Supporting Inforamtion

Synthesis of Impurities of Pramipexole Dihydrochloride

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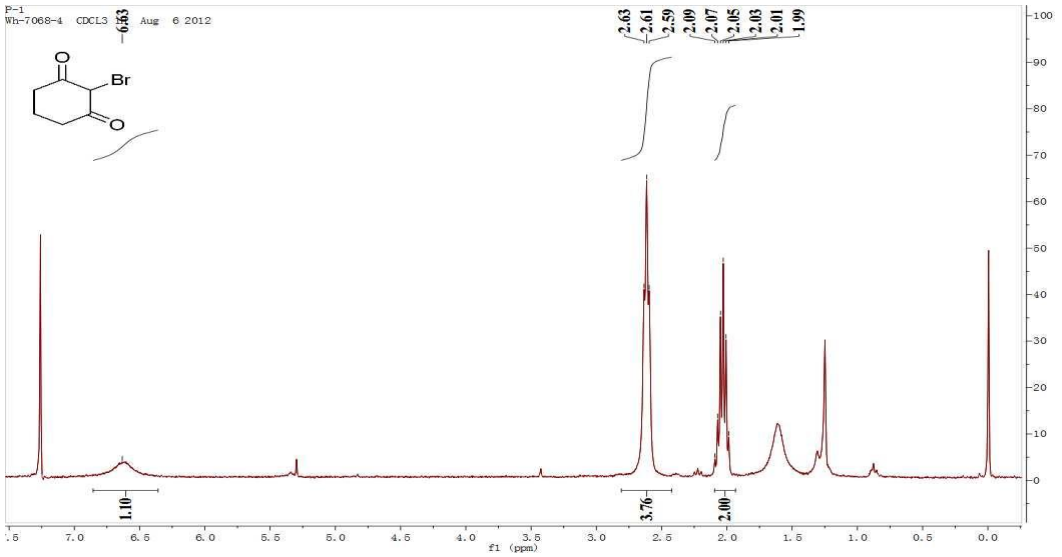
Context

1. Compound 1-3

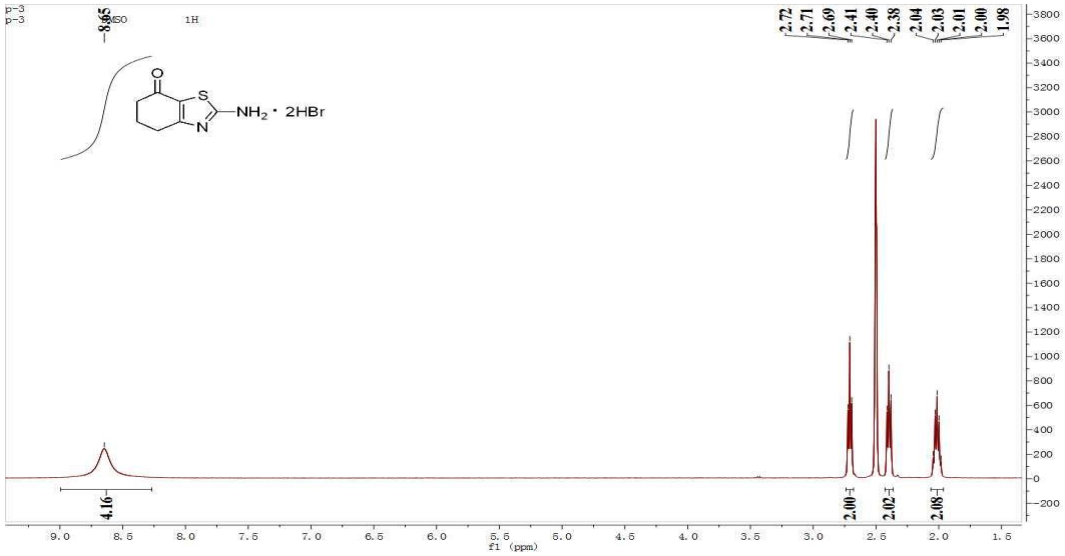
^{1}H NMR ($CDCl_3$, 300 MHz): δ 6.63(s, 1H), 2.61(t, J = 5.9 Hz, 4H), 2.03 (p, J = 5.9

Hz, 2H).



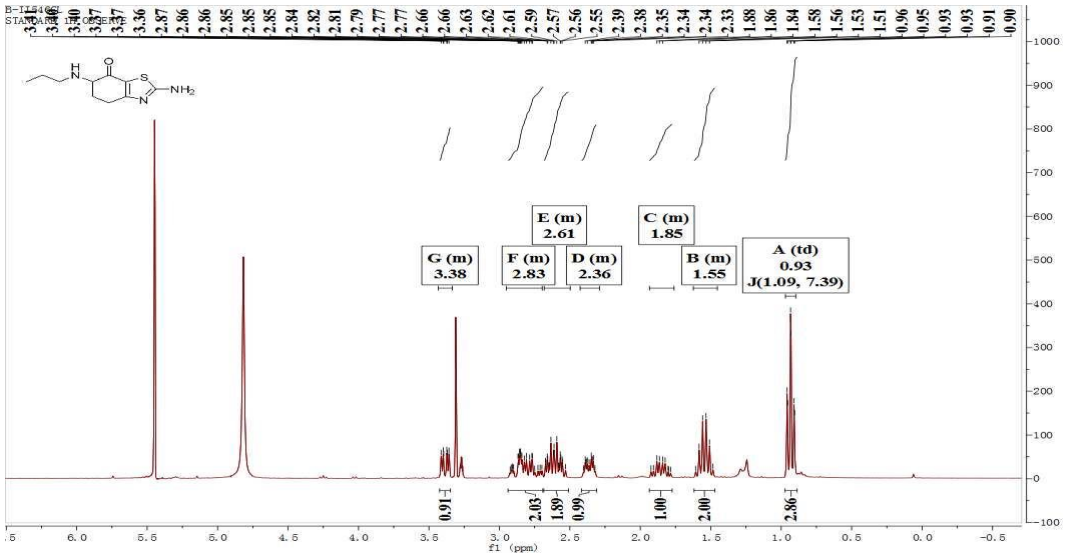
2. Compound 1-2

^{1}H NMR (DMSO-d_6, 400 MHz): δ 8.65(4H, s), 2.71(t, J = 6.1 Hz, 2H), 2.40(m. 2H), 2.01(m, 2H).

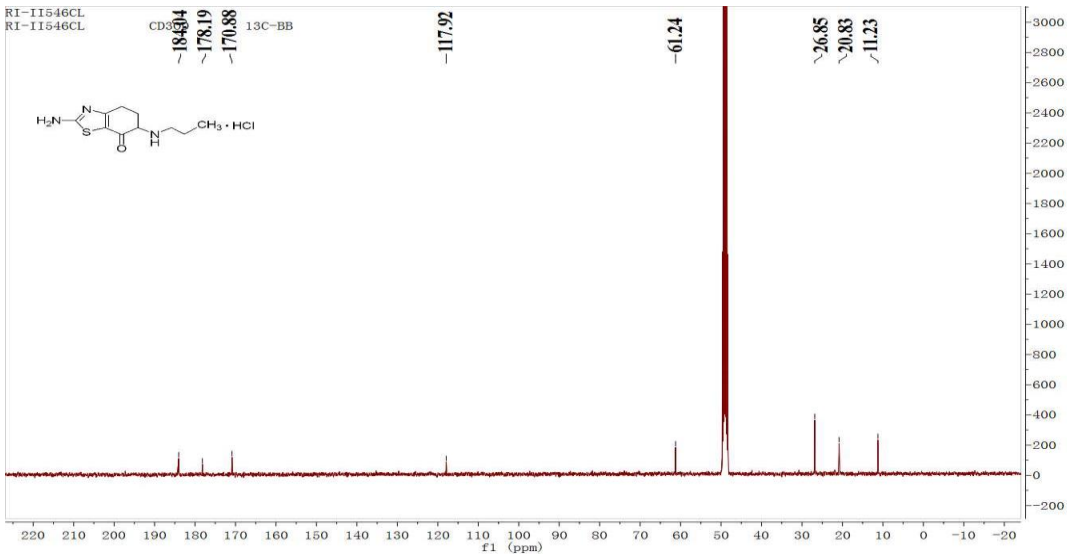


3. Compound 1

^{1}H NMR (CD_3OD, 300 MHz): δ 3.36–3.41 (m, 1H), 2.70–2.92 (m, 2H), 2.53–2.67 (m, 2H), 2.32–2.40 (m, 1H), 1.78–1.92 (m, 1H), 1.48–1.61 (m, 2H), 0.93 (td, J = 1.1 Hz, 7.4 Hz, 3H).

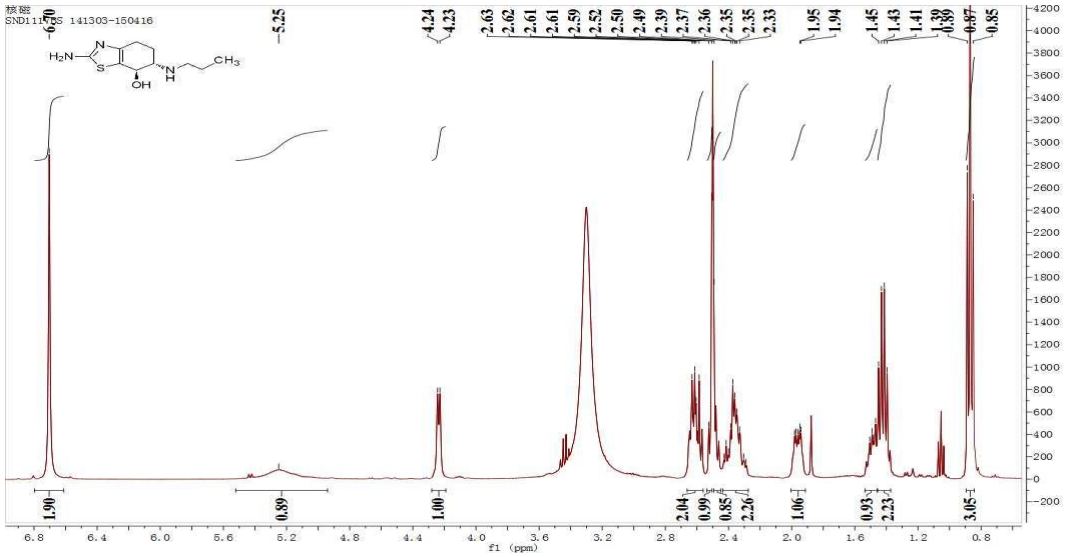


^{13}C NMR (CD_3OD, 100 MHz): 184.04, 178.19, 170.88, 117.92, 61.24, 26.85, 20.83, 11.23.

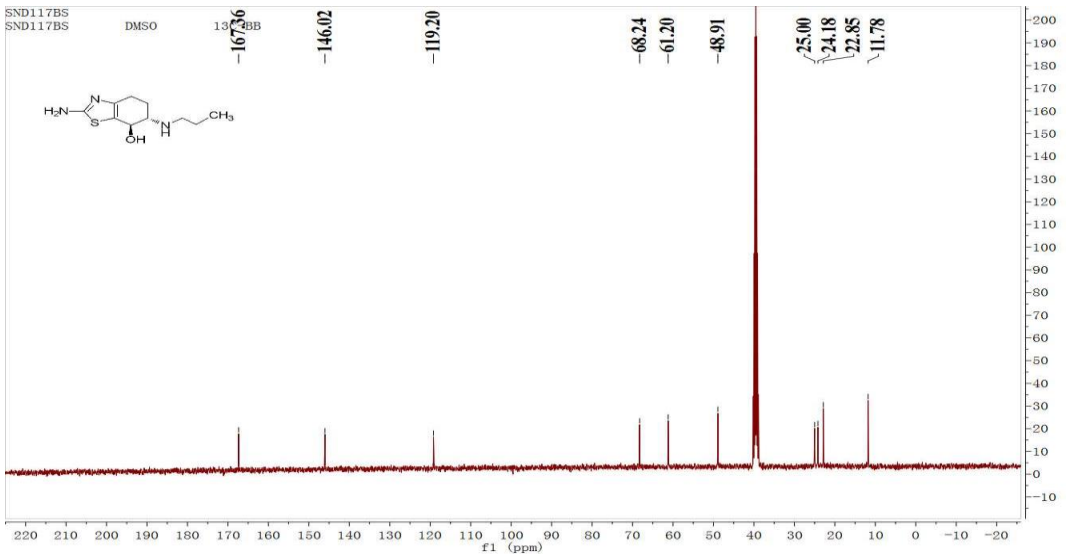


4. Compound 2

^{1}H NMR (DMSO-d_6, 400 MHz): δ 6.70 (s, 2H), 5.25 (s, 1H), 4.24 (d, J = 5.9 Hz, 1H), 2.56–2.66 (m, 2H), 2.50–2.53 (m, 1H), 2.45–2.49 (m, 1H), 2.28–2.43 (m, 2H), 1.92–2.00 (m, 1H), 1.46–1.53 (m, 1H), 1.42 (dd, J = 7.3 Hz, 14.6 Hz, 2H), 0.87 (t, J = 7.3 Hz, 3H).

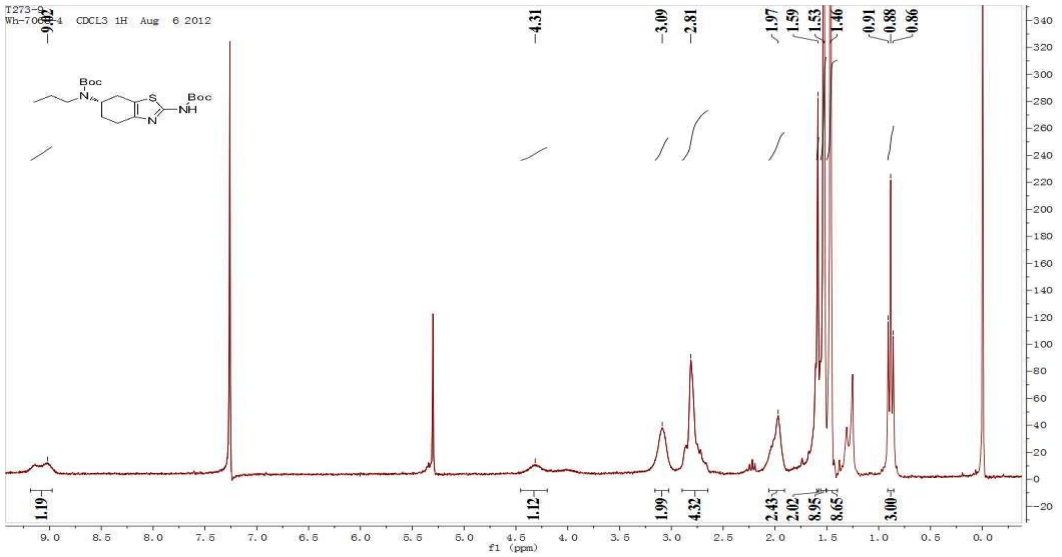


^{13}C NMR (DMSO-d_6, 100 MHz): 167.36, 146.02, 119.20, 68.24, 61.20, 48.91, 25.00, 24.18, 22.85, 11.78.



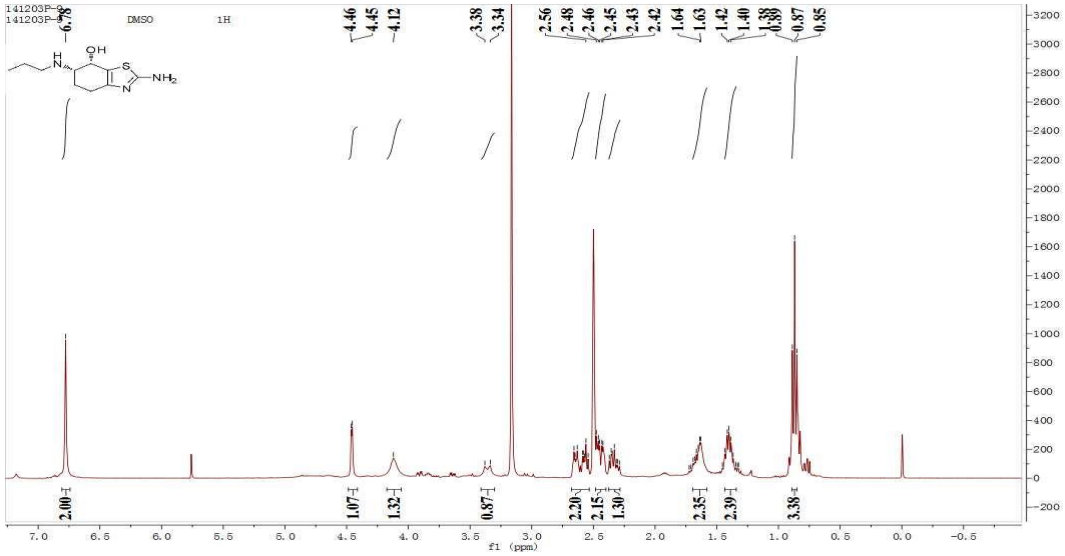
5. Compound 4

^{1}H NMR ($CDCl_3$, 400 MHz): δ 9.02 (s, 1H), 4.21 (brs, 1H), 3.02–3.16 (m, 2H), 2.70–2.88 (m, 4H), 1.90–2.04 (m, 2H), 1.58–1.60 (m, 2H), 1.53 (s, 9H), 1.46 (s, 9H), 0.88 (t, J = 7.4 Hz, 3H).



6. Compound 3-4

^{1}H NMR (DMSO-d_6, 400 MHz): δ 6.78 (s, 2H), 4.46 (d, J = 3.3 Hz, 1H), 4.12 (s, 1H), 3.36 (d, J = 17.5 Hz, 1H), 2.54–2.68 (m, 2H), 2.40–2.48 (m, 2H), 2.28–2.38 (m, 1H), 1.58–1.69 (m, 2H), 1.34–1.44 (m, 2H), 0.87 (t, J = 7.4 Hz, 3H).



The Absolute Configuration of (6*S*, 7*S*)-2 monosulphate

X-ray crystallographic data of **(6*S*, 7*S*)-2 monosulphate** were solutions at T=296(2) K: $C_{10}H_{19}N_3O_5S$, orthorhombic. Space group, P212121, a=8.056(3) Å, b=10.267(4) Å, c=19.168(6) Å, α=90.00°, β=90.00°, γ=90.00°, V=1585.4(9) Å^3, Z=4.

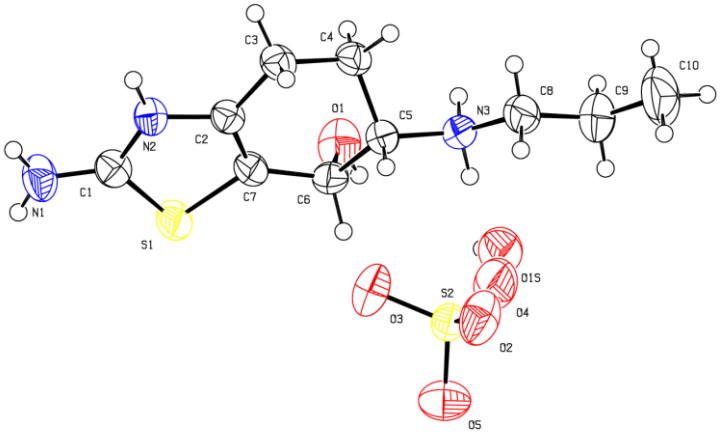
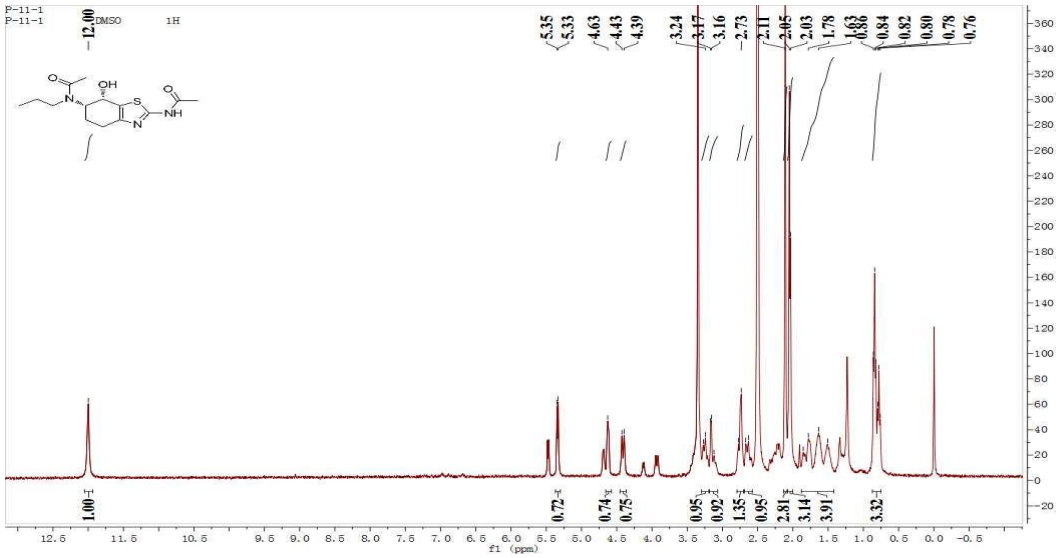


Figure 2. X-ray structure of **2**

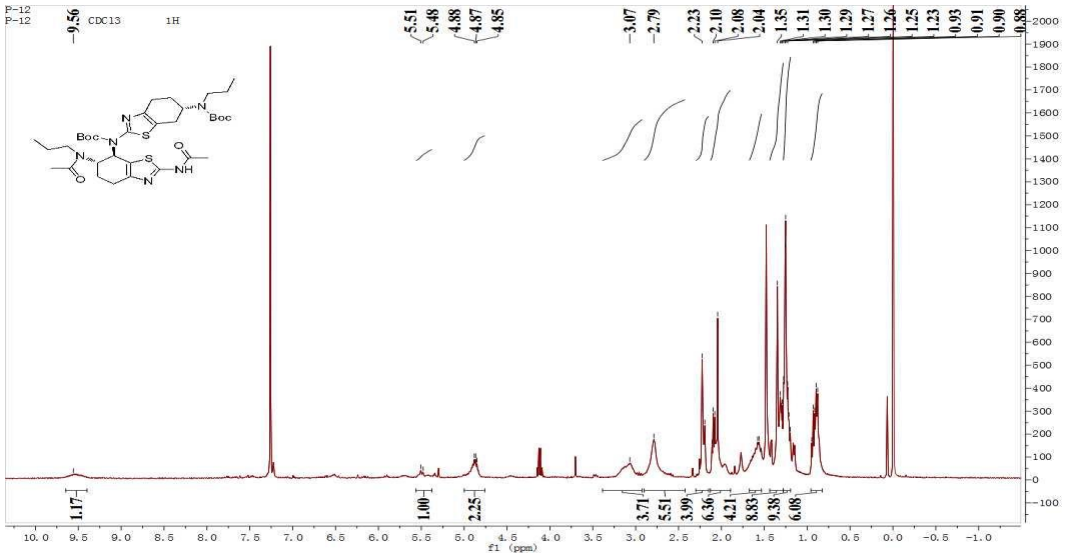
7. Compound 3-3

^{1}H NMR (DMSO-d_6, 400 MHz): δ 12.00 (s, 1H), 5.34 (d, J = 6.4 Hz, 1H), 4.63 (brs, 1H) , 4.41(d, J = 13.3 Hz, 1H), 3.26 (d, J = 11.2 Hz, 1H), 3.15 (m, 1H), 2.75 (d, J = 15.4 Hz, 1H), 2.65 (d, J = 16.2 Hz, 1H), 2.11 (s, 3H), 2.04 (d, J=6.6 Hz, 3H), 1.44–1.88 (m, 4H), 0.81 (dt, J = 7.2 Hz, 24.8 Hz, 3H).



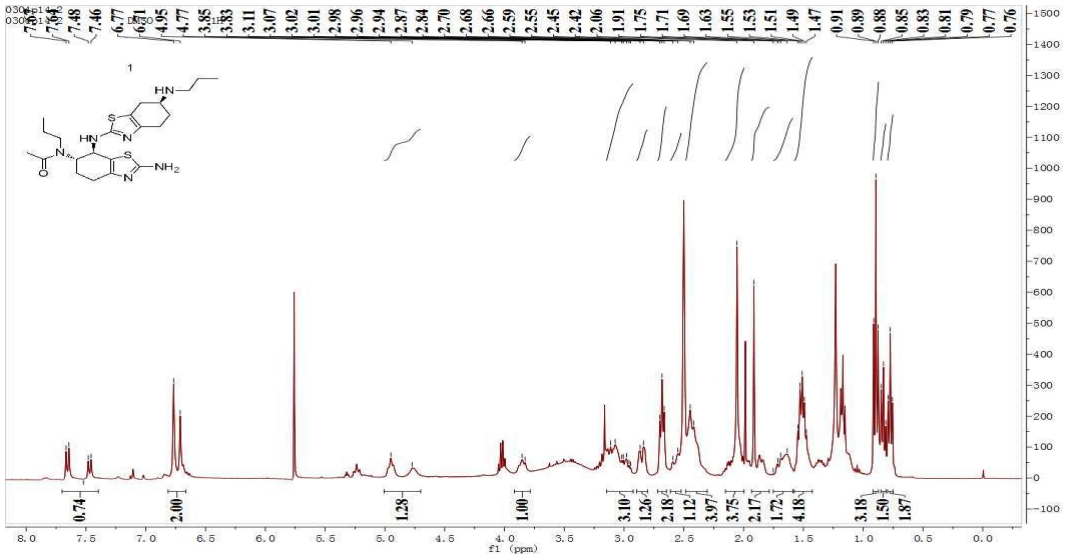
8. Compound 3-2

^{1}H NMR ($CDCl_3$, 400 MHz): δ 9.56 (brs, 1H), 5.44–5.56 (m, 1H), 4.80–4.95 (m, 2H), 3.07 (m, 4H), 2.50–2.90 (m, 6H), 2.16–2.30 (m, 4H), 1.92–2.10 (m, 6H), 1.53–1.66 (m, 4H), 1.31 (dd, J = 8.6 Hz, 14.2 Hz, 9H), 1.24 (dt, J = 6.8 Hz, 12.4 Hz, 9H), 0.81-0.97 (m, 6H).

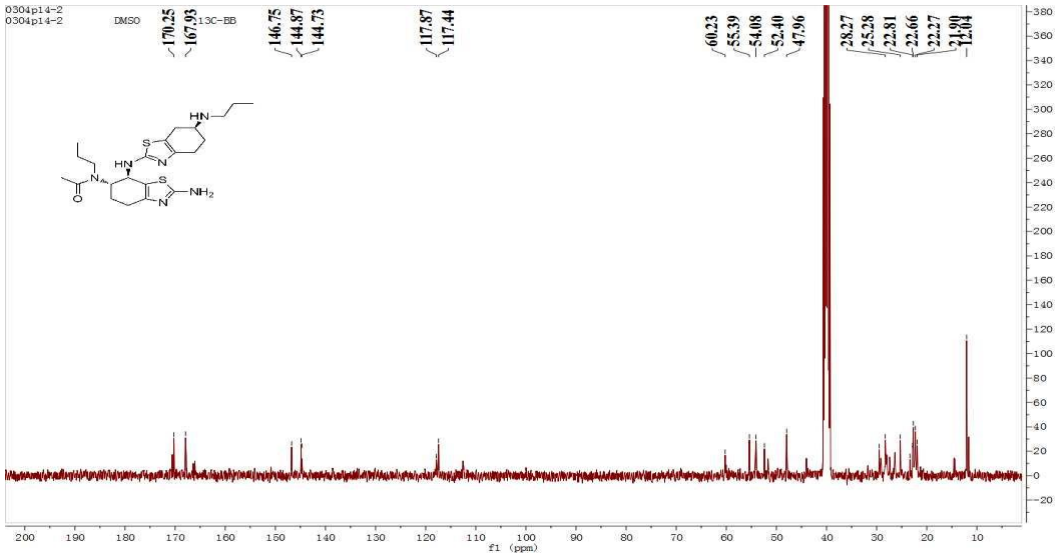


9. Compound 3-1

^{1}H NMR (DMSO-d_6, 400 MHz): δ 7.56 (dd, J= 9.4 Hz,71.2 Hz, 1H), 6.75 (d, J = 22.1 Hz, 2H), 4.87 (d, J = 71.2 Hz, 1H), 3.85 (d, J = 9.9 Hz, 1H), 2.94–3.14 (m, 3H), 2.86 (d, J = 11.1 Hz, 1H), 2.69 (t, J = 7.3 Hz, 2H), 2.58 (d, 16.5 Hz, 1H), 2.30–2.49 (m, 4H), 2.06 (brs, 4H), 1.82–1.94 (m, 2H), 1.60–1.76 (m, 2H), 1.52 (dt, 7.0 Hz, 13.9 Hz, 4H), 0.90 (t, J = 7.4 Hz, 3H), 0.81 (dt, J = 7.3 Hz, 22.5 Hz, 3H).

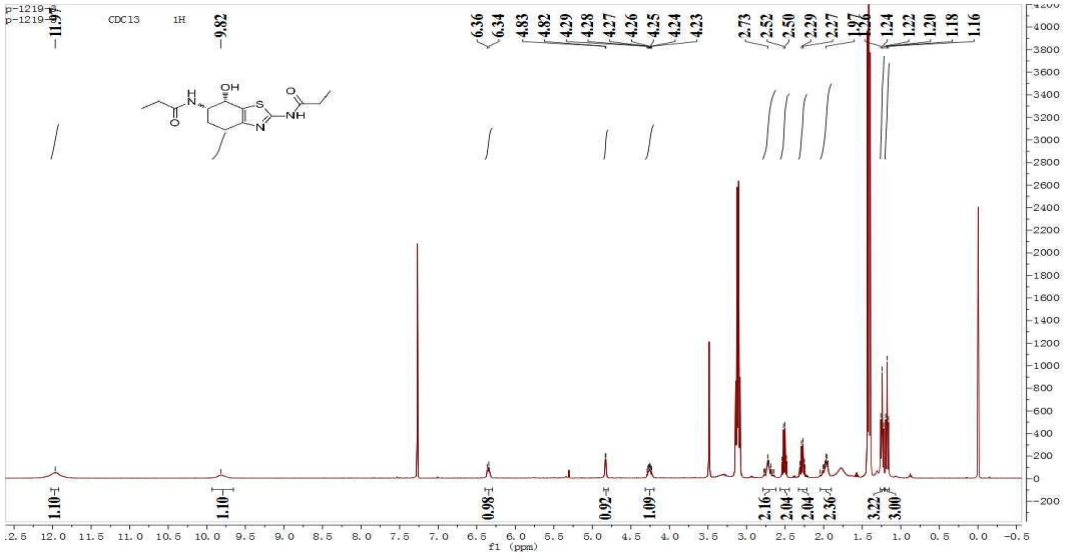


^{13}C NMR (DMSO-d_6, 100 MHz): 170.25, 167.93, 146.75, 144.87, 144.73, 117.87, 117.44, 60.23, 55.39, 54.08, 52.40, 47.96, 29.48, 28.29, 25.28, 23.26, 22.81, 22.66, 22.27, 21.90, 12.04.



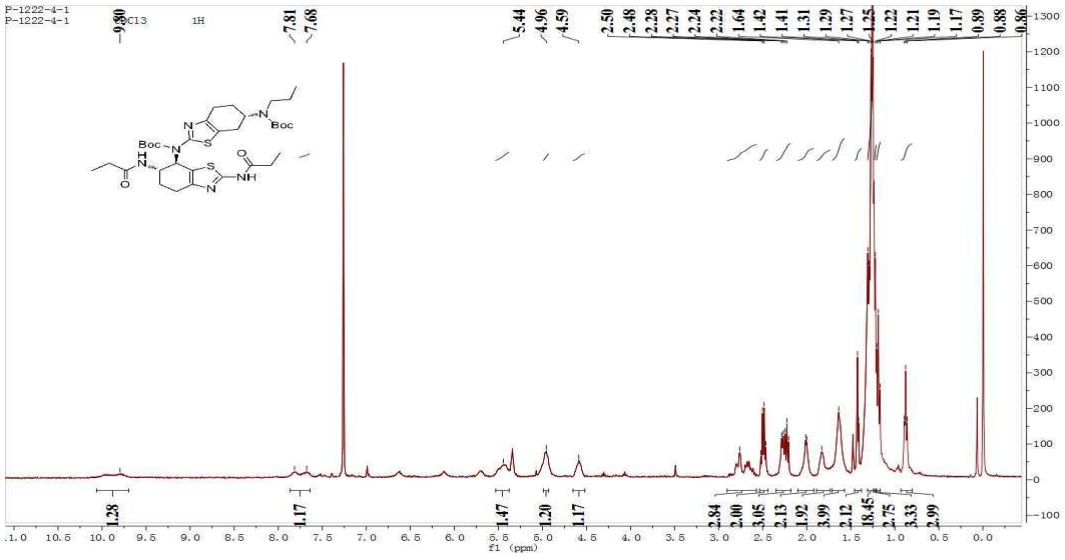
10. Compound 3-11

^{1}H NMR ($CDCl_3$, 400 MHz): δ 11.97 (s, 1H), 9.82 (brs, 1H), 6.35 (d, J = 8.5 Hz, 1H), 4.83 (d, J = 3.4 Hz, 1H), 4.22–4.29 (m, 1H), 2.64–2.77 (m, 2H), 2.51 (q, J = 7.5 Hz, 2H), 2.28(q, J = 7.5 Hz, 2H), 1.90–2.02 (m, 2H), 1.24 (t, J = 7.5 Hz, 3H), 1.18 (t, J = 7.6 Hz, 3H).



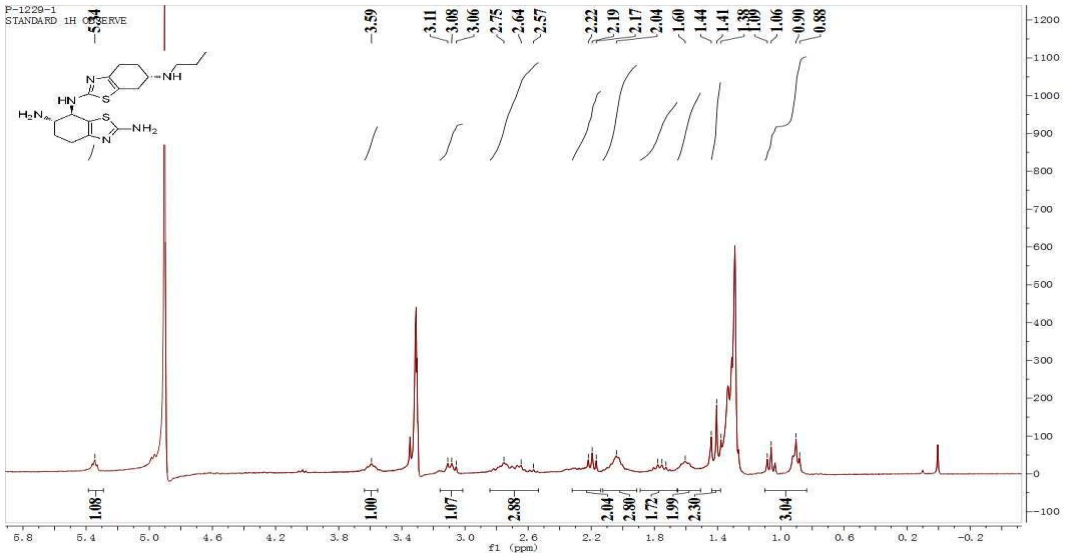
11. Compound 3-10

^{1}H NMR ($CDCl_3$, 400 MHz): δ 9.80 (brs, 1H), 7.75 (d, J = 55.1 Hz, 1H), 5.44 (brs, 1H), 4.96 (brs, 1H), 4.59 (brs, 1H), 2.57–2.90 (m, 3H), 2.49 (q, J = 7.6 Hz, 2H), 2.18–2.34 (m, 3H), 2.01 (d, J = 4.7 Hz, 2H), 1.83 (brs, 2H), 1.64 (brs, 4H), 1.42 (d, J = 5.0 Hz, 2H), 1.28 (dd, 7.5 Hz, 15.1 Hz, 18H), 1.22 (t, J = 7.6 Hz, 3H), 1.19 (t, J = 7.6 Hz, 3H), 0.88 (t, J = 6.4 Hz, 3H).



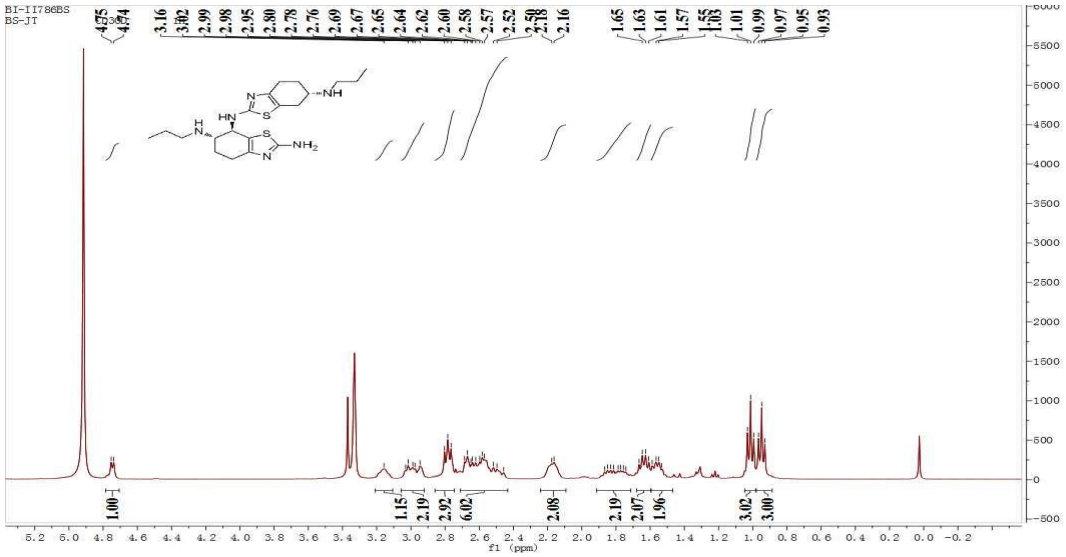
12. Compound 3-8

^{1}H NMR (CD_3OD, 300 MHz): δ 5.29–5.38 (m, 1H), 3.56–3.64 (m, 1H), 3.05–3.16 (m, 1H), 2.55–2.86 (m, 3H), 2.16–2.35 (m, 2H), 1.95–2.15 (m, 3H), 1.66–1.90 (m, 2H), 1.51–1.65 (m, 2H), 1.41 (t, J = 9.3 Hz, 2H), 0.89 (t, J = 6.9 Hz, 3H).



13. Compound 3

^{1}H NMR (CD_3OD, 400 MHz): δ 4.75 (d, J = 5.9 Hz, 1H), 3.16 (brs, 1H), 2.92–3.03 (m, 2H), 2.75–2.86 (m, 3H), 2.44–2.69 (m, 6H), 2.17 (d, J = 5.4 Hz, 2H), 1.72–1.91 (m, 2H), 1.64 (dd, J = 7.6 Hz, 15.1 Hz, 2H), 1.56 (dd, J = 8.1 Hz, 14.3 Hz, 2H), 1.01 (t, J = 7.4 Hz, 3H), 0.95 (t, J = 7.4 Hz , 3H).



^{13}C NMR (CD_3OD, 100 MHz): 169.54, 167.29, 146.36, 144.04, 116.10, 113.37, 58.70, 54.06, 53.81, 48.70, 48.37, 28.26, 28.17, 24.97, 24.61, 23.33, 22.24, 22.06, 10.62, 10.58.