Supporting Infomation

Synthesis of amino acid derivatives of quinolone antibiotics

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General methods. Melting points were determined on a capillary point apparatus equipped with a digital thermometer and are uncorrected. NMR spectra were recorded in DMSO-d_6 or $CDCl_3$ with TMS for ^1H (300 MHz) and ^{13}C (75 MHz) as internal reference. HPLC analyses were performed using Chirobiotic T column (4.6 x 250 mm), detection at 220 nm, flow rate of 0.5 mL/min and MeOH/H_2O (50:50) as an eluting solvent.

3-(1*H*-Benzo[*d*][*1,2,3*]triazole-1-carbonyl)-1-ethyl-7-methyl-1,8-naphthyridin-4(1*H*)-one (6):

To a solution of 1*H*-benzotriazole (2.0 g, 16 mmol) in methylene-chloride was added thionyl chloride (0.5 g, 4.5 mmol) at 25°C. After 30 min. 1-ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxylic acid (1.0 g, 4.3 mmol) was added and the stirring was continued for 2h. The precipitate was filtered off, and the filtrate was washed with water and evaporated to give yellow solid of 3-(1*H*-benzo[*d*][*1,2,3*]triazole-1-carbonyl)-1-ethyl-7-methyl-1,8-naphthyridin-4(1*H*)-one (1.3 g, 4.1 mmol, 90%) with the melting point of 169-171°C.

^1H NMR (300 MHz, $CDCl_3$) δ: 1.54 (t, J = 7.2 Hz, 3H), 2.70 (s, 3H), 4.54 (q, J = 7.1 Hz, 2H), 7.28 (d, J = 8.1 Hz, 1H), 7.50 (t, J = 8.1 Hz, 1H), 7.66 (t, J = 7.4 Hz, 1H), 8.11 (d, J = 8.2 Hz, 1H), 8.32 (d, J = 8.2 Hz, 1H), 8.50 (s, 1H), 8.62 (d, J = 8.0 Hz, 1H). ^{13}C NMR (75 MHz, $CDCl_3$) δ: 15.2, 25.1, 46.7, 114.4, 115.1, 120.0, 120.9, 121.3, 126.0, 130.0, 131.6, 136.8, 146.0, 147.5, 148.6, 163.1, 164.2, 174.5. $C_{18}H_{15}N_5O_2 \cdot 1/2\ H_2O$, Calculated: C, 63.15; H, 4.71; N, 20.46, Found: C, 62.78; H, 4.61; N, 20.06.

3-(1*H*-Benzo[*d*][*1,2,3*]triazole-1-carbonyl)-1-ethyl-[*1,3*]dioxolo[*4,5-g*]cinnolin-4(1*H*)-one (7):

To a solution of 1*H*-benzotriazole (0.55 g, 4.60 mmol) in methylene-chloride was added thionyl-chloride (0.13 ml, 1.70 mmol) at 25°C. After 30 min. 1-ethyl-4-oxo-1,4-dihydro-[*1,3*]dioxolo[*4,5-g*]cinnoline-3-carboxilic acid (0.3 g, 1.15 mmol) was added and stirring was continued for 2h. The reaction mixture was washed with water (1x), aq. sat. sodium-carbonate (3x),

and brine (1x), dried over sodium sulfate and the solvent was removed under reduced pressure, gave 3-(1*H*-benzo[*d*][*1,2,3*]triazole-1-carbonyl)-1-ethyl-[*1,3*]dioxolo[*4,5-g*]cinnolin-4(1*H*)-one (0.3 g, 80%) with the melting point of 221-223°C.

^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.42 (t, *J* = 7.0 Hz, 3H), 4.59 (q, *J* = 7 Hz, 2H), 6.33 (s, 2H), 7.48 (s, 1H), 7.69 (t, *J* = 7.7 Hz, 2H), 7.87 (t, *J* = 7.7 Hz, 1H), 8.31 (dd, *J* =2.5 & 8.0 Hz, 2H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 13.8, 18.0, 47.8, 52.7, 95.7, 100.8, 103.4, 123.2, 135.1, 138.1, 148.1, 154.0, 161.2, 167.7, 173.9. $C_{18}H_{13}N_5O_4 \cdot 1/2\ H_2O$, Calculated: C, 58.06; H, 3.79; N, 18.81,. Found: C, 58.06; H, 3.39; N, 18.71.

2-(1*H*-Benzo[*d*][*1,2,3*]triazole-1-carbonyl)-9-fluoro-5-methyl-6,7-dihydropyrido[*3,2,1-ij*]quinolin-1(5*H*)-one (8):

To a solution of 1*H*-benzotriazole (0.5 g, 4.4 mmol) in methylene-chloride was added thionyl chloride (0.2 g, 1.3 mmol) at 25°C. After 30 min. 9-fluoror-5-methyl-1-oxo-1,5,6,7-tetrahydropyrido[*3,2,1-ij*]quinoline-2-carboxylic acid (0.3 g, 1.1 mmol) was added and the stirring was continued for 2h. The precipitate was filtered off, and the filtrate was washed with water and evaporated to give yellow solid of 2-(1*H*-benzo[*d*][*1,2,3*]triazole-1-carbonyl)-9-fluoro-5-methyl-6,7-dihydropyrido[*3,2,1-ij*]quinolin-1(5*H*)-one (0.3 g, 0.83 mmol, 90%) with the melting point of 232-235°C.

^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.43 (d, *J* = 6.7 Hz, 3H), 2.08-2.29 (m, 2H), 3.03-3.25 (m, 2H), 4.73 (bs, 1H), 7.58-7.68 (m, 2H), 7.69-7.89 (m, 2H), 8.20-8.34 (m, 2H), 8.77-8.88 (m, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 19.9, 21.5, 25.3, 56.5, 108.3, 108.6, 112.6, 113.6, 119.9, 120.4, 120.7, 126.3, 129.1, 129.2, 130.5, 130.9, 131.4, 131.5, 132.5, 145.4, 147.0, 160.4, 164.6, 172.3. $C_{20}H_{15}FN_4O_2$, Calculated: C, 66.29; H, 4.17; N, 15.46, Found: C, 66.19; H, 4.18; N, 15.14.

General procedure for oxolinic-amino acid conjugates (25-40):

A mixture of 7-(1*H*-benzo[*d*][*1,2,3*]triazole-1-carbonyl)-5-ethyl-[*1,3*]dioxolo[*4,5-g*]quinolin-8(5*H*)-one (181 mg, 0.5 mmol), amino acid (0.5 mmol) and triethylamine (101 mg, 0.13 mL, 1.0 mmol) in acetonitrile-water mixture (3.5 mL +1.5 mL) was stirred at room temperature for three hours. The acetonitrile was removed under vacuum and the residue was acidified with concentrated HCl. The precipitates was filtered and washed with cold water and dried under reduced pressure and recrystallized from aq. ethanol to gave the corresponding product.

2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)acetate (25):

117 mg, 92%, mp. 296-298ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.35 (t, *J* = 7.0 Hz, 3H), 4.06 (bs, 2H), 4.41-4.43 (m, 2H), 6.22 (s, 2H), 7.45 (s, 1H), 7.61 (s, 1H), 8.68 (s, 1H), 10.57 (d, *J* = 4.8 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 40.9, 48.9, 96.7, 102.6, 102.8, 110.2, 123.1, 136.1, 146.1, 146.3, 152.6, 164.6, 171.5, 174.0. $C_{15}H_{14}N_2O_6$, Calculated: C, 56.60; H, 4.43; N, 8.80, Found: C, 56.35; H, 4.41; N, 8.56.

(*S*)-2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)propanoate (26):

160 mg, 96%, mp. 257-259 ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.32-1.41 (m, 6H), 4.13-4.52 (m, 3H), 6.23 (s, 2H), 7.47 (s, 1H), 7.60 (s, 1H), 8.69 (s, 1H), 10.48 (d, *J* = 7.0 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 18.2, 47.5, 48.8, 96.6, 102.5, 102.7, 110.1, 123.1, 136.0, 146.0, 146.2, 152.5, 163.8, 174.1. $C_{16}H_{16}N_2O_6$, Calculated: C, 57.83; H, 4.85; N, 8.43, Found: C, 58.13; H, 4.84; N, 8.35.

2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)propanoic acid (27):

140 mg, 84%, mp. 257-259 ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.32-1.41 (m, 6H), 4.41-4.50 (m, 3H), 6.23 (s, 2H), 7.47 (s, 1H), 7.60 (s, 1H), 8.69 (s, 1H), 10.48 (d, *J* = 7.2 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 18.3, 47.5, 48.8, 96.6, 102.5, 102.7, 110.1, 123.1, 136.0, 146.0, 146.2, 152.5,

163.8, 174.0, 174.1. $C_{16}H_{16}N_2O_6$, Calculated: C, 57.83; H, 4.85; N, 8.43, Found: C, 57.53; H, 4.92; N, 8.46.

(*S*)-2-(5-Ethyl-8-oxo-5,8-dihydro-[*1,3*]dioxolo[*4,5*-g]quinoline-7-carboxamido)-3-phenylpropanoate (28):

280 mg, 58%, mp. 213-215°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.33 (t, *J* = 7.0 Hz, 3H), 3.00-3.08 (m, 1H), 3.15-3.22 (m, 1H), 4.40 (q, *J* = 6.0 Hz, 2H), 4.75 (q, *J* = 7.1 Hz, 1H), 6.23 (s, 2H), 7.19-7.30 (m, 5H), 7.46 (s, 1H), 7.60 (s, 1H), 8.67 (s, 1H), 10.49 (d, *J* = 7.6 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 37.4, 48.8, 53.3, 96.6, 102.5, 102.7, 110.0, 123.0, 126.6, 128.3, 129.2, 136.0, 137.1, 146.1, 146.2, 152.5, 164.1, 172.8, 173.9. $C_{22}H_{20}N_2O_6$, Calculated: C, 64.70; H, 4.94; N, 6.86, Found: C, 64.34; H, 4.90; N, 6.85.

2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)-3-phenylpropanoate (29):

180 mg, 88%, mp. 248-249 ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.33 (t, *J* = 7.0 Hz, 3H), 3.04 (dd, *J* = 13.5 & 8.0 Hz 1H), 3.18 (dd, *J* =13.5 & 8.0 Hz 1H), 4.41 (q, *J*= 7.0 Hz, 2H), 4.75-4.77 (m, 1H), 6.23 (s, 2H), 7.22-7.30 (m, 5H), 7.47 (s, 1H), 7.61 (s, 1H), 8.67 (s, 1H), 10.49 (d, *J* = 7.8 Hz, 1H).^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.5, 37.4, 48.8, 53.3, 96.6, 102.5, 102.7, 110.0, 123.0, 126.6, 128.2, 129.2, 136.0, 137.1, 146.1, 146.2, 152.5, 164.1, 172.8, 174.0. $C_{22}H_{20}N_2O_6$, Calculated: C, 64.70; H, 4.94; N, 6.86, Found: C, 64.34; H, 4.90; N, 6.85.

(*S*)-2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)-4-methylpentanoate (31):

165 mg, 88%, mp. 219-221ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 0.92 (t, *J* = 6.9 Hz, 6H), 1.34 (t, *J* = 6.9 Hz, 3H), 1.62-1.75 (m, 3H), 4.42 (q, *J* = 6.9 Hz , 2H), 4.52 (q, *J* = 6.9 Hz, 1H), 6.23 (s, 2H), 7.47 (s, 1H), 7.61 (s, 1H), 8.70 (s, 1H), 10.46 (d, *J* = 7.8 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6,

21.6, 22.9, 24.6, 41.0, 48.9, 50.2, 96.6, 102.5, 102.8, 110.1, 123.1, 136.0, 146.1, 146.2, 152.6, 164.2, 174.1. $C_{19}H_{22}N_2O_6$, Calculated: C, 60.95; H, 5.92; N, 7.48, Found: C, 60.67; H, 5.86; N, 7.14.

(2*S*,3*S*)-2-(5-Ethyl-8-oxo-dihydro-[*1*,*3*]dioxolo[*4*,*5*-*g*]quinoline-7-carboxamido)-3-methylpentanoate (32):

173 mg, 92%, mp. 225-228ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 0.88-0.93 (m, 6H), 1.17-1.28 (m 1H), 1.34 (t, *J*= 7.0 Hz, 3H), 1.44-1.53 (m, 1H), 1.92 (m, 1H), 4.40-4.51 (m, 3H), 6.24 (s, 2H), 7.50 (s, 1H), 7.65 (s, 1H), 8.71 (s, 1H), 10.56 (d, *J* = 8.4 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 11.5, 14.6, 15.9, 24.7, 36.9, 48.9, 56.1, 96.6, 102.6, 102.7, 110.2, 123.1, 136.1. 146.1, 146.2, 152.6, 164.2 173.0, 174.2. $C_{19}H_{22}N_2O_6$, Calculated: C, 60.95, H, 5.92; N, 7.48, Found: C, 60.61; H, 5.95; N, 7.32 .

(*S*)-2-(5-Ethyl-8-oxo-dihydro-[*1*,*3*]dioxolo[*4*,*5*-*g*]quinoline-7-carboxamido)-3-(1*H*-indol-3-yl)propanoate (33):

162 mg, 72%, mp. 167-171 ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.32 (t, *J* = 7.5 Hz, 3H), 3.17-3.33 (m, 2H), 4.40 (q. *J* = 7.5 Hz, 2H), 4.79-4.83 (m, 1H), 6.23 (s, 2H), 6.92-6.97 (m, 1H), 7.02-7.07 (m, 1H), 7.18 (s, 1H), 7.31-7.34 (m, 1H), 7.46 (s, 1H), 7.54-7.61 (m, 2H), 8.69 (s, 1H), 10.53 (d, *J* = 7.5 Hz, 1H), 10.91 (s, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 27.7, 48.9, 52.7, 96.6, 102.5, 102.7, 109.4, 110.2, 111.4, 118.4, 121.0, 123.1, 123.6, 127.3, 136.0, 136.1, 146.1, 146.2, 152.5, 164.1, 173.3, 174.0. $C_{24}H_{21}N_3O_6 \cdot H_2O$, Calculated: C, 61.93; H, 4.55; N, 9.03, Found: C, 61.71; H, 4.79; N, 9.35.

(*S*)-2-(5-Ethyl-8-oxo-dihydro-[*1*,*3*]dioxolo[*4*,*5*-*g*]quinoline-7-carboxamido)-3-hydroxypropanoate (34):

110 mg, 63%, mp. 246-248ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.34 (t, *J*= 7.5 Hz, 3H), 3.79-3.80 (m, 2H), 4.03-4.04 (m, 2H), 4.41 (q, *J* = 7.5 Hz, 2H), 6.23 (s, 2H), 7.47 (s, 1H), 7.60 (s, 1H), 8.33 (bs, 1H), 8.69 (s, 1H), 10.37 (s, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 42.0, 45.4, 48.9, 96.6, 102.5,

102.8, 110.4, 123.1, 136.0, 146.0, 146.2, 152.5, 164.5, 171.2, 173.9. $C_{16}H_{16}N_2O_7$, Calculated: C, 55.17; H, 4.63; N, 8.04, Found: C, 55.00; H, 4.57; N, 7.68.

(*S*)-2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)-3-sulfanylpropanoate (35):

160 mg, 88%, mp. 218-220 ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.38 (t, *J* = 7.2 Hz, 3H), 2.30 (t, *J* = 8.4 Hz, 1H), 3.02-3.06 (m, 2H), 4.48 (q, *J* = 7.5 Hz, 2H), 4.82-4.84 (m. 1H), 6.28 (s, 2H), 7.53 (s, 1H), 7.67 (s, 1H), 8.75 (s, 1H), 10.76 (d, *J* = 7.4 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 26.2, 48.9, 53.6, 96.7, 102.6, 102.8, 107.1, 110.1, 123.1, 136.0, 146.2, 148.2, 152.6, 164.2, 171.5, 174.0. $C_{16}H_{16}N_2O_6S\cdot\frac{1}{2}H_2O$, Calculated: C, 51.47; H, 4.59; N, 7.50, Found: C, 51.07; H, 4.54; N, 7.19 .

(S)-2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)succinoate (36):

180 mg, 96%, mp. 238-239ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.36 (t, *J* = 7.2 Hz, 3H), 2.73-2.89 (m, 2H), 4.43 (q, *J* = 7.2 Hz, 2H), 4.81 (m, 1H), 6.23 (s, 2H), 7.46 (s, 1H), 7.61 (s, 1H), 8.69 (s, 1H), 10.62 (d, *J* = 7.8 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 36.6, 48.2, 48.9, 96.6, 102.5, 102.7, 110.1, 123.1, 136.0, 146.2, 152.5, 164.1, 171.9, 172.4, 173.9. $C_{17}H_{16}N_2O_8$, Calculated: C, 54.26; H, 4.29; N, 7.44, Found: C, 53.91; H, 4.29; N, 7.13 .

(*S*)-2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)-3-methylbutanoate (37):

130 mg, 72%, mp. 225-227ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 0.95 (d, *J* = 6.6 Hz, 6H), 1.35 (t, *J* = 7.0 Hz, 3H), 2.16-2.22 (m, 1H), 4.40-4.47 (m, 3H), 6.24 (s, 2H), 7.48 (s, 1H), 7.63 (s, 1H), 8.70 (s, 1H), 10.57 (d, *J* = 8.5 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 17.7, 19.4, 30.3, 48.9, 56.8, 96.6, 102.6, 102.7, 110.2, 123.1, 136.0, 146.1, 146.2, 152.6, 164.4, 173.0, 174.2. $C_{18}H_{20}N_2O_6\cdot H_2O$, Calculated: C, 57.14; H, 5.86; N, 7.40, Found: C, 57.56; H, 5.69; N, 7.35 .

(S)-2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)-3-(*p*-hydroxyphenyl) propanoate (38):

190 mg, 90%, mp. 292-293ºC ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.33 (t, *J*= 7.0 Hz, 3H), 2.91 (dd, *J* = 14.0 & 7.8 Hz, 1H), 3.05(dd, *J* = 14.0 & 4.8 Hz, 1H), 4.41 (q, *J* = 6.6 Hz, 2H), 4.66 (m, 1H), 6.23 (s, 2H), 6.64 (d, *J* = 8.1 Hz, 2H), 7.00 (d, *J* = 8.1 Hz, 2H), 7.46 (s, 1H), 7.60 (s, 1H), 8.66 (s, 1H), 9.24 (s, 1H), 10.43 (d, *J* = 7.4 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 36.6, 48.9, 53.6, 96.6, 102.8, 110.1, 115.1, 123.1, 127.1, 130.1, 136.0, 146.1, 146.2, 152.5, 156.0, 164.0, 172.9, 174.0. $C_{22}H_{20}N_2O_7 \cdot 1.5H_2O$, Calculated: C, 58.53; H, 5.14; N, 6.21, Found: C, 58.66; H, 4.88; N, 5.91.

(*2S,2'S*)-3,3'-Disulfanediylbis[2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)propanoate] (39):

105 mg, 58%, mp. 234-236ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.32 (t, *J* = 6.6 Hz, 6H), 3.18-3.35 (m, 4H), 4.48 (q, *J* = 6.6 Hz, 4H), 4.81-4.85 (m, 2H), 6.21 (s, 4H), 7.40 (s, 2H), 7.53 (s, 2H), 8.65 (s, 2H), 10.64 (d, *J* = 7.7 Hz, 2H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 40.3, 48.9, 51.4, 96.5, 102.5, 102.8, 109.9, 123.0, 136.0, 146.2, 152.5, 164.3, 171.9, 173.9. $C_{32}H_{30}N_4O_{12}S_2 \cdot H_2O$, Calculated: C, 51.61; H, 4.33; N, 7.52, Found: C, 51.46; H, 4.32; N, 7.01.

2-[2-(5-Ethyl-8-oxo-dihydro-[*1,3*]dioxolo[*4,5-g*]quinoline-7-carboxamido)acetamido]-3-acetic acid (40):

170 mg, 90%, mp. 282-284 ºC. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.30 (t, *J* = 7.5 Hz, 3H), 3.68 (d, *J* = 9.0 Hz, 2H), 3.82 (d, *J* = 7.8 Hz, 2H), 4.37 (q, *J* = 7.5 Hz, 2H), 6.18 (s, 2H), 7.40 (s, 1H), 7.54 (s, 1H), 8.63 (s, 1H), 10.55 (d, *J* = 7.6 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ:14.8, 48.9, 54.4, 61.8, 96.6, 102.6, 102.8, 110.4, 123.2, 136.0, 146.1, 146.2, 152.6, 164.2, 172.2, 174.0. $C_{17}H_{17}N_3O_7$, Calculated: C, 54.40; H, 4.57; N, 11.20, Found: C, 53.95; H, 4.98; N, 11.55.

General procedure for nalidixic-amino acid conjugates (41-51):

A mixture of 3-(1*H*-Benzo[*d*][*1,2,3*]triazole-1-carbonyl)-1-ethyl-7-methyl-1,8-naphthyridin-4(1*H*)-one (100 mg, 0.3 mmol), amino acid (0.3 mmol) and triethylamine (61 mg, 0.08 mL, 0.6 mmol) in acetonitrile-water mixture (2.1 mL + 0.9 mL) was stirred at room temperature for three hours. The acetonitrile was removed under vacuum and the residue was acidified with concentrated HCl. The precipitates was filtered and washed with cold water and dried under reduced pressure and recrystallized from aq. ethanol to gave the corresponding product.

2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)acetate (41):

40 mg, 40%, mp. 256-260°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.38 (t, *J* = 6.9 Hz, 3H), 2.66 (s, 3H), 4.08 (d, *J* = 5.4 Hz, 2H), 4.55-4.62 (m, 2H), 7.48 (d, *J* = 8.1 Hz, 1H), 8.55 (d, *J* = 8.1 Hz, 1H), 8.97 (s, 1H), 10.07 (s, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.0, 24.9, 40.9, 46.0, 111.7, 119.6, 121.5, 135.9, 148.0, 148.1, 163.2, 163.9, 171.3, 175.7. $C_{14}H_{15}N_3O_4$, Calculated: C, 58.13; H, 5.23; N, 14.53, Found: C, 58.44; H, 5.18; N, 14.33.

(*S*)-2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)propanoate (42):

81 mg, 90%, mp. 251-253°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.35-1.41 (m, 6H), 2.66 (s, 3H), 4.46-4.58 (m, 3H), 7.48 (d, *J* = 8.2 Hz, 1H), 8.54 (d, *J* = 8.1 Hz, 1H), 8.94 (s, 1H), 10.21 (d, *J* = 7.1 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.2, 18.4, 25.0, 46.2, 47.7, 111.7, 119.8, 121.7, 136.1, 148.2, 148.3, 163.5, 174.2, 176.0. $C_{15}H_{17}N_3O_4 \cdot H_2O$. Calculated: C, 56.07; H, 5.96; N, 13.08, Found: C, 56.40; H, 5.99; N, 13.05.

2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)propanoate (43):

87 mg, 96%, mp. 252-254°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.35-1.41 (m, 6H), 2.66 (s, 3H), 4.46-4.56 (m, 3H), 7.48 (d, *J* = 8.1 Hz, 1H), 8.54 (d, *J* = 8.1 Hz, 1H), 8.94 (s, 1H), 10.21 (d, *J* = 7.1 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.1, 18.3, 25.0, 46.2, 47.7, 111.7, 119.8, 121.7, 136.1,

148.2, 148.3, 163.5, 174.2, 176.0. $C_{15}H_{17}N_3O_4$ Calculated: C, 59.40; H, 5.65; N, 13.85, Found: C, 59.64; H, 5.63; N, 13.66.

(S)-2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)-3-phenylpropanoate (44):

250 mg, 55%, mp. 213-215°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.36 (t, *J* = 7.0 Hz, 3H), 2.63 (s, 3H), 3.06 (dd, *J* = 13.5 & 7.5 Hz, 1H), 3.20 (dd, *J* = 13.8 & 5.1 Hz, 1H), 4.52 (q, *J* = 7.0 Hz, 2H), 4.80 (q, *J* = 7.2 Hz, 1H), 7.18-7.30 (m, 5H), 7.42 (d, *J* = 8.1 Hz, 1H), 8.50 (d, *J* = 8.3 Hz, 1H), 8.93 (s, 1H), 10.19 (d, *J* = 7.4 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.0, 24.9, 37.3, 46.0, 53.3, 11.5, 119.6, 121.4, 126.6, 128.3, 129.2, 135.9, 137.0, 148.1, 163.1, 163.5, 172.7, 175.7. $C_{21}H_{21}N_3O_4$, Calculated: C, 66.48; H, 5.58; N, 11.07, Found: C, 66.21; H, 5.77; N, 11.17.

(*S*)-2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)-4-methylsulfanylbutanoate (45):

70 mg, 64%, mp. 164-165°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.33 (t, *J* = 6.9 Hz, 3H), 1.91-2.15 (m, 6H), 2.51 (m, 1H), 2.60 (s, 3H), 4.49 (q, *J* = 6.9 Hz, 2H), 4.59-4.66 (m, 1H), 7.39 (d, *J* = 8.1 Hz 1H), 8.45 (d, *J* = 8.1 Hz, 1H), 8.91 (s, 1H), 10.21 (d, *J* = 7.7 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 14.6, 15.0, 24.8, 29.5, 31.6, 46.0, 50.9, 111.6, 119.6, 121.4, 135.8, 148.0, 163.2, 163.6, 173.1, 175.8. $C_{17}H_{21}N_3O_4S$, Calculated: C, 56.18; H, 5.82; N, 11.56, Found: C, 55.81; H, 5.82; N, 11.53.

(*S*)-2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)-4-methylpentanoate (46):

70 mg, 67%, mp. 171-172°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 0.90-0.94 (m, 6H), 1.37 (t, *J* = 6.6 Hz, 3H), 1.65-1.67 (m, 3H), 2.64 (s, 3H), 4.53-455 (m, 3H), 7.44 (d, *J* = 8.2 Hz, 1H), 8.50 (d, *J* = 8.1 Hz, 1H), 8.96 (s, 1H), 10.16 (d, *J* = 8.0 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.0, 21.6, 22.8,

24.6, 24.8, 40.3, 46.0, 50.2, 111.6, 119.6, 121.4, 135.8, 148.0, 163.2, 163.5, 173.9, 175.9. $C_{18}H_{23}N_3O_4$, Calculated: C, 62.59; H, 6.71; N, 12.17, Found: C, 62.33; H, 6.73; N, 12.29.

(*S*)-2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)-3-methylpentanoate (47):

80 mg, 77%, mp. 159-160°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 0.89-0.99 (m, 6H), 1.15-1.31 (m, 1H), 1.39 (t, *J* = 6.6 Hz, 3H), 1.46-1.54 (m, 1H), 1.93 (m, 1H), 2.67 (s, 3H), 4.49-4.66 (m, 3H), 7.49 (d, *J* = 8.1, Hz, 1H), 8.57 (d, *J* = 8.1 Hz, 1H), 8.98 (s, 1H), 10.28 (d, *J* = 8.4 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 11.5, 15.0, 15.9, 24.7, 24.9, 36.9, 46.0, 56.1, 111.7, 119.7, 121.5, 136.0, 148.1, 163.2, 163.6, 172.9, 176.0. $C_{18}H_{23}N_3O_4$, Calculated: C, 62.59; H, 6.71; N, 12.17, Found: C, 61.23; H, 6.68; N, 11.83.

(*S*)-2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)succinoate (48):

45 mg, 43%, mp. 238-239°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.38 (t, *J* = 7.2 Hz, 3H), 2.66 (s, 3H), 2.74-2.92 (m, 2H), 4.56 (q *J* = 7.2 Hz, 2H), 4.79-4.86 (m , 1H), 7.47 (d, *J* = 8.1 Hz, 1H), 8.53 (d, *J* = 8.1 Hz, 1H), 8.96 (s, 1H), 10.38 (d, *J* = 8.0 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.0, 24.9, 36.5, 46.0, 48.2, 111.6, 119.7, 121.5, 135.9, 148.2, 163.2, 163.5, 171.9, 172.3, 175.7. $C_{16}H_{17}N_3O_6$, Calculated: C, 55.33; H, 4.93; N, 12.10, Found: C, 55.48; H, 4.90; N, 12.30.

(*S*)-2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)-3-methylbutanoate (49):

60 mg, 60%, mp. 182-185°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 0.95 (d, *J* = 6.9 Hz, 6H), 1.39 (t, *J* = 7.0 Hz, 3H), 2.17-2.24 (m, 1H), 2.66 (s, 3H), 4.45-4.63 (m, 3H), 7.47 (d, *J* = 8.1 Hz, 1H), 8.55 (d, *J* = 8.1, 1H), 8.97 (s, 1H), 10.28 (d, *J* = 8.4 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.0, 17.6, 19.3, 24.9, 30.3, 46.0, 56.8, 111.7, 119.6, 121.5, 135.9, 148.0, 163.2, 163.8, 172.9, 176.0. $C_{17}H_{21}N_3O_4$, Calculated: C, 62.59; H, 6.71; N, 12.17, Found: C, 62.33; H, 6.73; N, 12.29.

(*S*)-2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)-3-(p-hydroxyphenyl)propanoate (50):

92 mg, 78%, mp. 140-142°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.35 (t, *J* = 6.9 Hz, 3H), 2.62 (s, 3H), 2.91-3.10 (m, 2H), 4.51 (q, *J* = 6.9 Hz, 2H), 4.67-4.74 (m, 1H), 6.65 (d, *J* = 8.0 Hz, 2H), 7.02 (d, *J* = 8.0 Hz, 2H), 7.41 (d, *J* = 8.1 Hz, 1H), 8.48 (d, *J* = 8.1 Hz, 1H), 8.92 (s, 1H), 9.23 (s, 1H), 10.15 (d, *J* = 7.4 Hz,1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.0, 24.8, 36.6, 46.0, 53.6, 111.6, 115.1, 119.6, 121.4, 127.0, 130.2, 135.9, 148.0, 148.1, 156.1, 163.1, 163.5, 172.8, 175.8. $C_{21}H_{21}N_3O_5 \cdot H_2O$, Calculated: C, 61.01; H, 5.61; N, 10.16, Found: C, 61.36; H, 5.32; N, 10.55.

2-[2-(1-Ethyl-7-methyl-4-oxo-1,4-dihydro-1,8-naphthyridine-3-carboxamido)acetamido]acetate (51):

80 mg, 66%, mp. 246-247°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.38 (t, *J* = 6.9 Hz, 3H), 2.65 (s, 3H), 3.80 (d, *J* = 5.4 Hz, 2H), 4.06 (d, *J* = 5.4 Hz, 2H), 4.56 (q, *J* = 6.9 Hz, 2H), 7.45 (d, *J* = 8.1 Hz, 1H), 8.25 (bs, 1H), 8.53 (d, *J* = 8.1 Hz, 1H), 8.95 (s, 1H), 10.08 (s, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.0, 24.8, 42.0, 46.0, 111.9, 119.6, 121.4, 135.9, 147.9, 148.1, 163.1, 163.9, 169.1, 171.2, 175.7. $C_{16}H_{18}N_4O_5$, Calculated: C, 55.49; H, 5.24; N, 16.18, Found: C, 54.96; H, 5.06; N, 15.91.

General procedure for cinoxacin-amino acid conjugates (52-54):

A mixture of 3-(1*H*-benzo[*d*][*1,2,3*]triazole-1-carbonyl)-1-ethyl-[*1,3*]dioxolo[*4,5-g*]cinnolin-4(1*H*)-one (100 mg, 0.3 mmol), amino acid (0.3 mmol) and triethylamine (61 mg, 0.08 mL, 0.6 mmol) in acetonitrile-water mixture (2.1 mL + 0.9 mL) was stirred at room temperature for three hours. The acetonitrile was removed under vacuum and the residue was acidified with concentrated HCl. The precipitates was filtered and washed with cold water and dried under reduced pressure and recrystallized from aq. ethanol to give the corresponding product.

(*S*)-2-(1-Ethyl-4-oxo-1,4-dihydro-[*1,3*]dioxolo[*4,5-g*]cinnoline-3-carboxamido)propanoate (52):

93 mg, 82%, mp. 236-238°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.38-1.43 (m, 6H), 4.45-4.50 (m, 1H), 4.57-4.64 (m, 2H), 6.31 (s, 2H), 7.54 (s, 1H), 7.65 (s, 1H), 10.45 (d, *J* = 6.9 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 15.2, 18.4, 25.0, 46.3, 47.7, 111.7, 119.8, 121.8, 136.1, 148.2, 148.3, 163.5, 174.2, 176.0. $C_{15}H_{17}N_3O_7 \cdot H_2O$, Calculated: C, 51.28; H, 4.88; N, 11.96, Found: C, 51.49; H, 4.77; N, 11.92.

2-(1-Ethyl-4-oxo-1,4-dihydro-[*1,3*]dioxolo[*4,5-g*]cinnoline-3-carboxamido)-3-phenylpropanoate (53):

93 mg, 82%, mp. 266-268°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.39 (t, *J* = 7.1 Hz, 3H), 3.03-3.10 (m, 1H), 3.20 (dd, *J* = 4.9 & 13.9 Hz, 1H), 4.58 (q, *J* = 7.0 Hz, 2H), 4.73-4.80 (m, 1H), 6.29 (s, 2H), 7.19-7.30 (m, 5H), 7.51 (s, 1H), 7.61 (s, 1H), 10.45 (d, *J* = 7.4 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 13.7, 37.1, 52.7, 53.5, 95.7, 100.8, 103.4, 123.2, 126.6, 128.3, 129.2, 134.8, 137.0, 138.1, 148.1, 153.9, 161.4, 167.7, 172.5. $C_{21}H_{19}N_3O_6$, Calculated: C, 61.61; H, 4.68; N, 10.26, Found: C, 61.28; H, 4.55; N, 10.21.

(*S*)-2-(1-Ethyl-4-oxo-1,4-dihydro-[*1,3*]dioxolo[*4,5-g*]cinnoline-3-carboxamido)-3-(1*H*-indol-3-yl)propanoate (54):

80 mg, 73%, mp. 179-181°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.39 (t, *J* = 6.9 Hz, 3H), 3.26 (m, 2H), 4.59 (q, *J* = 6.9 Hz, 2H), 4.81 (q, *J* = 6.3 Hz, 1H), 6.30 (s, 2H), 6.94 (t, *J* = 7.4 Hz, 1H), 7.05 (t, *J* = 7.6 Hz, 1H), 7.19 (s, 1H), 7.32 (d, *J* = 8.1 Hz, 1H), 7.50 (bs, 1H), 7.54 (d, *J* = 8.0 Hz, 1H), 7.64 (s, 1H), 10.49 (d, *J* = 7.1 Hz, 1H), 10.90 (s, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 13.7, 52.7, 53.0, 95.7, 100.8, 103.4, 109.2, 111.4, 118.4, 121.0, 123.2, 123.7, 127.3, 135.0, 136.1, 138.1, 148.0, 154.0, 161.4, 167.7, 173.0. $C_{23}H_{22}N_4O_7 \cdot H_2O$ Calculated: C, 59.22; H, 4.75; N, 12.01, Found: C, 59.47; H, 4.71; N, 12.50.

General procedure for flumequine-amino acid conjugates (55,56):

A mixture of 2-(1*H*-Benzo[*d*][1,2,3]triazole-1-carbonyl)-9-fluoro-5-methyl-6,7-dihydropyrido [3,2,1-*ij*]quinolin-1(5*H*)-one (100 mg, 0.3 mmol), amino acid (0.3 mmol) and triethylamine (61 mg, 0.08 mL, 0.6 mmol) in acetonitrile-water mixture (2.1 mL + 0.9 mL) was stirred at room temperature for three hours. The acetonitrile was removed under vacuum and the residue was acidified with concentrated HCl. The precipitates was filtered and washed with cold water and dried under reduced pressure and recrystallized from aq. ethanol to give the corresponding product.

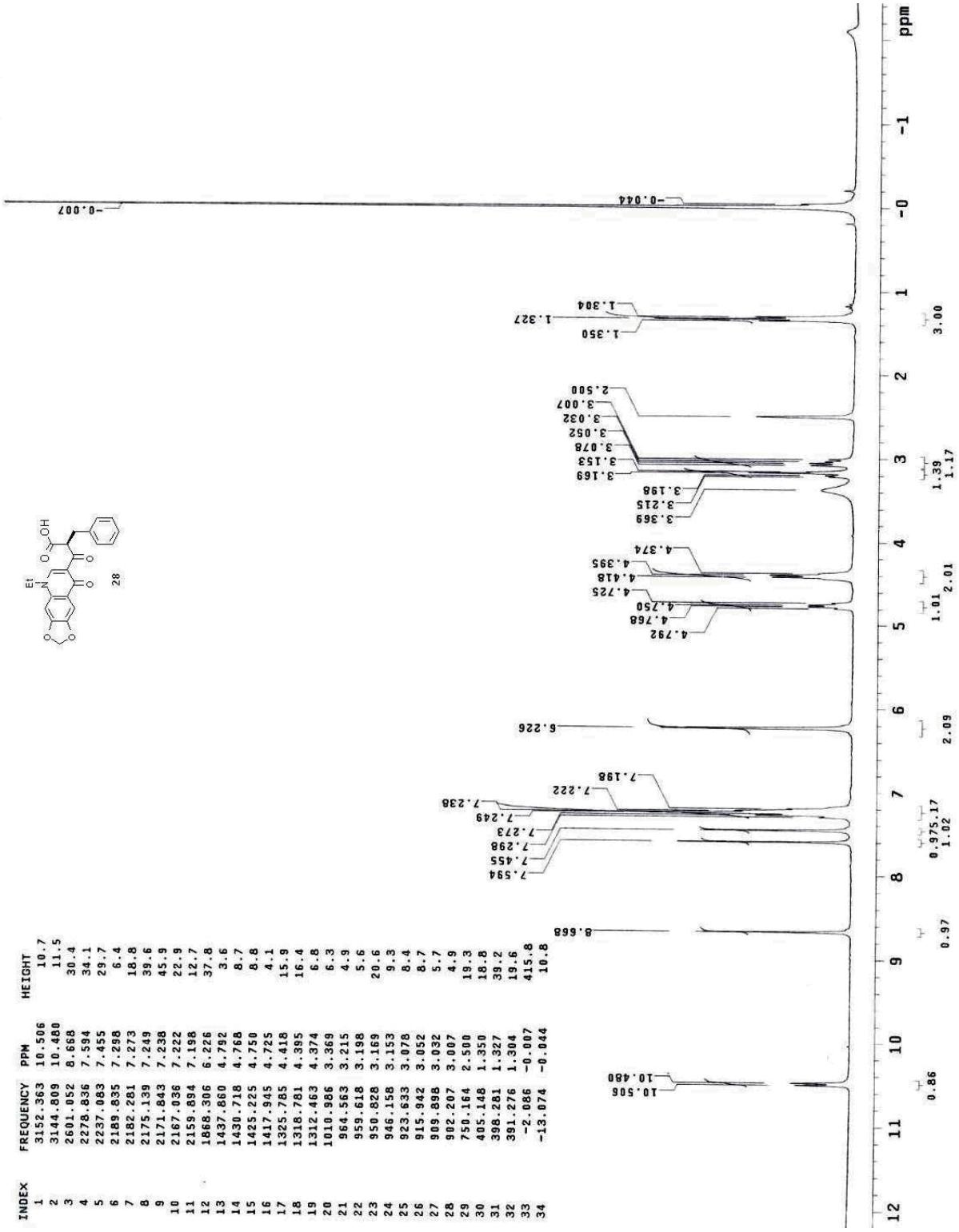
(2*S*)-2-(9-Fluoro-5-methyl-1-oxo-1,5,6,7-tetrahydropyrido[*3,2,1-ij*]quinoline-2-carboxamido)-3-phenylpropanoate (55):

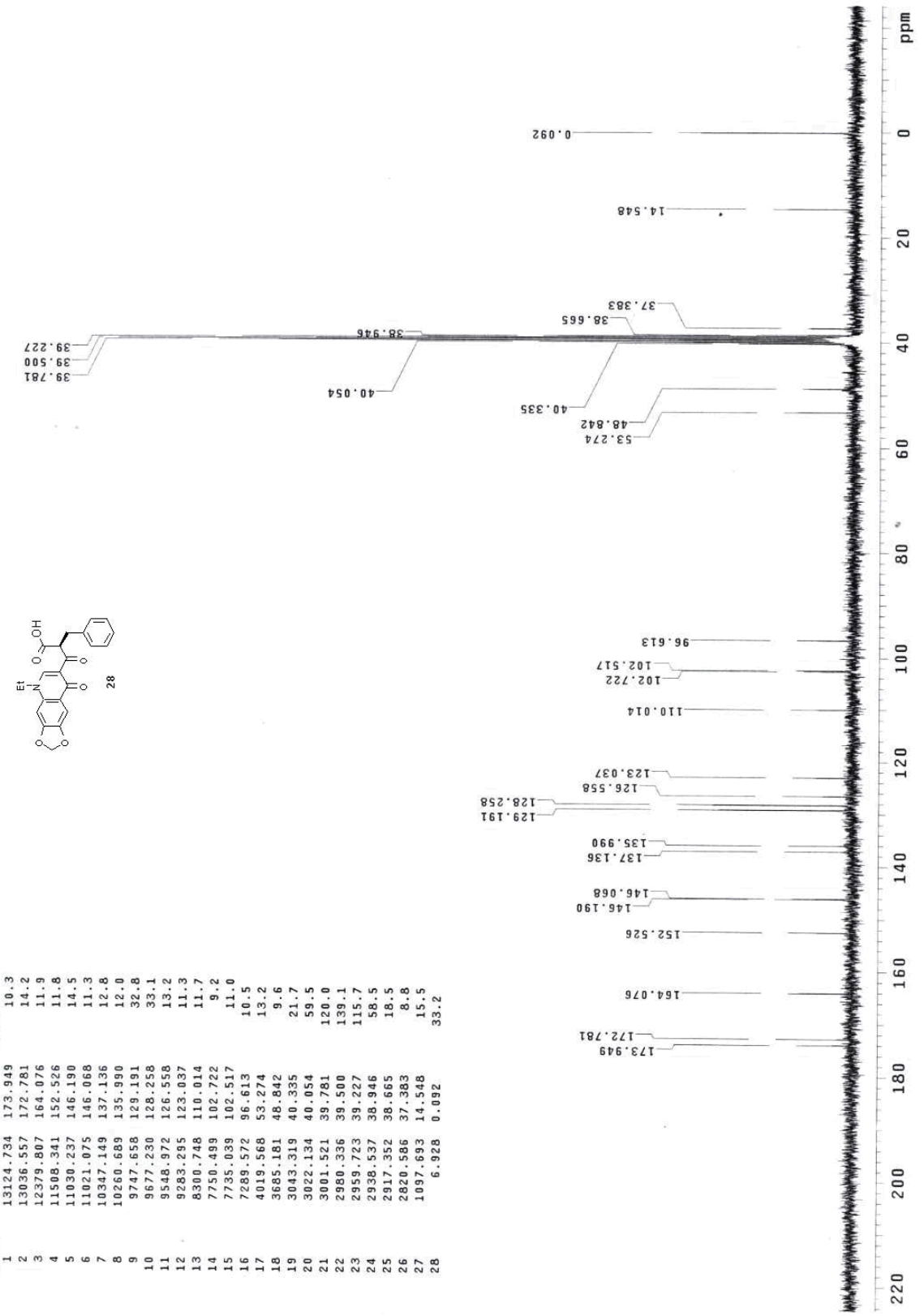
65 mg, 53%, mp. 175-176°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.36 (d, *J* = 6.6 Hz, 3H), 2.09 (bs, 2H), 3.00-3.40 (m, 4H), 4.78-4.80 (m, 2H), 7.15-7.30 (m, 5H), 7.60 (dd, *J* = 9.0 & 3.0 Hz, 1H), 7.80 (dd, *J* = 8.7 & 2.7 Hz, 1H), 8.80, (s, 1H), 10.25 (d, *J* = 7 Hz, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 20.0, 21.5, 25.3, 37.3, 53.3, 53.4, 56.5, 108.1, 108.4, 109.8, 120.3, 120.6, 126.6, 128.3, 128.9, 129.2,

131.3, 131.4, 132.4, 137.0, 137.1, 146.3, 157.1, 160.3, 163.8, 163.9, 172.7, 174.6. $C_{23}H_{21}FN_2O_4$, Calculated: C, 67.64; H, 5.18; N, 6.86, Found: C, 67.38; H, 5.18; N, 6.81.

(2*S*)-2-(9-Fluoro-5-methyl-1-oxo-1,5,6,7-tetrahydropyrido[*3,2,1-ij*]quinoline-2-carboxamido)-3-(1*H*-indol-3-yl)propanoic acid (56):

75 mg, 56%, mp. 202-203°C. ^{1}H NMR (300 MHz, DMSO-d_6) δ: 1.40 (d, *J*= 6.6 Hz, 3H), 2.14 (bs, 2H), 3.00-3.50 (m, 4H), 4.86 (m, 2H), 6.98 (t, J = 7.2 Hz, 1H), 7.08 (t, *J* = 7.2 Hz, 1H), 7.20 (s, 1H), 7.36 (d, *J* = 6.9 Hz, 1H), 7.58-7.66 (m, 2H), 7.81-7.84 (m, 1H), 8.85 (s, 1H), 10.39 (d, *J* = 7 Hz, 1H), 10.93 (s, 1H). ^{13}C NMR (75 MHz, DMSO-d_6) δ: 20.0, 21.5, 25.3, 27.7, 52.7, 56.5, 108.0, 108.3, 109.3, 110.0, 111.4, 118.4, 120.3, 120.6, 121.0, 123.7, 127.3, 128.8, 128.9, 131.4, 131.5, 132.4, 136.1, 146.3, 157.1, 160.3, 163.9, 173.3, 174.5, 174.6. $C_{25}H_{22}FN_3O_4 \cdot H_2O$, Calculated: C, 64.51; H, 5.20; N, 9.03, Found: C, 64.44; H, 5.13; N, 8.84.





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5	11030.237	146.190	14.5
6	11021.075	146.068	11.3
7	10347.149	137.136	12.8
8	10260.689	135.990	12.0
9	9747.658	129.191	32.8
10	9677.230	128.258	33.1
11	9548.972	126.558	13.2
12	9283.295	123.037	11.3
13	8300.748	110.014	11.7
14	7750.499	102.722	9.2
15	7735.039	102.517	11.0
16	7289.572	96.613	10.5
17	4019.568	53.274	13.2
18	3685.181	48.842	9.6
19	3043.319	40.335	21.7
20	3022.134	40.054	59.5
21	3001.521	39.781	120.0
22	2980.336	39.500	139.1
23	2959.723	39.227	115.7
24	2938.537	38.946	58.5
25	2917.352	38.665	18.5
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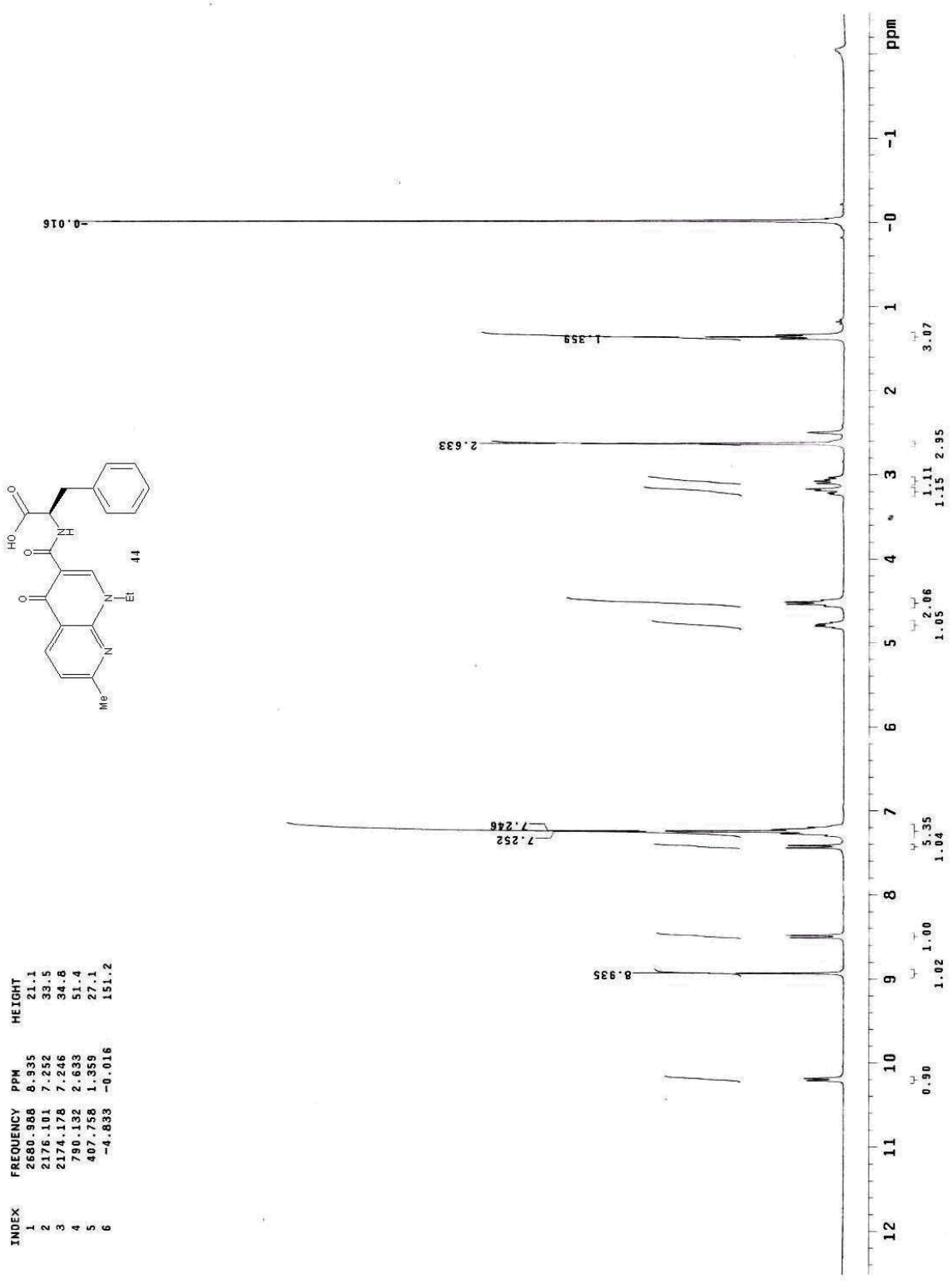
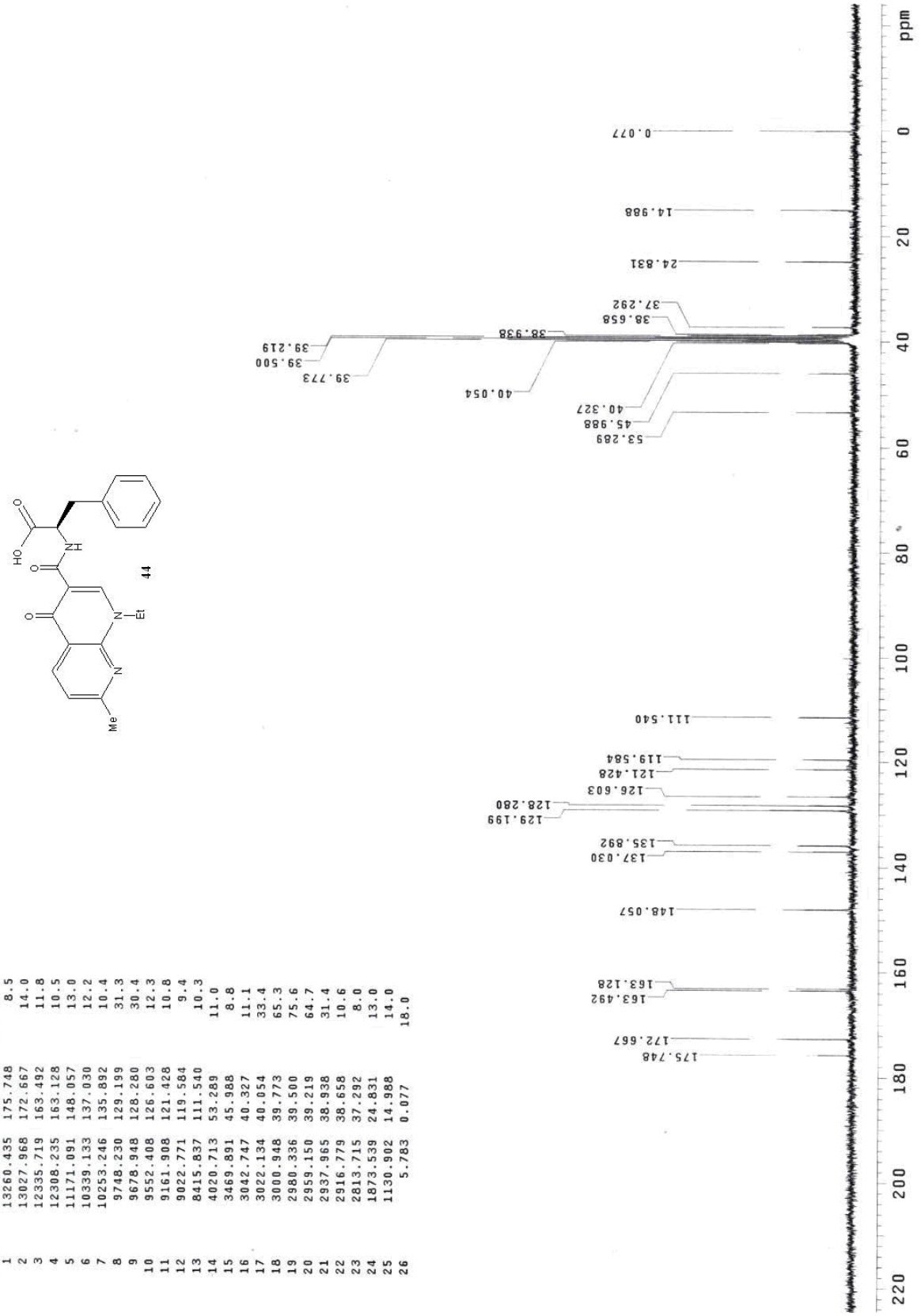
27	1097.693	14.548	15.5
28	6.928	0.092	33.2





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INDEX	FREQUENCY	PPM	HEIGHT
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4	12308.235	163.128	10.5
5	11171.091	148.057	13.0
6	10339.133	137.030	12.2
7	10253.246	135.892	10.4
8	9748.230	129.199	31.3
9	9678.948	128.280	30.4
10	9552.408	126.603	12.3
11	9161.908	121.428	10.8
12	9022.771	119.584	9.4
13	8415.837	111.540	10.3
14	4020.713	53.289	11.0
15	3469.891	45.988	8.8
16	3042.747	40.327	11.1
17	3022.134	40.054	33.4
18	3000.948	39.773	65.3
19	2980.336	39.500	75.6
20	2959.150	39.219	64.7
21	2937.965	38.938	31.4
22	2916.779	38.658	10.6
23	2813.715	37.292	8.0
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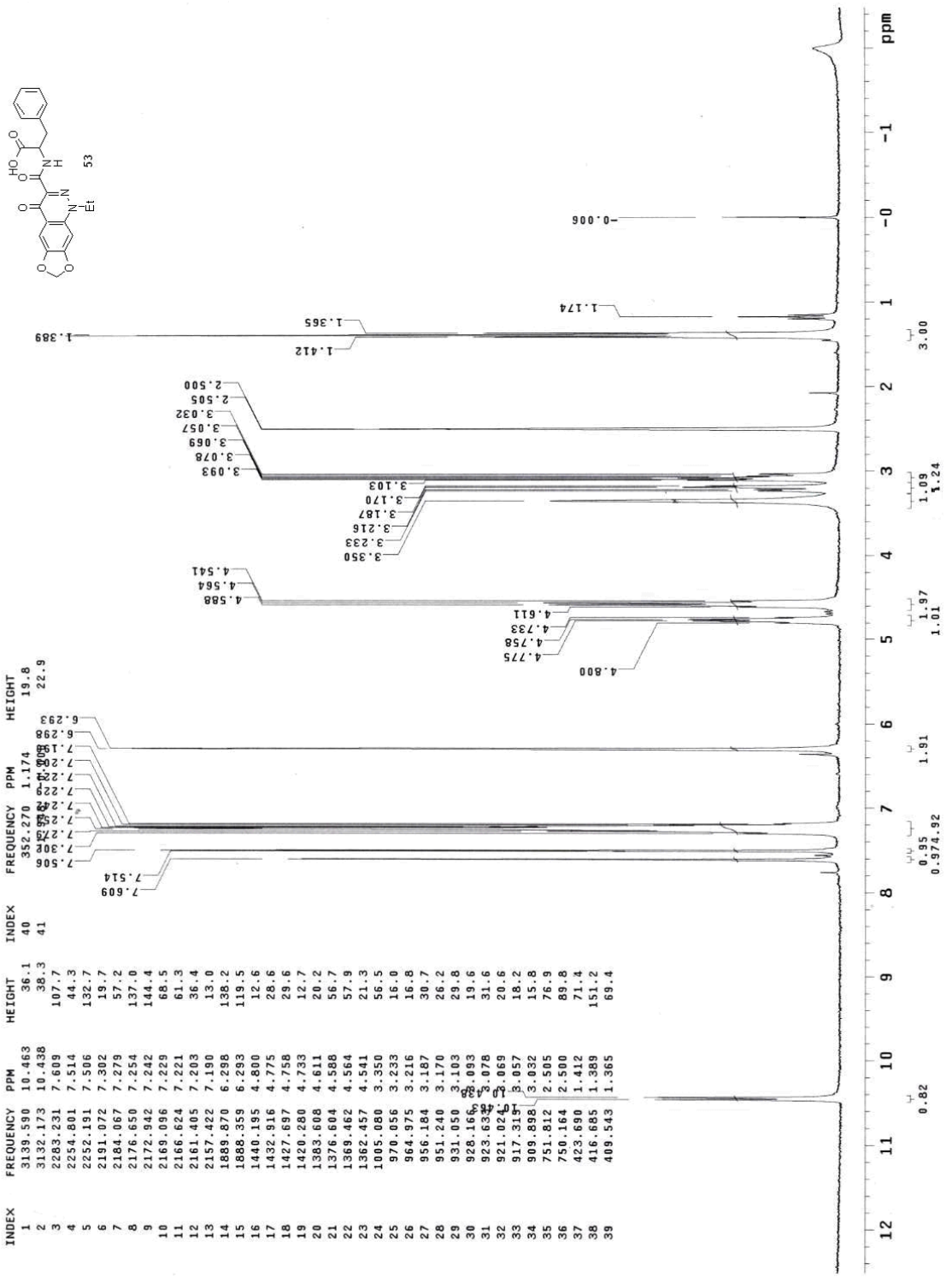
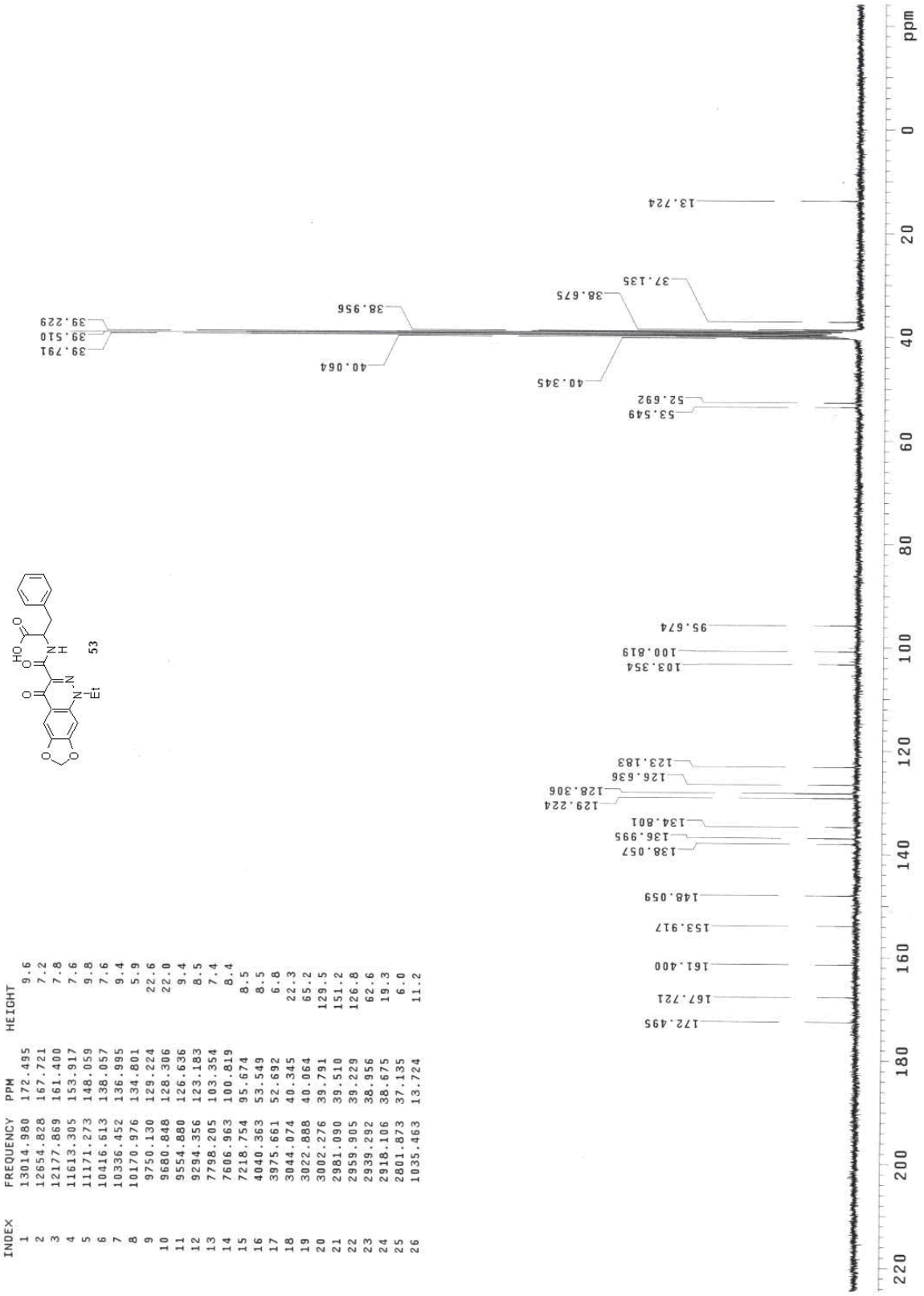
25	1130.902	14.988	14.0
26	5.783	0.077	18.0





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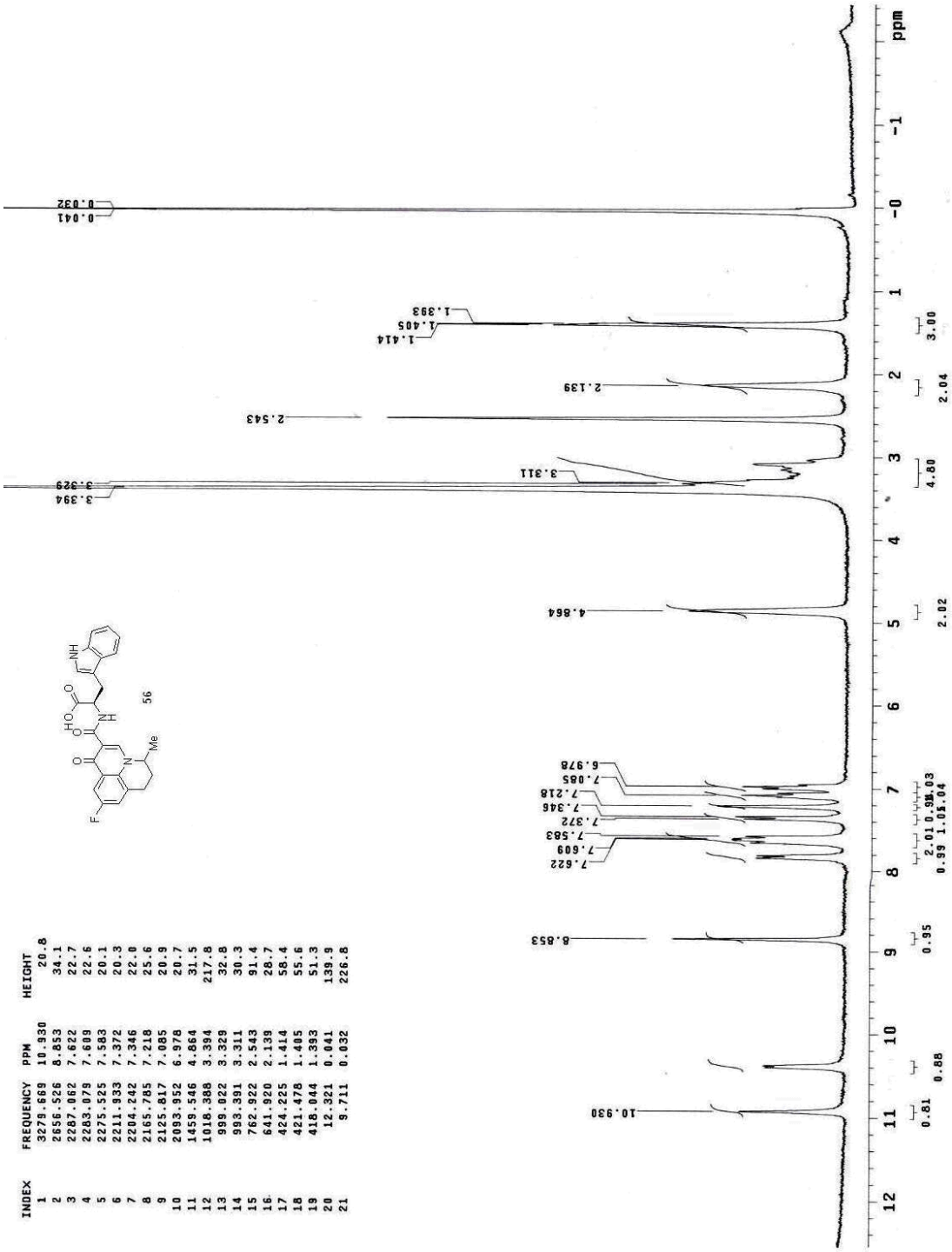
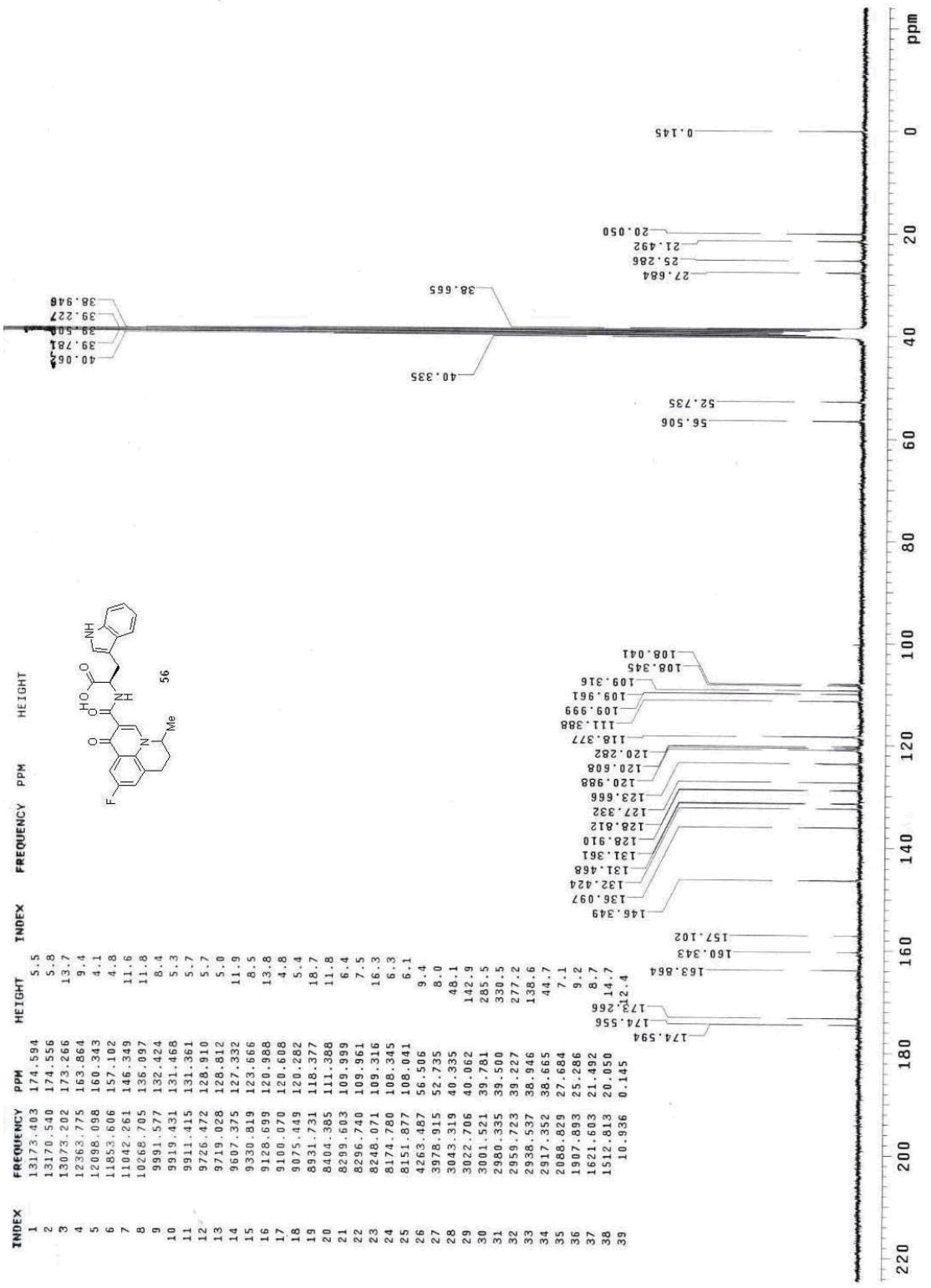
3	12177.869	161.400	7.8
4	11613.305	153.917	7.6
5	11171.273	148.059	9.8
6	10416.613	138.057	7.6
7	10336.452	136.995	9.4
8	10170.976	134.801	5.9
9	9750.130	129.224	22.6
10	9680.848	128.306	22.0
11	9554.880	126.636	9.4
12	9294.356	123.183	8.5
13	7798.205	103.354	7.4
14	7606.963	100.819	8.4
15	7218.754	95.674	8.5
16	4040.363	53.549	8.5
17	3975.661	52.692	6.8
18	3044.074	40.345	22.3
19	3022.888	40.064	65.2
20	3002.276	39.791	129.5
21	2981.090	39.510	151.2
22	2959.905	39.229	126.8
23	2939.292	38.956	62.6
24	2918.106	38.675	19.3
25	2801.873	37.135	6.0
26	1035.463	13.724	11.2



INDEX	FREQUENCY	PPM	HEIGHT
1	3279.669	10.930	20.8
2	2656.526	8.853	34.1
3	2287.062	7.622	22.7
4	2283.079	7.609	22.6
5	2275.525	7.583	20.1
6	2211.933	7.372	20.3
7	2204.242	7.346	22.0
8	2165.785	7.218	25.6
9	2125.817	7.085	20.9
10	2093.952	6.978	20.7
11	1459.546	4.864	31.5
12	1018.388	3.394	217.8
13	999.022	3.329	32.8
14	993.391	3.311	30.3
15	762.922	2.543	91.4
16	641.820	2.139	28.7
17	424.225	1.414	58.4
18	421.478	1.405	55.6
19	418.044	1.393	51.3
20	12.321	0.041	139.9
21	9.711	0.032	226.8



INDEX	FREQUENCY	PPM	HEIGHT	INDEX	FREQUENCY	PPM	HEIGHT
1	13173.403	174.594	5.5				
2	13170.540	174.556	5.8				
3	13073.202	173.266	13.7				
4	12363.775	163.864	9.4				
5	12098.098	160.343	4.1				
6	11853.606	157.102	4.8				
7	11042.261	146.349	11.6				
8	10268.705	136.097	11.8				
9	9991.577	132.424	8.4				
10	9919.431	131.468	5.3				
11	9911.415	131.361	5.7				
12	9726.472	128.910	5.7				
13	9719.028	128.812	5.0				
14	9607.375	127.332	11.9				
15	9330.819	123.666	8.5				
16	9128.699	120.988	13.8				
17	9100.070	120.608	4.8				
18	9075.449	120.282	5.4				
19	8931.731	118.377	18.7				
20	8404.385	111.388	11.8				
21	8299.603	109.999	6.4				
22	8296.740	109.961	7.5				
23	8248.071	109.316	16.3				
24	8174.780	108.345	6.3				
25	8151.877	108.041	6.1				
26	4263.487	56.506	9.4				
27	3978.915	52.735	8.0				
28	3043.319	40.335	48.1				
29	3022.706	40.062	142.9				
30	3001.521	39.781	285.5				
31	2980.335	39.500	330.5				
32	2959.723	39.227	277.2				
33	2938.537	38.946	138.6				
34	2917.352	38.665	44.7				
35	2088.829	27.684	7.1				
36	1907.893	25.286	9.2				
37	1621.603	21.492	8.7				
38	1512.813	20.050	14.7				
39	10.936	0.145	12.4				