Supplementary Information


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Analyses of compound 1

![Chemical Structure](image)

**Figure S1.** Infrared (IR) spectrum (KBr) of compound 1.

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**Figure S2.** $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 1.

The aromatic region

**Figure S3.** Maximize $^1$H NMR (400 MHz, DMSO-$d_6$) spectrum of compound 1.
Figure S4. D$_2$O of $^1$H NMR (400 MHz, DMSO-$d_6$) spectrum of compound 1.

Figure S5. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 1.

Figure S6. Mass chart of compound 1.
**Figure S7.** Electrospray ionization mass spectrometry (ESI-MS) spectrum of compound 1.

Analyses of compound 2
Figure S8. IR spectrum (KBr) of compound 2.

Figure S9. $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 2.
Figure S10. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 2.

Figure S11. ESI-MS spectrum of compound 2.
Analyses of compound 3

Figure S12. IR spectrum (KBr) of compound 3.
Figure S13. $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 3.

Figure S14. D$_2$O of $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 3.
Figure S15. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 3.

Figure S16. ESI-MS spectrum of compound 3.
Analyses of compound 5

Figure S17. IR spectrum (KBr) of compound 5.
**Figure S18.** $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 5.

**Figure S19.** $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 5.
Figure S20. ESI-MS spectrum of compound 5.

Analyses of compound 6
Figure S21. IR spectrum (KBr) of compound 6.

Figure S22. $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 6.
Figure S23. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 6.

Figure S24. ESI-MS spectrum of compound 6.
Analyses of compound 7

Figure S25. IR spectrum (KBr) of compound 7.
Figure S26. ESI-MS spectrum of compound 7.

Figure S27. $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 7.
**Figure S28.** $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 7.

**Analyses of compound 8**

![Chemical Structure of Compound 8](image-url)
Figure S29. IR spectrum (KBr) of compound 8.

Figure S30. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 8.
Figure S31. ESI-MS spectrum of compound 8.

Analyses of compound 9
Figure S32. IR spectrum (KBr) of compound 9.

Figure S33. ESI-MS spectrum of compound 9.
Figure S34. $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 9.

Figure S35. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 9.
Analyses of compound 11

*Figure S36.* IR spectrum (KBr) of compound 11.
Figure S37. ESI-MS spectrum of compound 11.

Figure S38. $^1$H NMR spectrum (400 MHz, CDCl$_3$) of compound 11.
Figure S39. $^{13}$C NMR spectrum (101 MHz, CDCl$_3$) of compound 11.

Analyses of compound 12
Figure S40. IR spectrum (KBr) of compound 12.

Figure S41. ESI-MS spectrum of compound 12.
Figure S42. $^1$H NMR spectrum (400 MHz, CDCl$_3$) of compound 12.

Figure S43. $^{13}$C NMR spectrum (101 MHz, CDCl$_3$) of compound 12.
Analyses of compound 13

Figure S44. IR spectrum (KBr) of compound 13.
Figure S45. ESI-MS spectrum of compound 13.

Figure S46. $^1$H NMR spectrum (400 MHz, CDCl$_3$) of compound 13.
Figure S47. $^{13}$C NMR spectrum (101 MHz, CDCl$_3$) of compound 13.

Analyses of compound (14)
Figure S48. IR spectrum (KBr) of compound 14.

Figure S49. ESI-MS spectrum of compound 14.
Figure S50. $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 14.

Figure S51. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 14.
Analyses of compound 15

Figure S52. IR spectrum (KBr) of compound 15.
Figure S53. ESI-MS spectrum of compound 15.

Figure S54. $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 15.
Figure S55. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 15.

Analyses of compound 16

![Chemical structure image]
Figure S56. IR spectrum (KBr) of compound 16.

Figure S57. ESI-MS spectrum of compound 16.
Figure S58. $^1$H NMR spectrum (400 MHz, DMSO-$d_6$) of compound 16.

Figure S59. $^{13}$C NMR spectrum (101 MHz, DMSO-$d_6$) of compound 16.