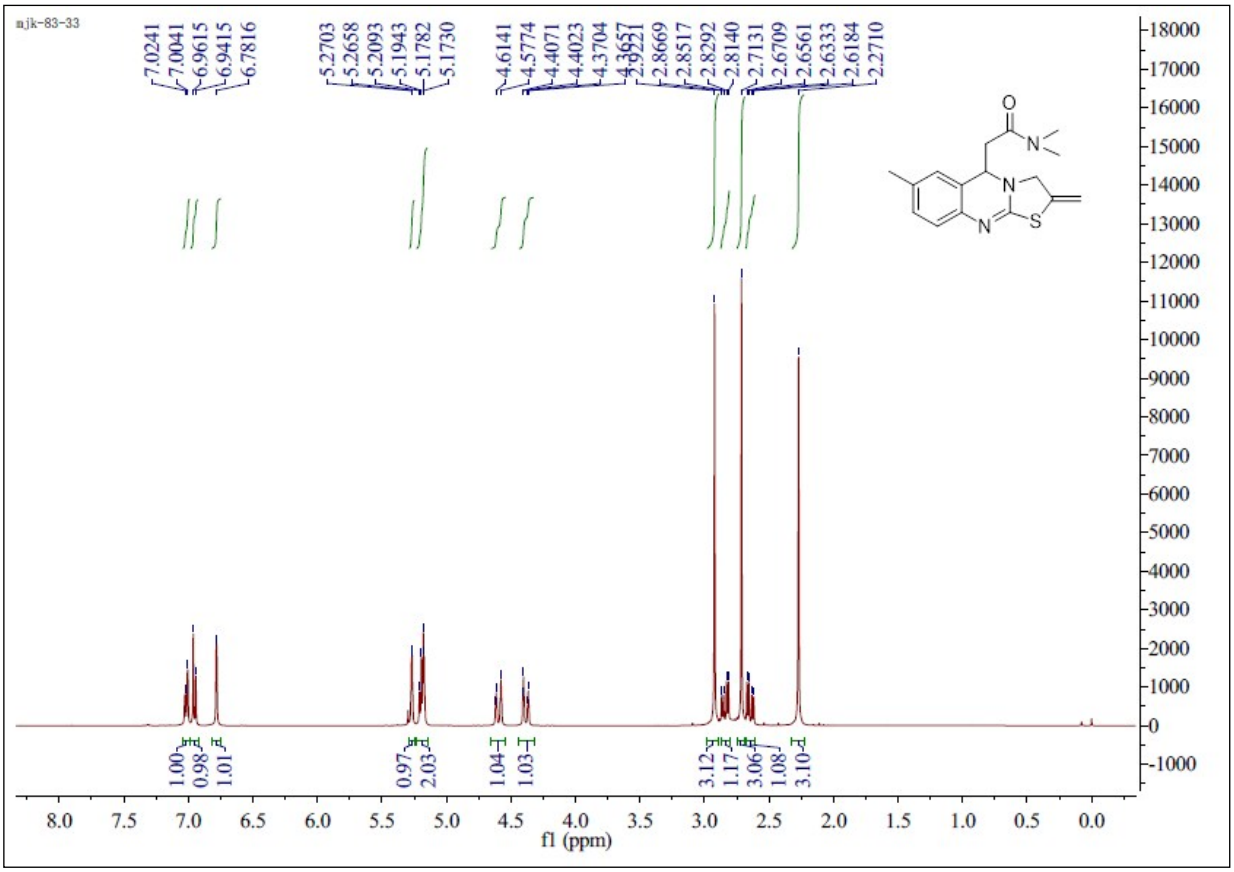
^{1}H NMR of **3ra**



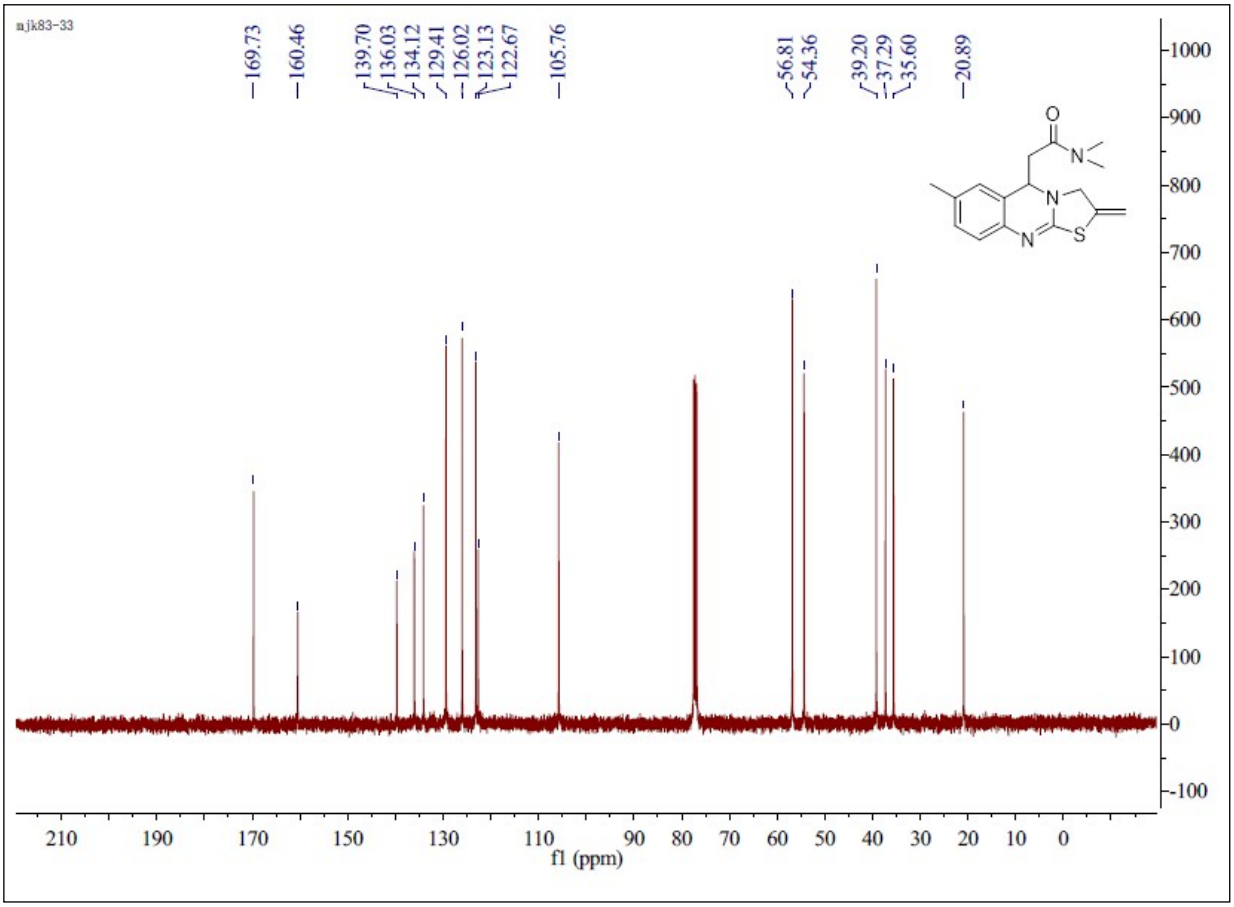
^{13}C NMR of **3ra**



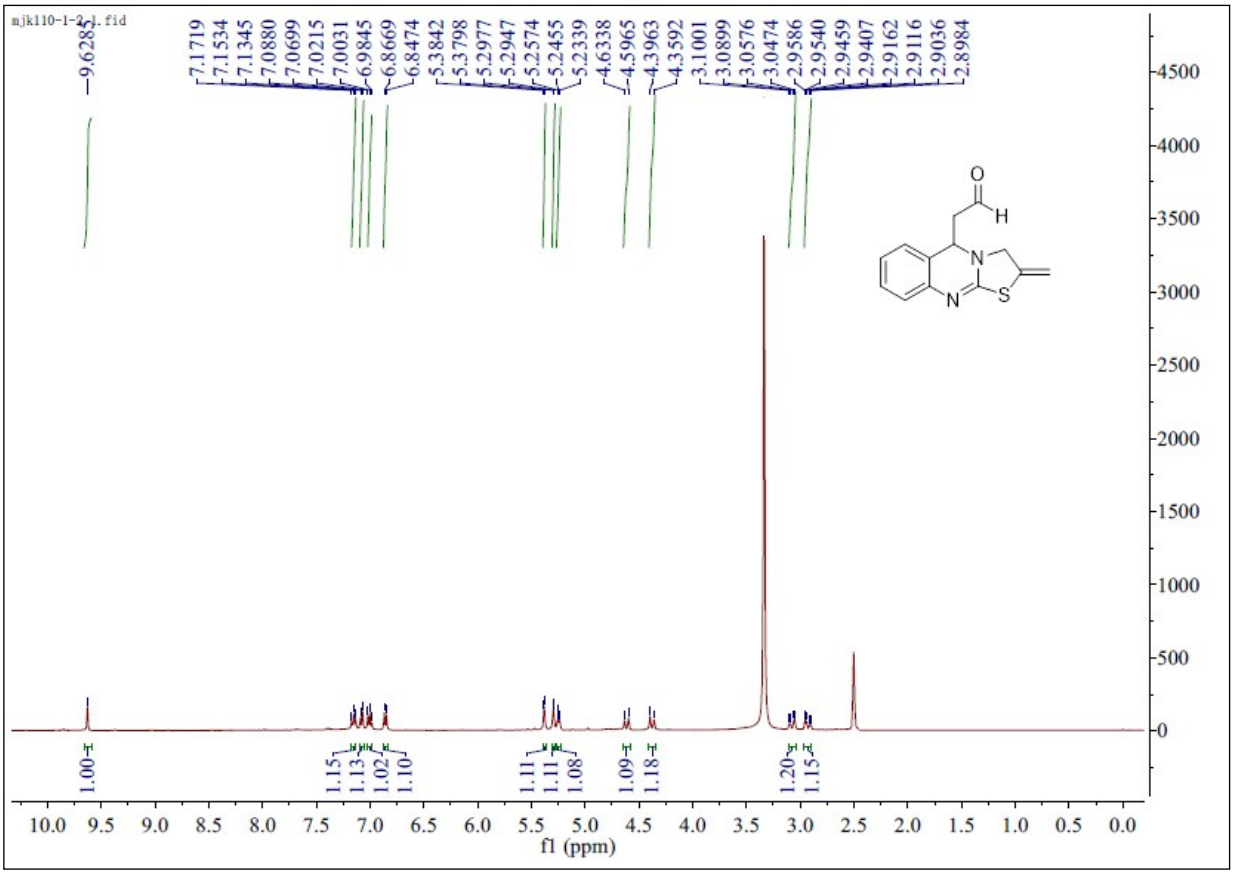
^{1}H NMR of **3sa**



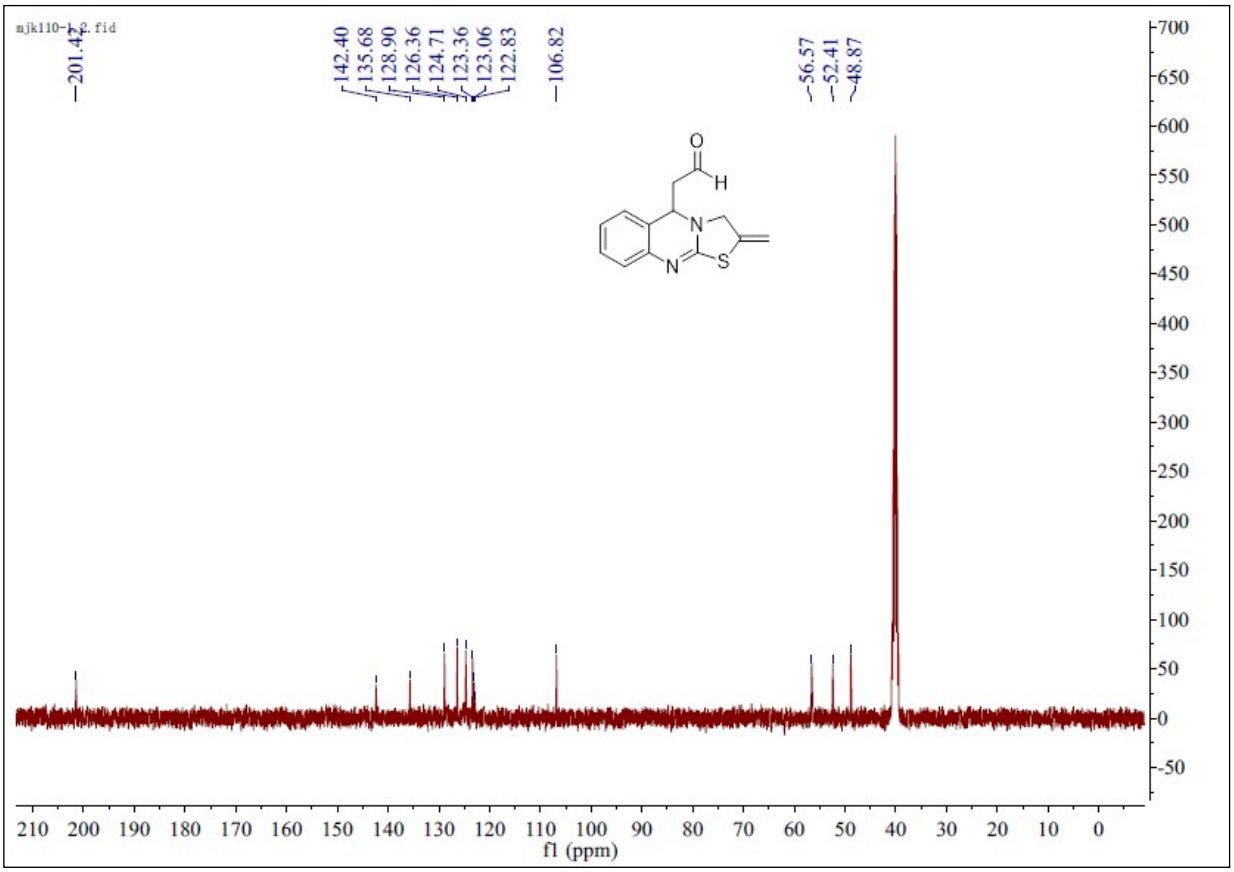
^{13}C NMR of **3sa**



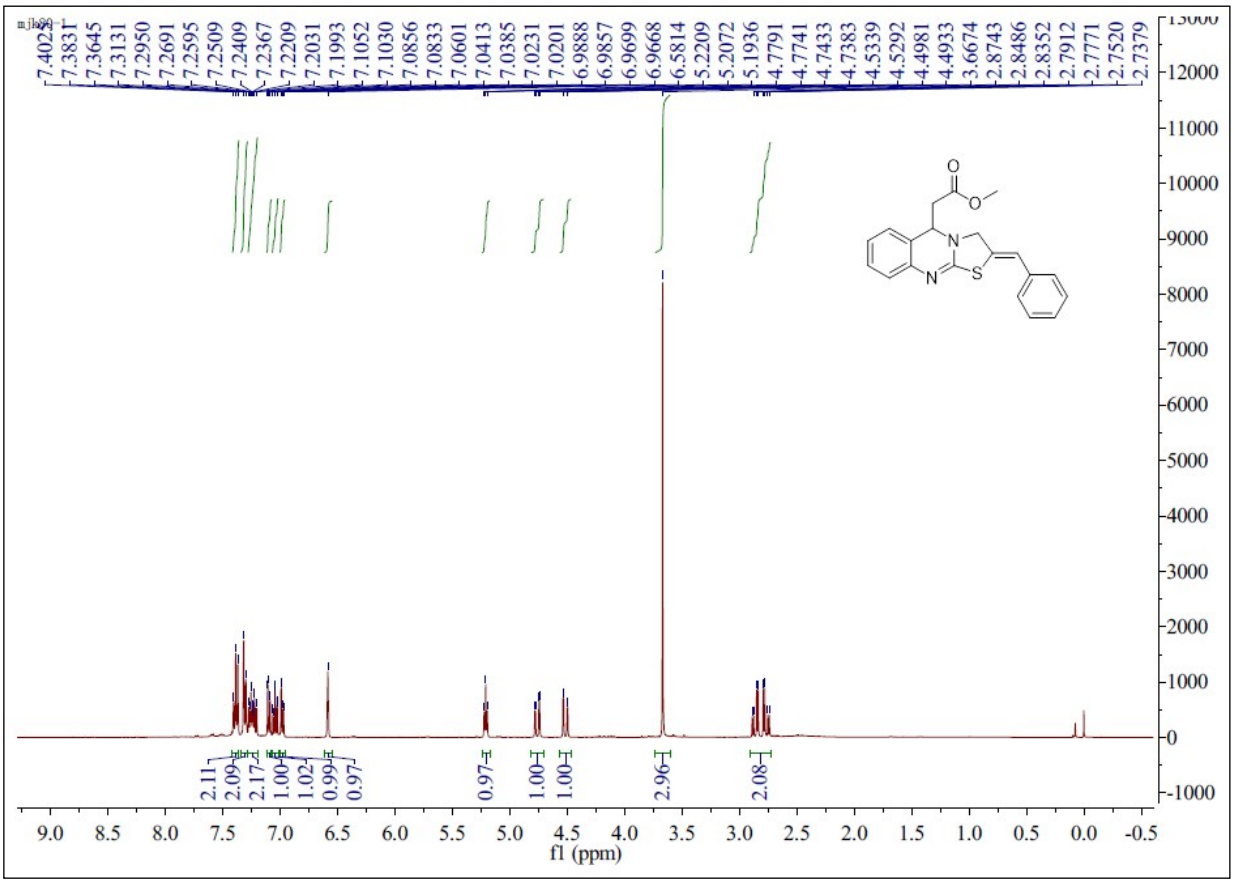
^{1}H NMR of **3ta**



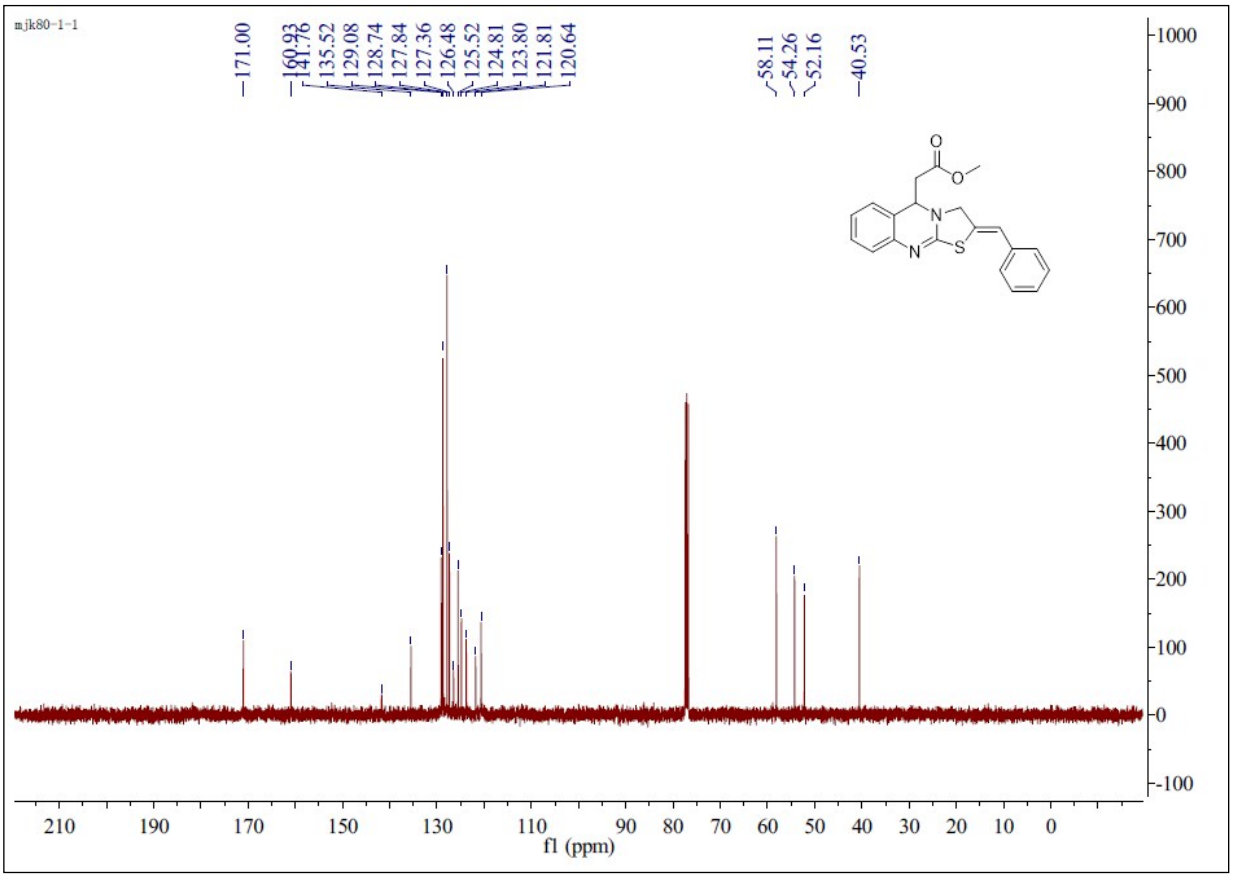
^{13}C NMR of **3ta**



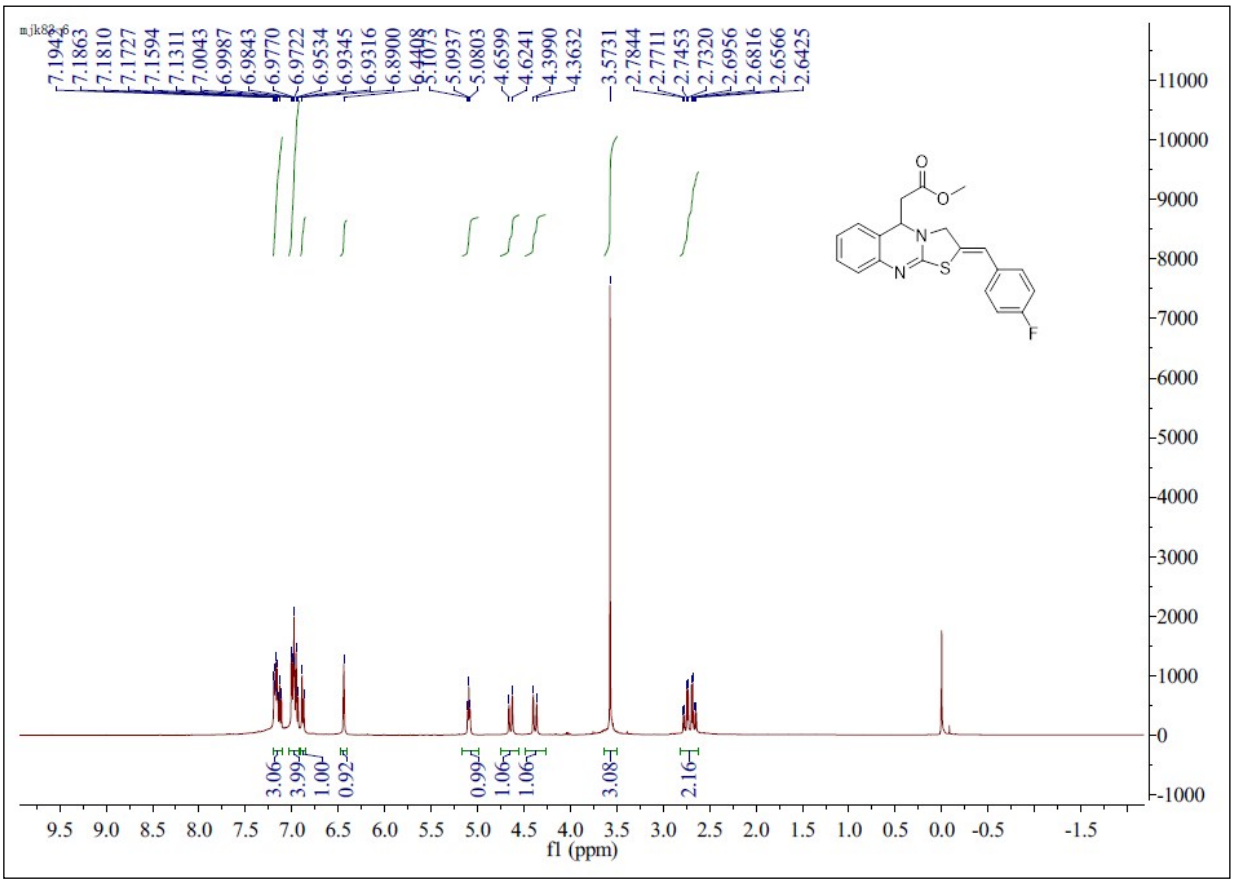
^{1}H NMR of **3ab**



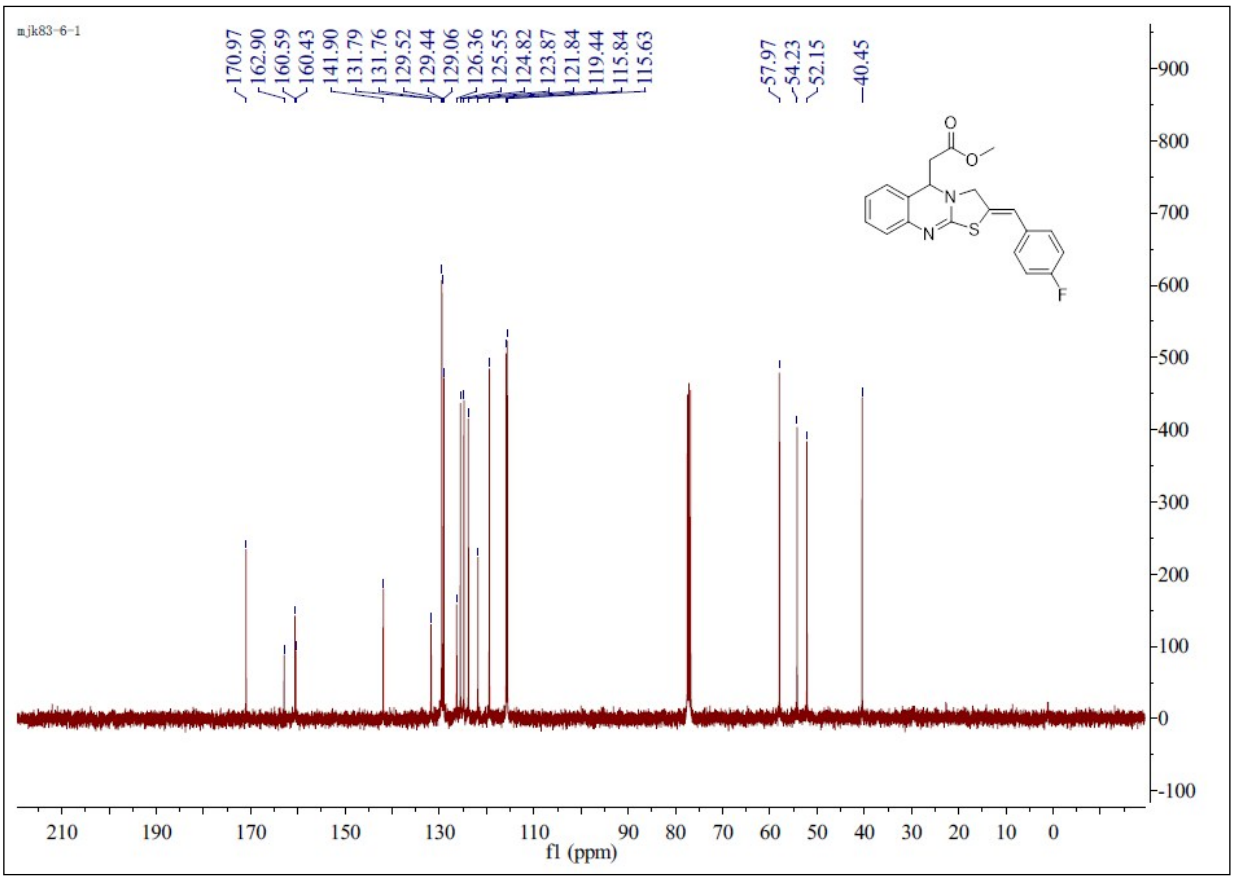
^{13}C NMR of **3ab**



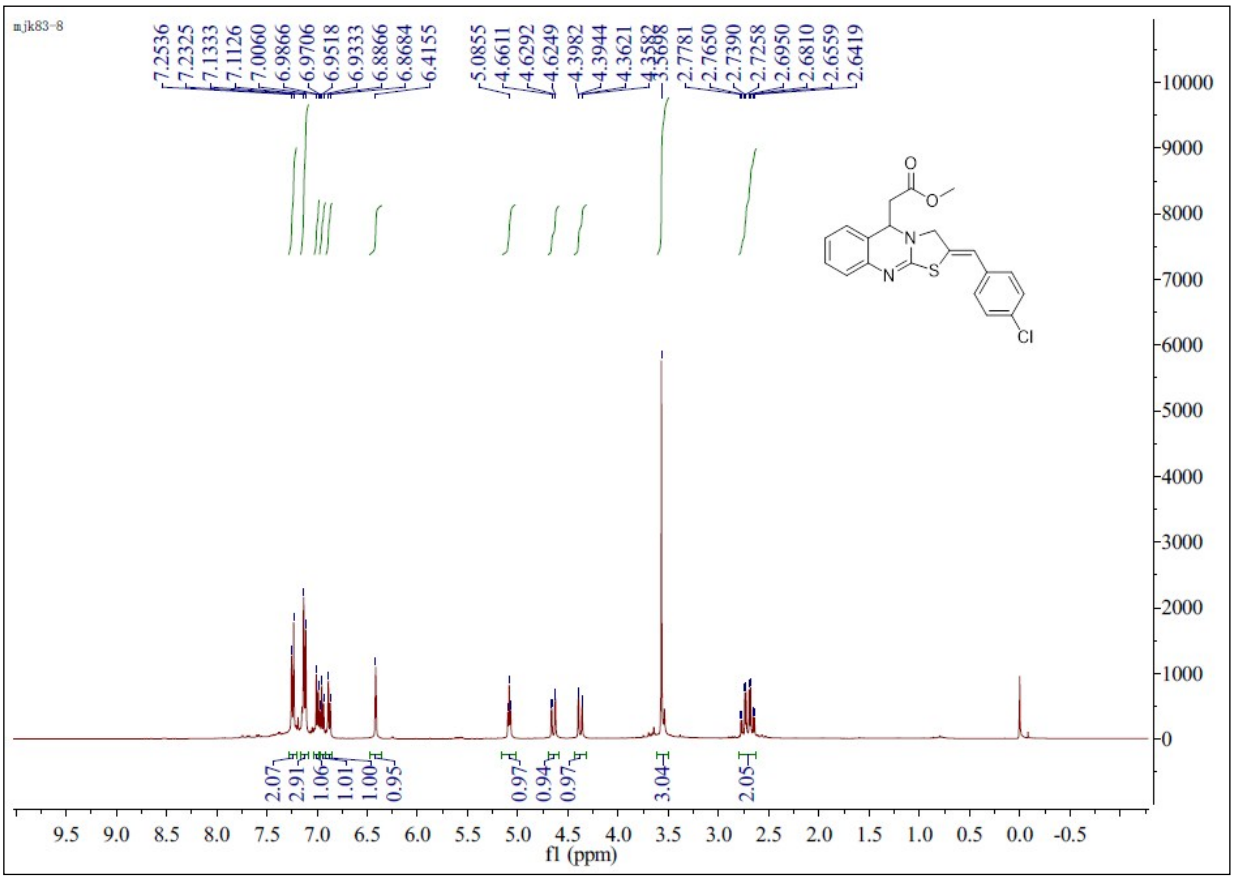
^{1}H NMR of **3ac**



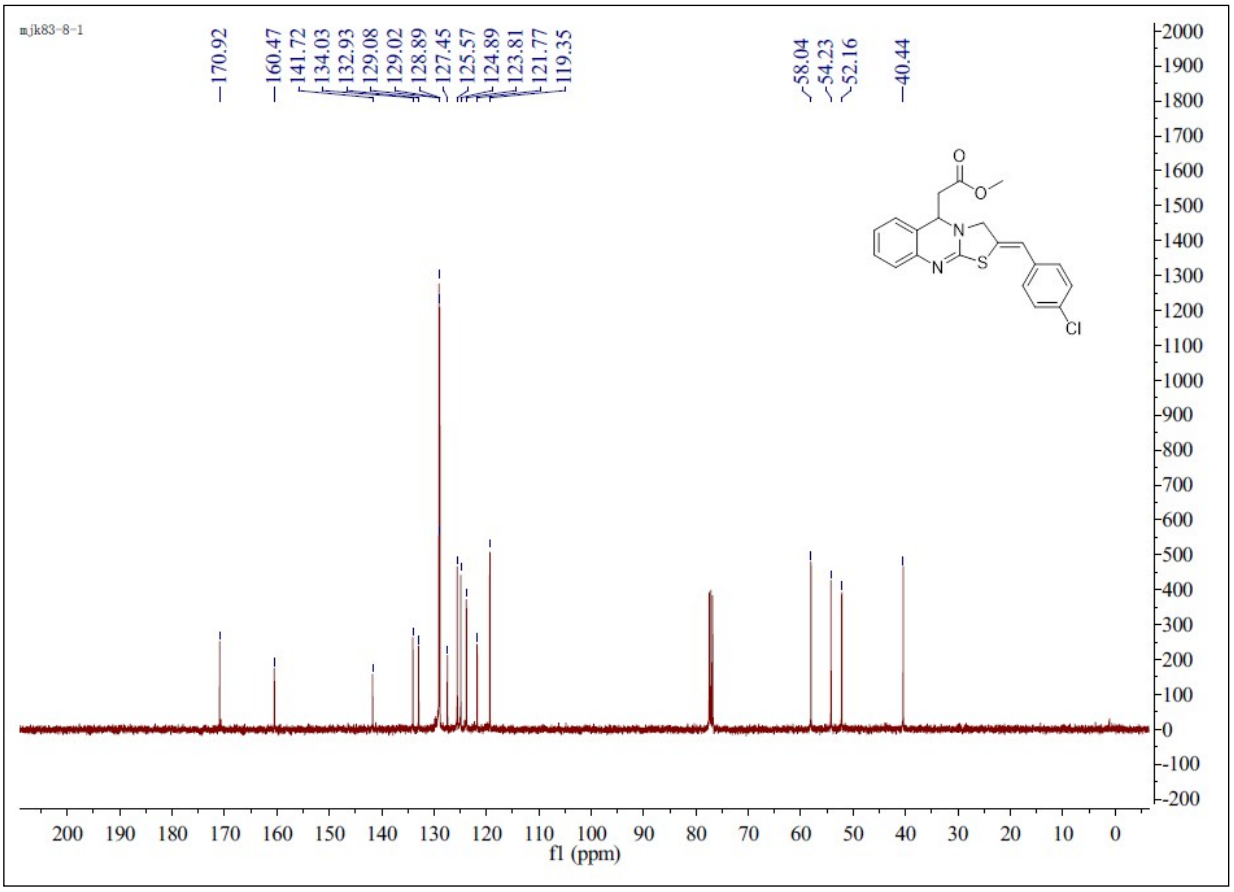
^{13}C NMR of **3ac**



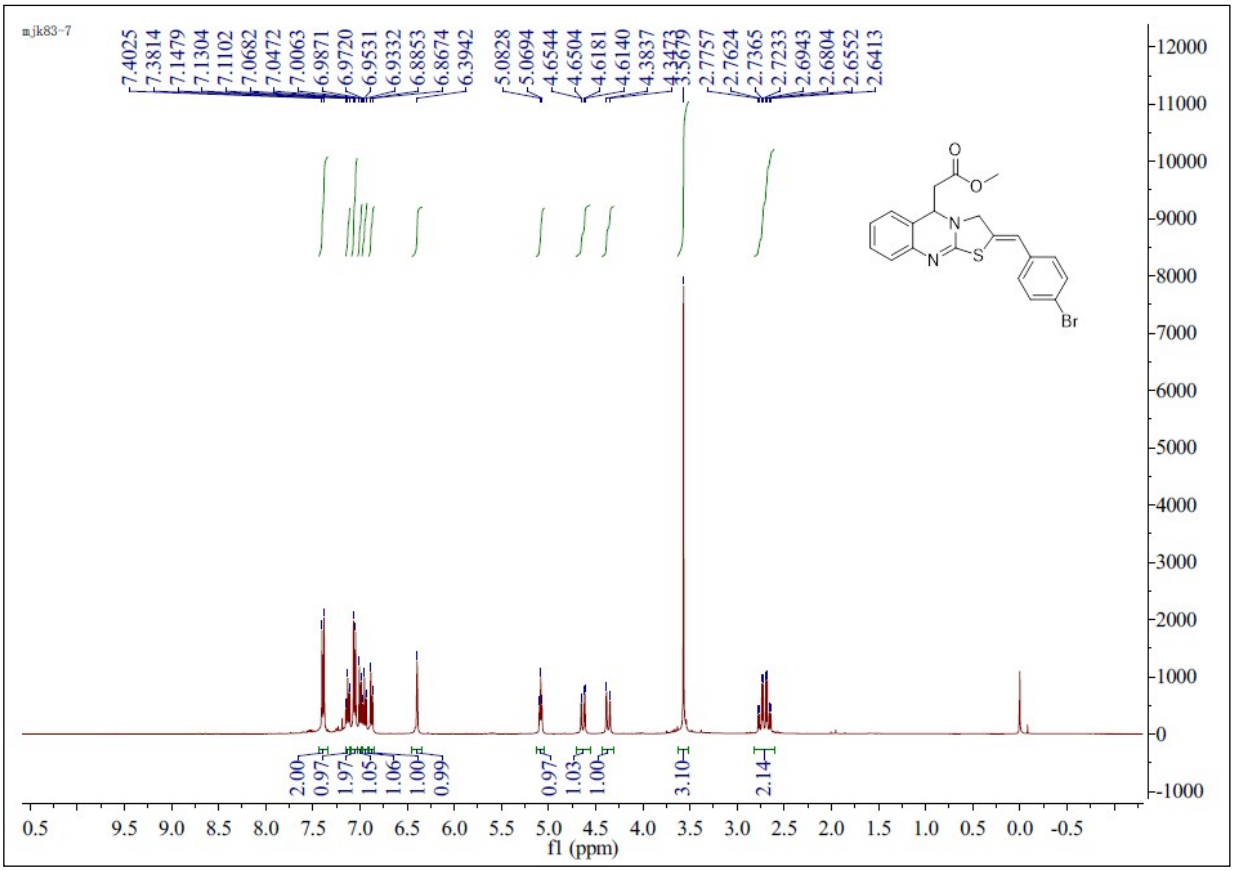
^{1}H NMR of **3ad**



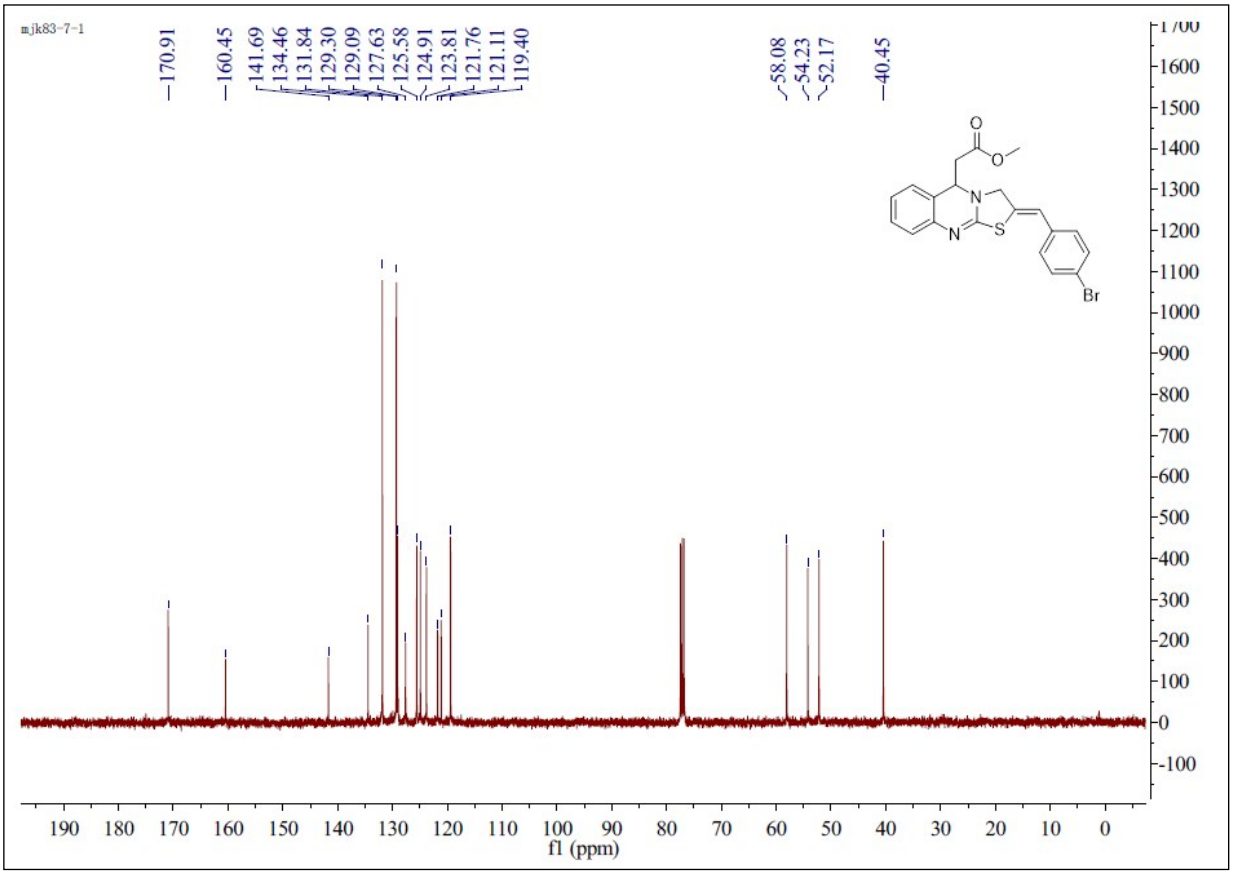
^{13}C NMR of **3ad**



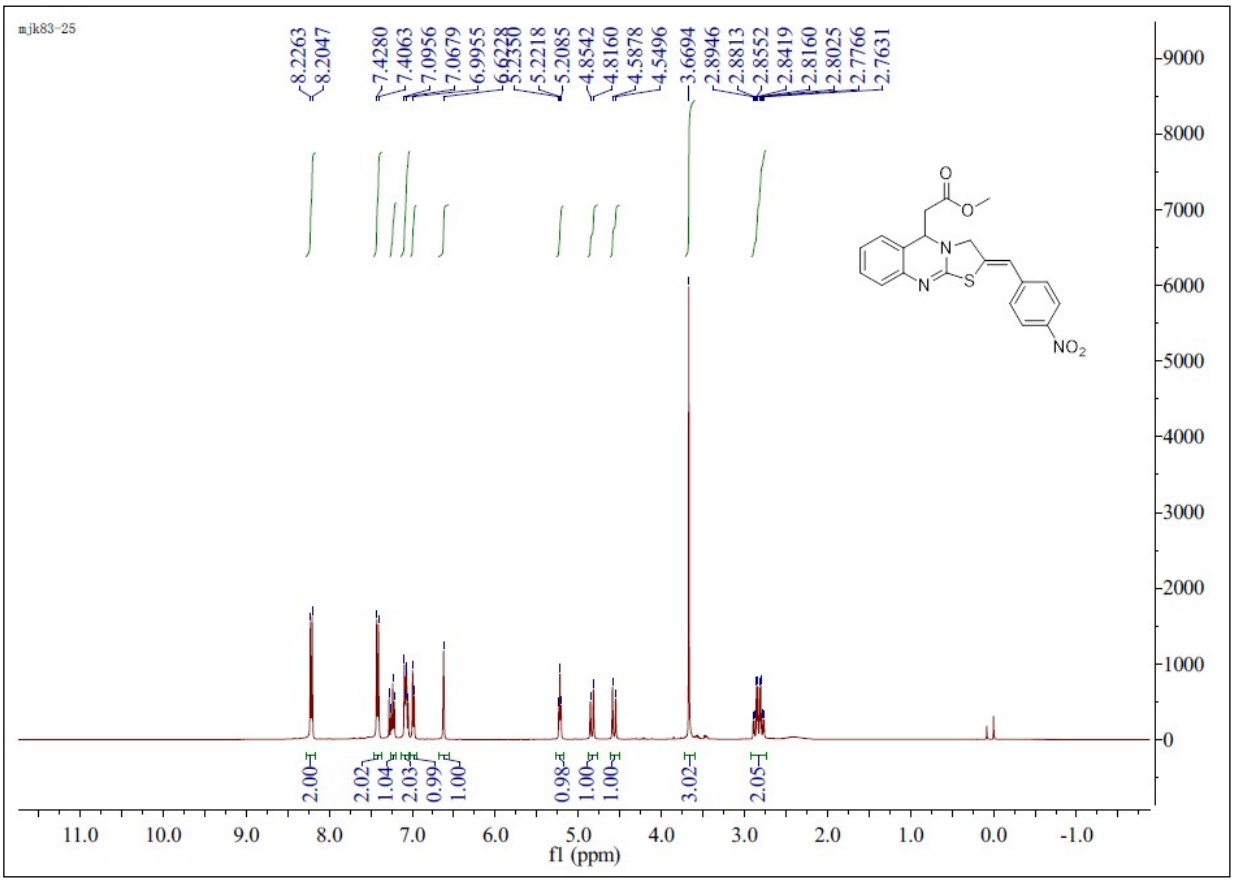
^{1}H NMR of **3ae**



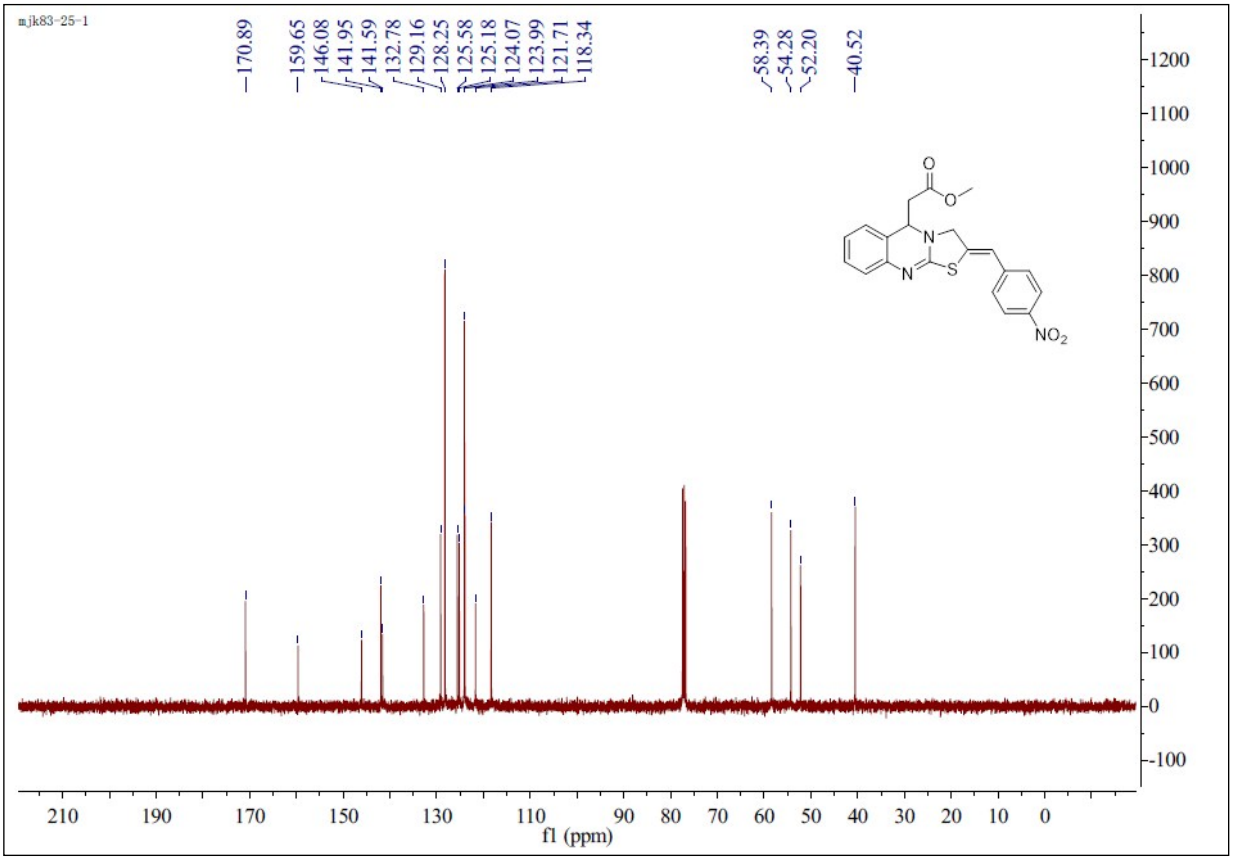
^{13}C NMR of **3ae**



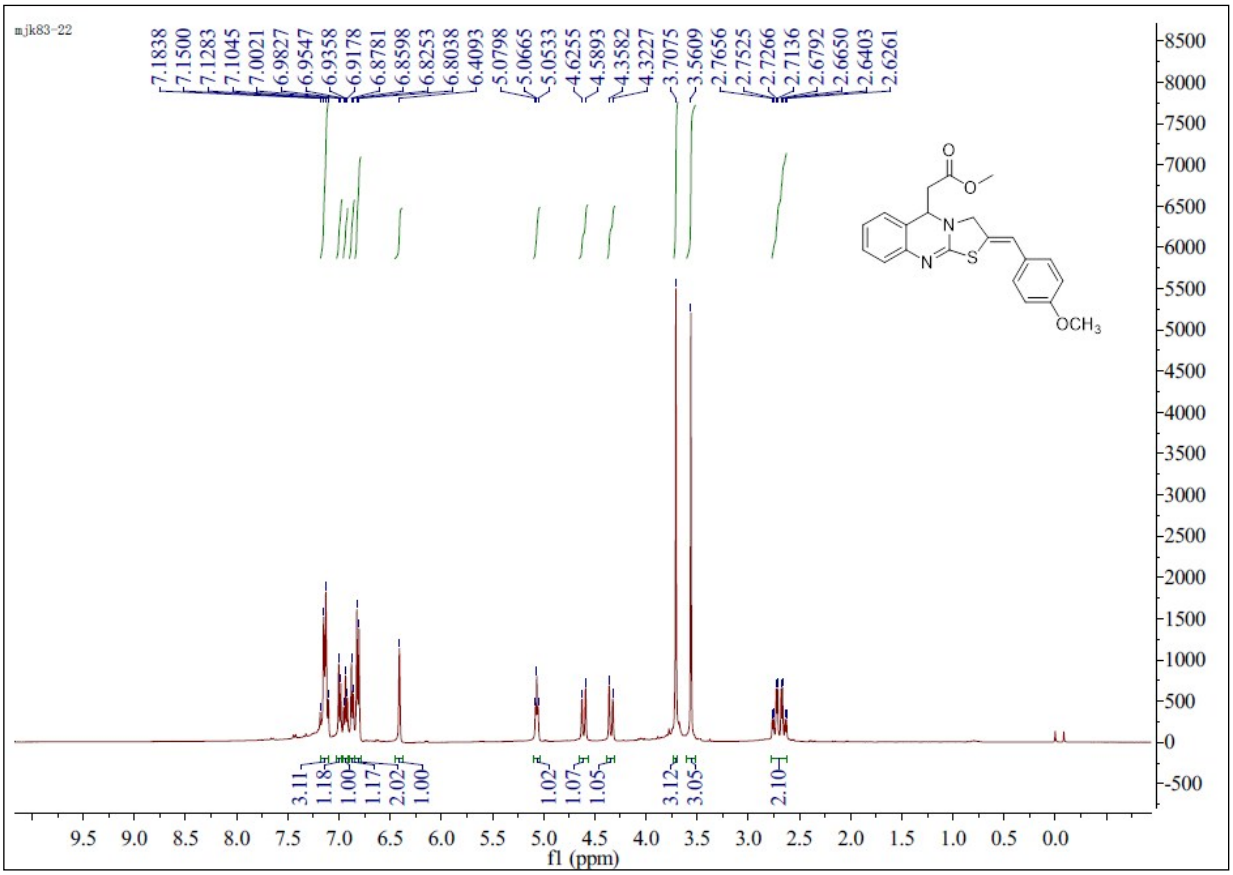
^{1}H NMR of **3af**



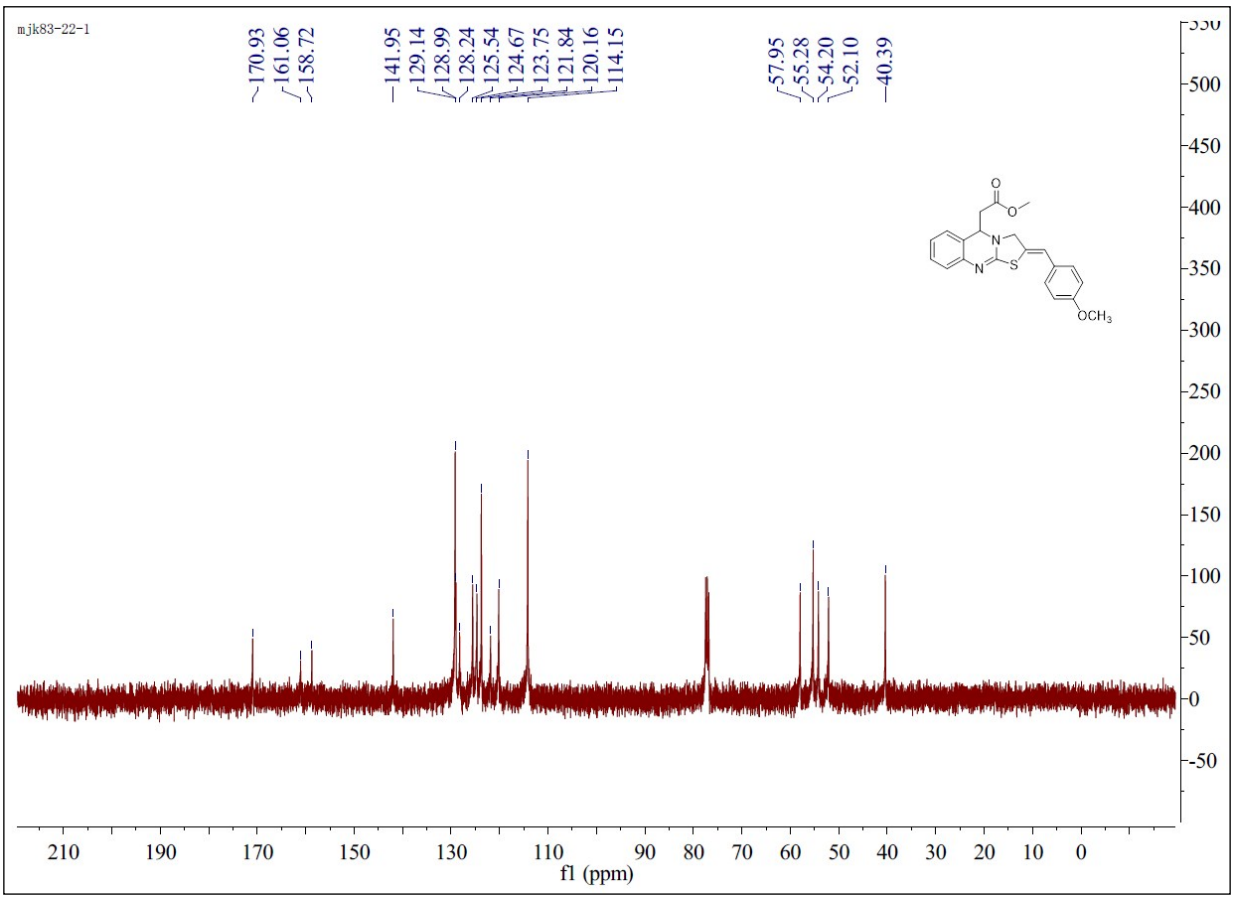
^{13}C NMR of **3af**



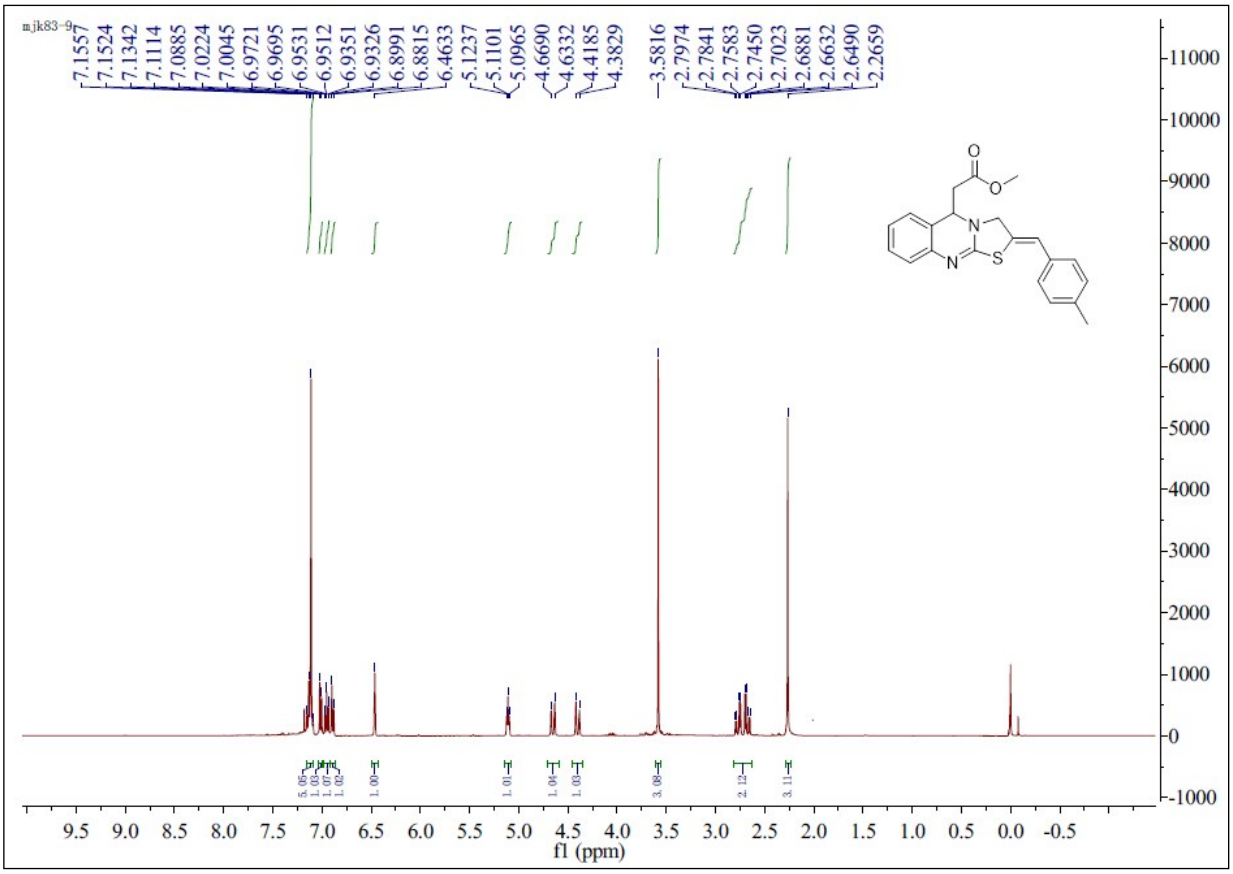
^{1}H NMR of **3ag**



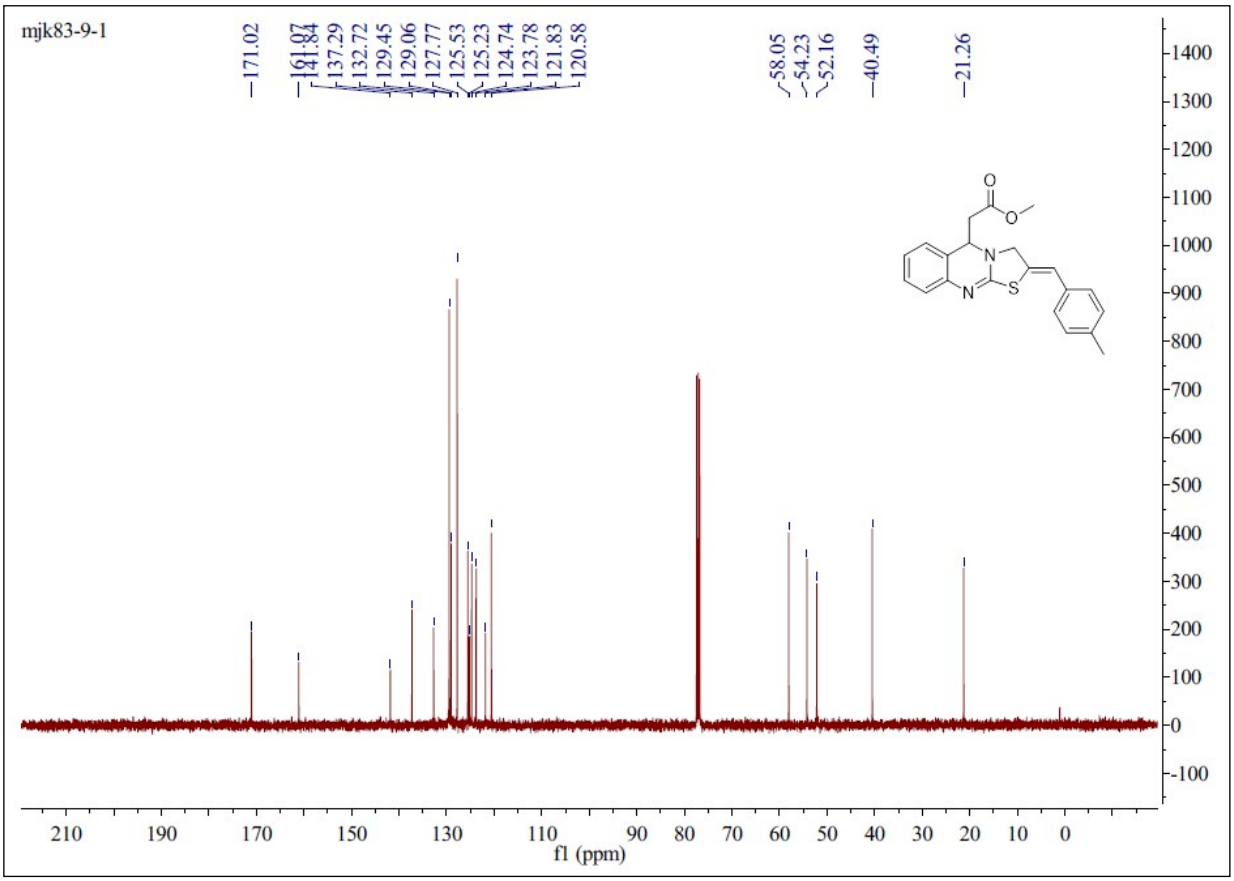
^{13}C NMR of **3ag**



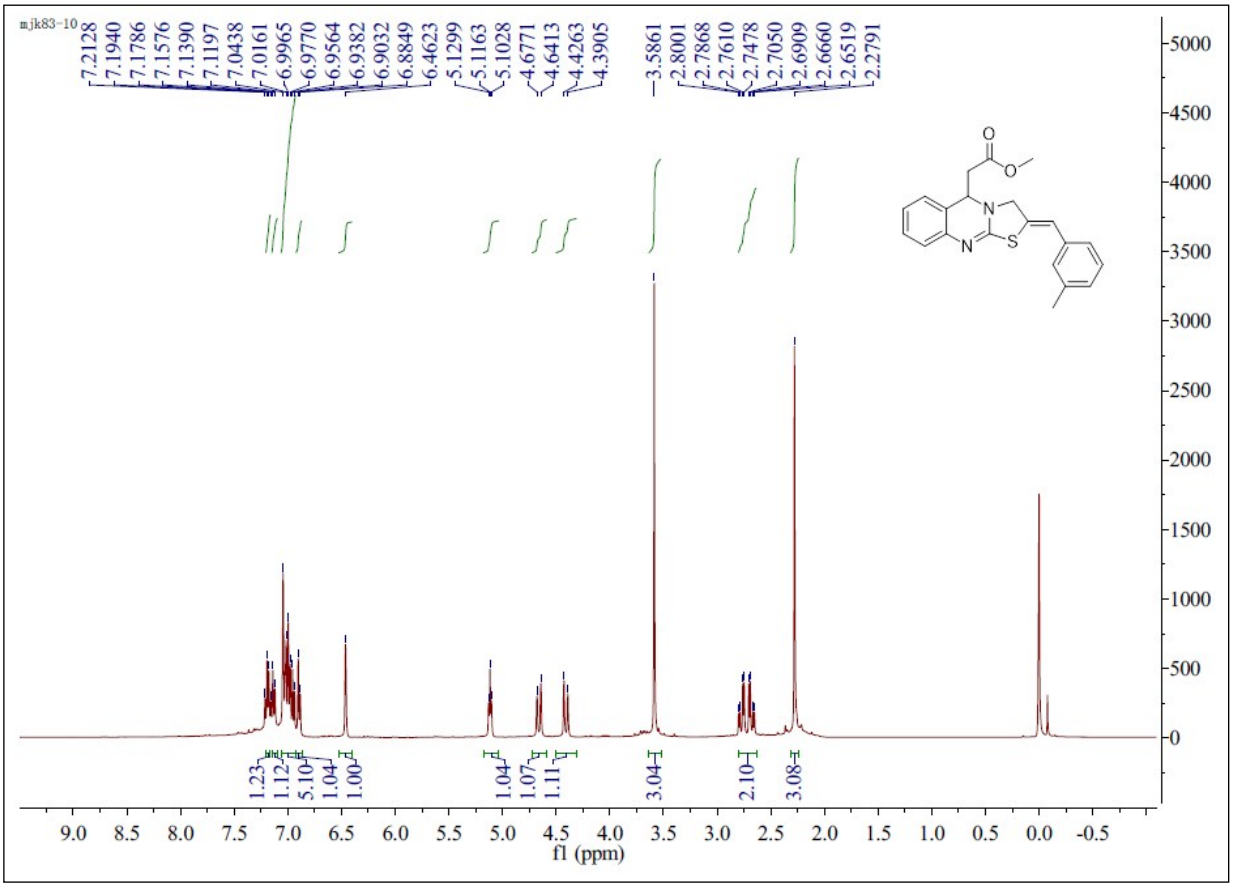
^{1}H NMR of **3ah**



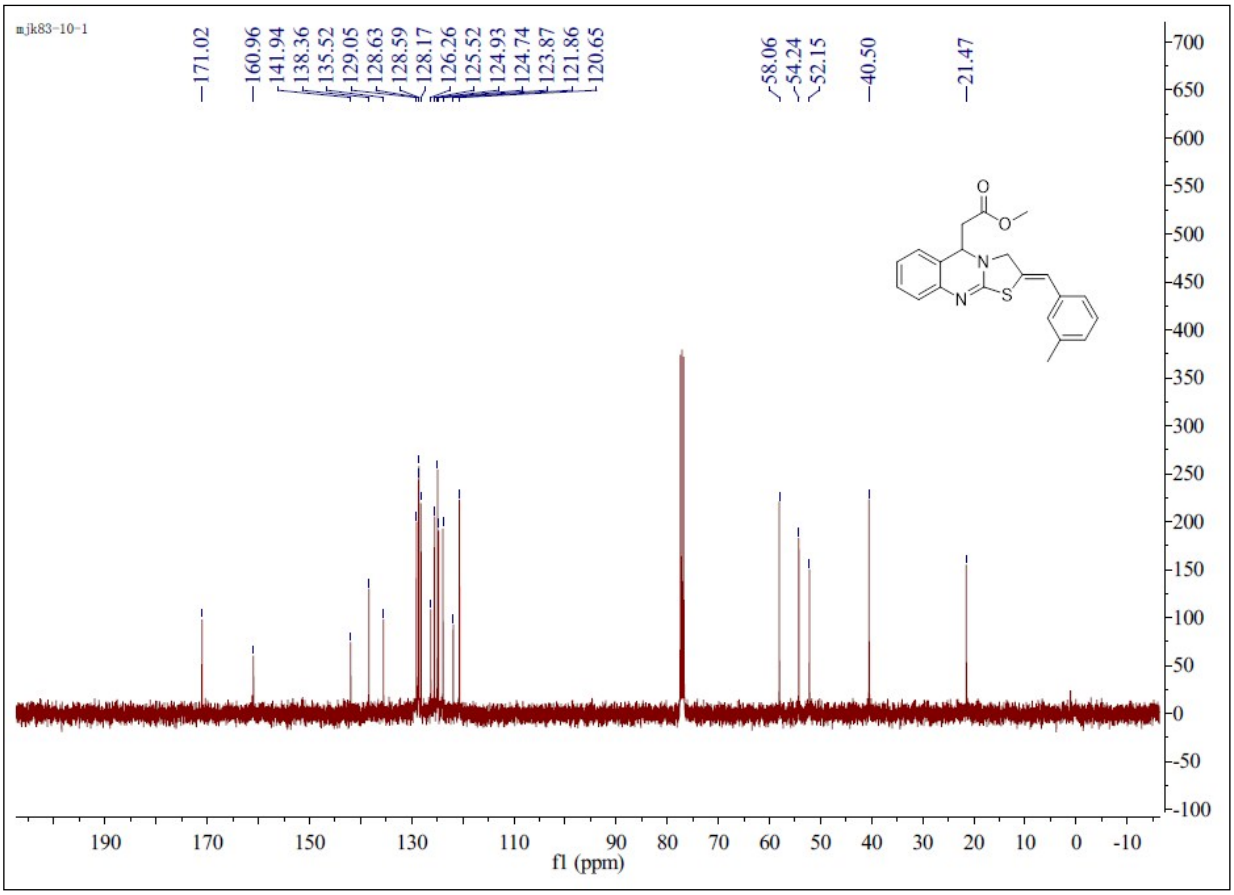
^{13}C NMR of **3ah**



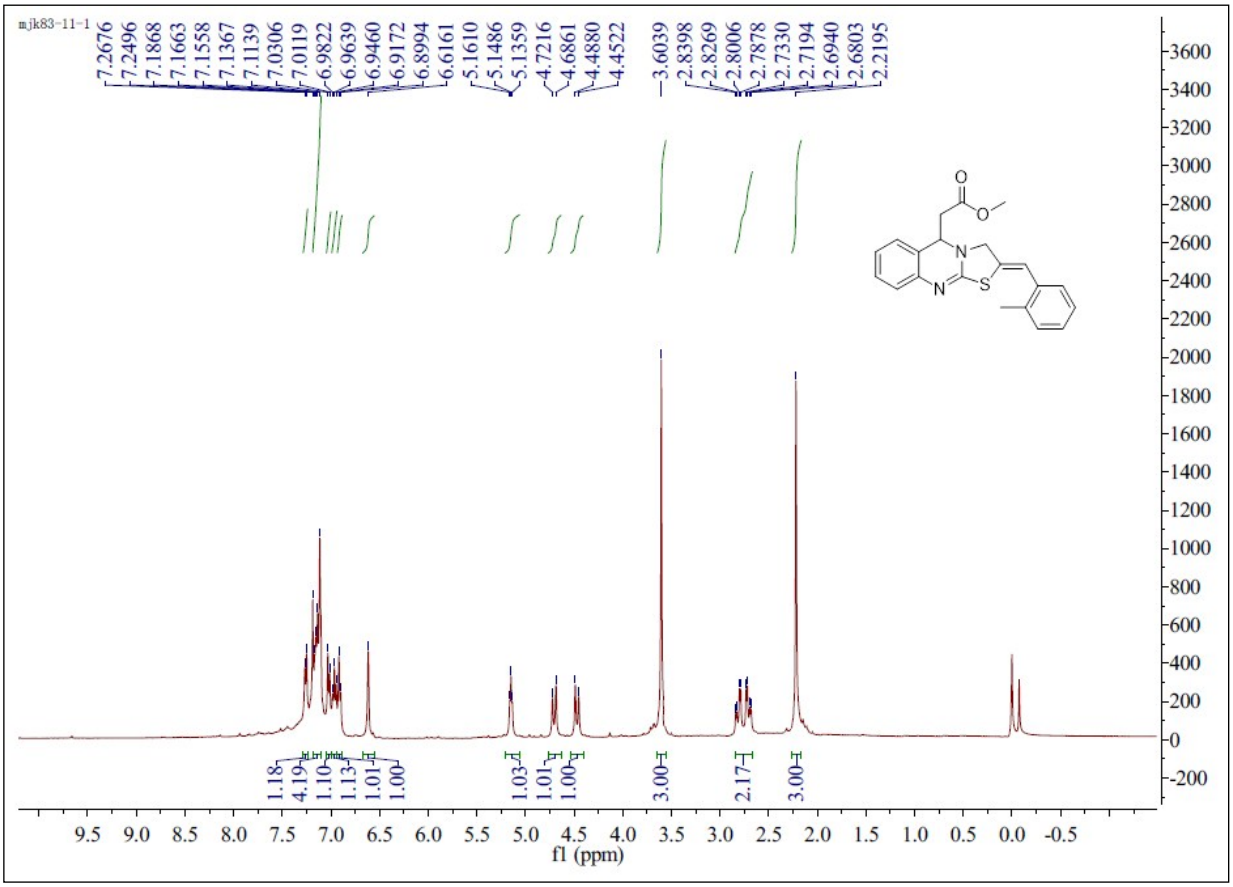
^{1}H NMR of **3ai**



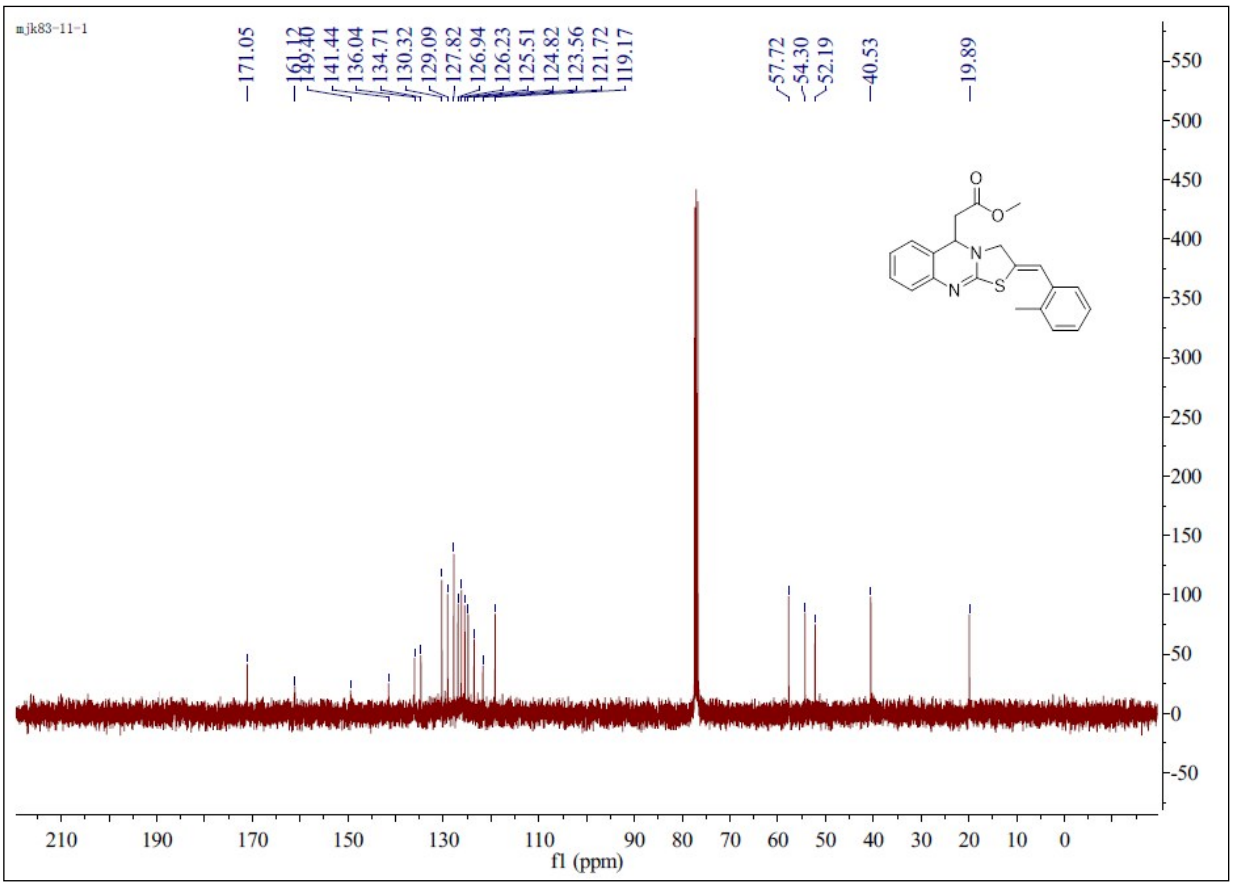
^{13}C NMR of **3ai**



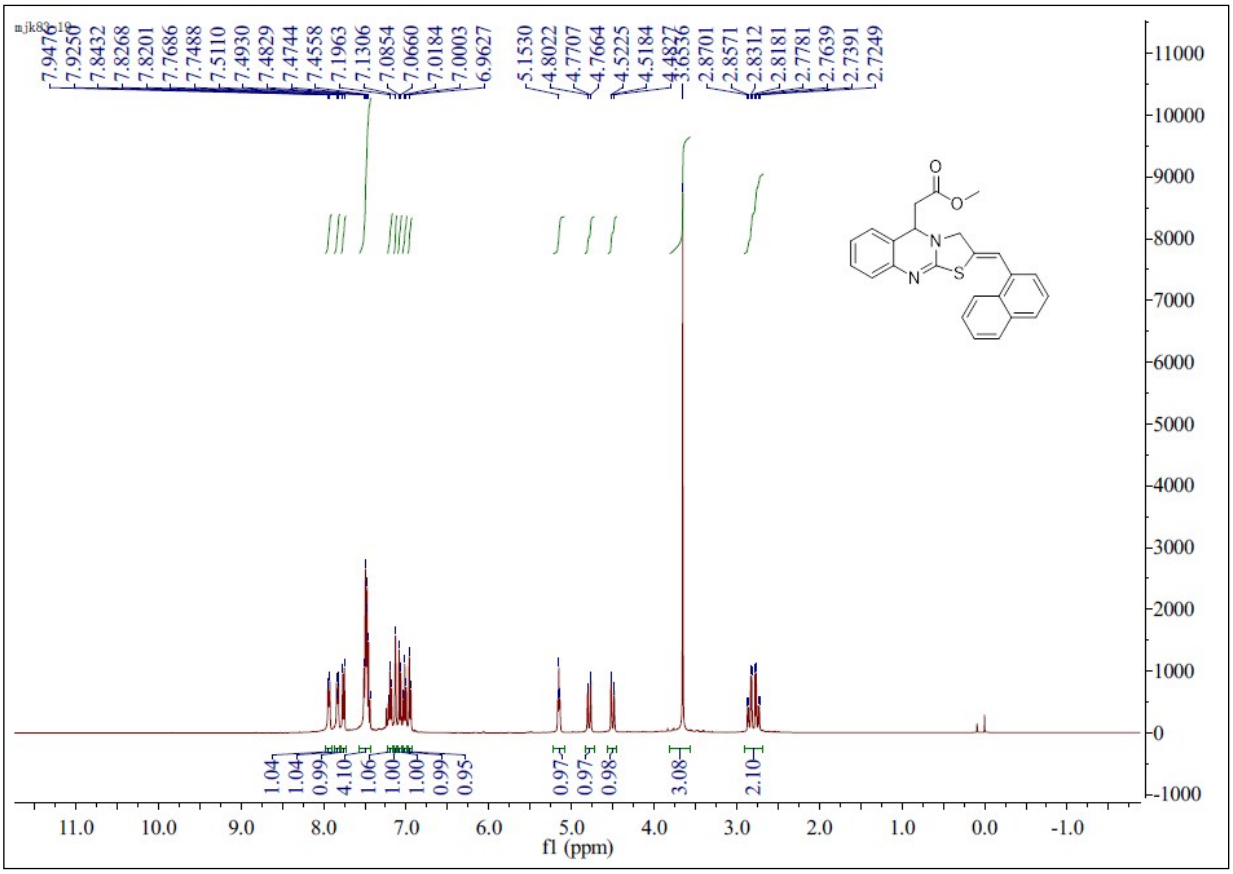
^{1}H NMR of **3aj**



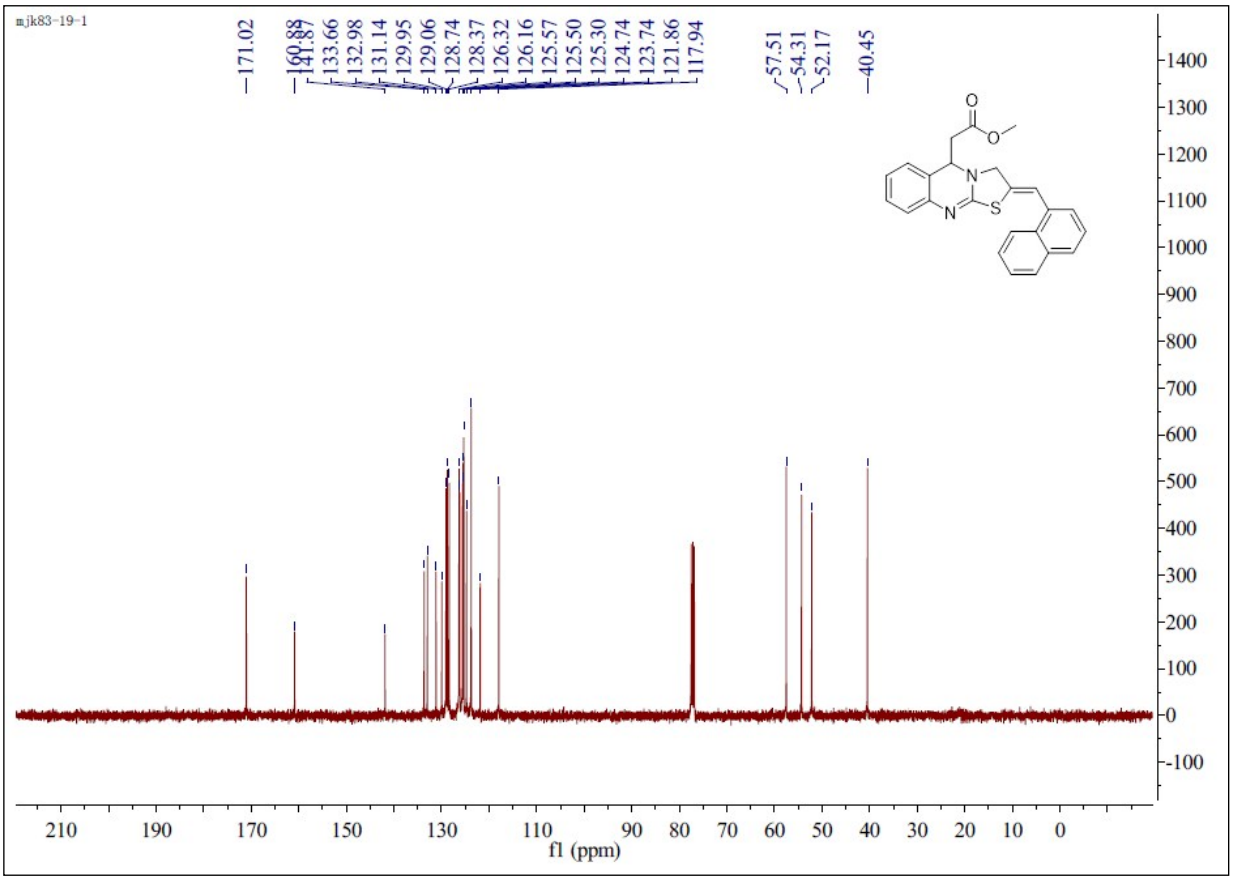
^{13}C NMR of **3aj**



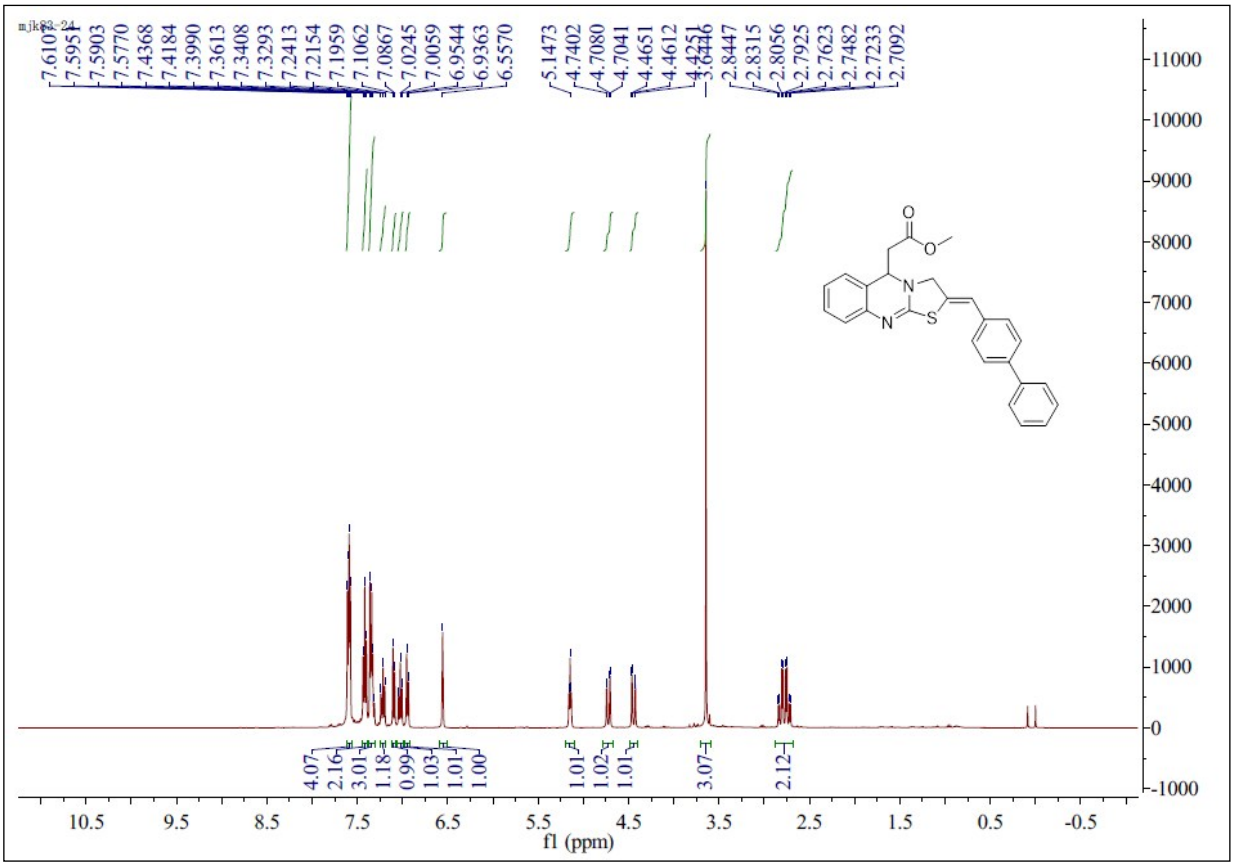
^{1}H NMR of **3ak**



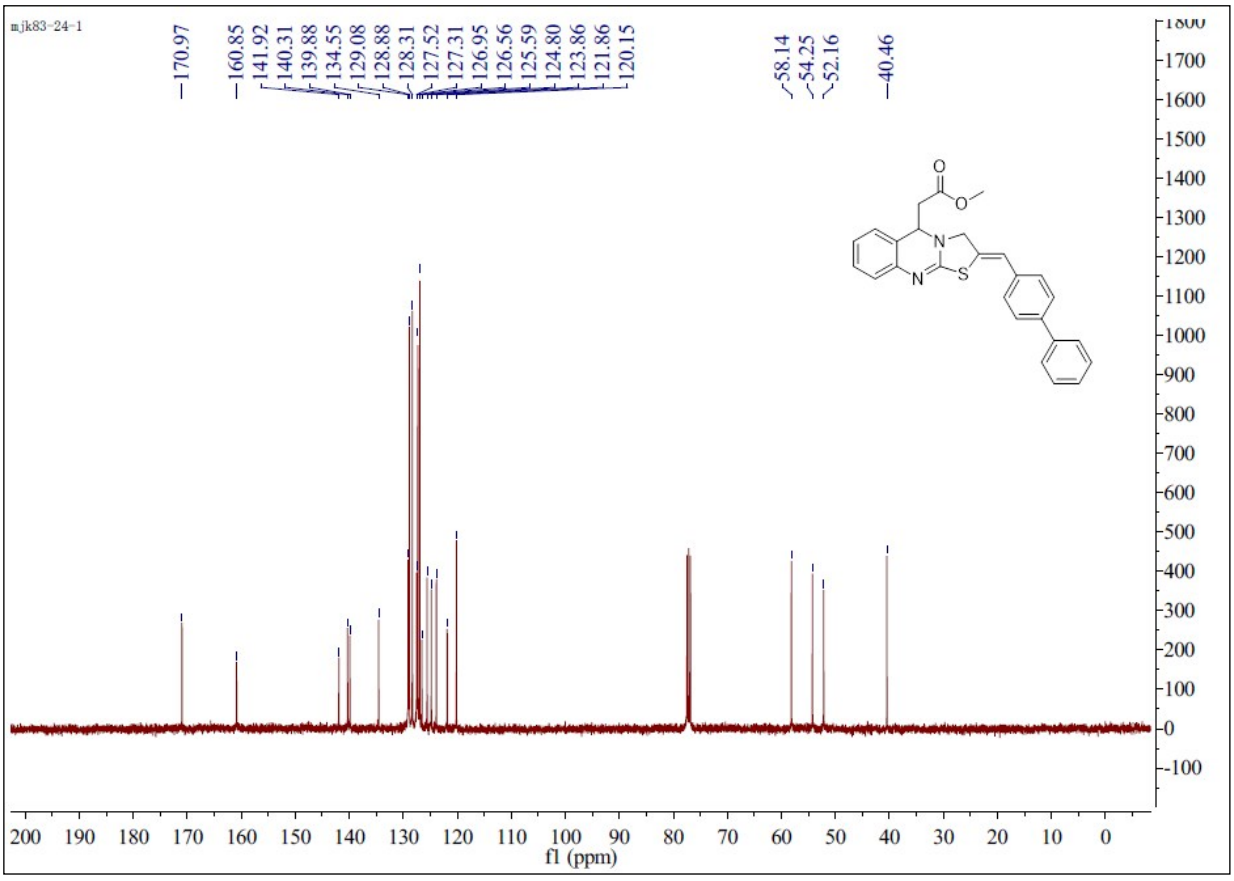
^{13}C NMR of **3ak**



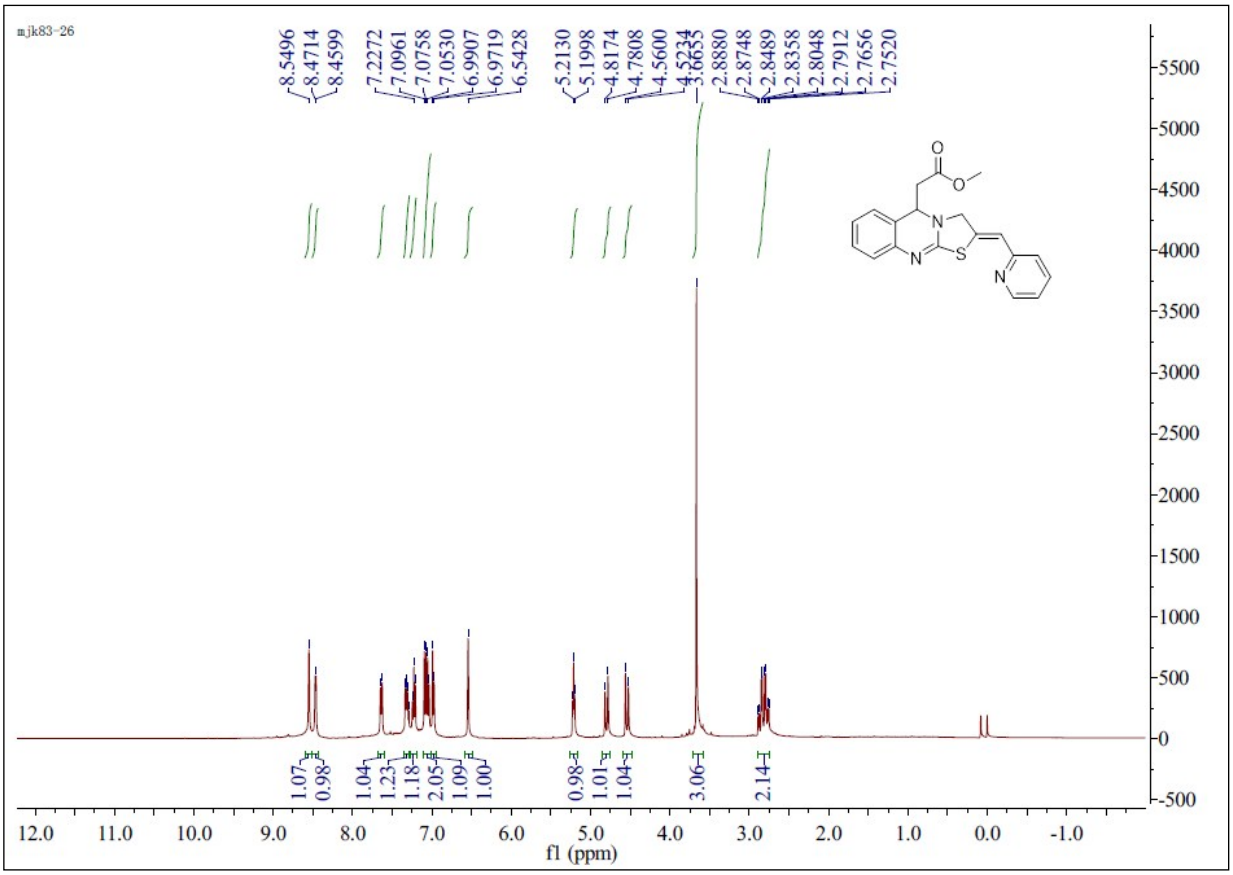
^{1}H NMR of **3al**



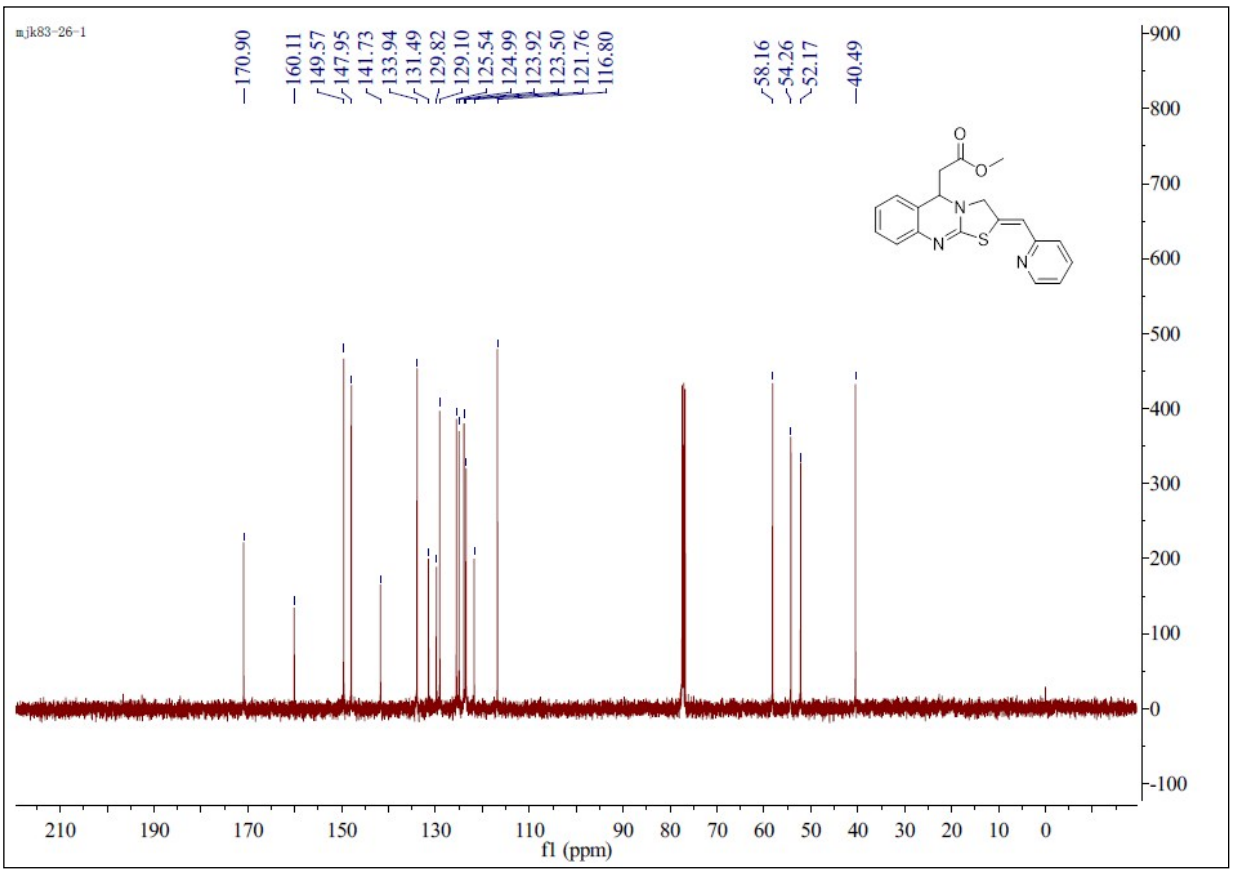
^{13}C NMR of **3al**



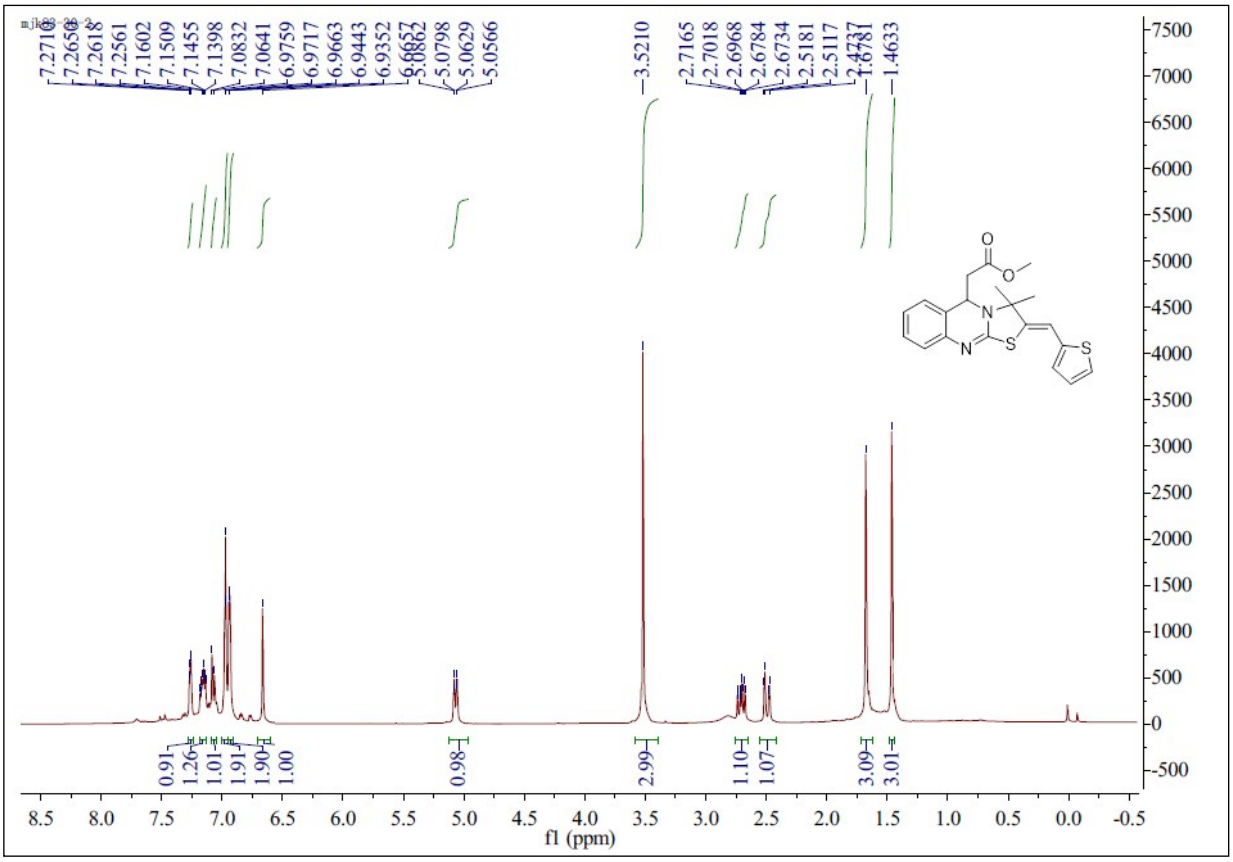
^{1}H NMR of **3am**



^{13}C NMR of **3am**



^{1}H NMR of **3an**



^{13}C NMR of **3an**