

Design, Synthesis and Biological Evaluation of [1,2,4]Triazolo[1,5-*a*]pyrimidine Indole Derivatives against Gastric Cancer Cells MGC-803 via the Suppression of ERK Signaling Pathway

Guang-Xi Yu ^{1,†}, Ying Hu ^{2,†}, Wei-Xin Zhang ^{2,†}, Xin-Yi Tian ³, Sai-Yang Zhang ¹, , Yan Zhang ^{1,*}, Shuo Yuan ^{4,*} and Jian Song ^{1,*}

¹ School of Basic Medical Sciences, Zhengzhou University, Zhengzhou 450001, China; ygx19990110@126.com (G.-X.Y.); saiyangz@zzu.edu.cn (S.-Y.Z.)

² Guana'anmen Hospital China Academy of Chinese Medicinal Sciences, Beijing 100053, China; huyingdr@126.com (Y.H.); zhangweixin@gs.zzu.edu.cn (W.-X.Z.)

³ Key Laboratory of Advanced Drug Preparation Technologies (Ministry of Education) , Institute of Drug Discovery & Development, School of Pharmaceutical Sciences , Zhengzhou University, Zhengzhou 450001, China; txyi626@163.com

⁴ Children's Hospital Affiliated of Zhengzhou University, Henan Children's Hospital, Zhengzhou Children's Hospital, Zhengzhou 450018, China

* Correspondence: zhangyan055@zzu.edu.cn (Y.Z.); 15890141701@163.com (S.Y.); mumuandzz@163.com (J.S.)

† These authors contributed equally to this work.

- ^1H NMR of Compound **H1****

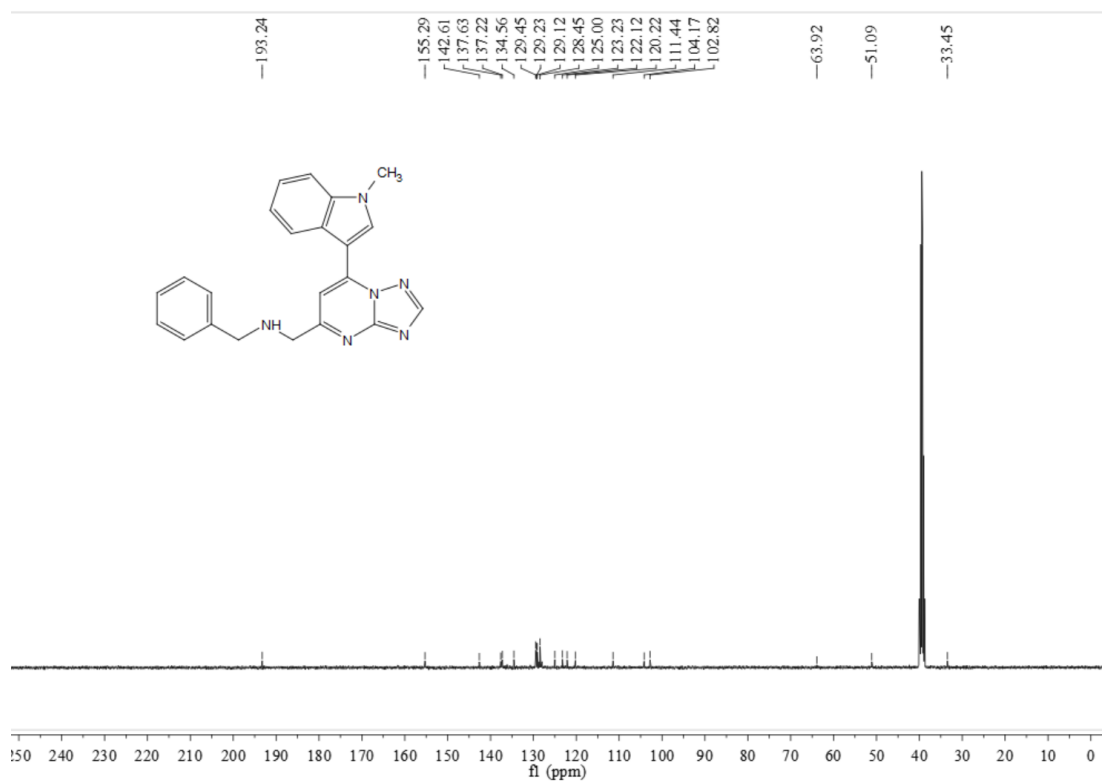


Figure S1. ^1H NMR spectrum of compound **H1** (400 MHz, DMSO- d_6)

- ^{13}C NMR of Compound **H1****

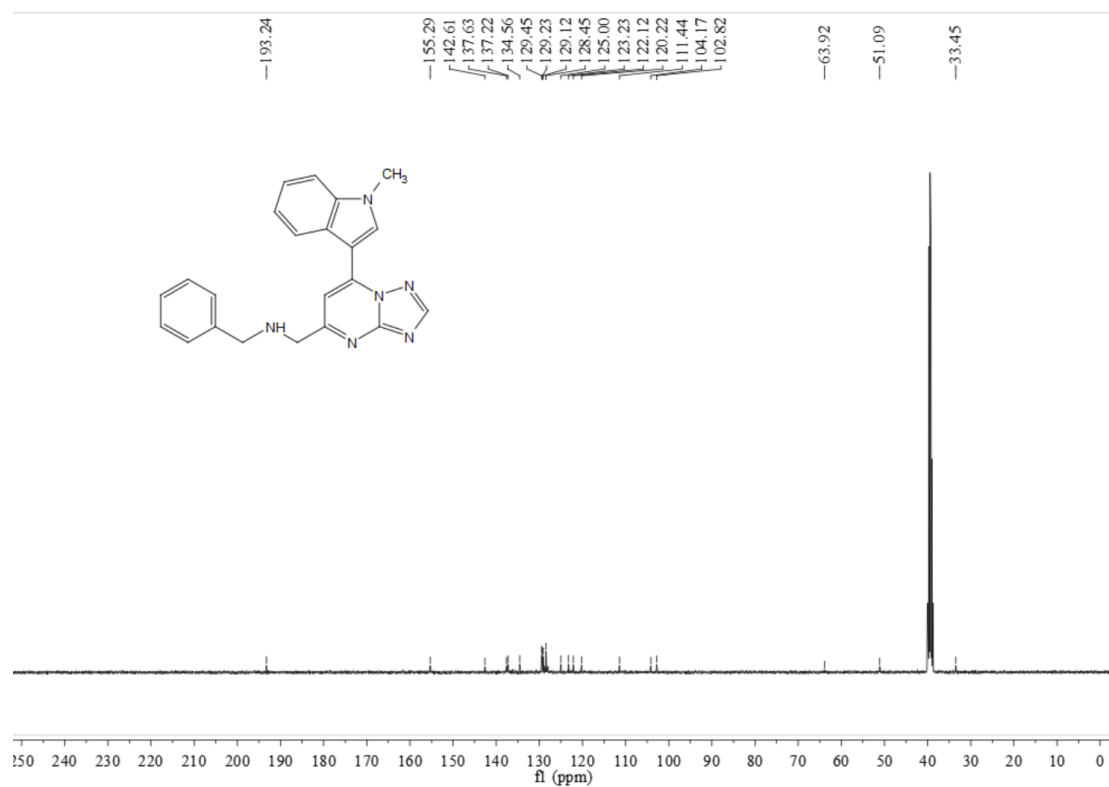


Figure S2. ^{13}C NMR spectrum of compound **H1** (100 MHz, DMSO- d_6)

- HRMS of Compound **H1**

TH-1200-1 #949 RT: 3.51 AV: 1 NL: 2.61E6
T: FTMS + p ESIFull ms [100.0000-1500.0000]

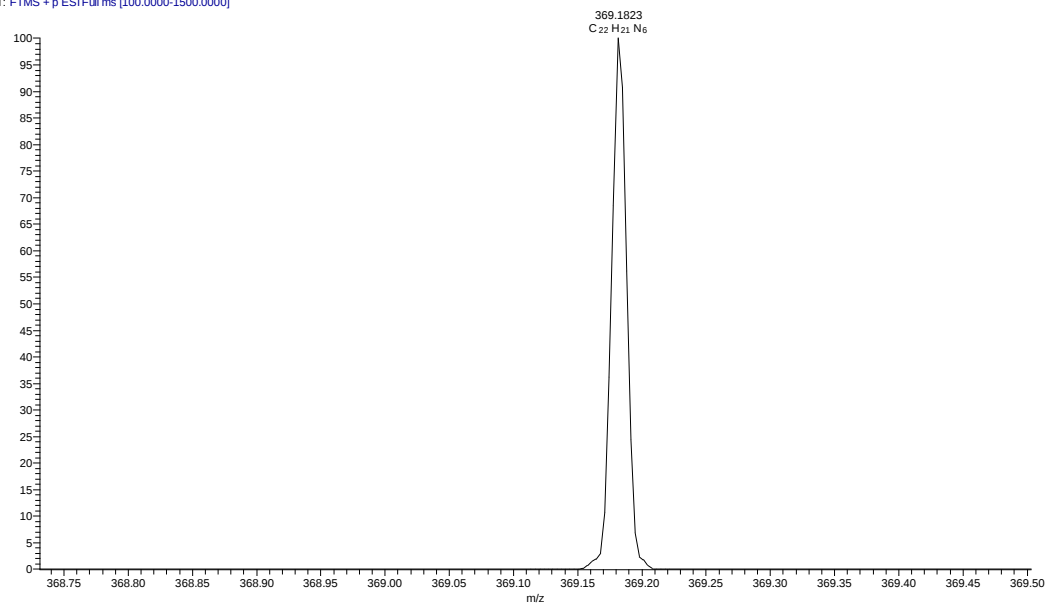


Figure S3. HRMS spectrum of compound **H1**

- ¹H NMR of Compound **H2**

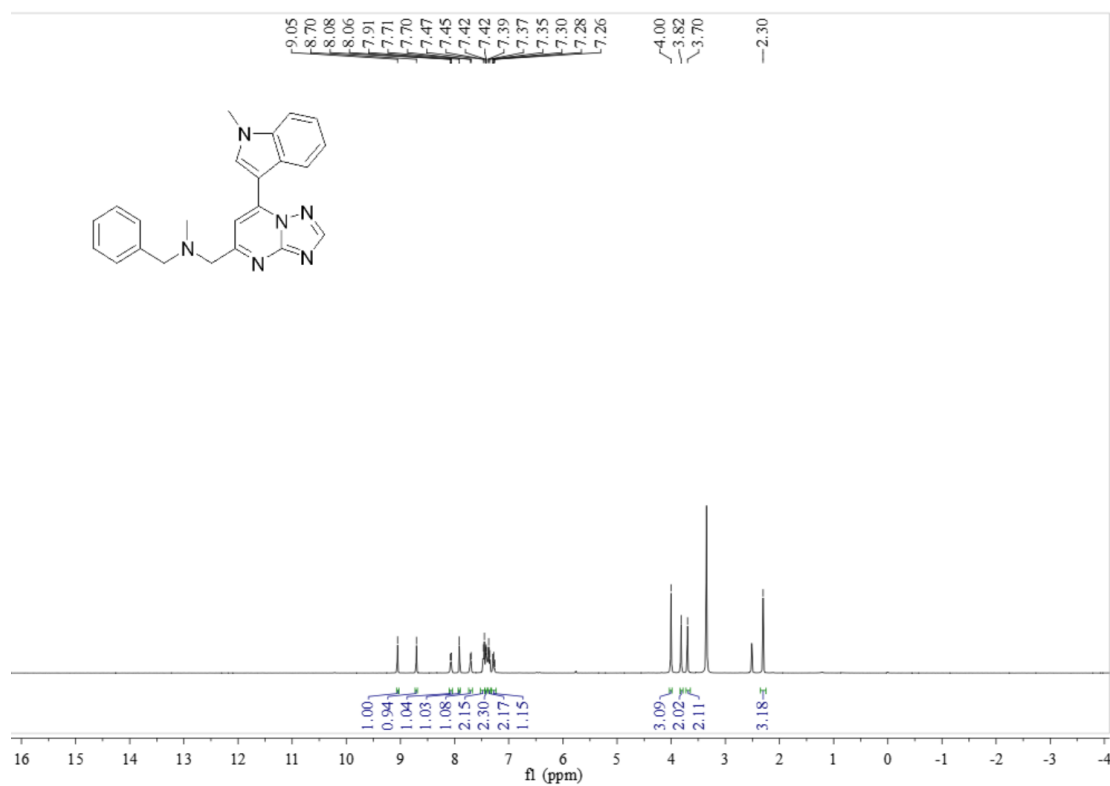


Figure S4. ¹³C NMR spectrum of compound **H2** (100 MHz, DMSO-*d*₆)

- ^{13}C NMR of Compound **H2****

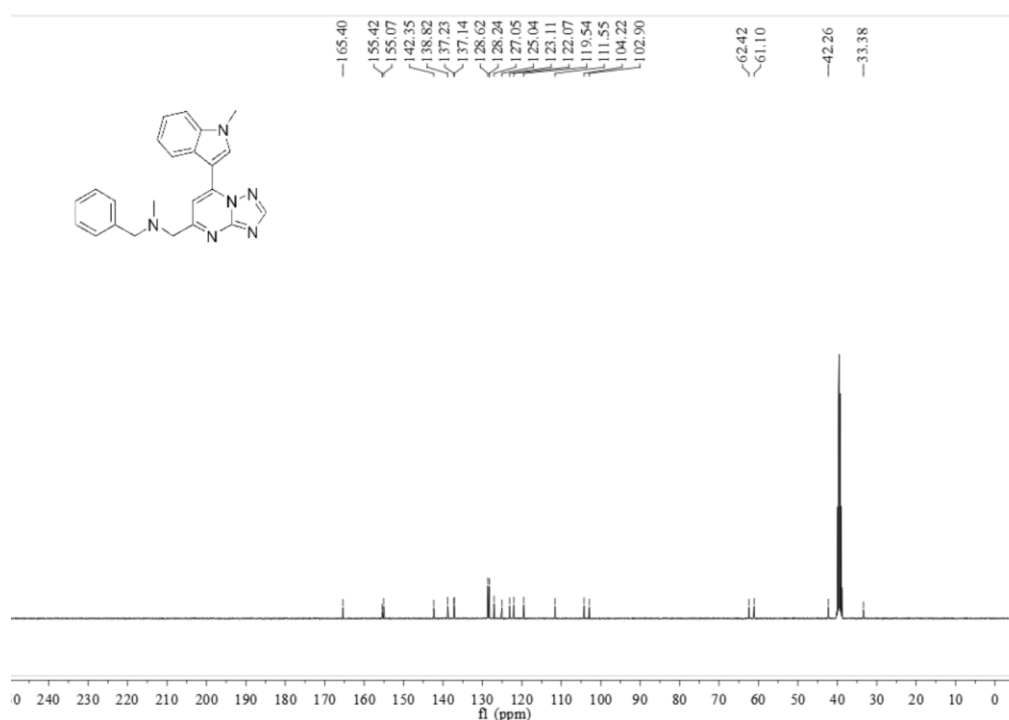


Figure S5. ^{13}C NMR spectrum of compound **H2** (100 MHz, $\text{DMSO-}d_6$)

- HRMS of Compound **H2****

TH-1200-3 #1409 RT: 5.24 AV: 1 NL: 2.30E6
T: FTMS + p ESI Full ms [100.0000-1500.0000]

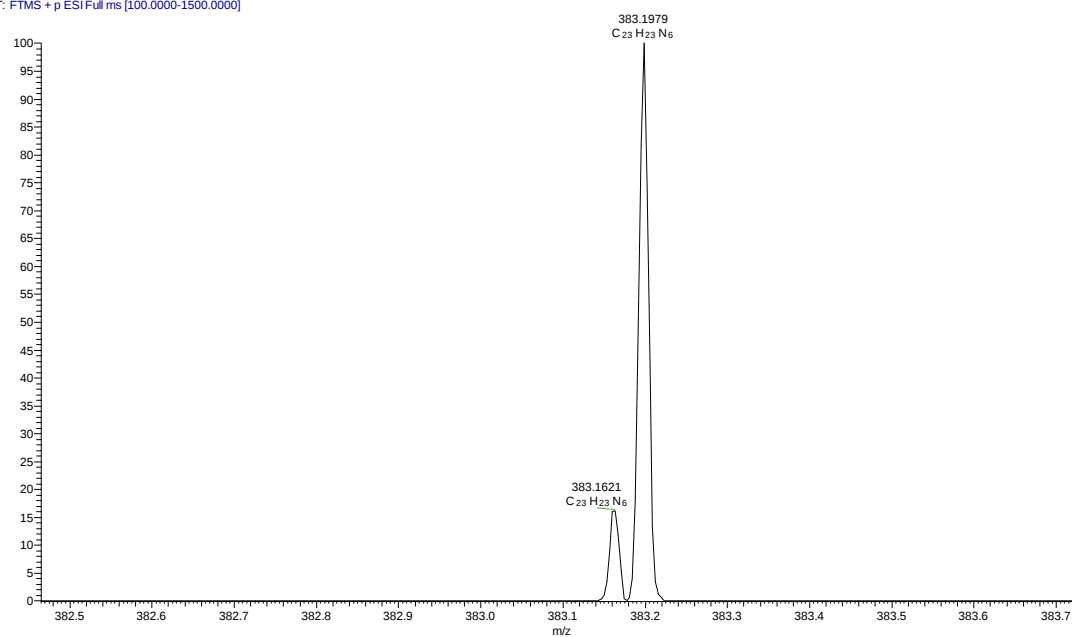


Figure S6. HRMS spectrum of compound **H2**

- ^1H NMR of Compound **H3****

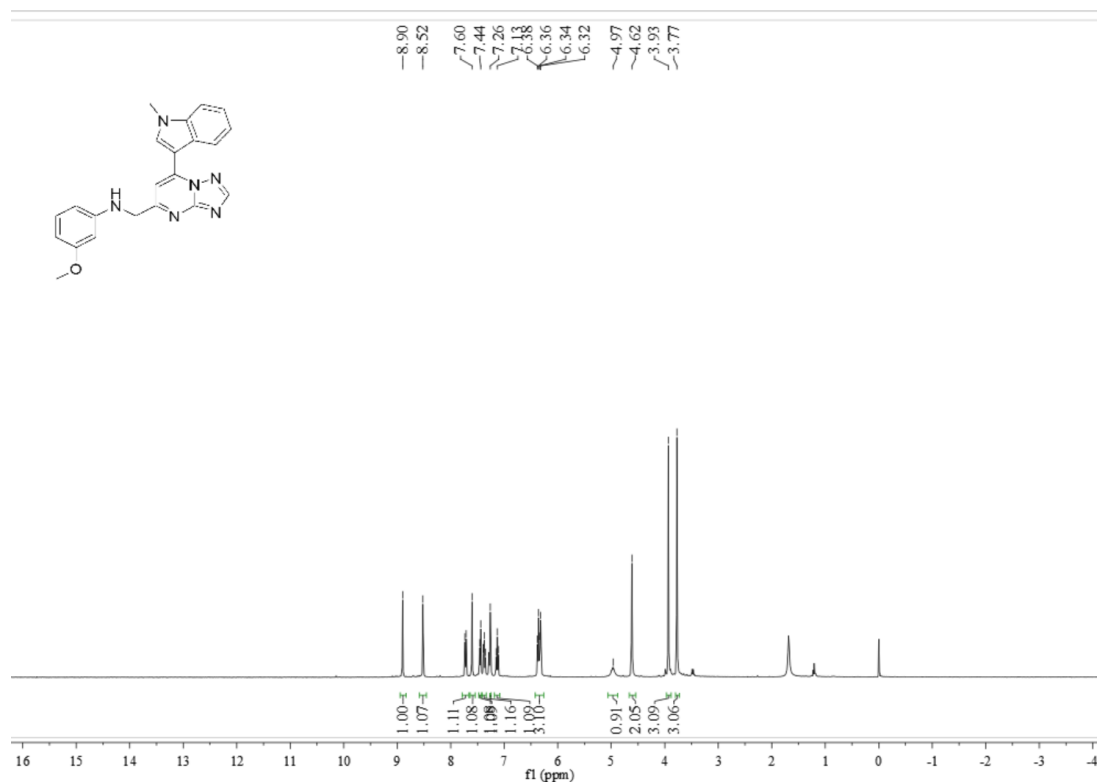


Figure S7. ^{13}C NMR spectrum of compound **H3** (100 MHz, CDCl_3)

- ^{13}C NMR of Compound **H3****

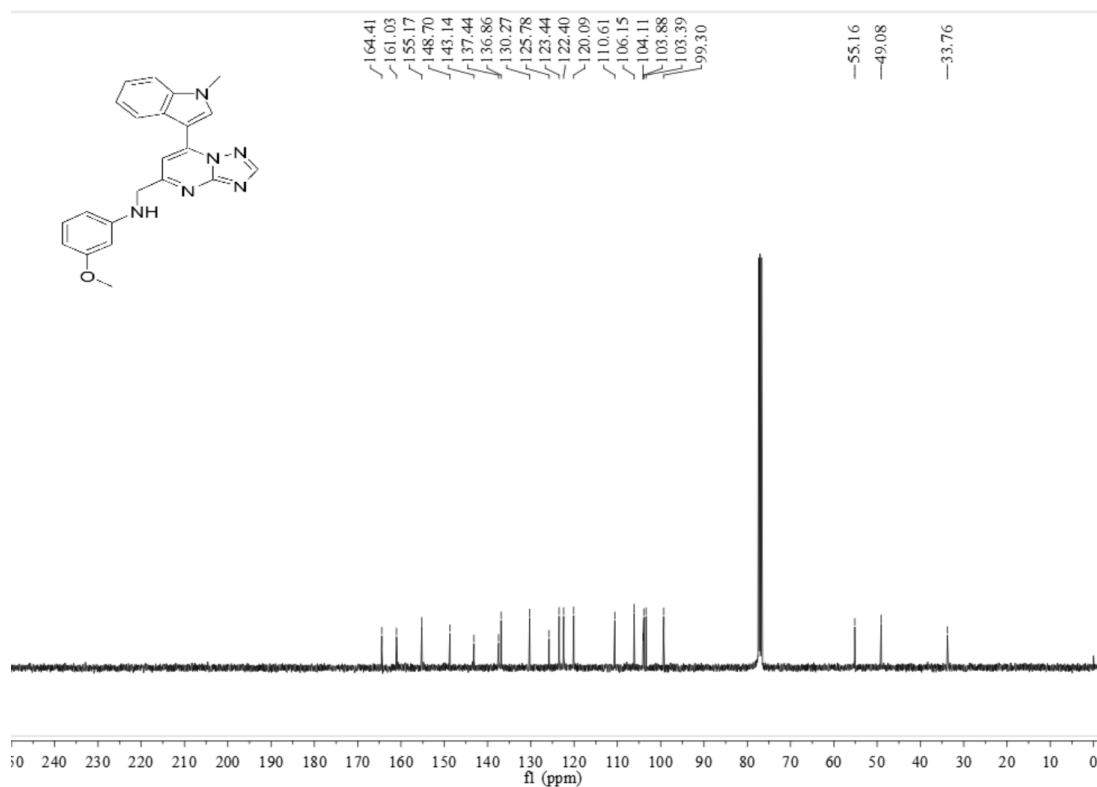


Figure S8. ^1H NMR spectrum of compound **H3** (400 MHz, CDCl_3)

● HRMS of Compound **H3**

TH-1200-3 #1367 RT: 5.10 AV: 1 NL: 4.56E7
T: FTMS + p ESI Full ms [100.0000-1500.0000]

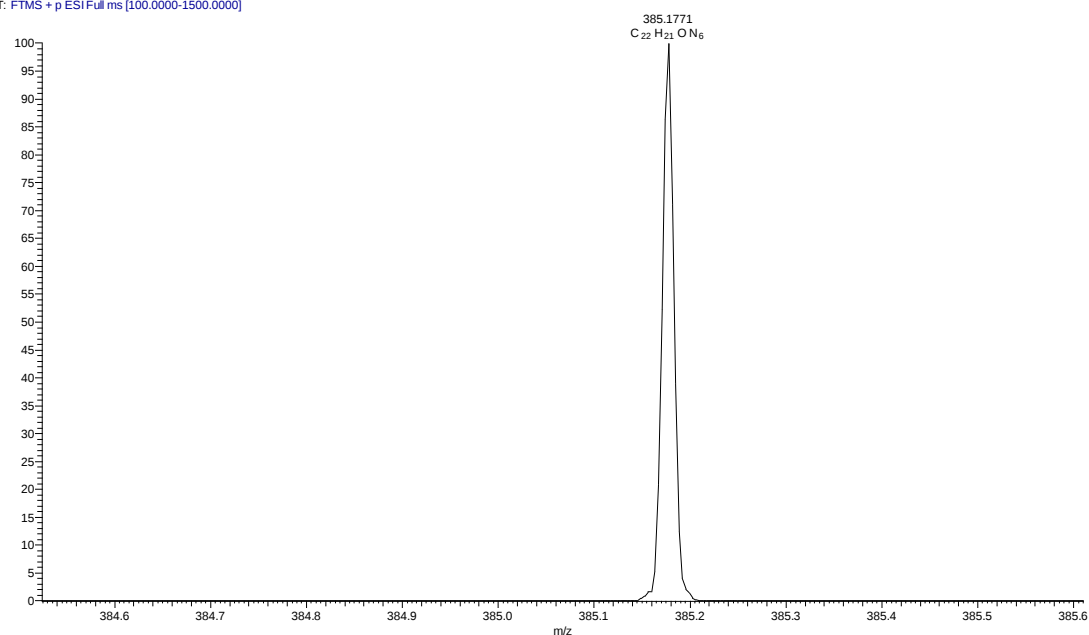


Figure S9. HRMS spectrum of compound **H3**

● ¹H NMR of Compound **H4**

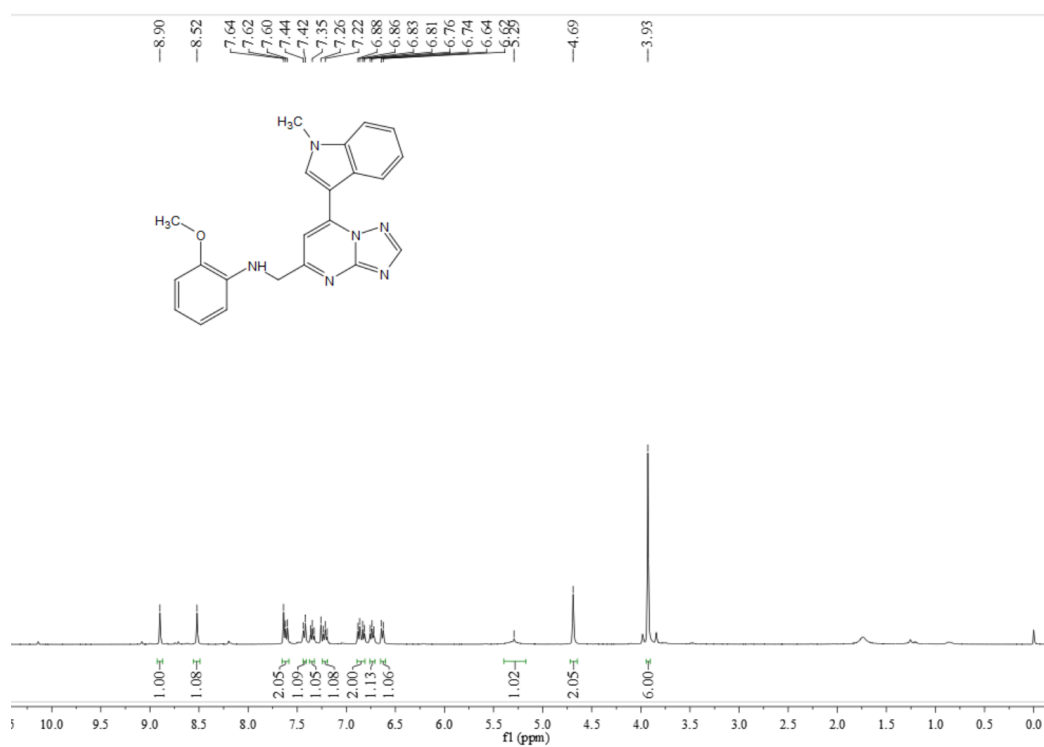


Figure S10. ¹H NMR spectrum of compound **H4** (400 MHz, CDCl₃)

● ^{13}C NMR of Compound **H4**

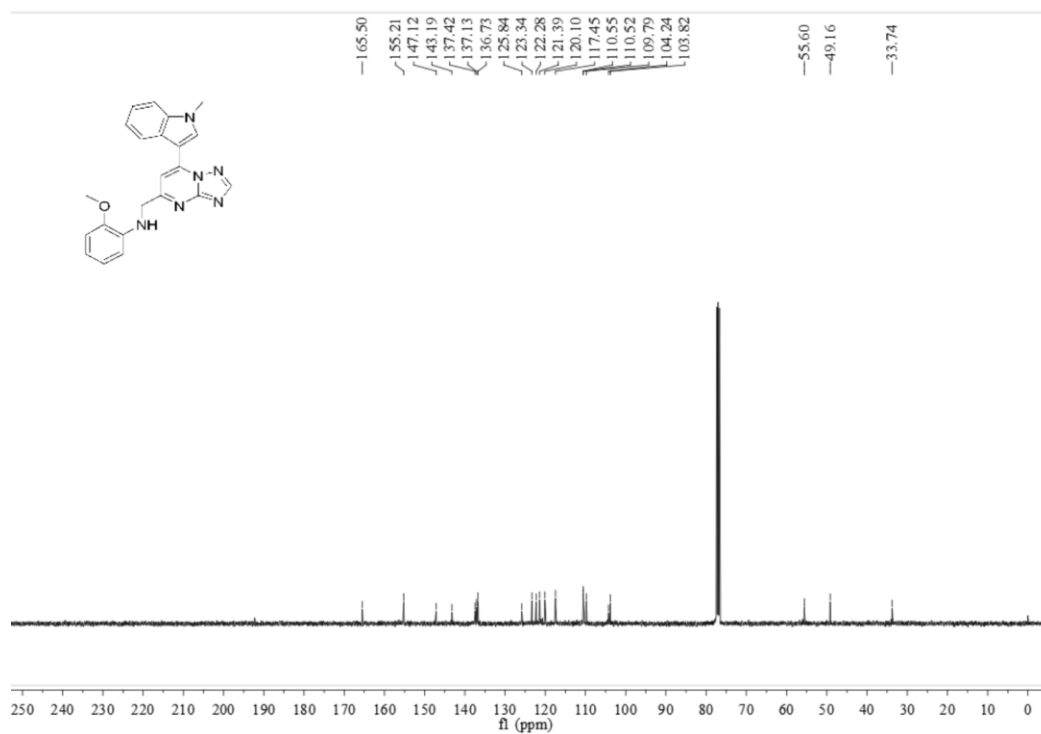


Figure S11. ^{13}C NMR spectrum of compound **H4** (100 MHz, CDCl_3)

● HRMS of Compound **H4**

TH-1200-2 #1301 RT: 4.90 AV: 1 NL: 2.21E4
T: FTMS + p ESI Full ms [100.0000-1500.0000]

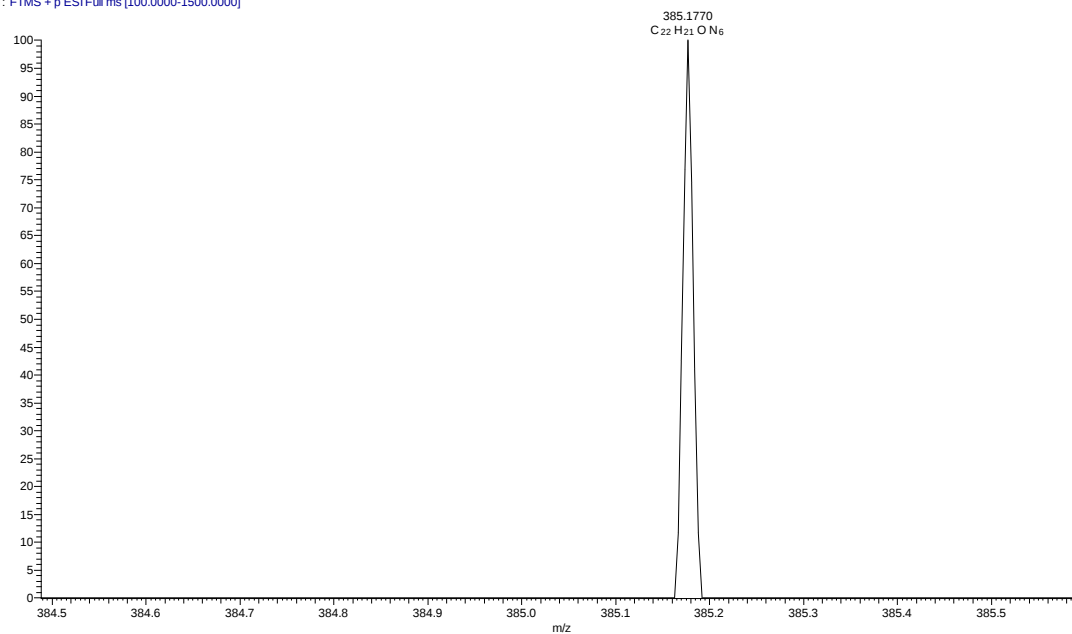
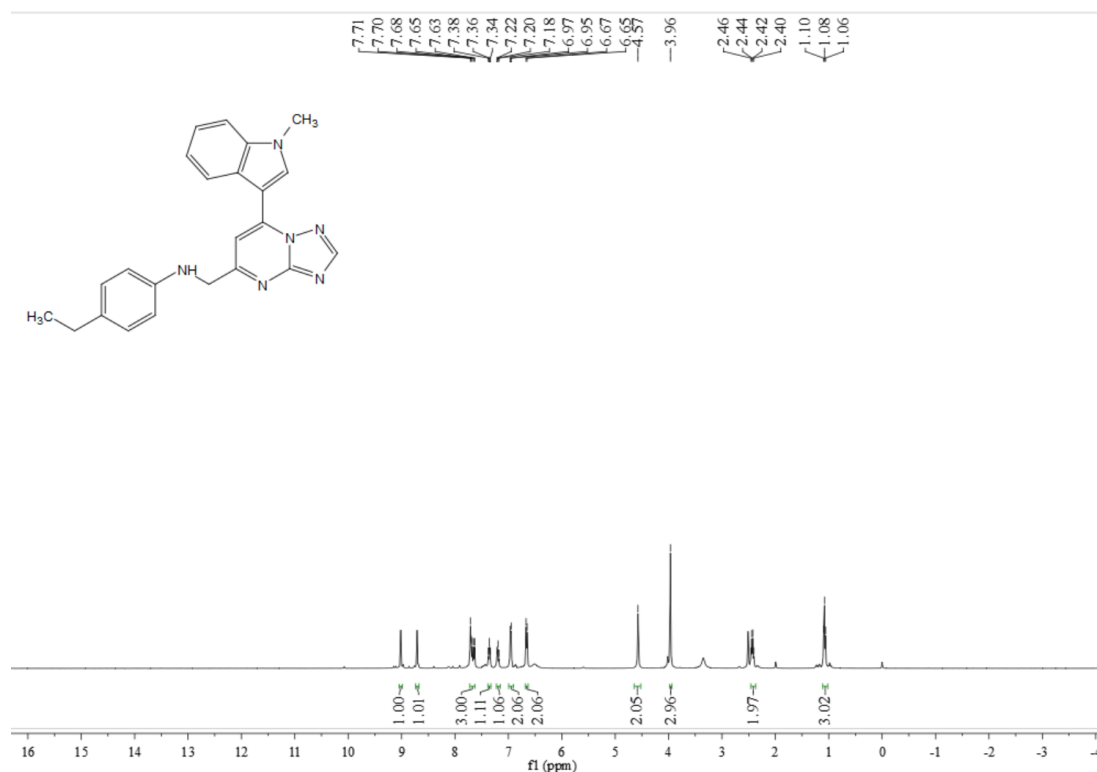


Figure S12. HRMS spectrum of compound **H4**

- ^1H NMR of Compound **H5****



● **Figure S13.** ^{13}C NMR spectrum of compound **H5** (400 MHz, DMSO- d_6)

- ^{13}C -NMR of Compound **H5****

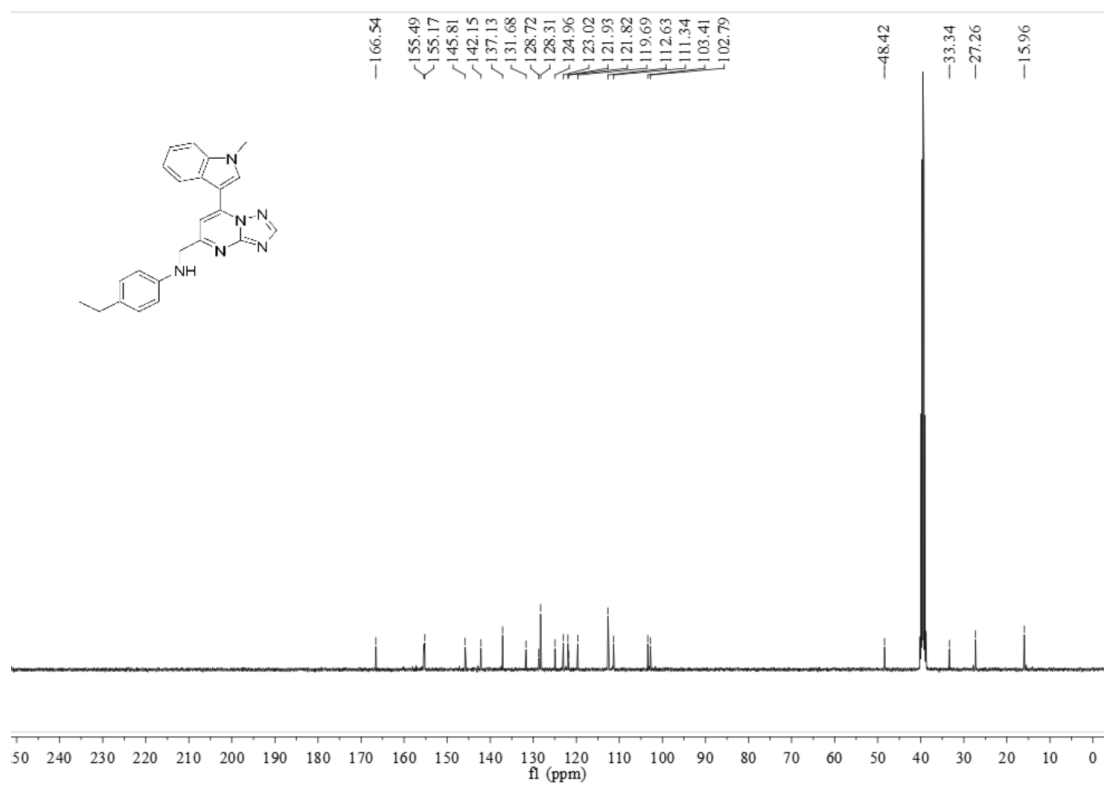


Figure S14. ^{13}C NMR spectrum of compound **H5** (100 MHz, DMSO- d_6)

● HRMS of Compound **H5**

TH-1200-42 #2372 RT: 8.46 AV: 1 NL: 1.75E6
T: FTMS + p ESI Full ms [100.0000-1500.0000]

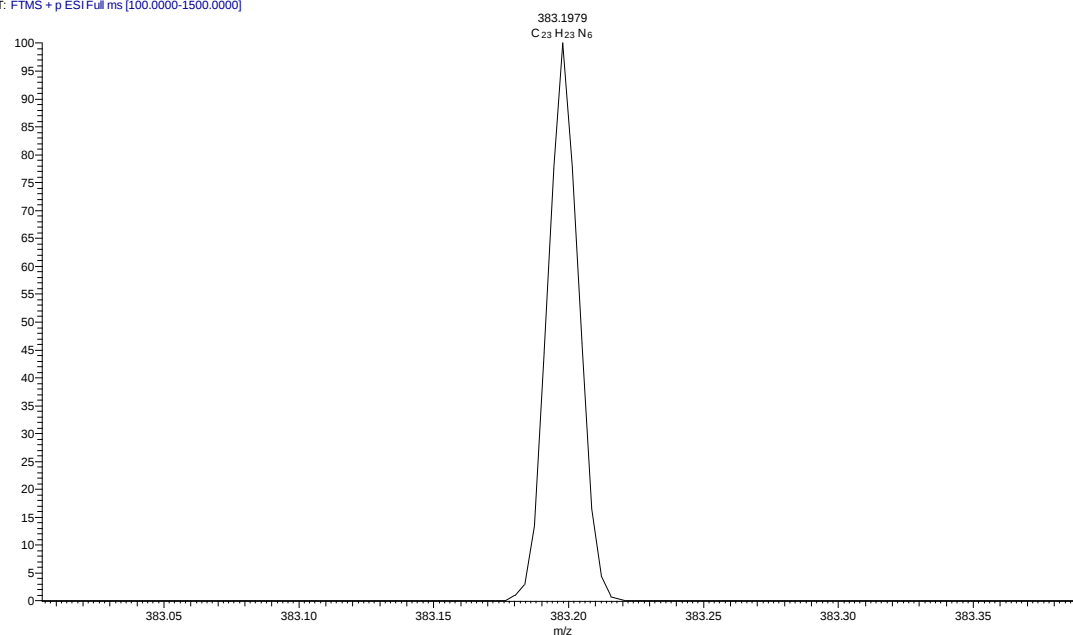


Figure S15. HRMS spectrum of compound **H5**

● ¹H NMR of Compound **H6**

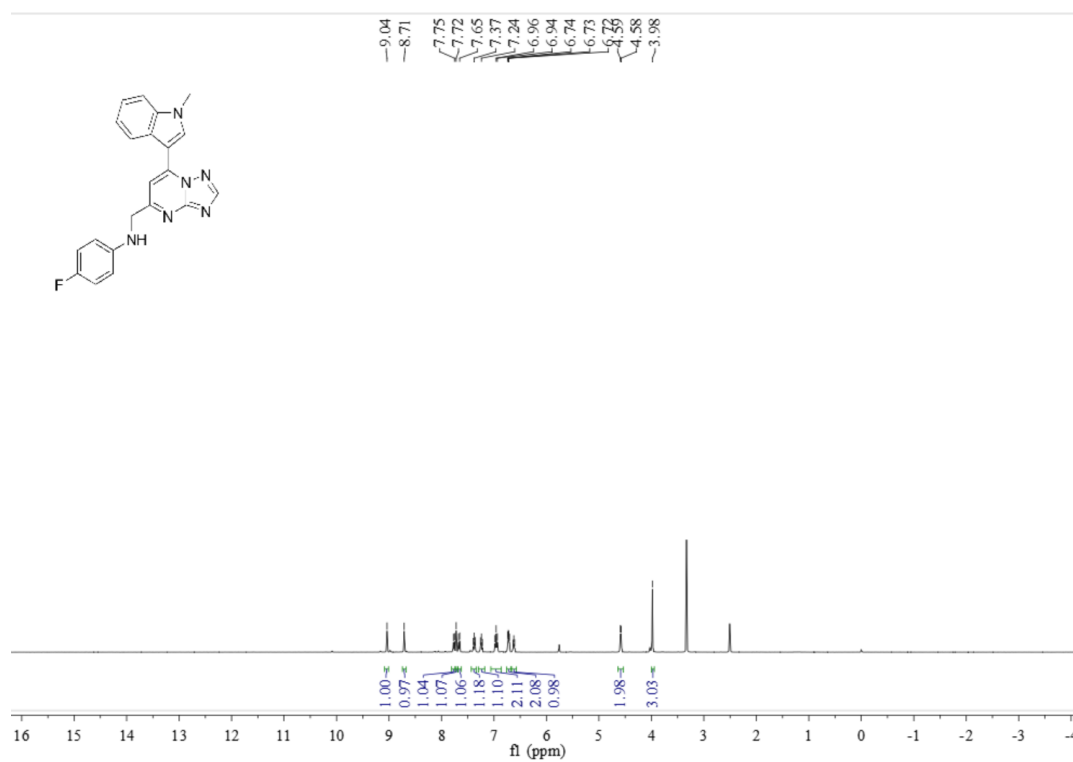


Figure S16. ¹H NMR spectrum of compound **H6** (400 MHz, DMSO-*d*₆)

● ^{13}C -NMR of Compound **H6**

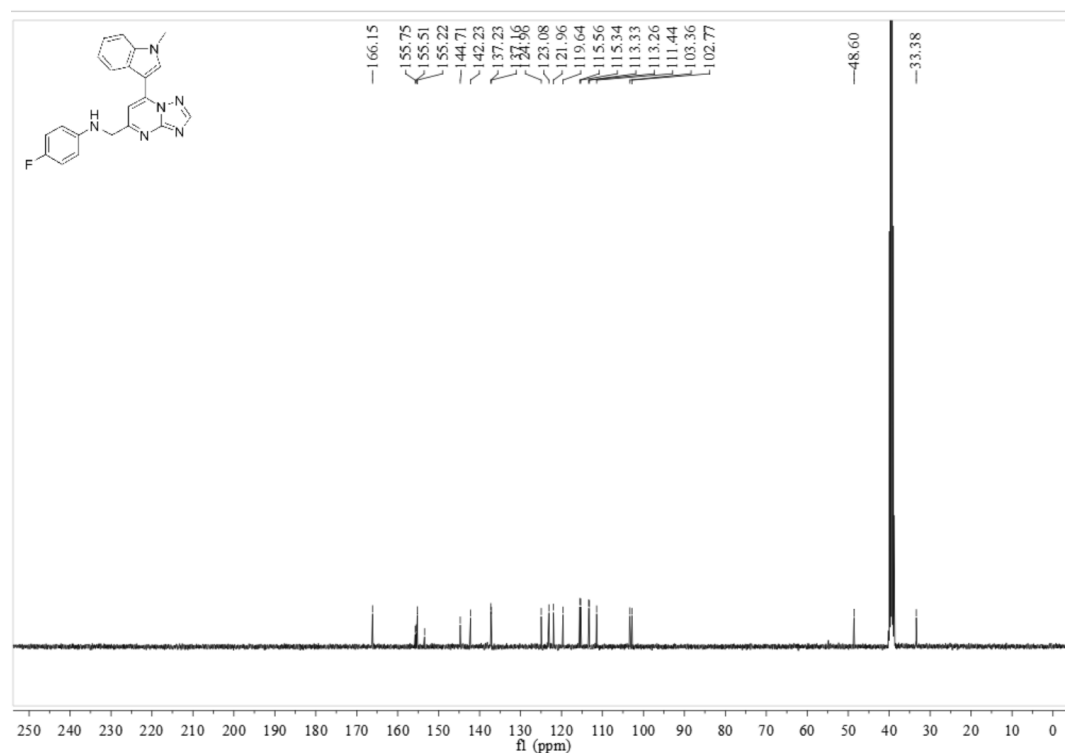


Figure S17. ^{13}C NMR spectrum of compound **H6** (100 MHz, $\text{DMSO-}d_6$)

● HRMS of Compound **H6**

TH-1200-1 #1333 RT: 4.90 AV: 1 NL: 1.04E7
T: FTMS + p ESI Full ms [100.0000-1500.0000]

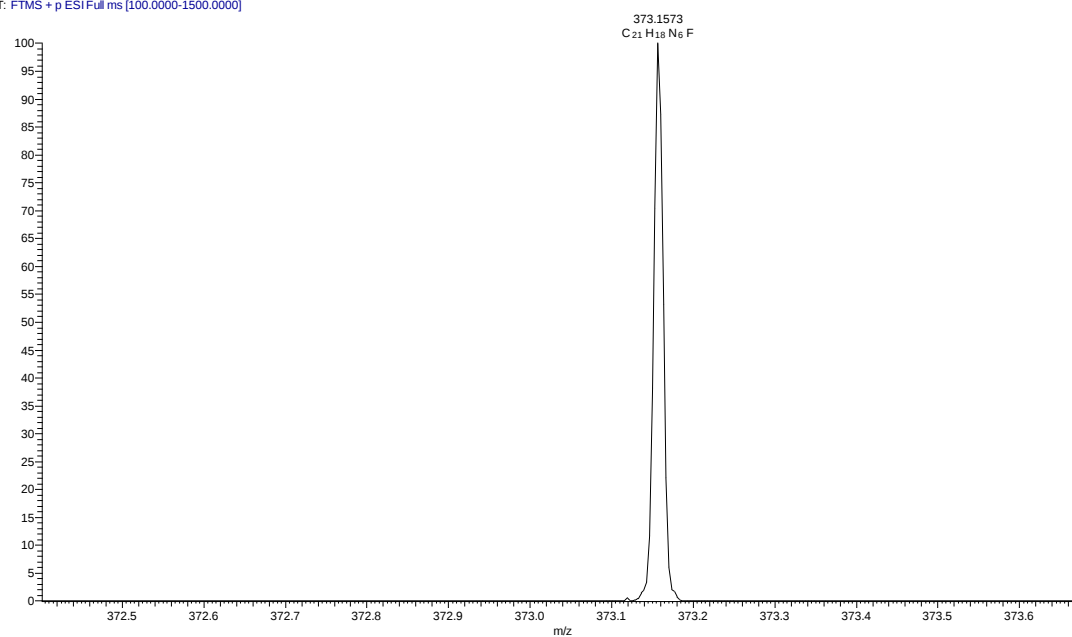


Figure S18. HRMS spectrum of compound **H6**

- ^1H NMR of Compound **H7****

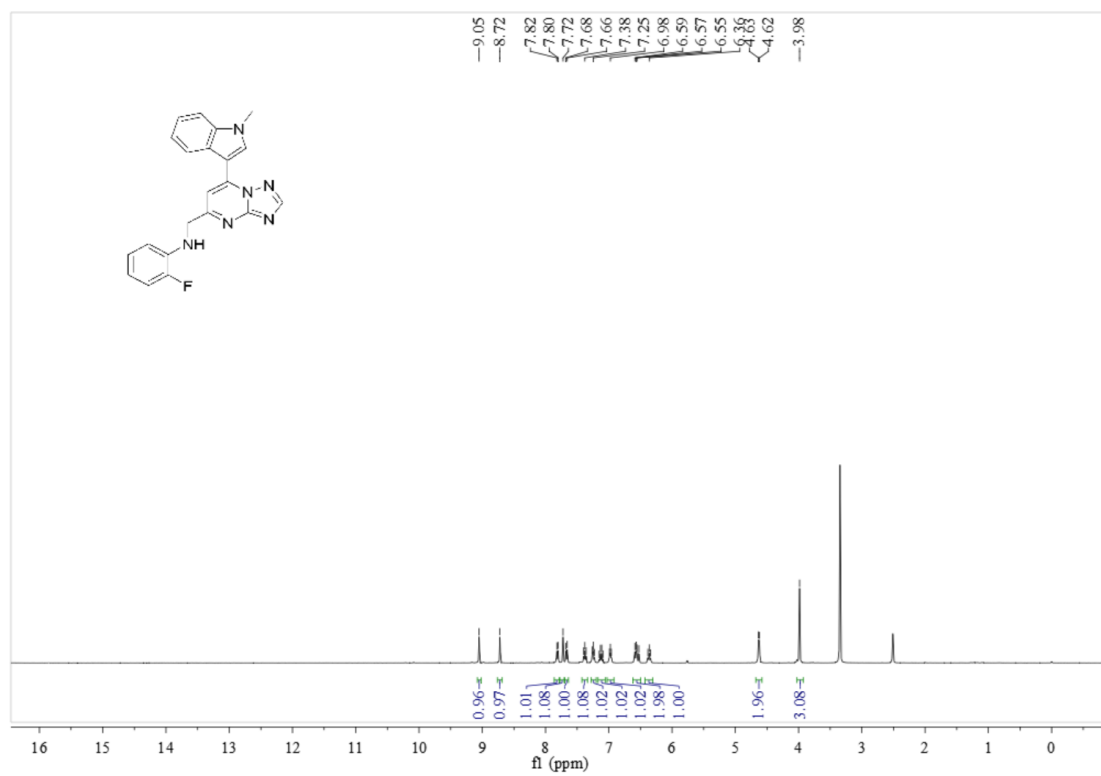


Figure S19. ^1H NMR spectrum of compound **H7** (400 MHz, DMSO- d_6)

- ^{13}C -NMR of Compound **H7****

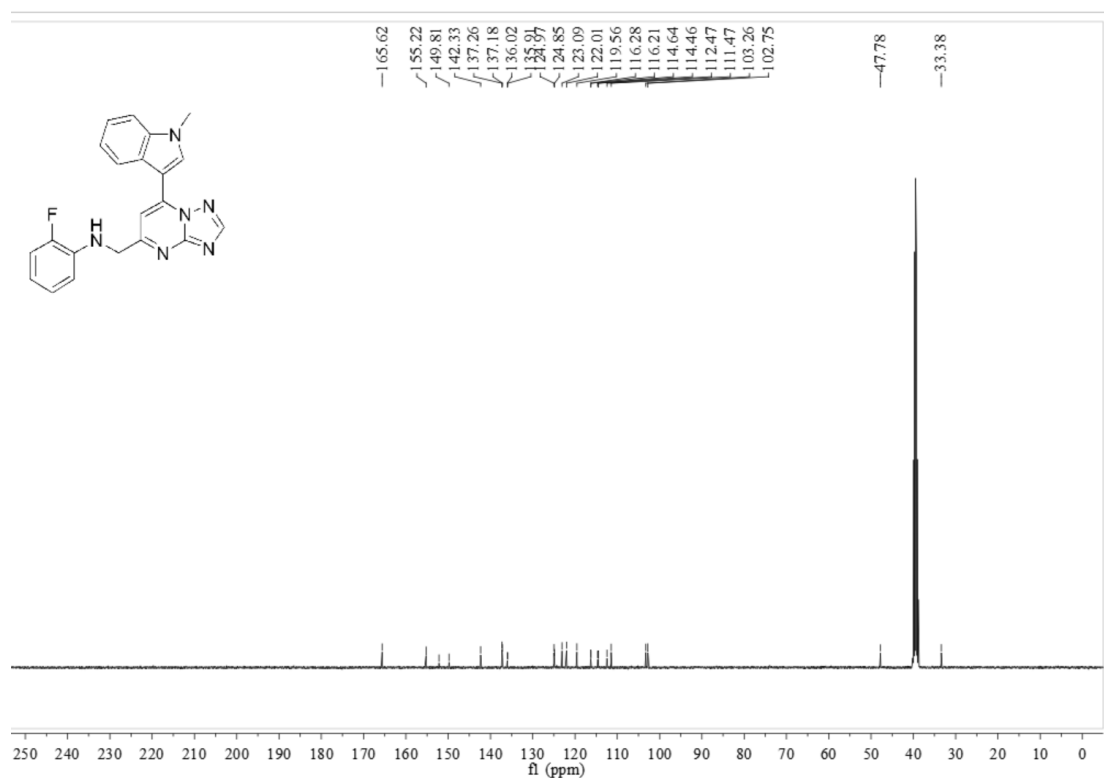


Figure S20. ^{13}C NMR spectrum of compound **H7** (100 MHz, DMSO- d_6)

● HRMS of Compound **H7**

TH-1200-2 #1265 RT: 4.76 AV: 1 NL: 3.68E4
T: FTMS + p ESI Full ms [100.0000-1500.0000]

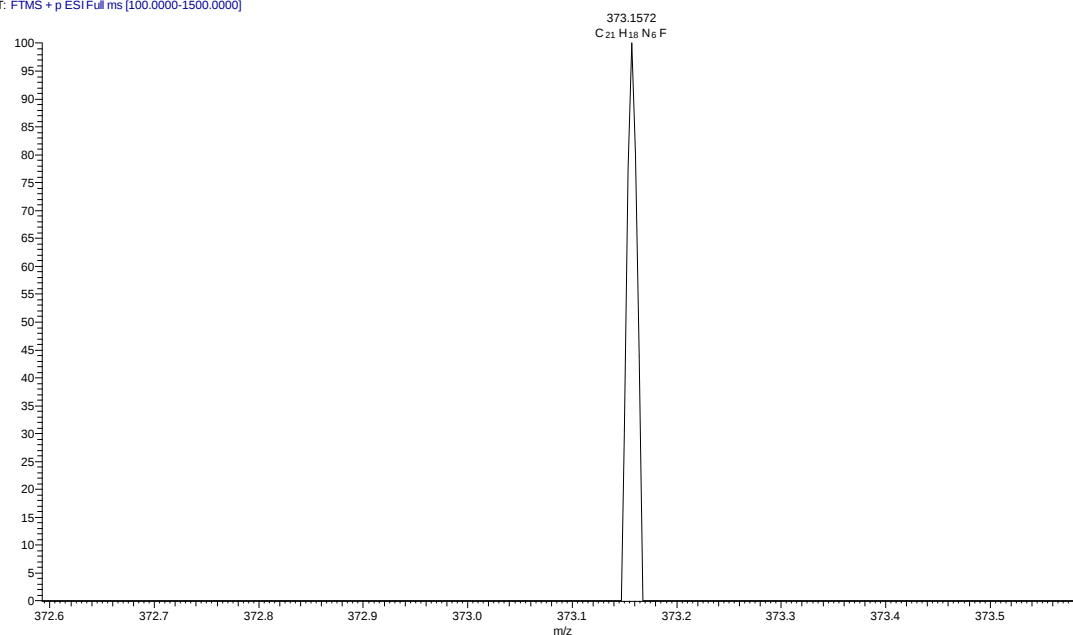


Figure S21. HRMS spectrum of compound **H7**

● ¹H NMR of Compound **H8**

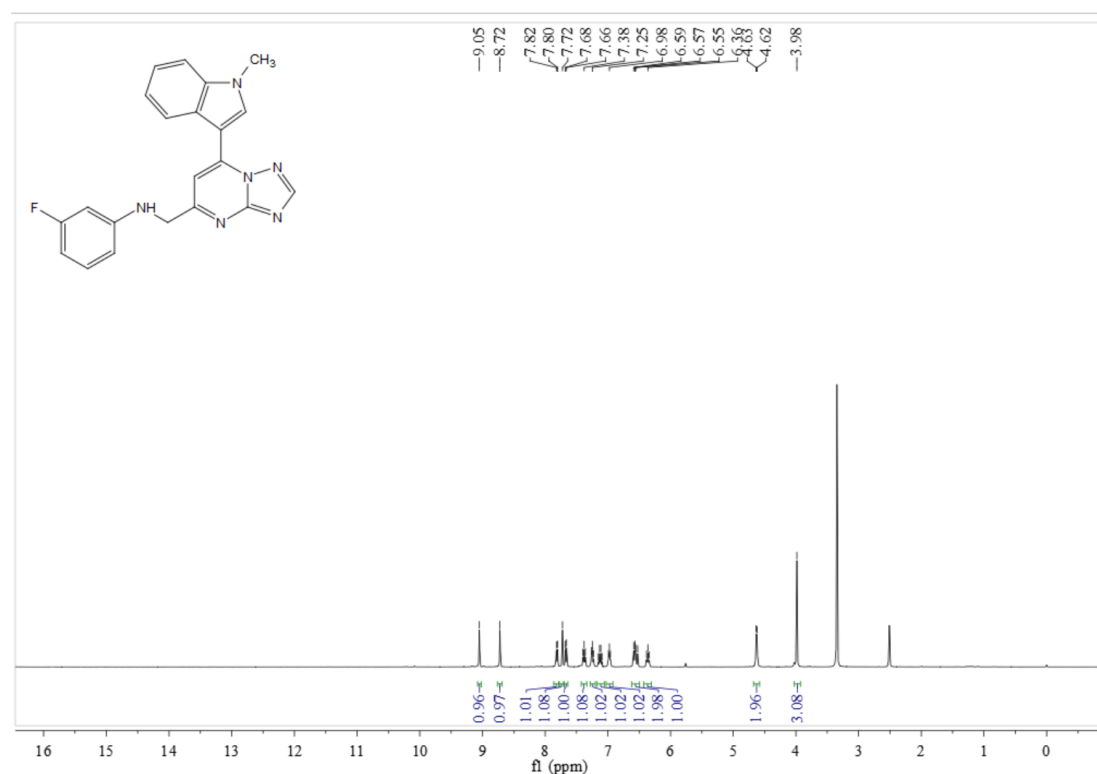


Figure S22. ¹H NMR spectrum of compound **H8** (400 MHz, DMSO-*d*₆)

● ^{13}C -NMR of Compound **H8**

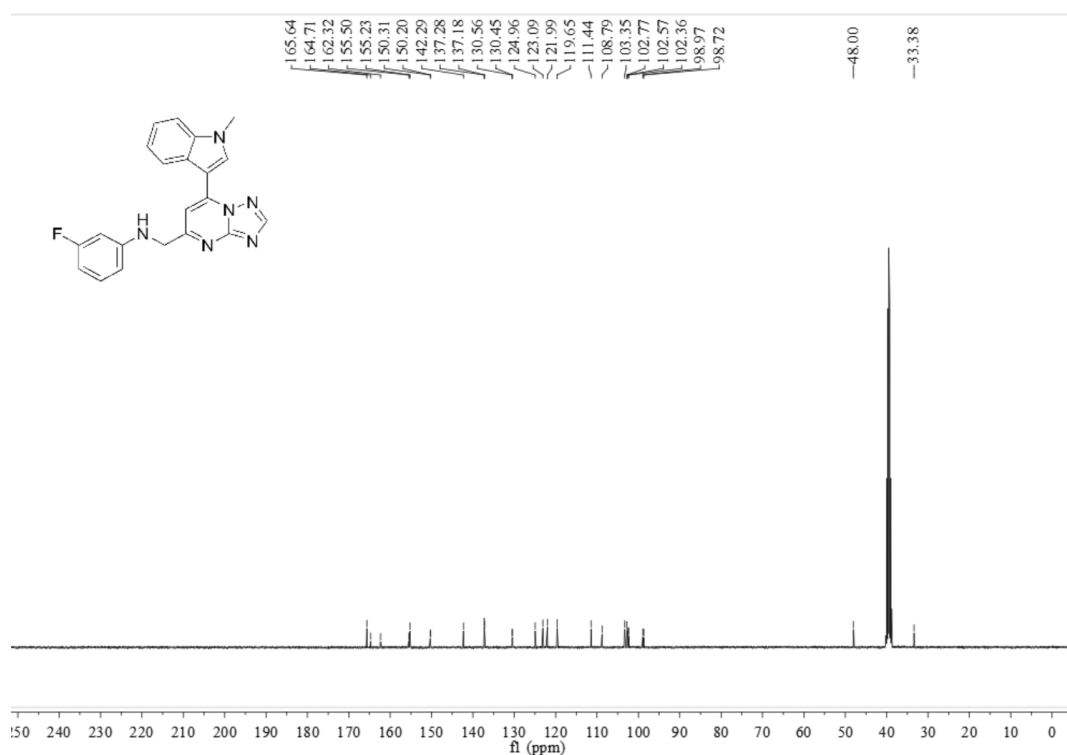


Figure S23. ^{13}C NMR spectrum of compound **H8** (100 MHz, $\text{DMSO-}d_6$)

● HRMS of Compound **H8**

TH-1200-3 #1278 RT: 4.81 AV: 1 NL: 4.61E4
T: FTMS + p ESI Full ms [100.0000-1500.0000]

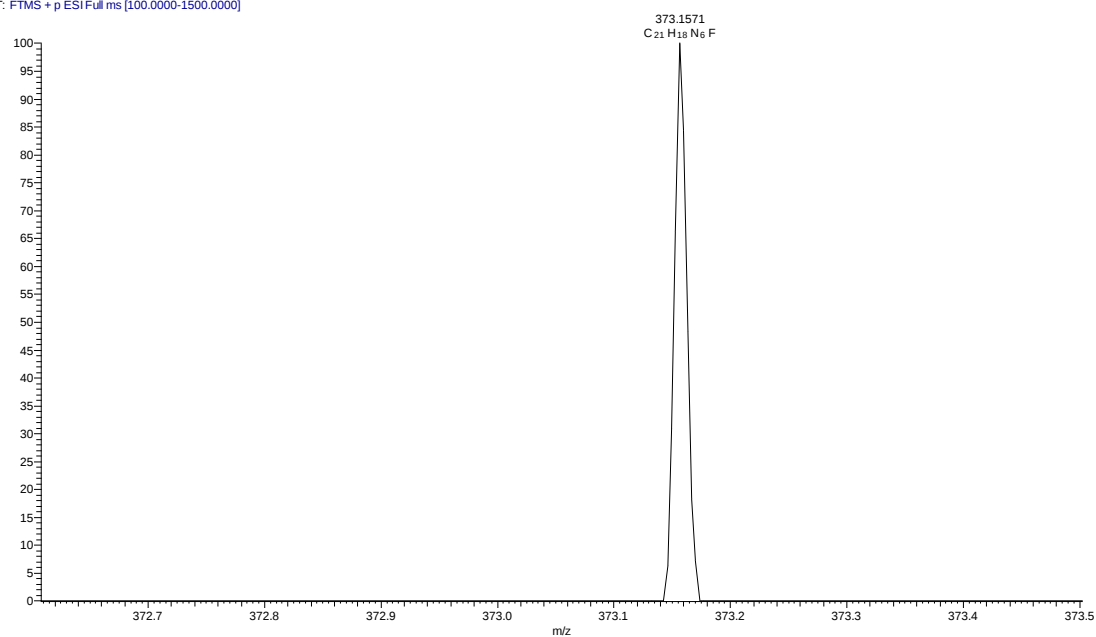


Figure S24. HRMS spectrum of compound **H8**

- ¹H NMR of Compound **H9**

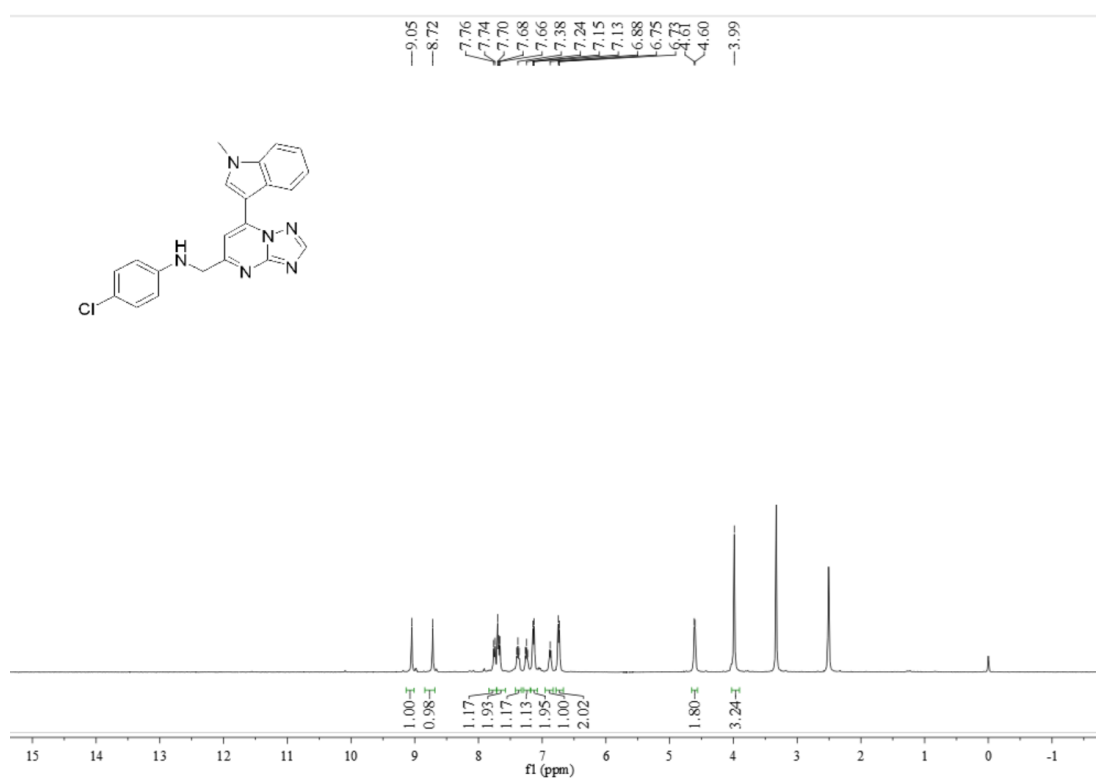


Figure S25. ¹H NMR spectrum of compound **H9** (400 MHz, DMSO-*d*₆)

- ¹³C-NMR of Compound **H9**

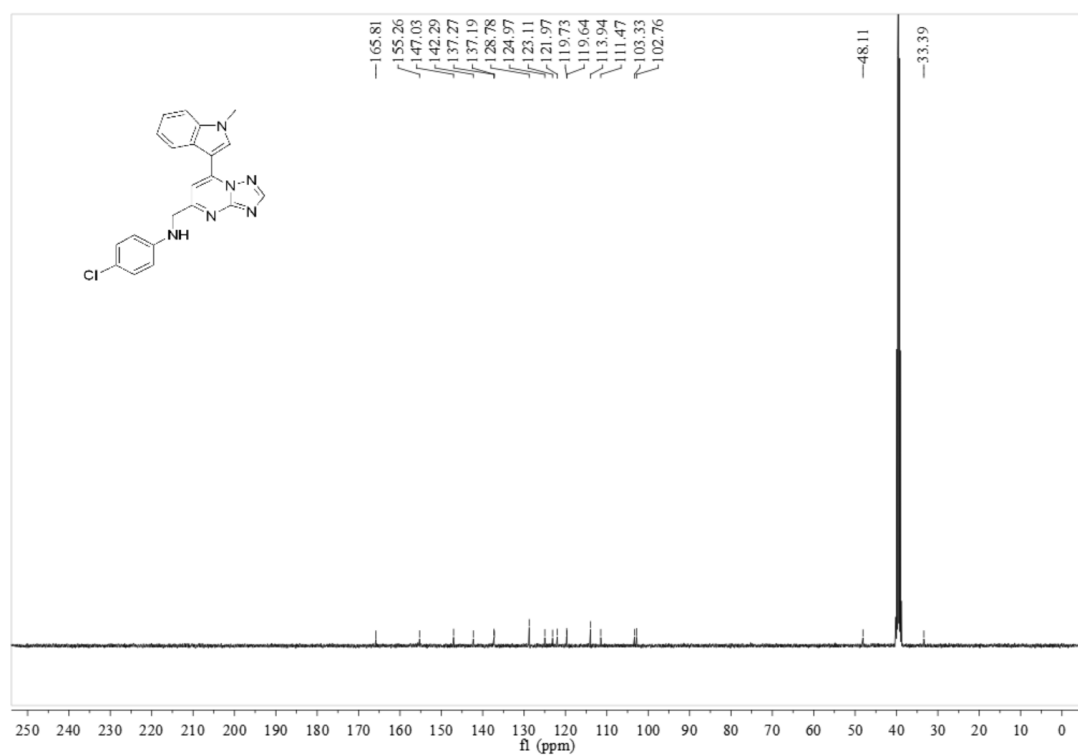


Figure S26. ¹³C NMR spectrum of compound **H9** (100 MHz, DMSO-*d*₆)

● HRMS of Compound **H9**

TH-1200-42 #2452 RT: 8.73 AV: 1 NL: 1.68E5
T: FTMS + p ESI Full ms [100.0000-1500.0000]

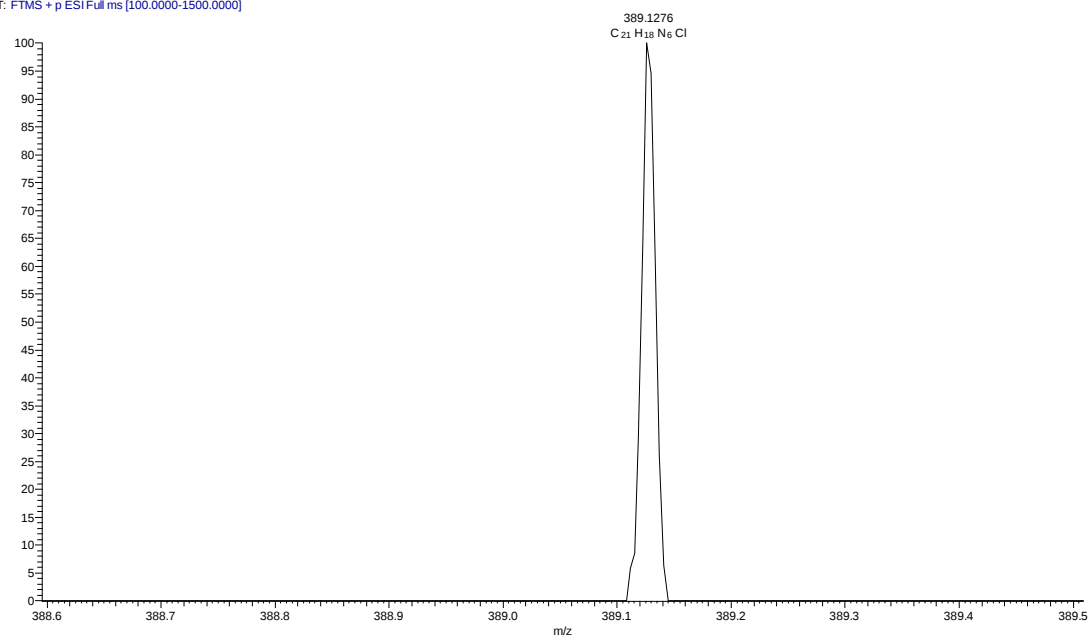


Figure S27. HRMS spectrum of compound **H9**

● ^1H NMR of Compound **H10**

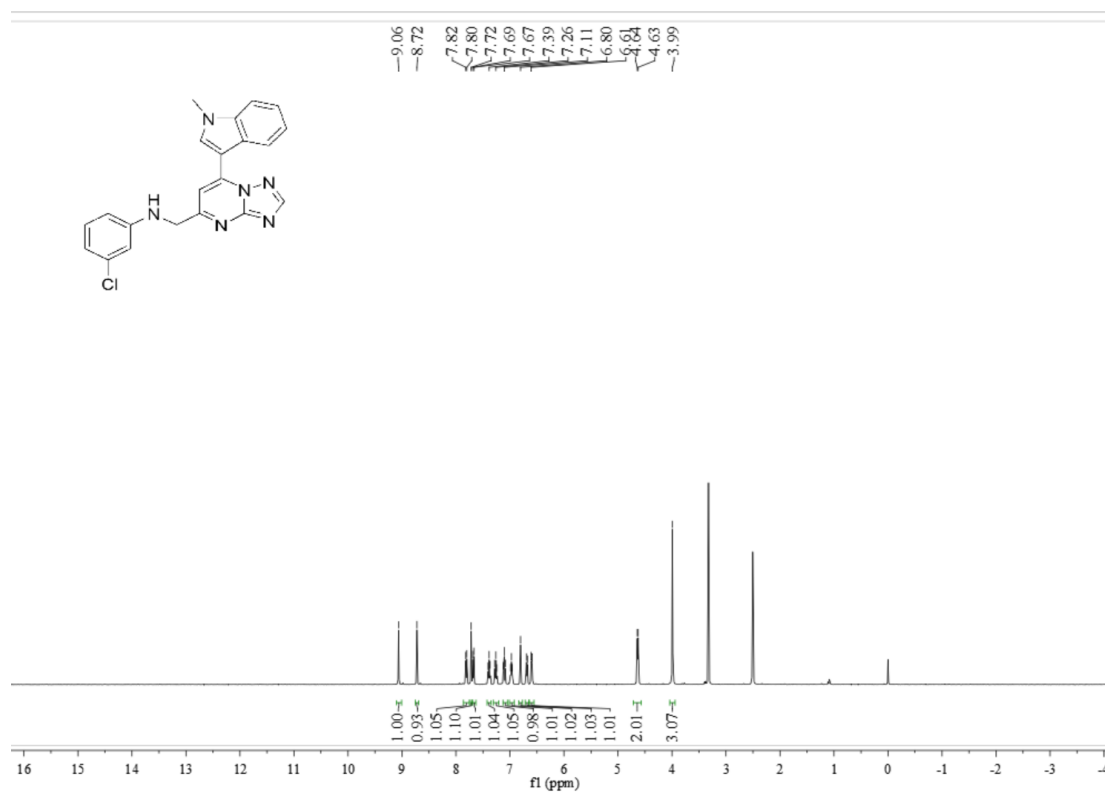


Figure S28. ^1H NMR spectrum of compound **H10** (400 MHz, DMSO- d_6)

- ^{13}C -NMR of Compound **H10****

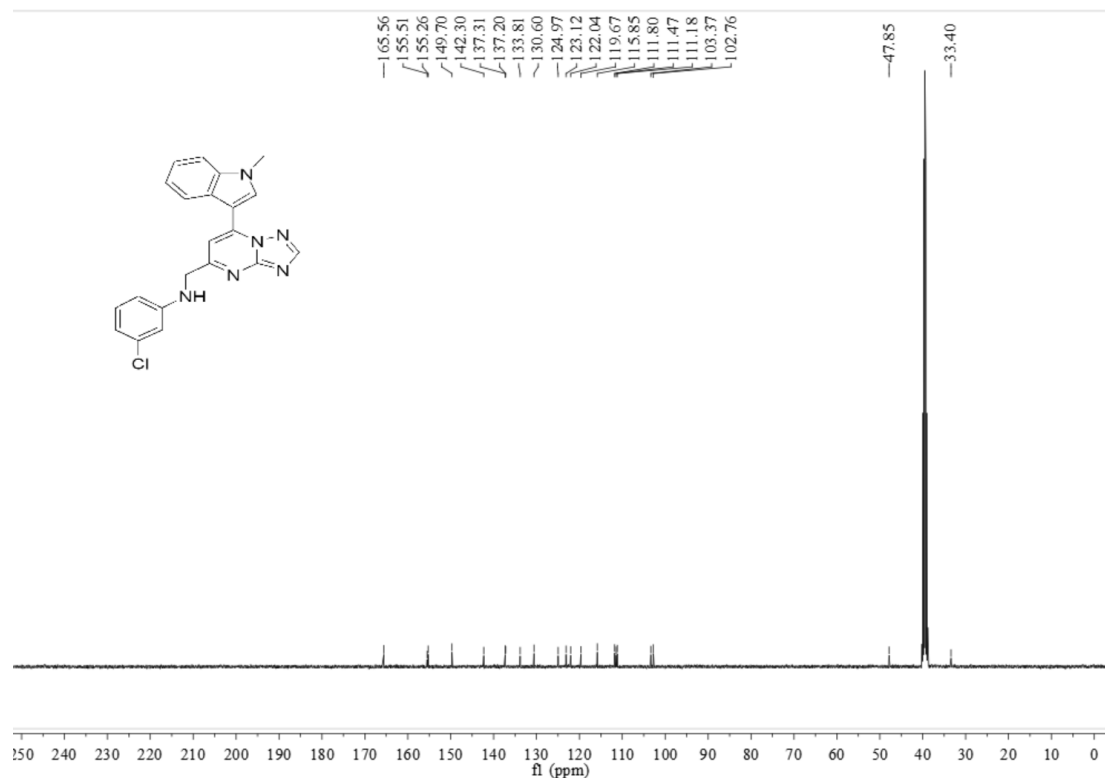


Figure S29. ^{13}C NMR spectrum of compound **H10** (100 MHz, DMSO- d_6)

- HRMS of Compound **H10****

TH-1200-1 #1503 RT: 5.49 AV: 1 NL: 1.71E7
T: FTMS + p ESI Full ms [100.0000-1500.0000]

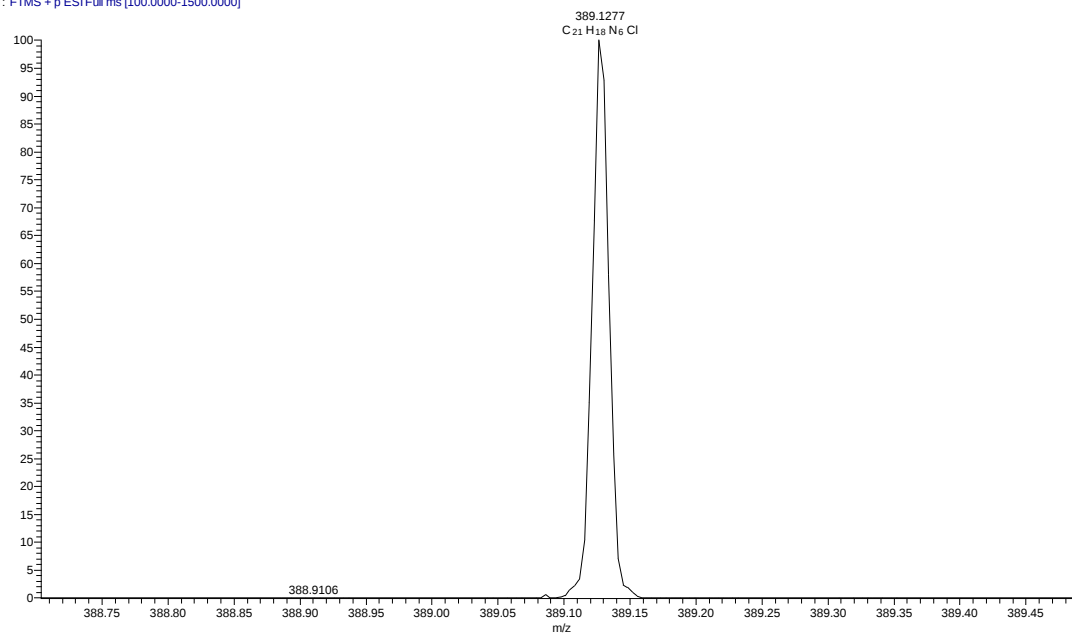


Figure S30. HRMS spectrum of compound **H10**

- ^1H NMR of Compound H11**

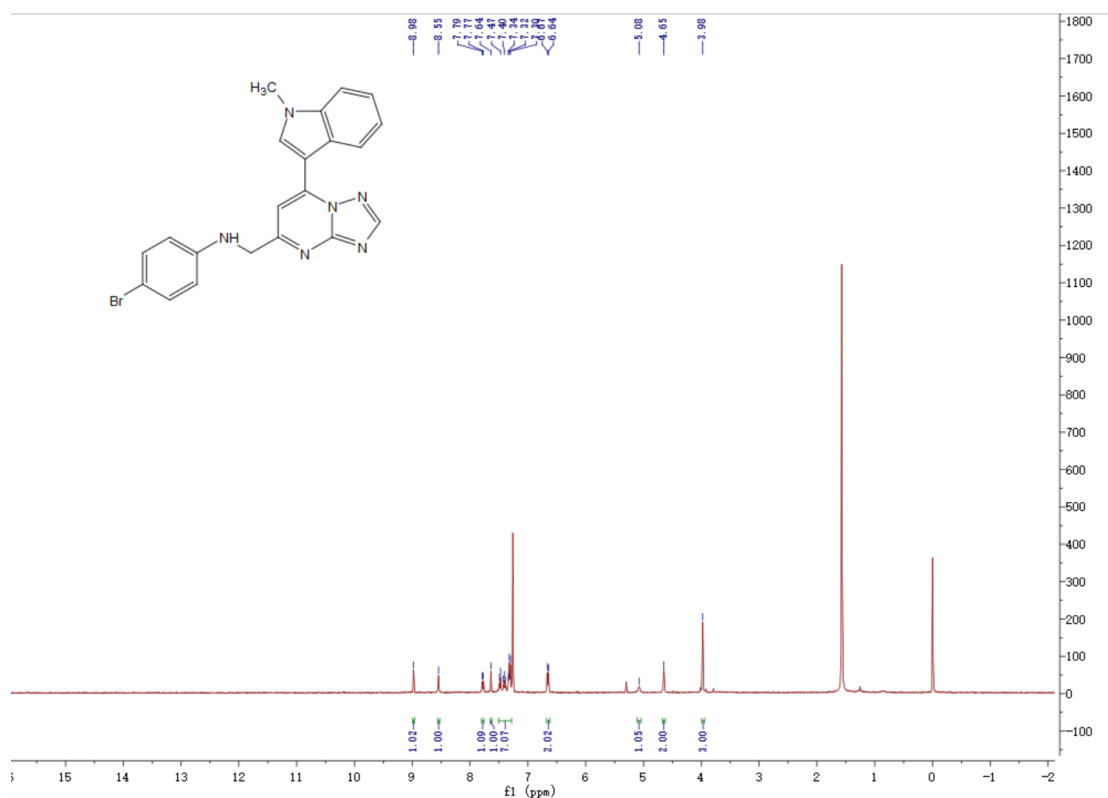


Figure S31. ^1H NMR spectrum of compound **H11** (400 MHz, DMSO- CDCl_3)

- ^{13}C -NMR of Compound H11**

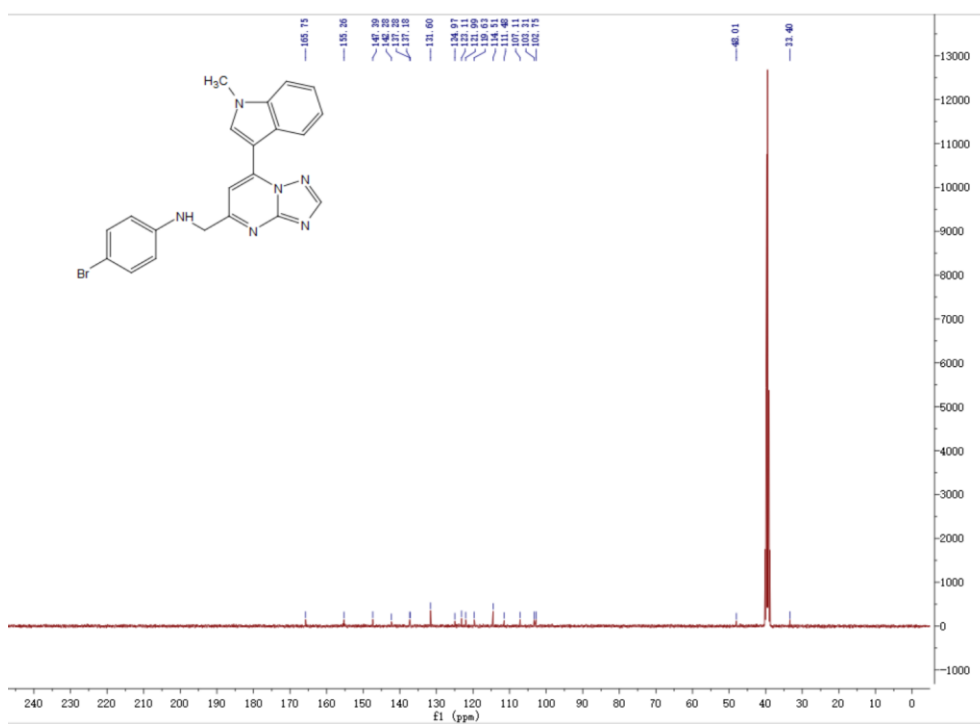


Figure S32. ^{13}C NMR spectrum of compound **H11** (100 MHz, DMSO- d_6)

● HRMS of Compound **H11**

TH-1200-2 #1401 RT: 5.24 AV: 1 NL: 3.49E6
T: FTMS + p ESI Full ms [100.0000-1500.0000]

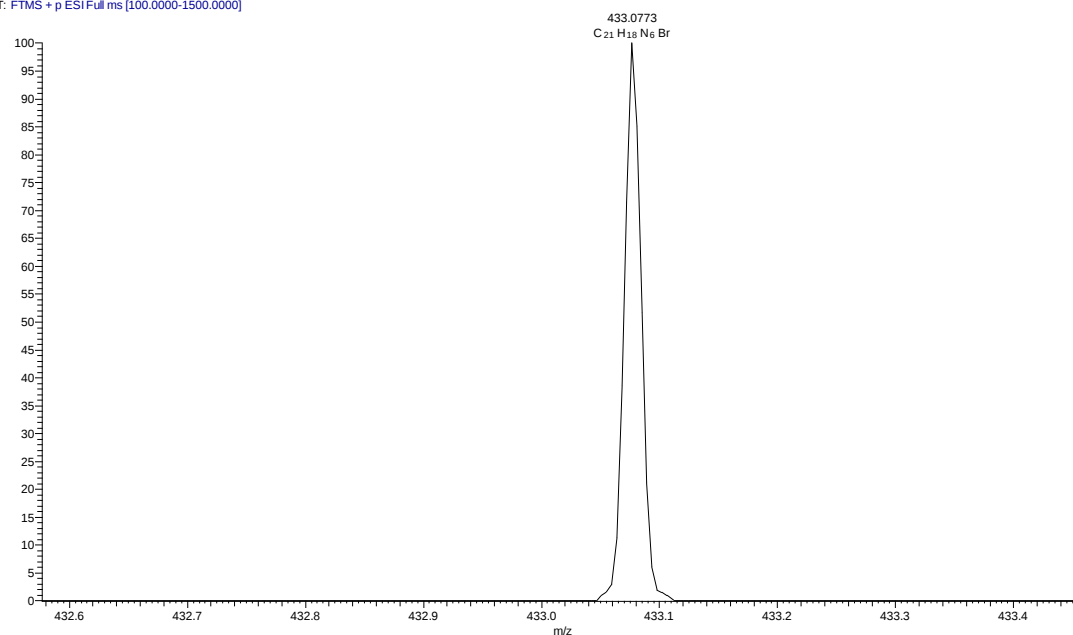


Figure S33. HRMS spectrum of compound **H11**

● ¹H NMR of Compound **H12**

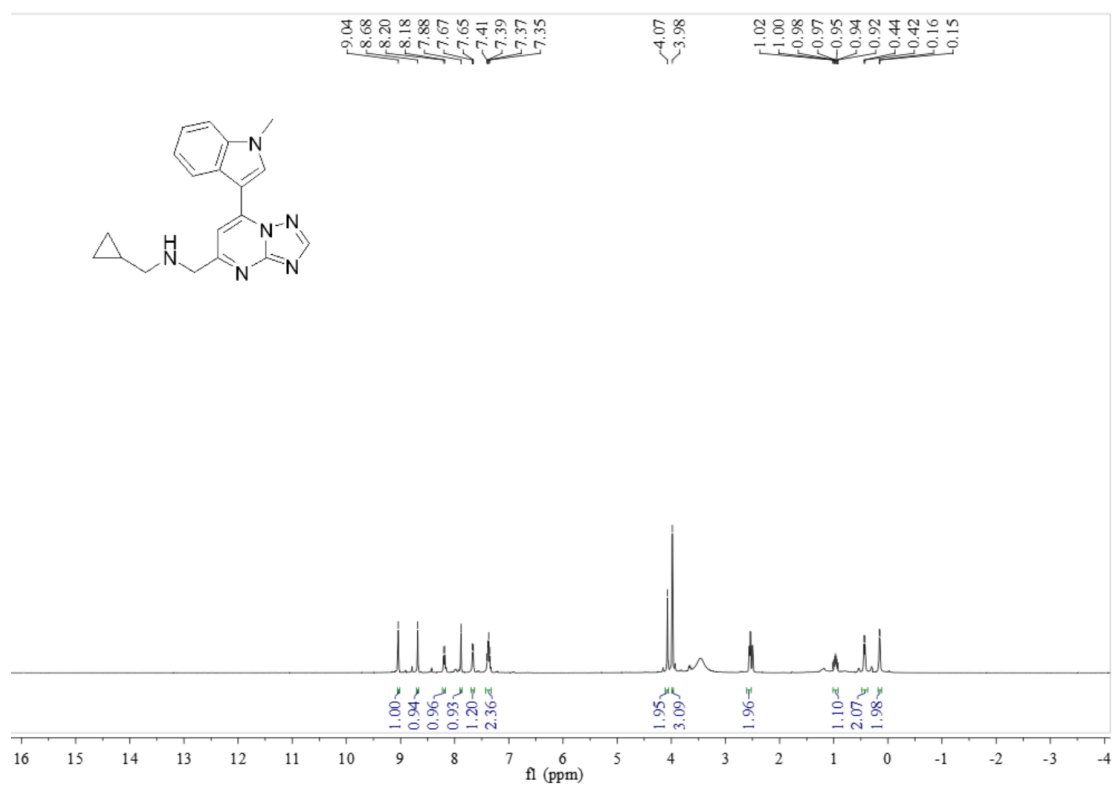


Figure S34. ¹H NMR spectrum of compound **H12** (400 MHz, DMSO-*d*₆)

● ^{13}C -NMR of Compound **H12**

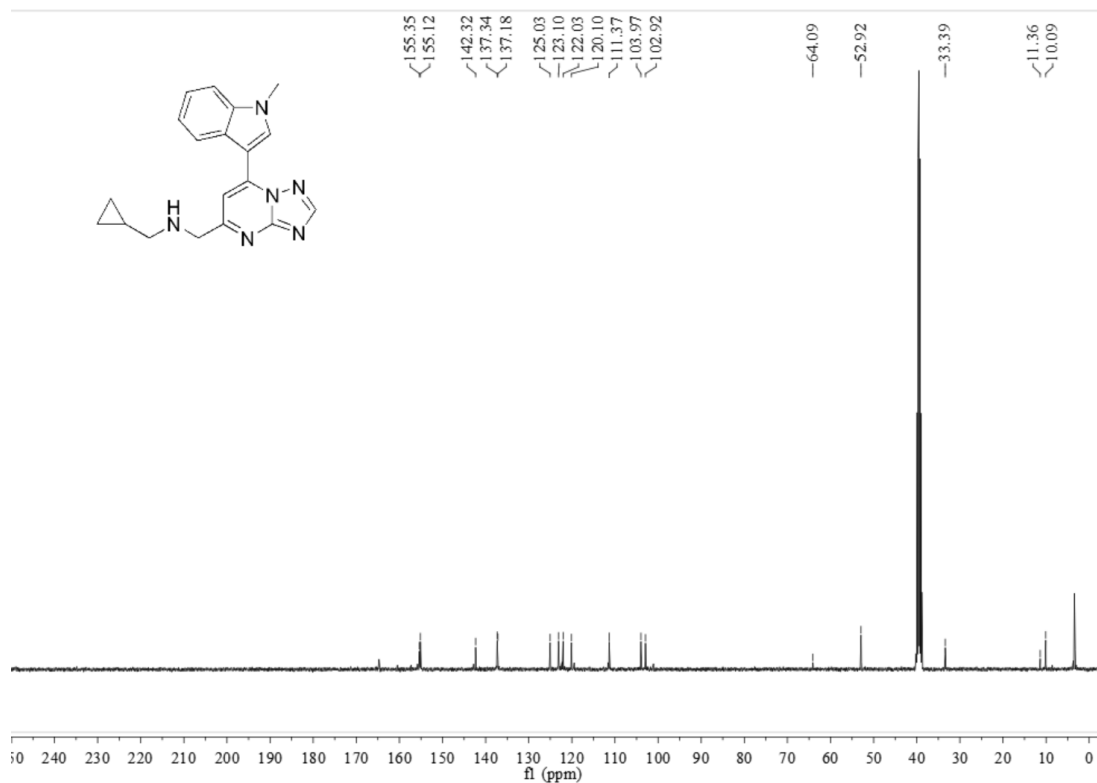


Figure S35. ^{13}C NMR spectrum of compound **H12** (100 MHz, DMSO- d_6)

● HRMS of Compound **H12**

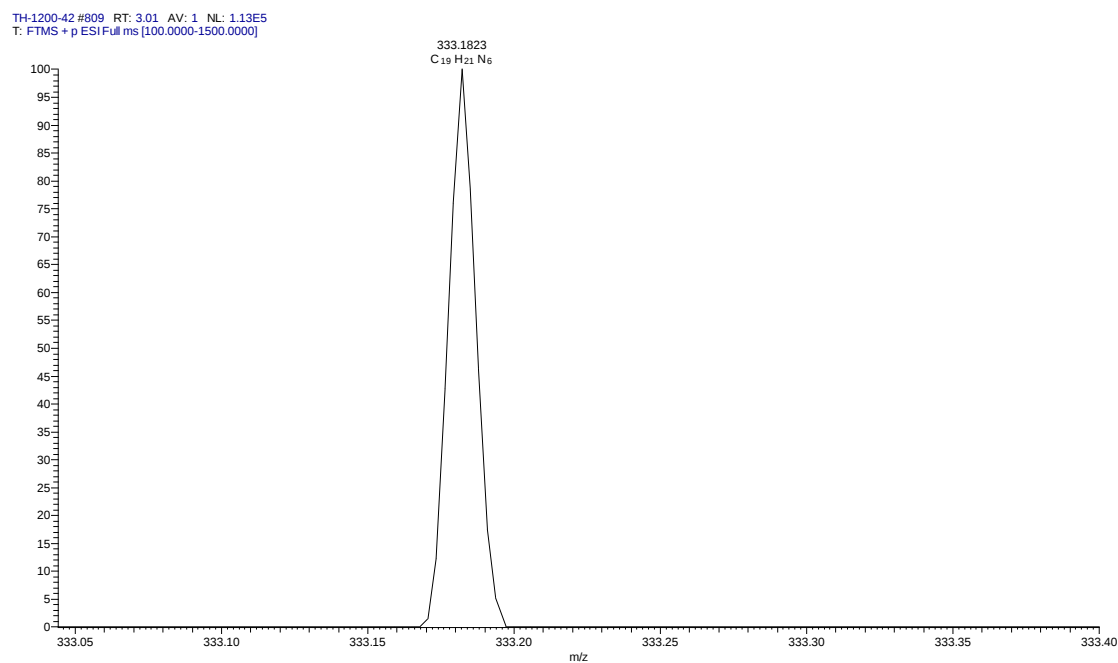


Figure S36. HRMS spectrum of compound **H12**

● ^1H NMR of Compound **H13**

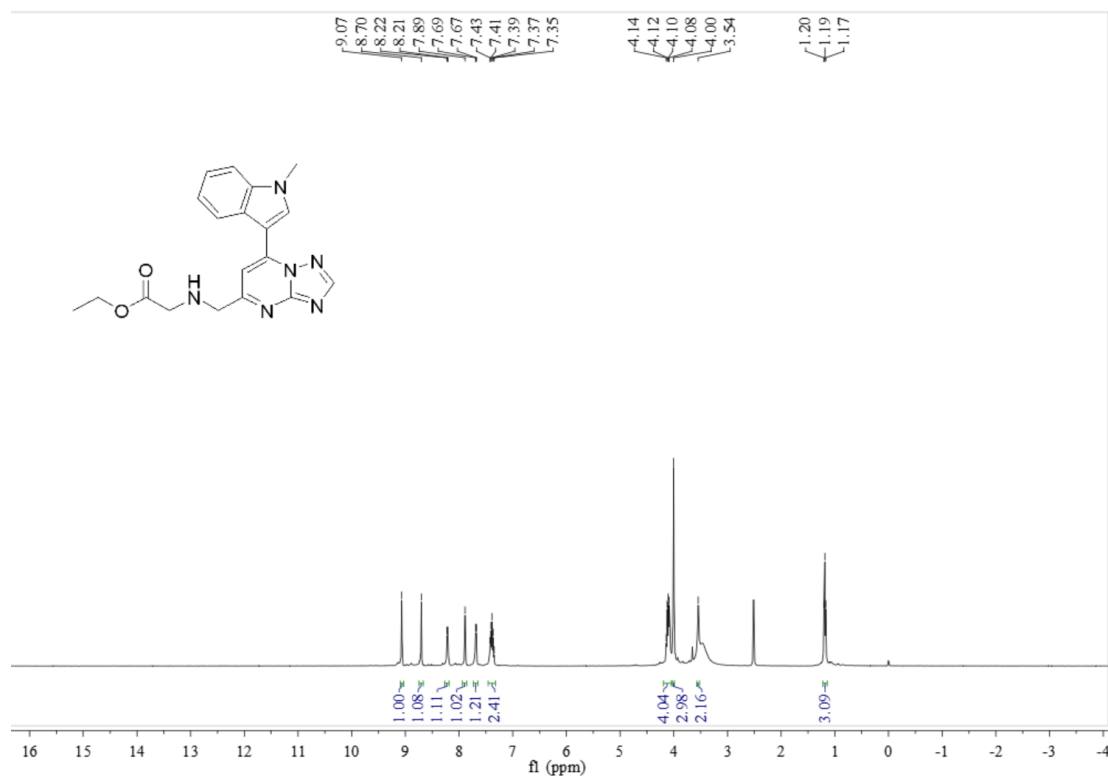


Figure S37. ^1H NMR spectrum of compound **H13** (400 MHz, DMSO- d_6)

● ^{13}C -NMR of Compound **H13**

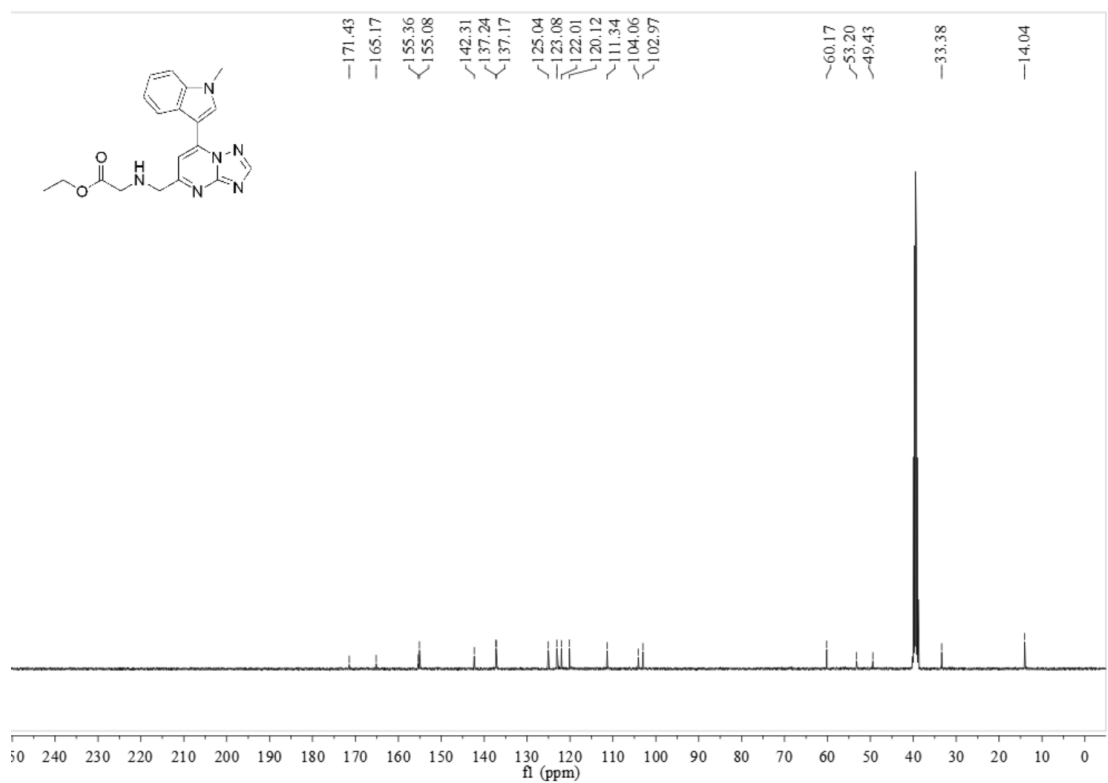


Figure S38. ^{13}C NMR spectrum of compound **H13** (100 MHz, DMSO- d_6)

- **HRMS of Compound H13**

TH-1200-52 #1070 RT: 3.86 AV: 1 NL: 2.00E6
T: FTMS + p ESI Full ms [100.0000-1500.0000]

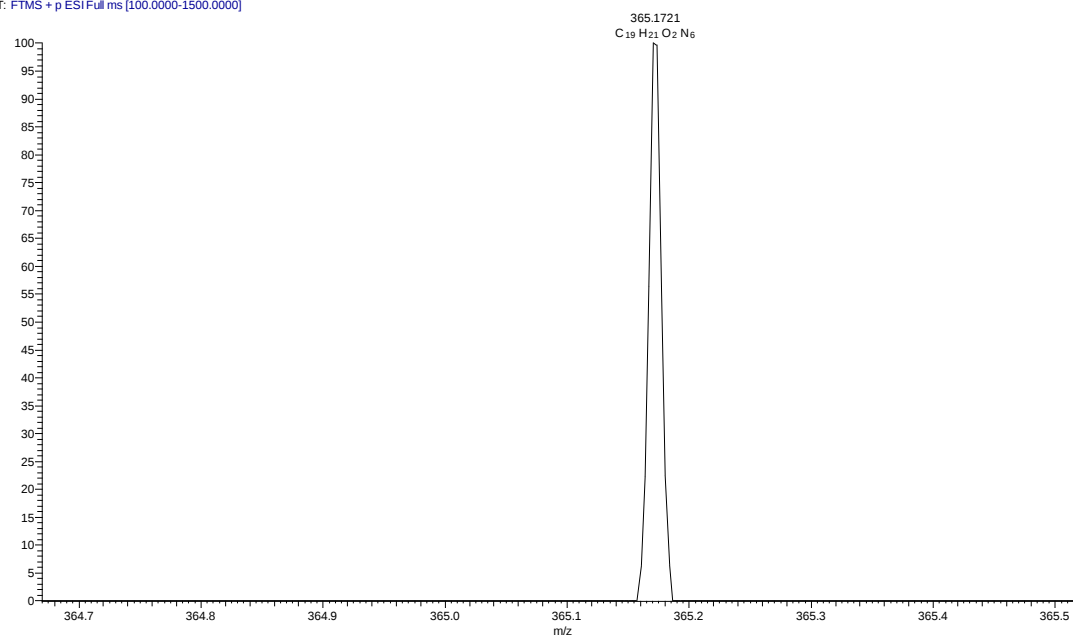


Figure S39. HRMS spectrum of compound **H13**

- **¹H NMR of Compound H14**

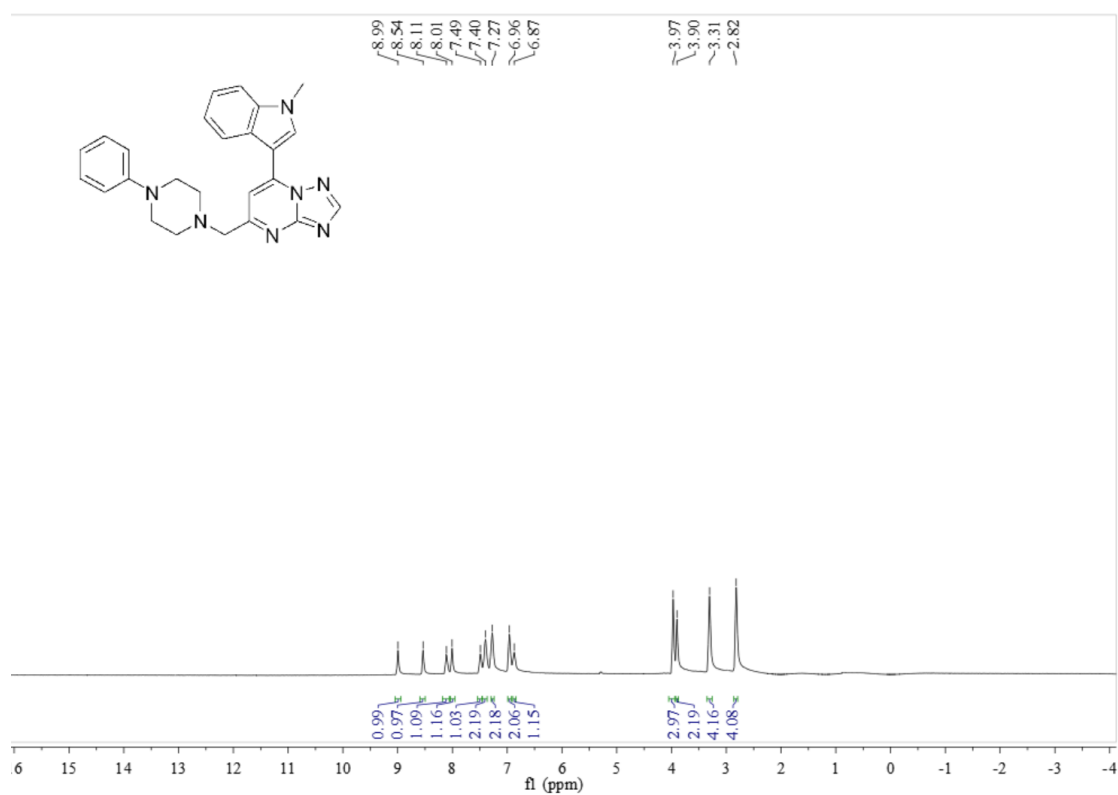


Figure S40. ¹H NMR spectrum of compound **H14** (400 MHz, DMSO-*d*₆)

● ¹³C-NMR of Compound **H14**

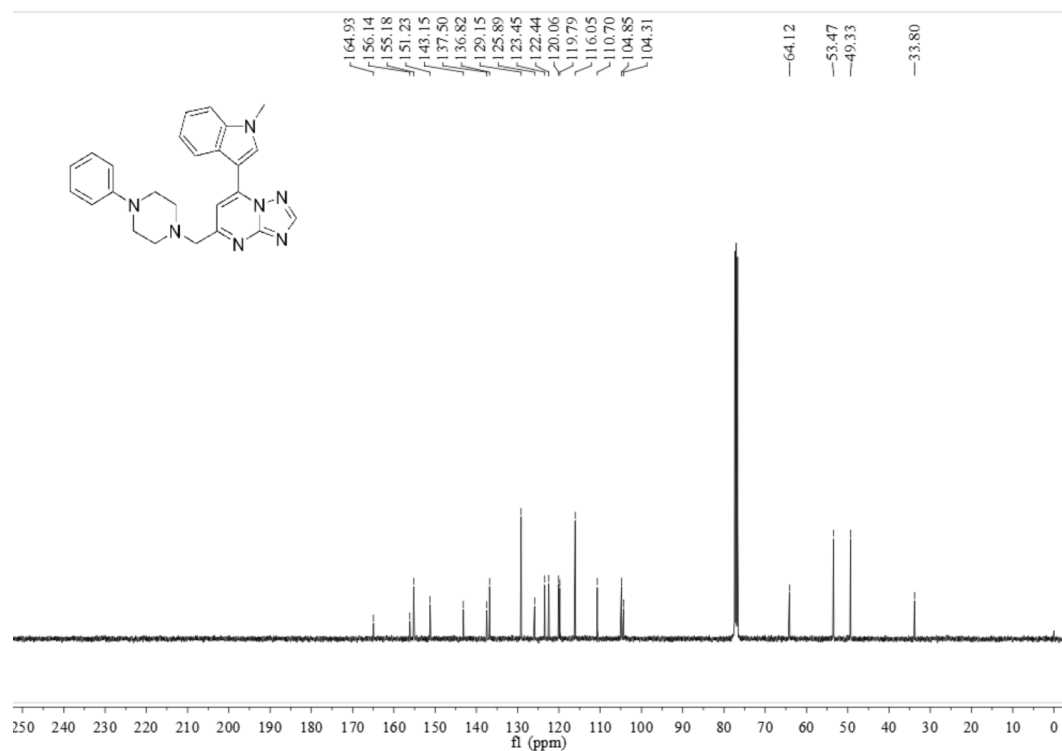


Figure S41. ¹³C NMR spectrum of compound **H14** (100 MHz, DMSO- CDCl₃)

● HRMS of Compound **H14**

TH-1200-52 #1019 RT: 3.71 AV: 1 NL: 2.86E7
T: FTMS + p ESI Full ms [100.0000-1500.0000]

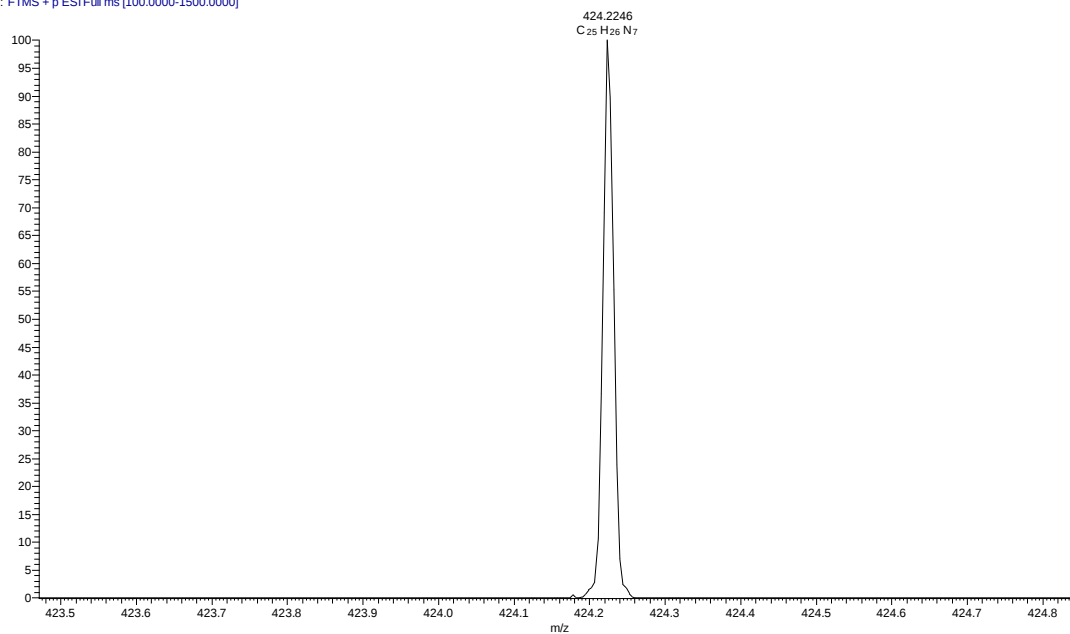


Figure S42. HRMS spectrum of compound **H14**

● ^1H NMR of Compound **H15**

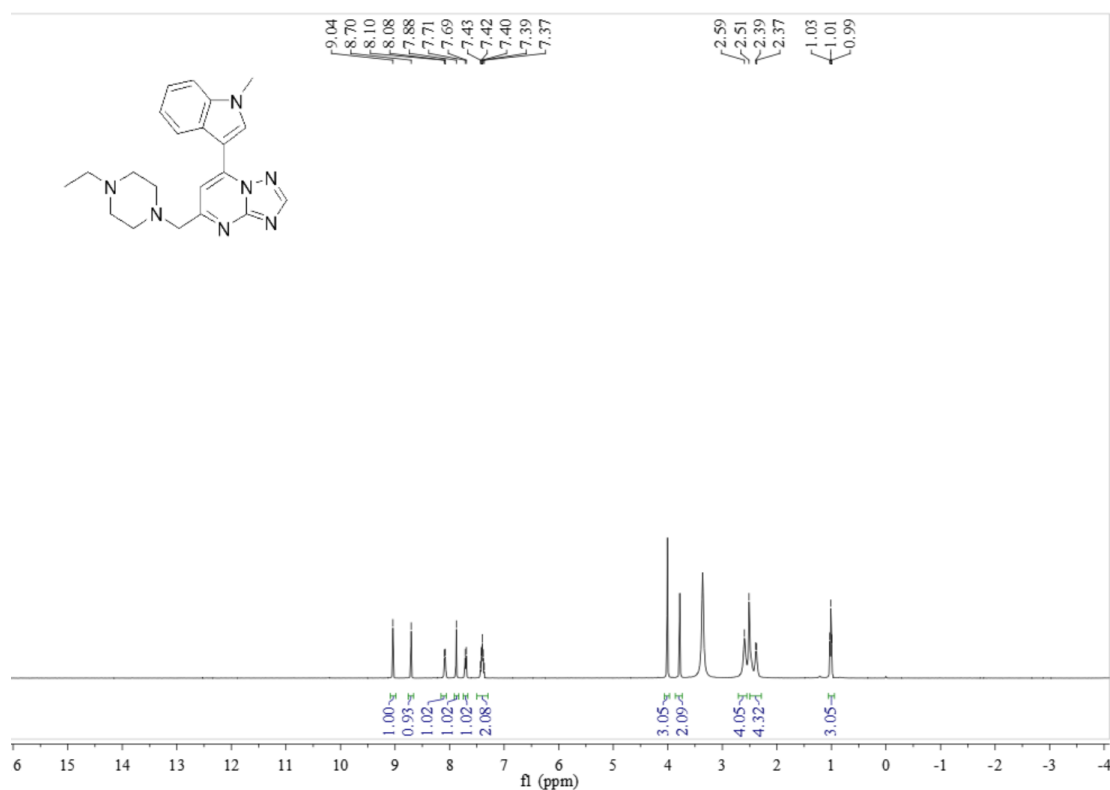


Figure S43. ^1H NMR spectrum of compound **H15** (400 MHz, DMSO- d_6)

● ^{13}C -NMR of Compound **H15**

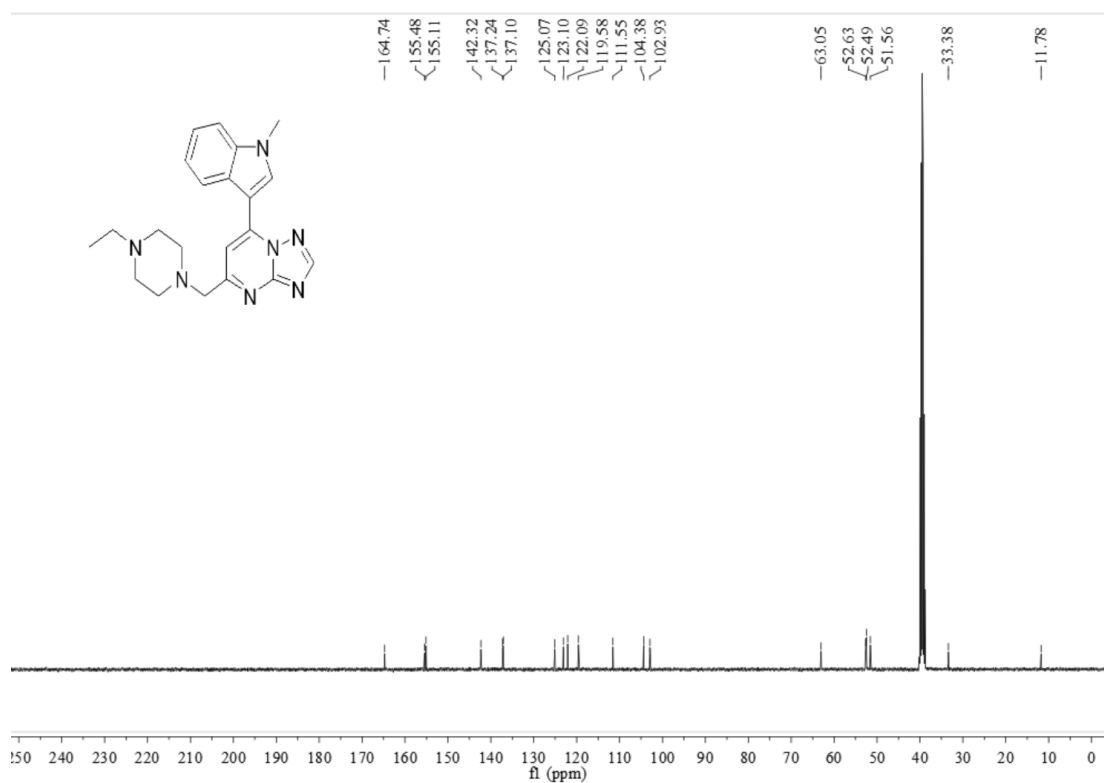


Figure S44. ^{13}C NMR spectrum of compound **H15** (100 MHz, DMSO- d_6)

- HRMS of Compound **H15**

TH-1200-52 #907 RT: 3.34 AV: 1 NL: 1.37E9
T: FTMS + p ESI Full ms [100.0000-1500.0000]

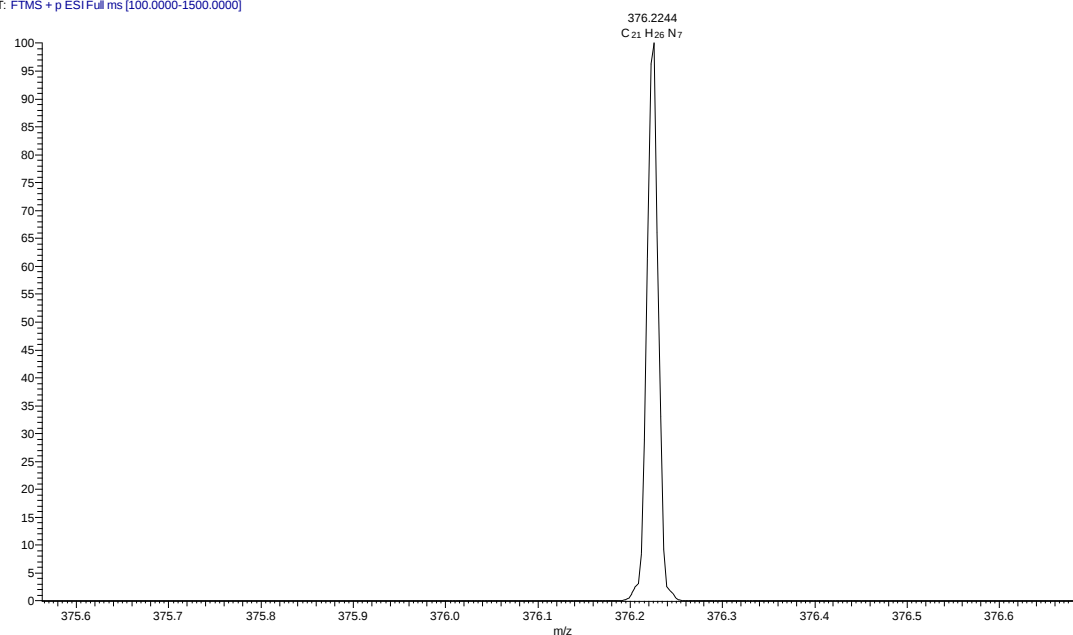


Figure S45. HRMS spectrum of compound **H15**

- ^1H NMR of Compound **H16**

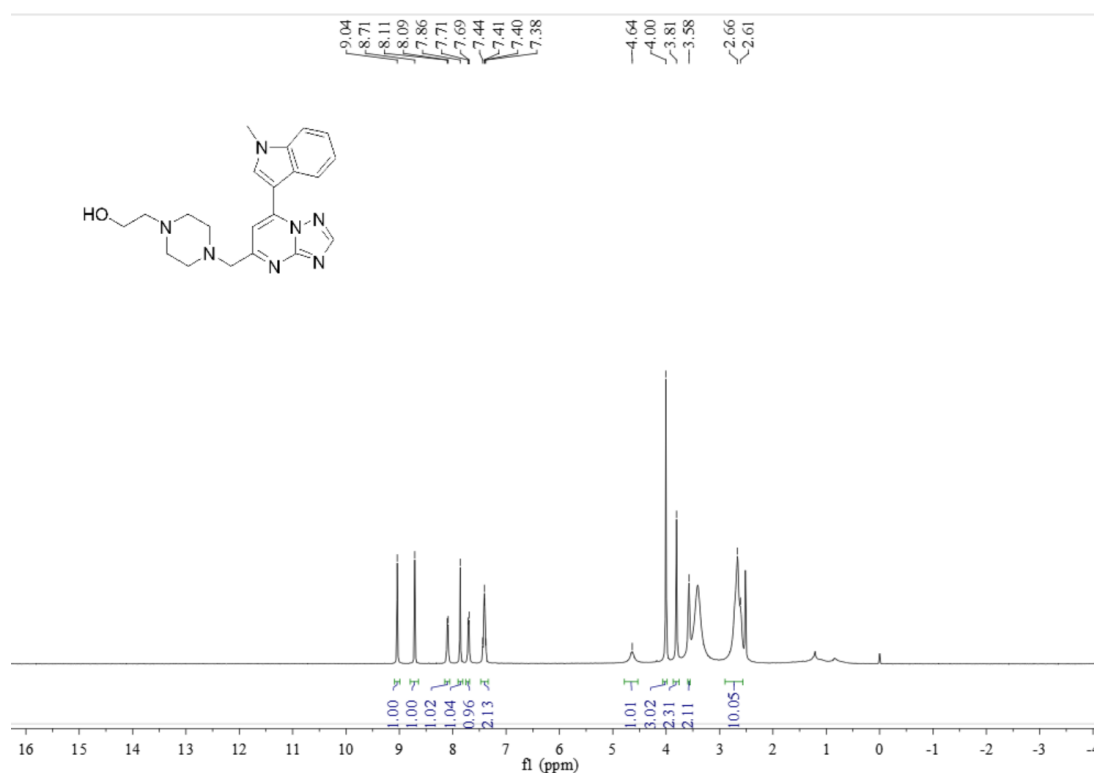
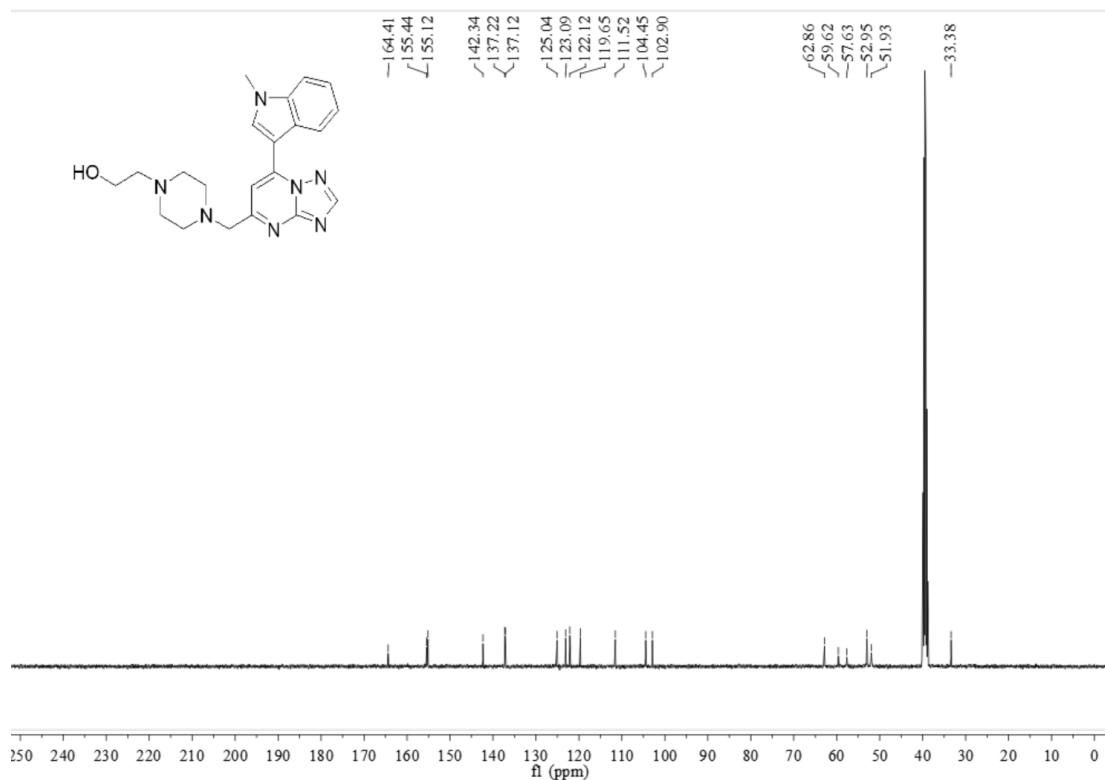


Figure S46. ^1H NMR spectrum of compound **H16** (400 MHz, $\text{DMSO-}d_6$)

● ¹³C-NMR of Compound **H16**



● ^1H NMR of Compound **H17**

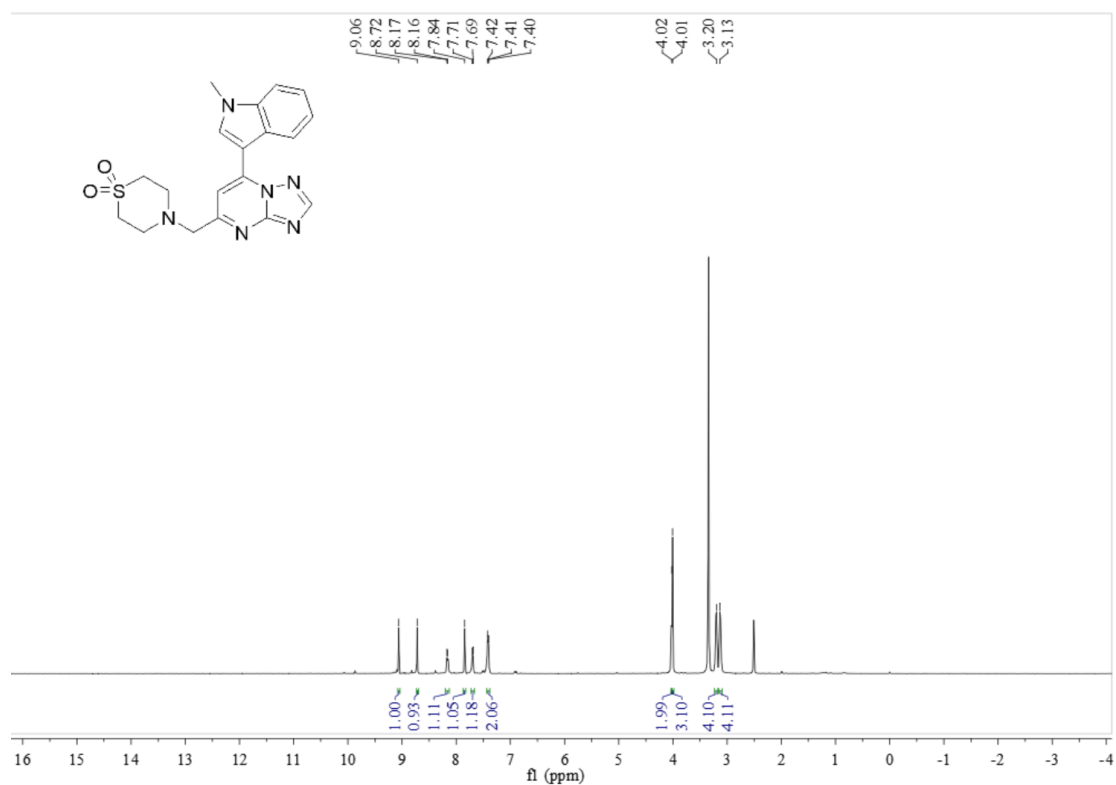


Figure S49. ^1H NMR spectrum of compound **H17** (400 MHz, DMSO- d_6)

● ^{13}C -NMR of Compound **H17**

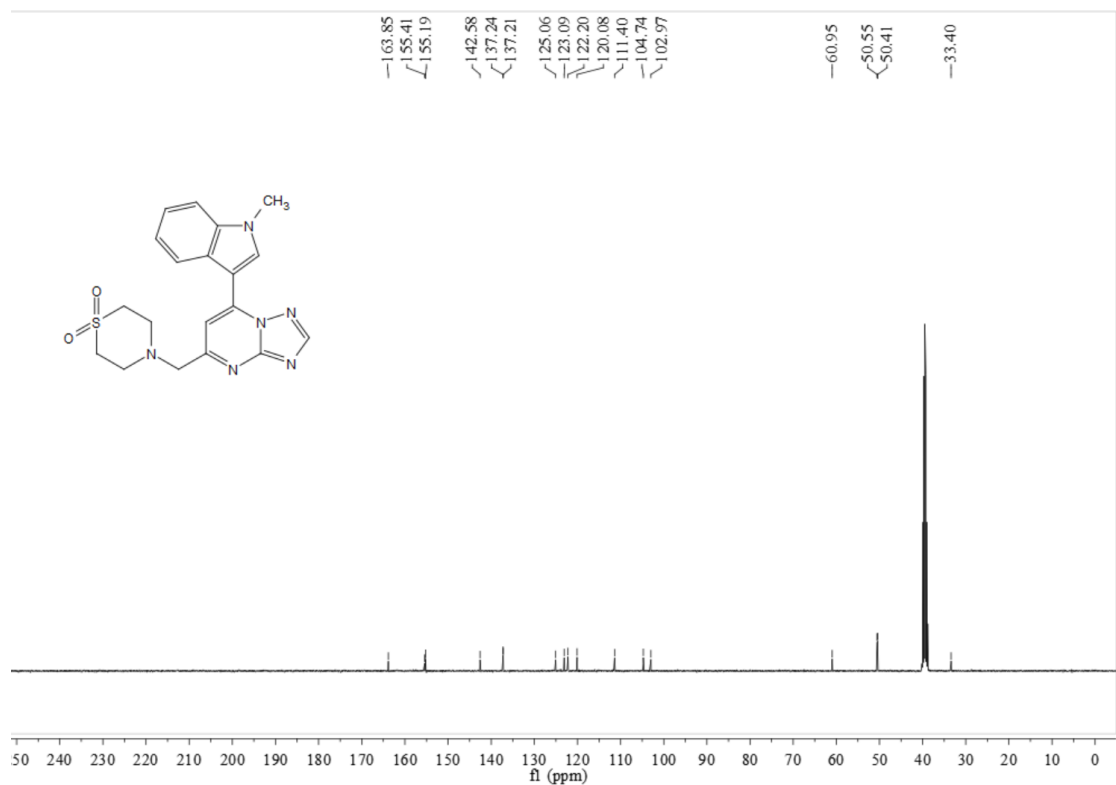


Figure S50. ^{13}C NMR spectrum of compound **H17** (100 MHz, DMSO- d_6)

● HRMS of Compound **H17**

TH-1200-6 #2034 RT: 8.27 AV: 1 NL: 1.45E5
T: FTMS + p ESI Full ms [100.0000-1500.0000]

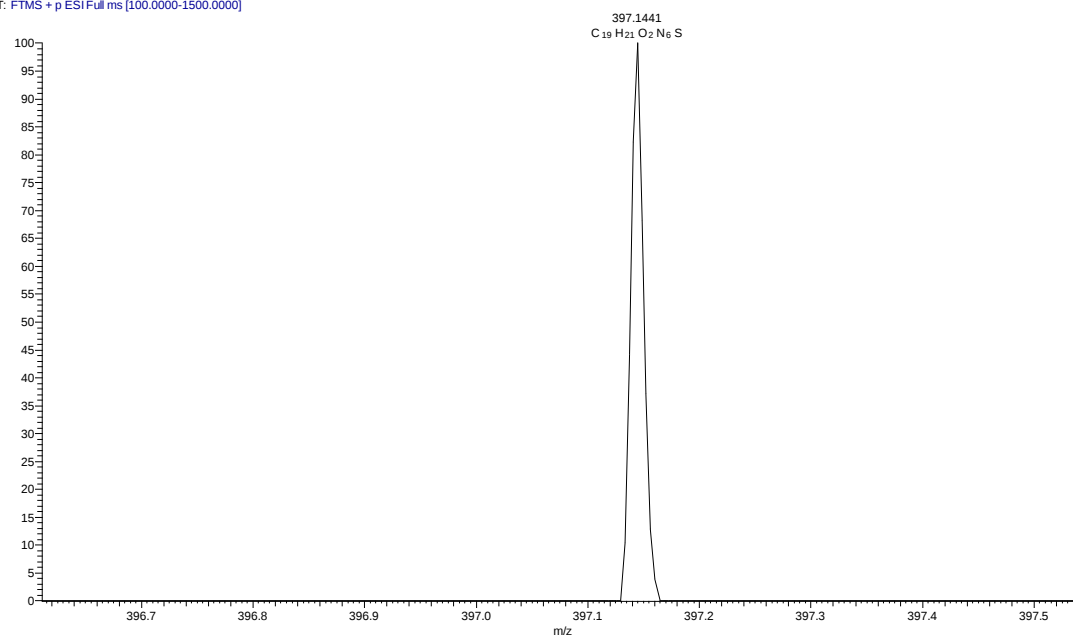


Figure S51. HRMS spectrum of compound **H17**

● ^1H NMR of Compound **H18**

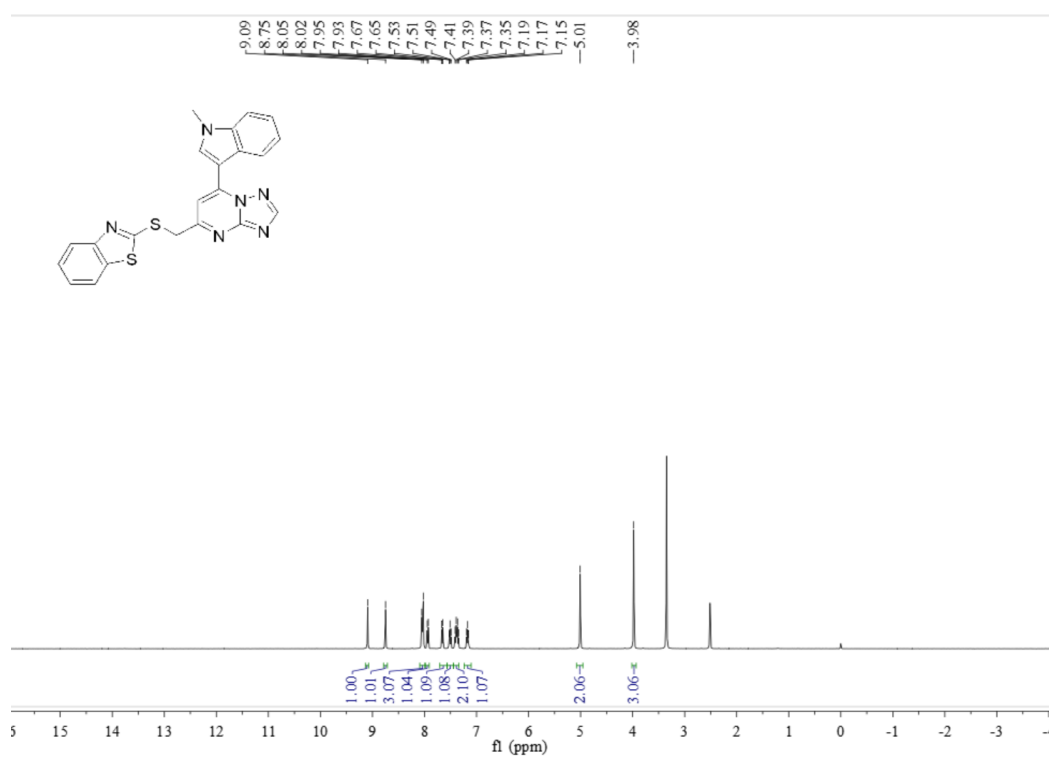


Figure S52. ^1H NMR spectrum of compound **H18** (400 MHz, $\text{DMSO}-d_6$)

● ^{13}C -NMR of Compound **H18**

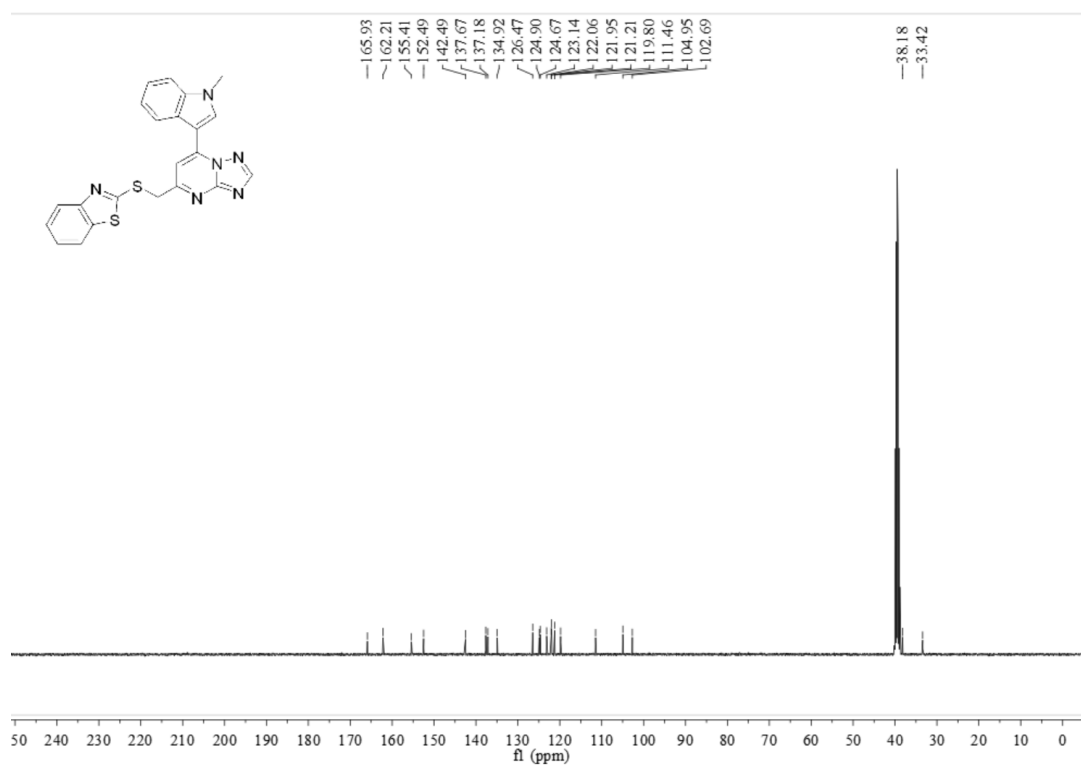


Figure S53. ^{13}C NMR spectrum of compound **H11** (100 MHz, DMSO- d_6)

● HRMS of Compound **H18**

TH-1200-6 #2034 RT: 8.27 AV: 1 NL: 1.45E5
T: FTMS + p ESI Full ms [100.0000-1500.0000]

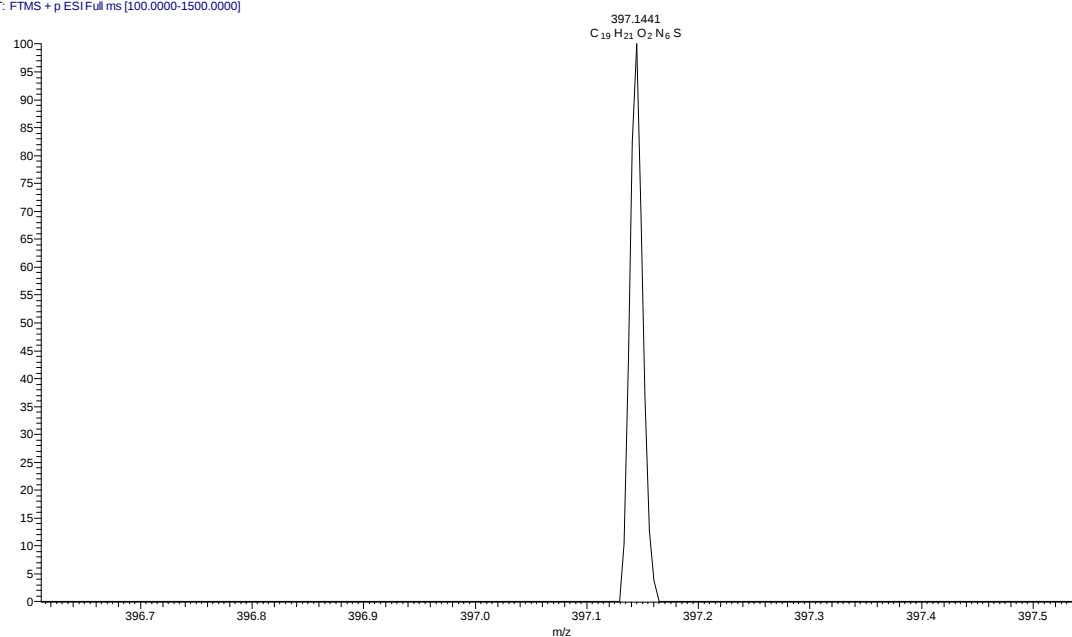


Figure S54. HRMS spectrum of compound **H18**