

Supporting Information

Bioactive Pyrrolo[2,1-f][1,2,4]triazines: Synthesis, Molecular Docking, In Vitro Cytotoxicity Assay and Antiviral Studies

Nataliya N. Mochulskaya ¹, Svetlana K. Kotovskaya ¹, Ilya I. Butorin ¹, Mikhail V. Varaksin ¹, *, Valery N. Charushin ¹, Vladimir L. Rusinov ¹, Yana L. Esaulkova ², Alexander V. Slita ², Polina A. Ilyina ² and Vladimir V. Zarubaev ²

¹ Department of Organic and Biomolecular Chemistry, Ural Federal University Named after the First President of Russia B.N. Yeltsin, Mira Street, 19, Yekaterinburg 620002, Russia; n.n.mochulskaya@urfu.ru (N.N.M.)

² Saint-Petersburg Pasteur Institute, Mira Street, 14, Saint Petersburg 197101, Russia

* Correspondence: Correspondence: m.v.varaksin@urfu.ru

Table of contents

Spectra of 3,5-disubstituted 1,2,4-triazines.....	S2
Spectra of 1,2,4-triazin-1-ium tetrafluoroborates	S5
Spectra of dimethyl 7-methyl-4-phenyl-2-p-tolylpyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate...	S13

Spectrum of 5-(3,4-dimethylphenyl)-3-phenyl-1,2,4-triazine (6e).

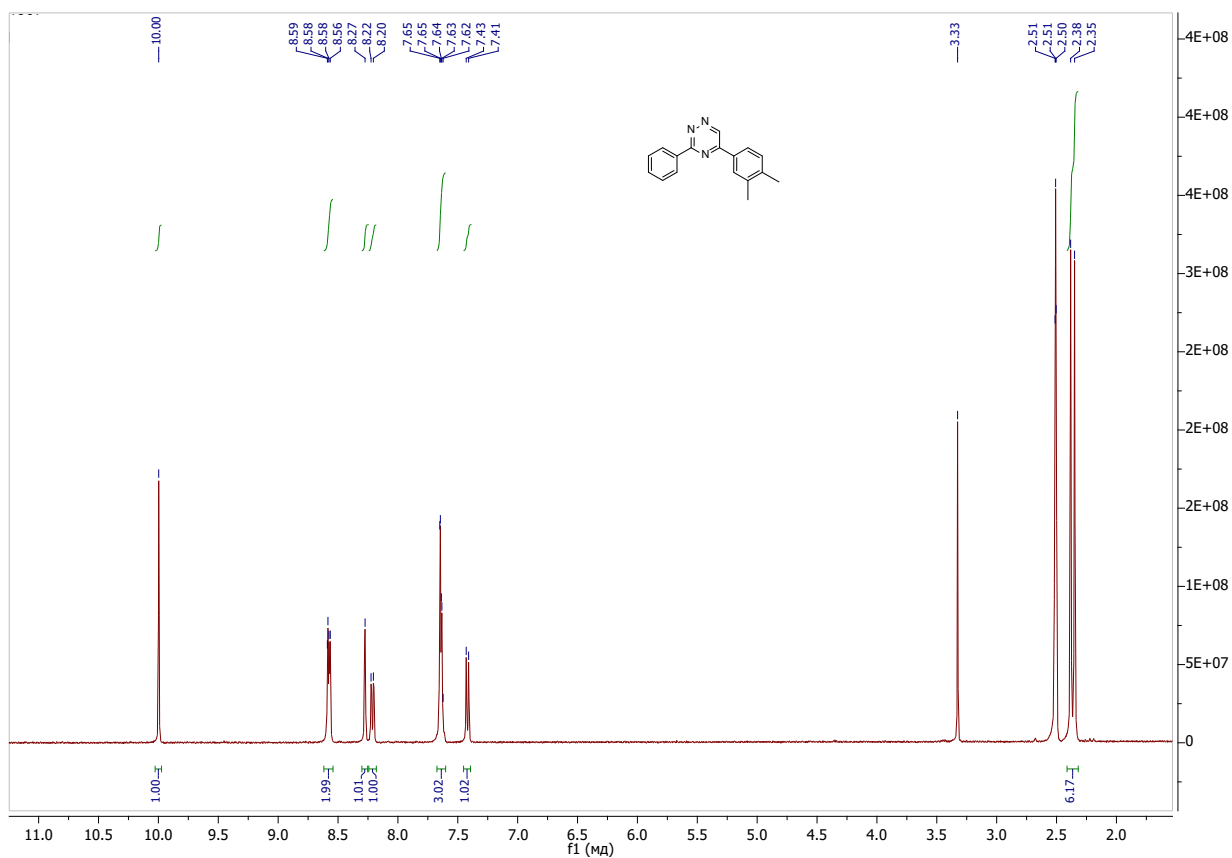


Figure S1. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of 6e

Spectrum of 3-phenyl-5-(thiophen-2-yl)-1,2,4-triazine (6h).

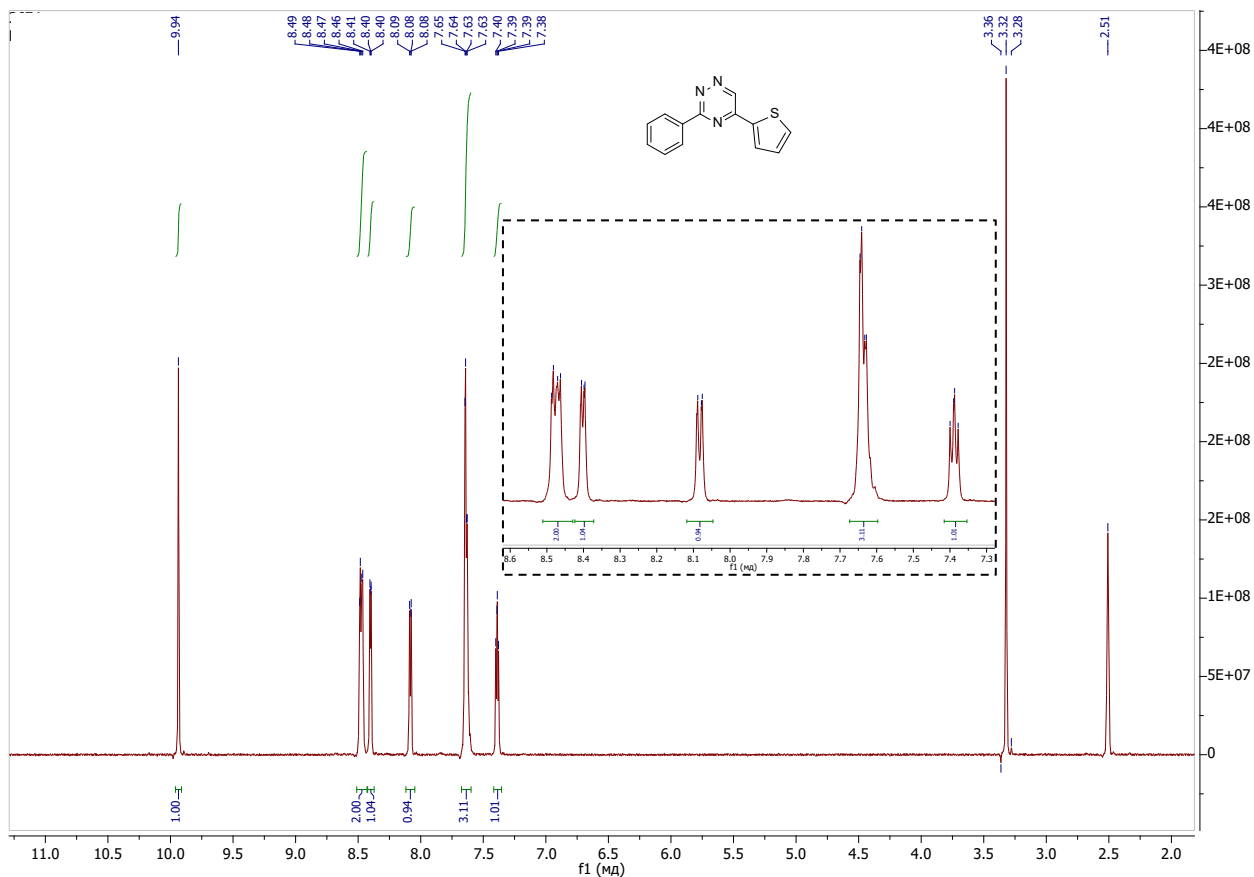


Figure S2. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of 6h

Spectrum of 5-(3,4-dimethylphenyl)-3-(*p*-tolyl)-1,2,4-triazine (7e).

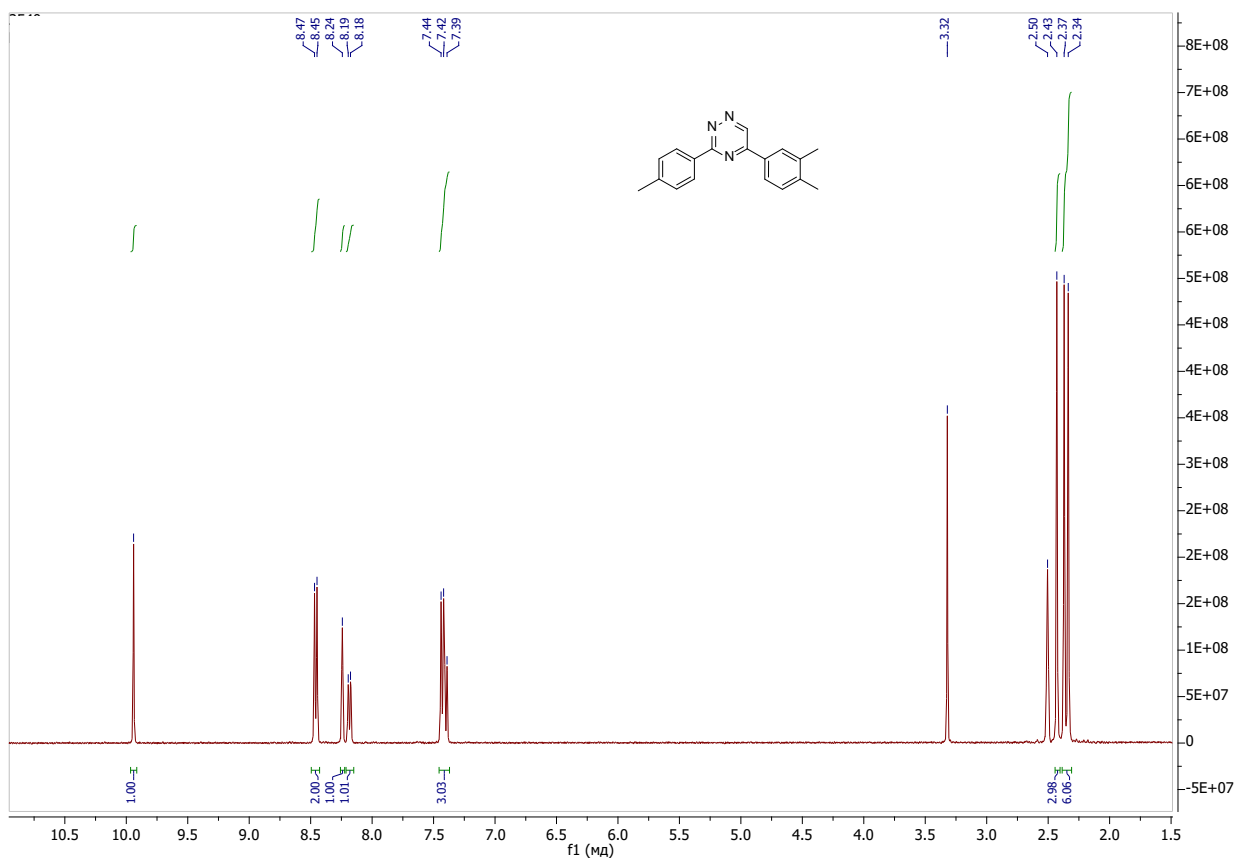


Figure S3. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of 7e

Spectrum of 5-(4-methoxyphenyl)-3-(*p*-tolyl)-1,2,4-triazine (7f).

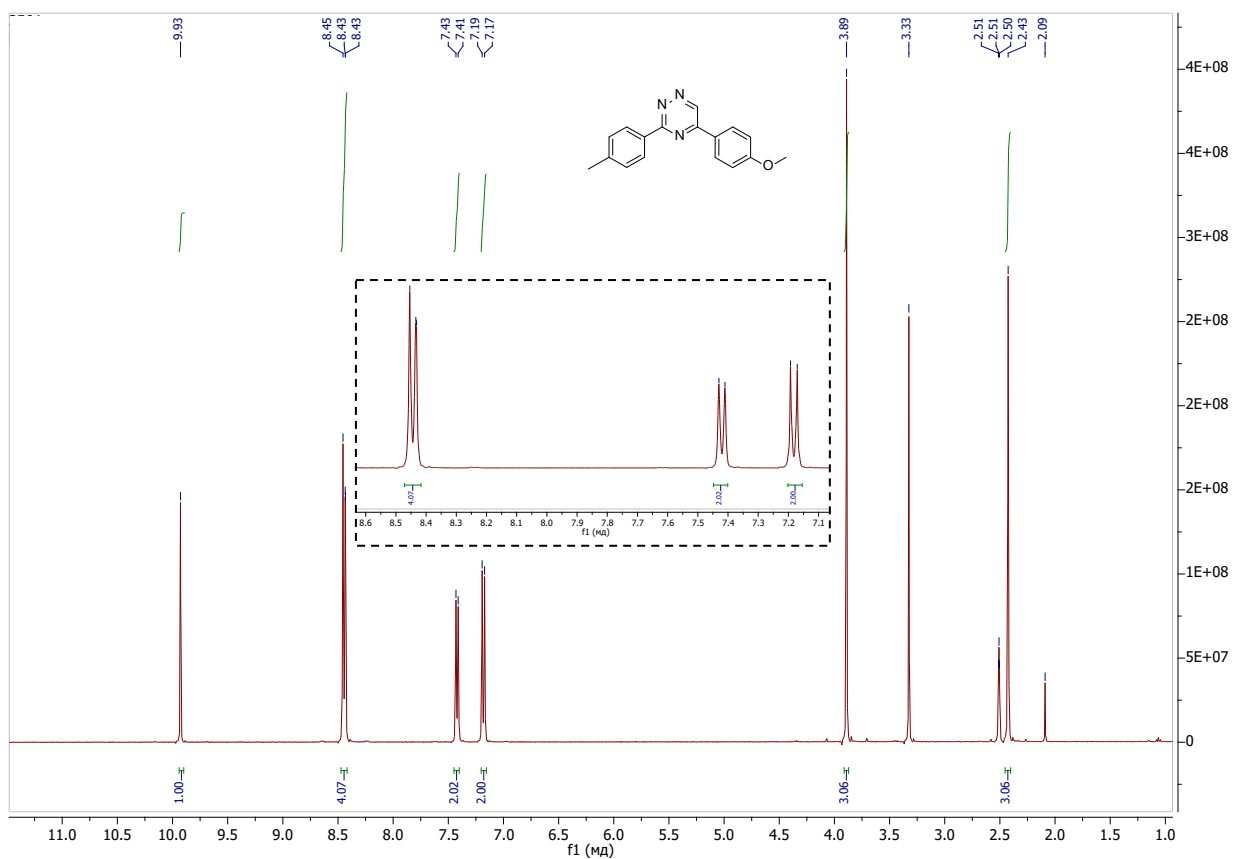


Figure S4. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of 7f

Spectrum of 3,5-di(thiophen-2-yl)-1,2,4-triazine (8h).

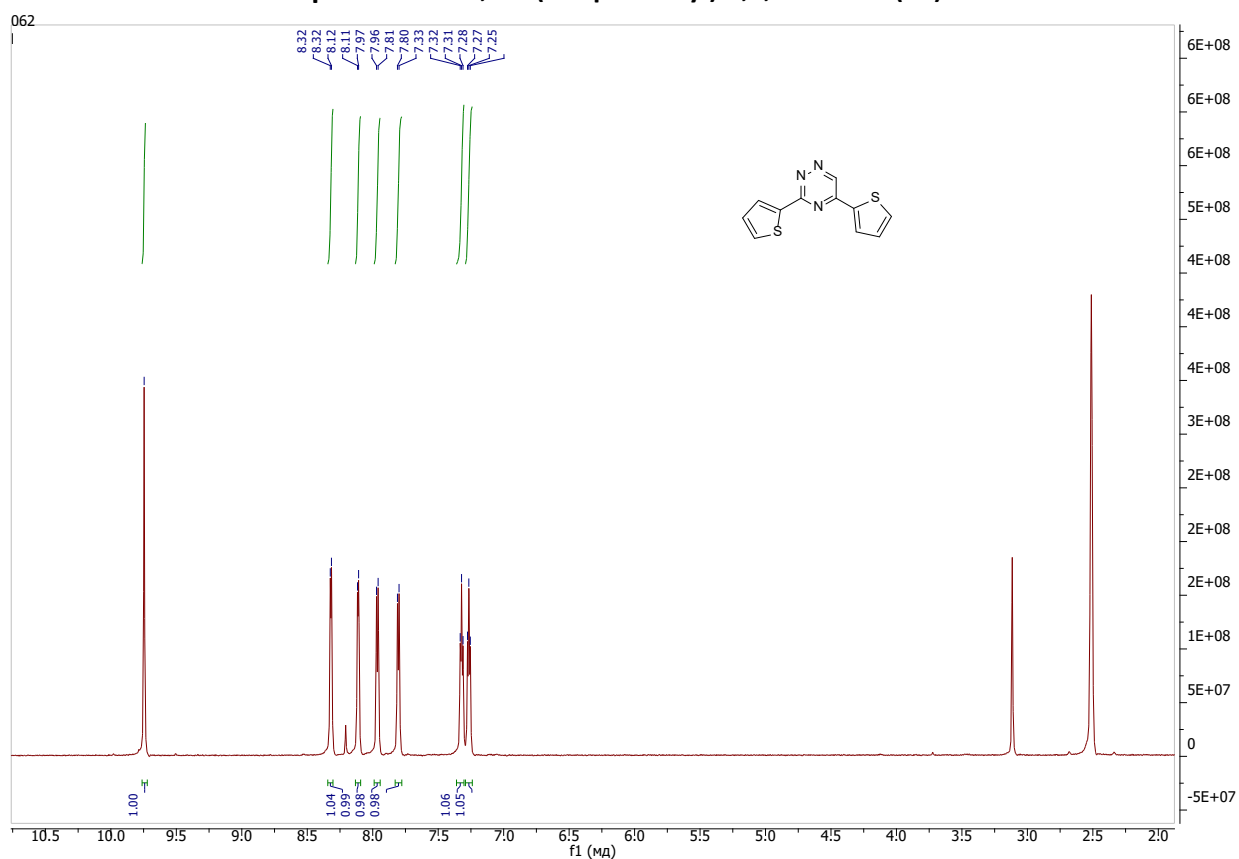


Figure S5. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of 8h

Spectrum of 1-ethyl-3,5-diphenyl-1,2,4-triazin-1-ium tetrafluoroborate (10a).

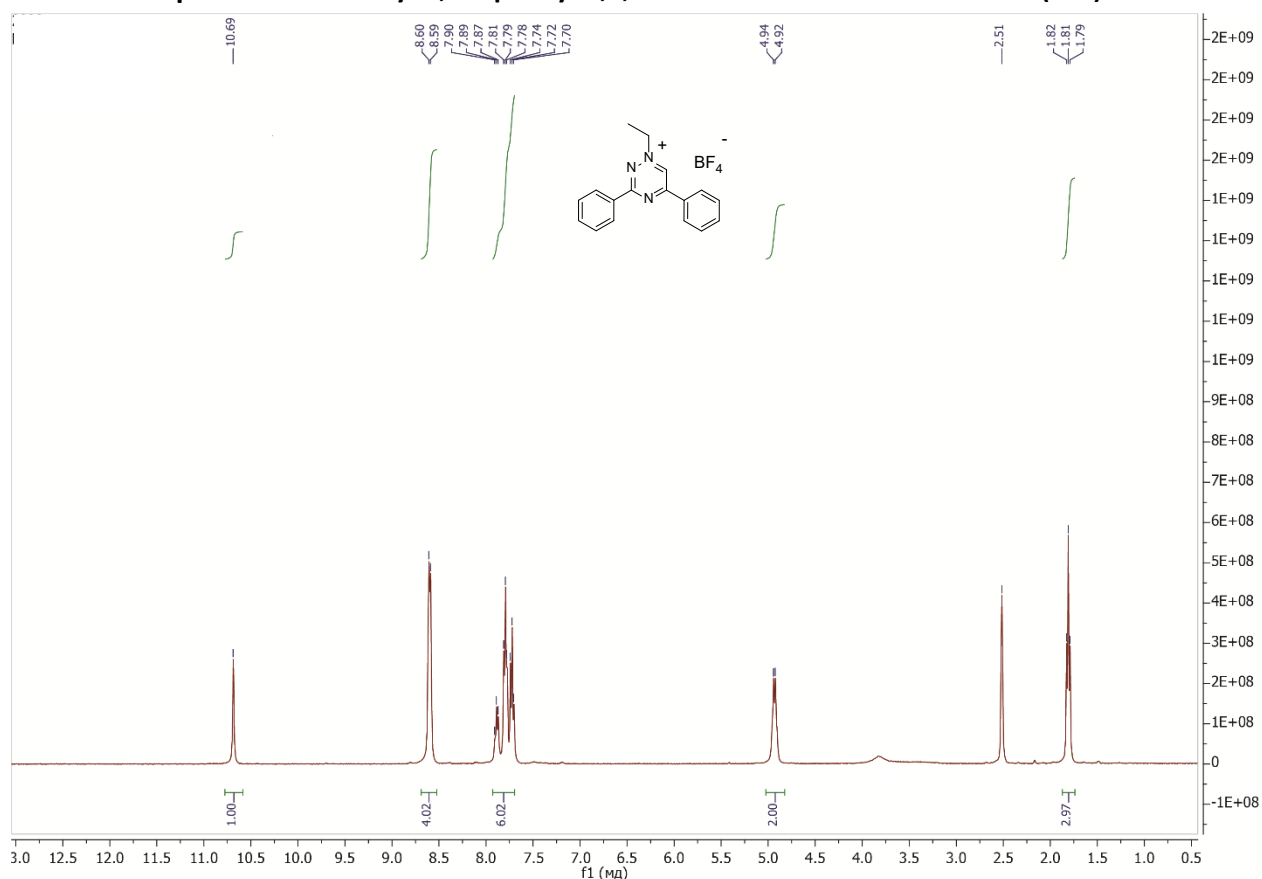


Figure S6. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of 10a

Spectrum of 1-ethyl-3-phenyl-5-(*p*-tolyl)-1,2,4-triazin-1-ium tetrafluoroborate (10d).

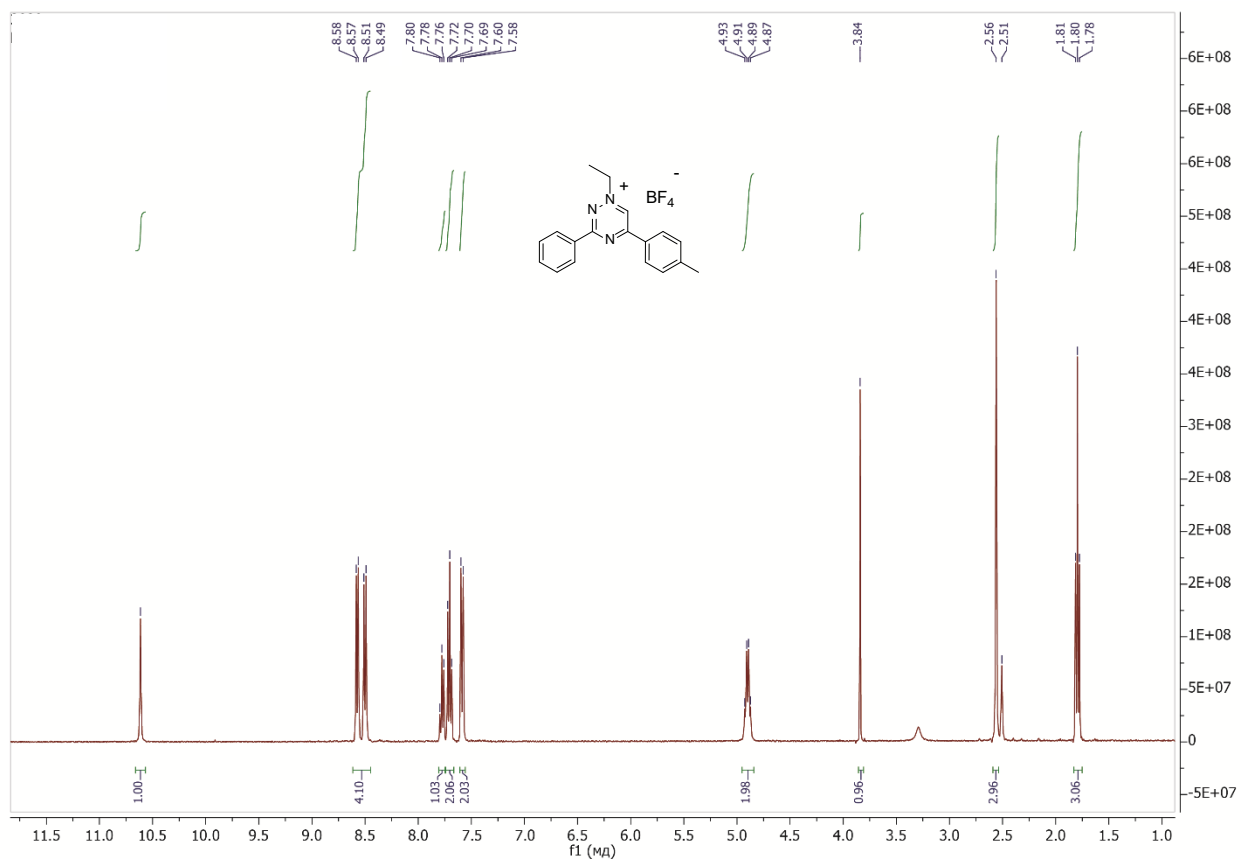


Figure S7. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of 10d

Spectrum of 5-(3,4-dimethylphenyl)-1-ethyl-3-phenyl-1,2,4-triazin-1-ium tetrafluoroborate (**10e**).

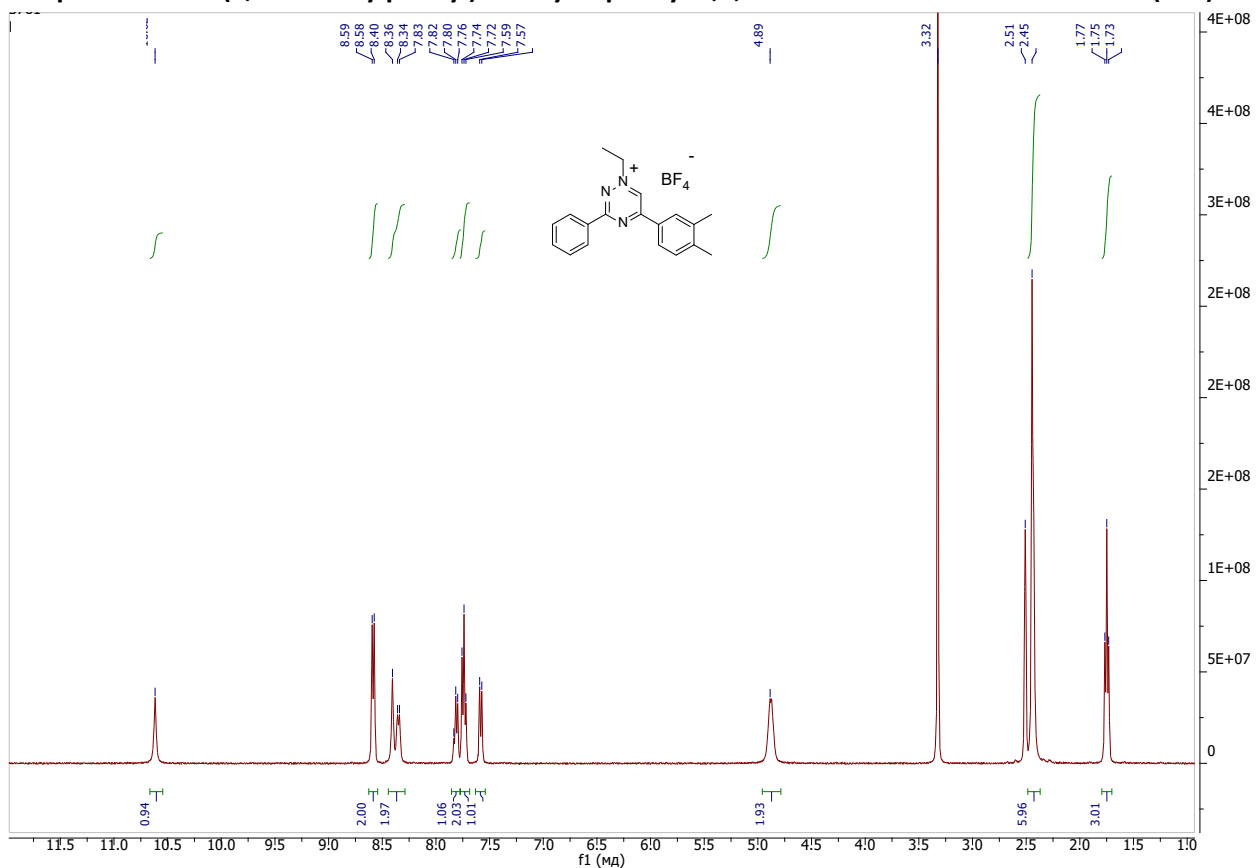


Figure S8. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of **10e**

Spectrum of 1-ethyl-5-(4-methoxyphenyl)-3-phenyl-1,2,4-triazin-1-ium tetrafluoroborate (**10f**).

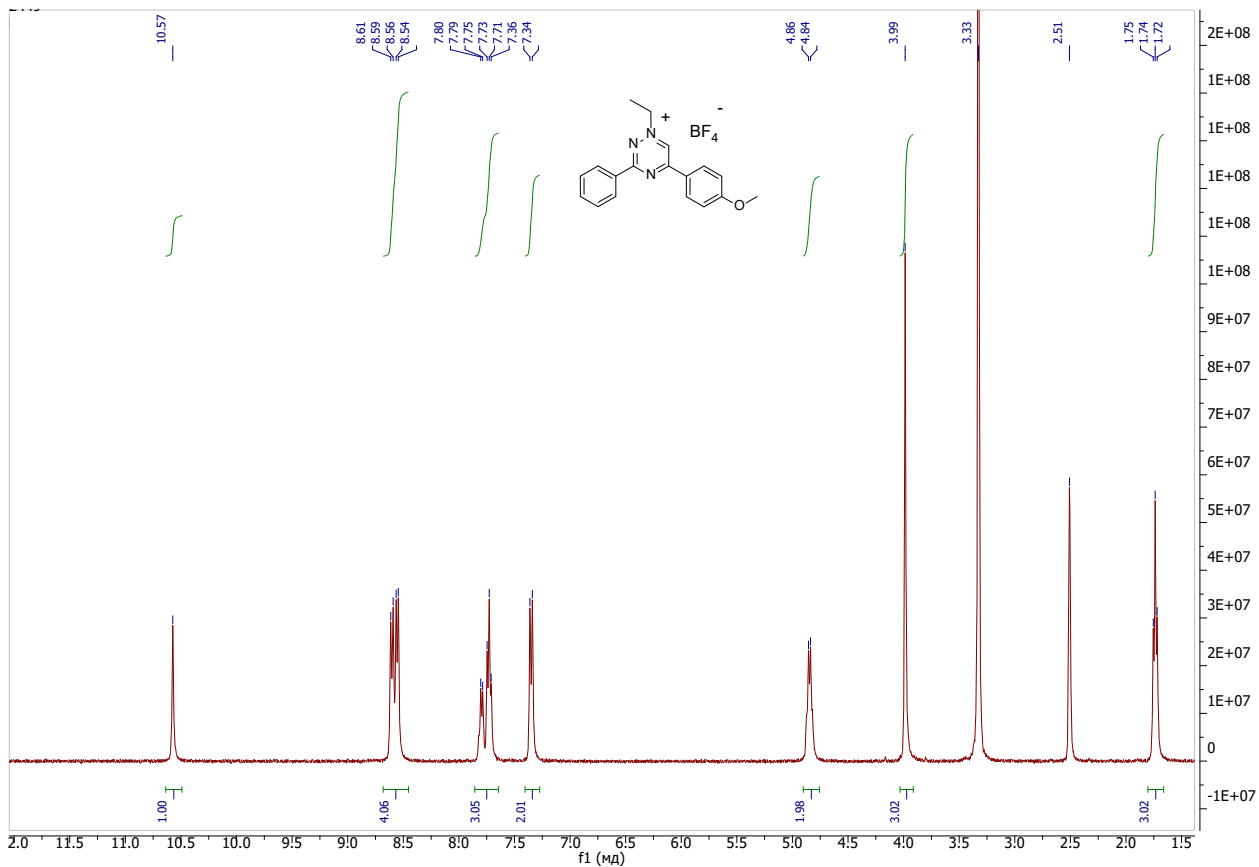


Figure S9. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of **10f**

Spectrum of 1-ethyl-5-(naphthalen-2-yl)-3-phenyl-1,2,4-triazin-1-ium tetrafluoroborate (10g).

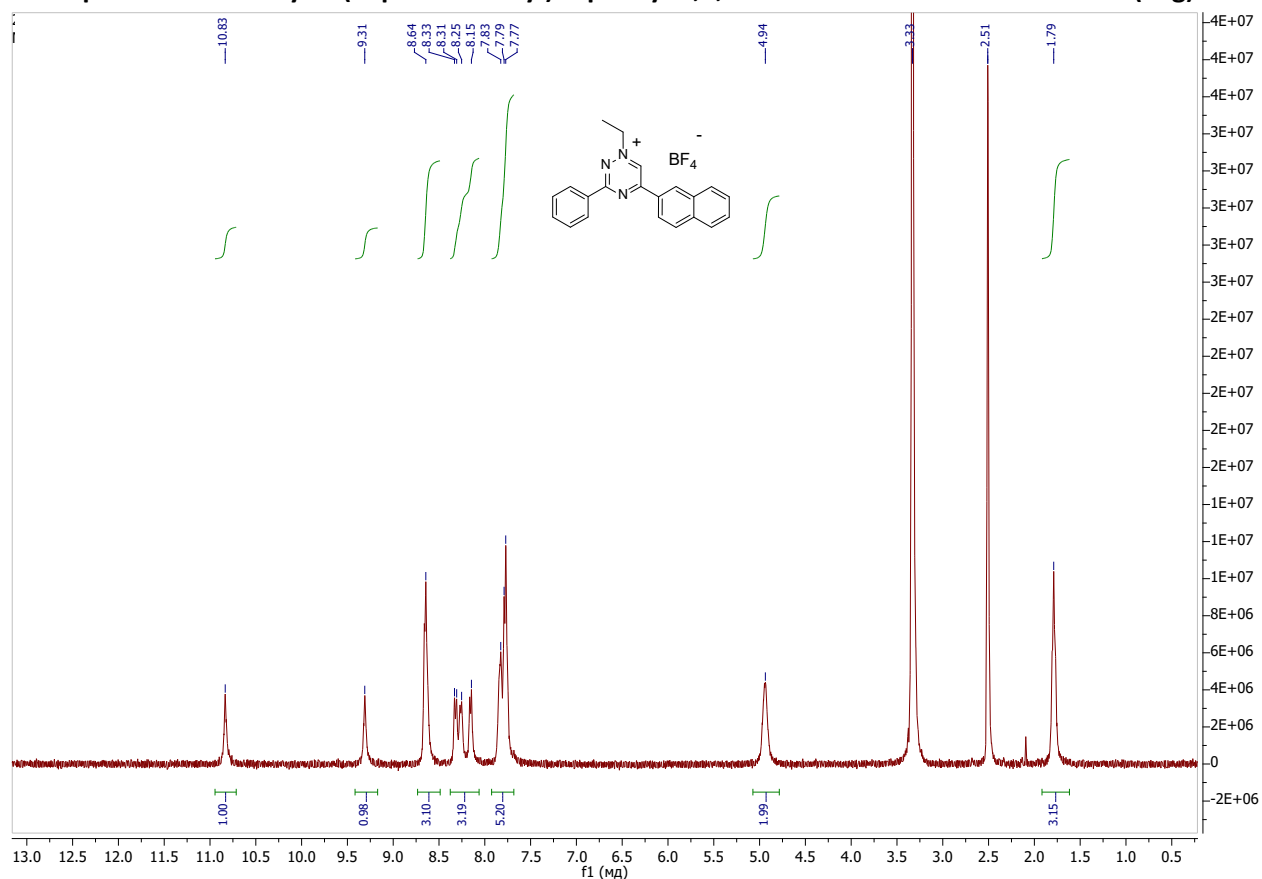


Figure S10. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of 10g

Spectrum of 1-ethyl-3-phenyl-5-(thiophen-2-yl)-1,2,4-triazin-1-ium tetrafluoroborate (10h).

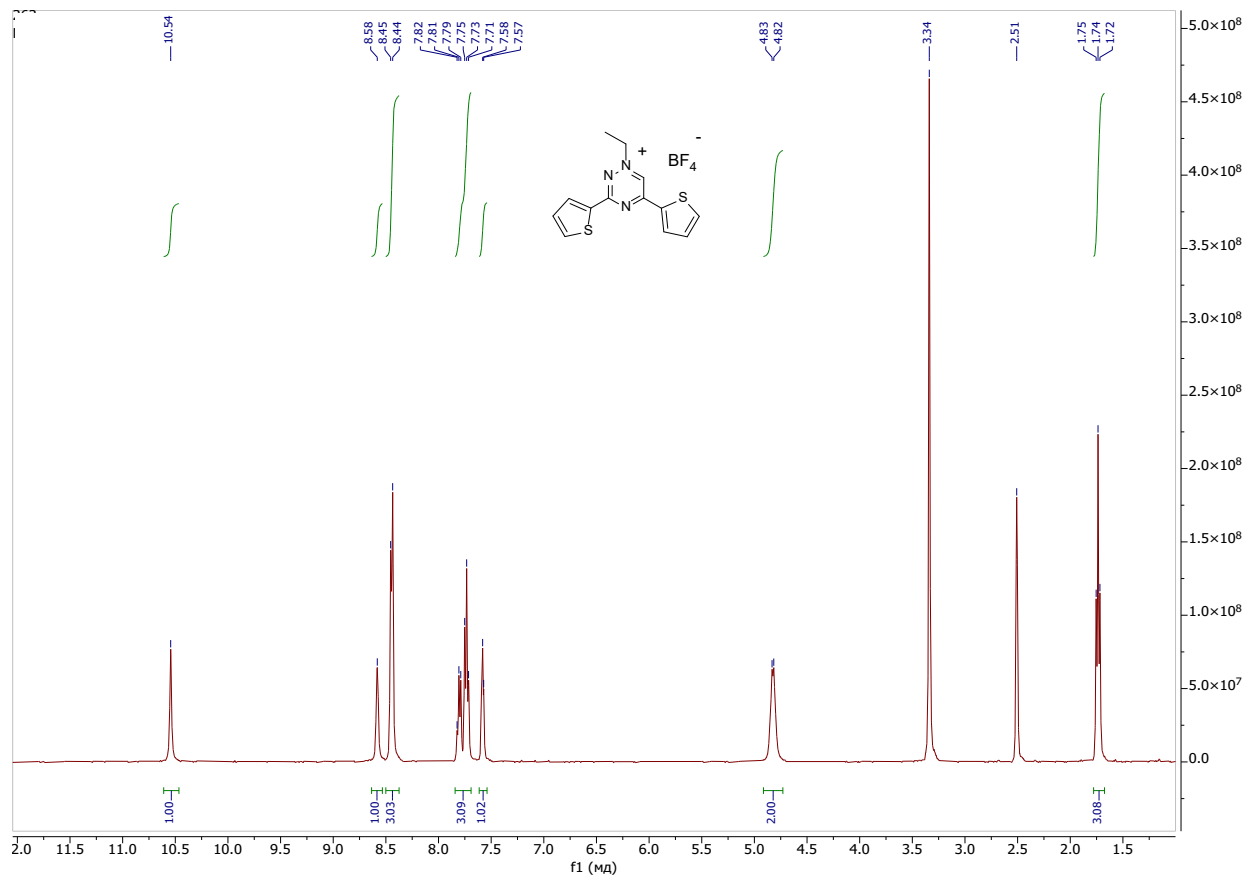


Figure S11. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of 10h

Spectrum of 1-Ethyl-5-phenyl-3-(*p*-tolyl)-1,2,4-triazin-1-ium tetrafluoroborate (11a).

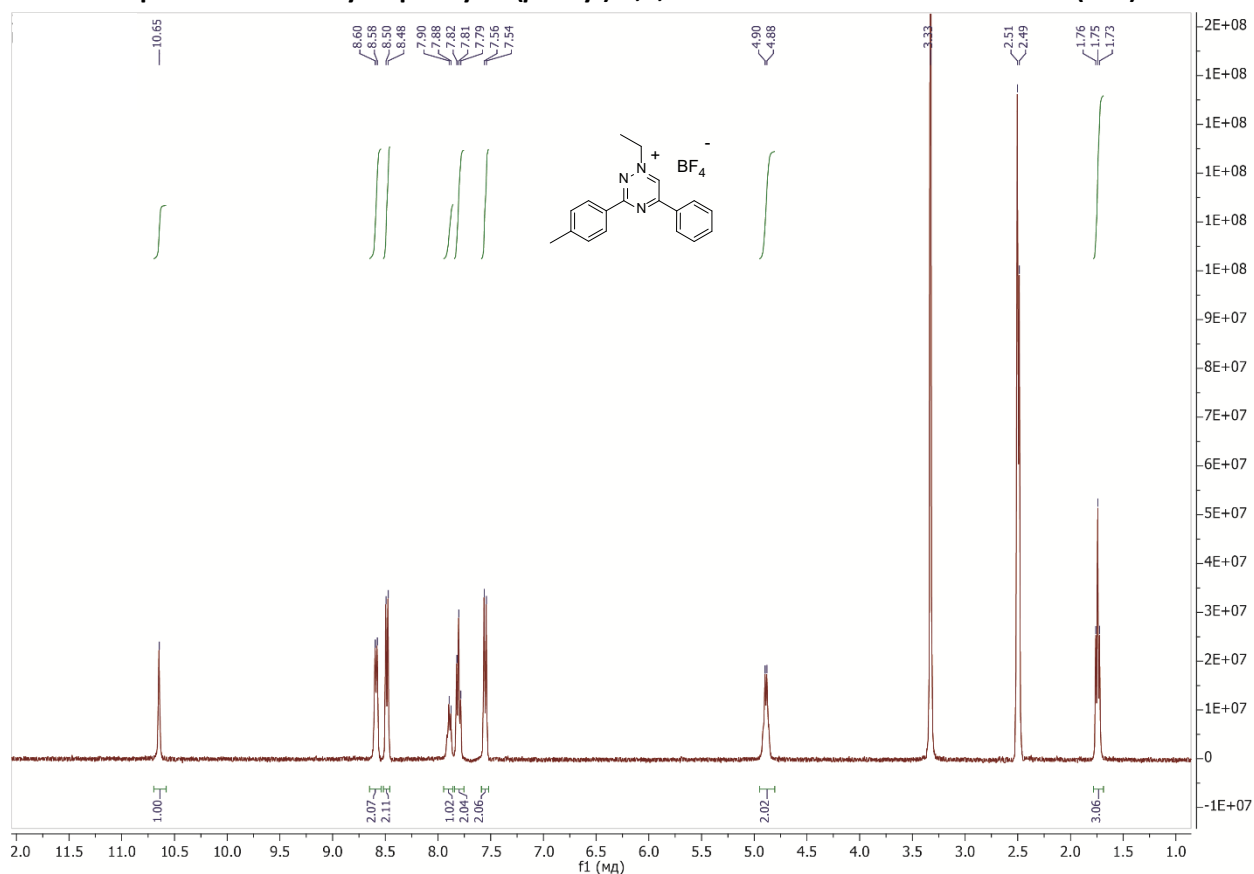


Figure S12. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of **11a**.

Spectrum of 5-(4-bromophenyl)-1-ethyl-3-(*p*-tolyl)-1,2,4-triazin-1-ium tetrafluoroborate (11b).

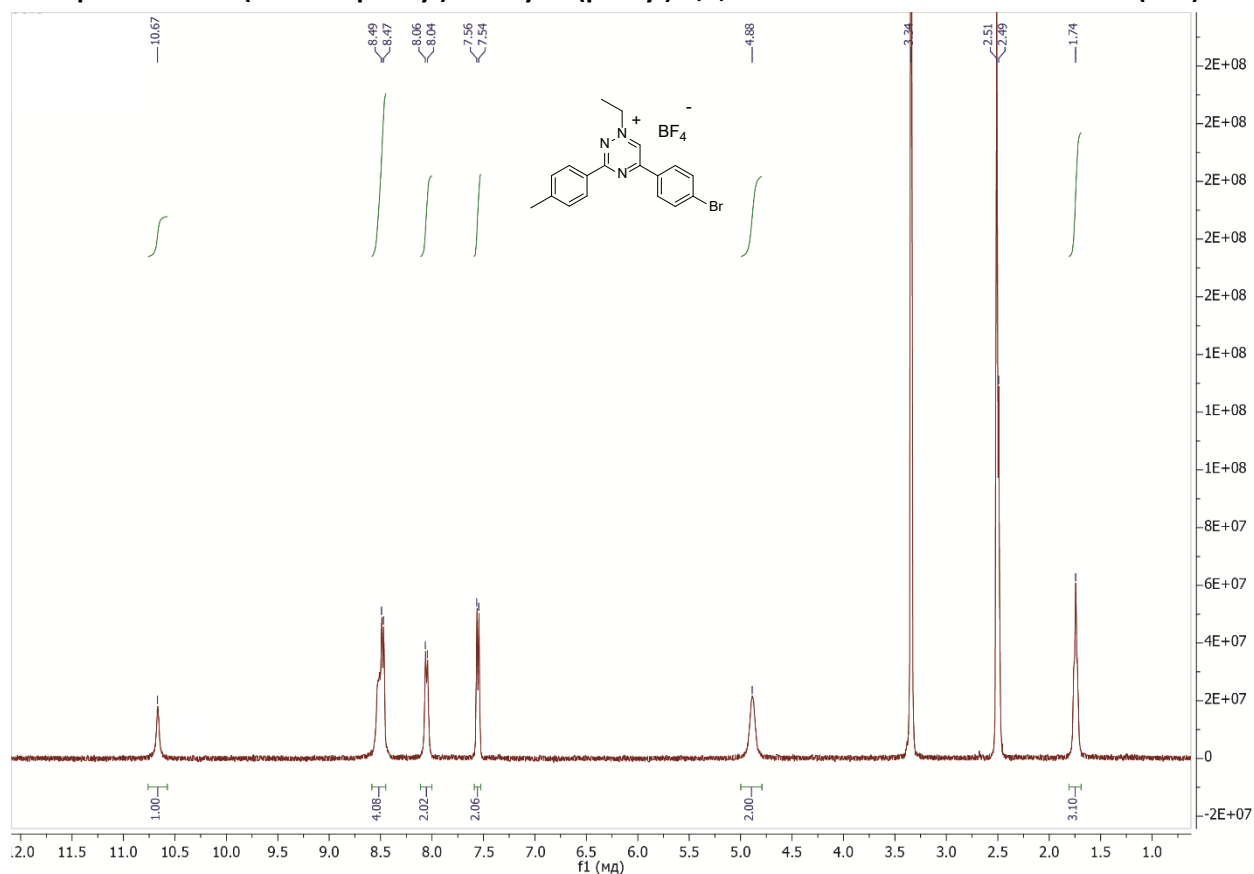


Figure S13. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of **11b**

Spectrum of 5-(3,4-dimethylphenyl)-1-ethyl-3-(*p*-tolyl)-1,2,4-triazin-1-ium tetrafluoroborate (**11e**).

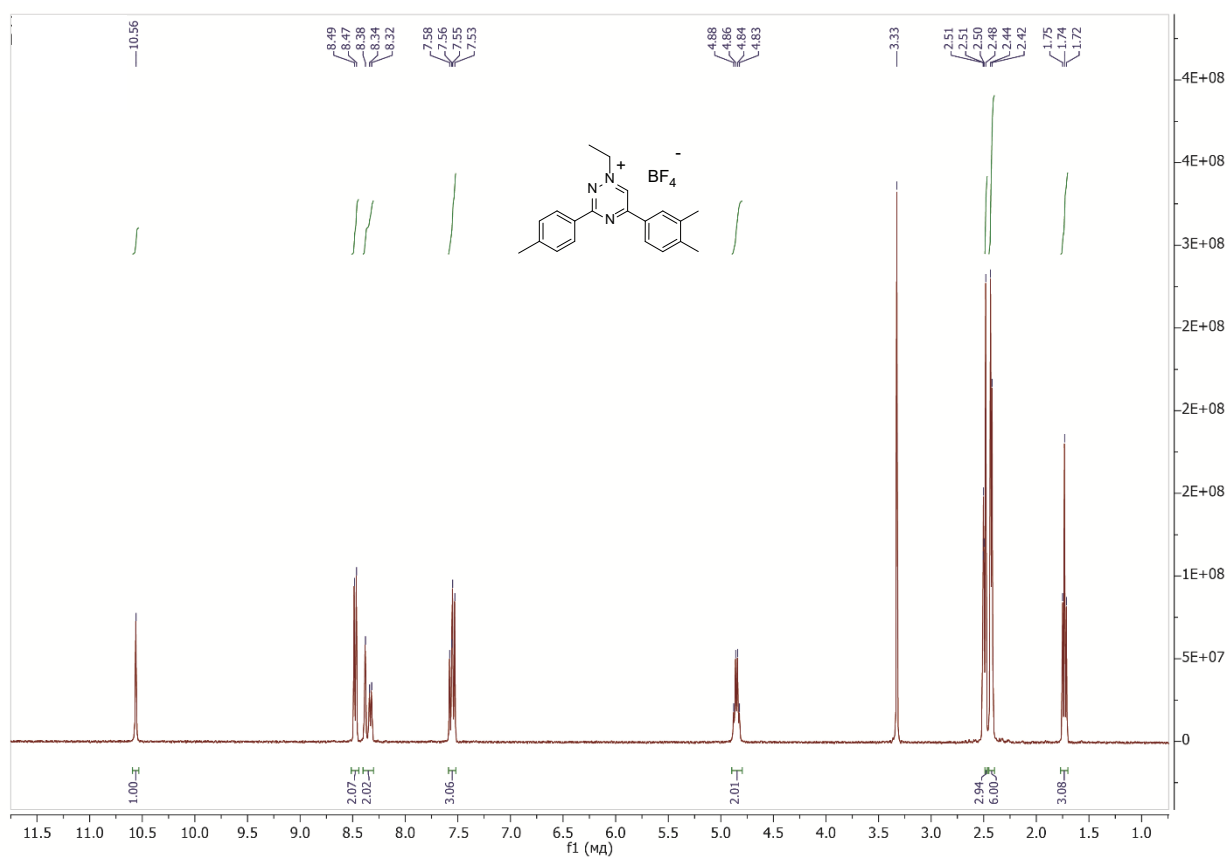


Figure S14. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of **11e**

Spectrum of 1-ethyl-5-(4-methoxyphenyl)-3-(*p*-tolyl)-1,2,4-triazin-1-ium tetrafluoroborate (**11f**).

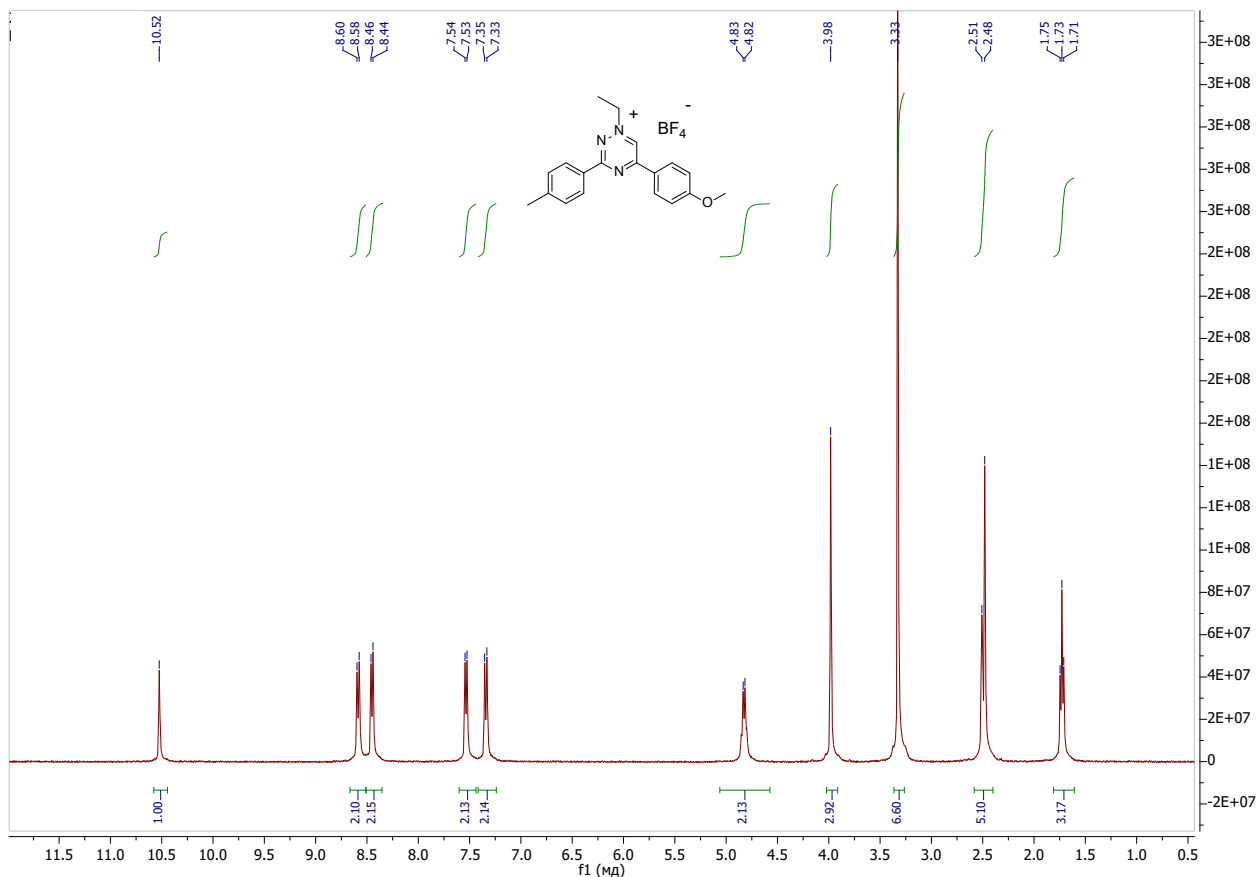


Figure S15. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of **11f**

Spectrum of 1-ethyl-5-(naphthalen-2-yl)-3-(*p*-tolyl)-1,2,4-triazin-1-ium tetrafluoroborate (**11g**).

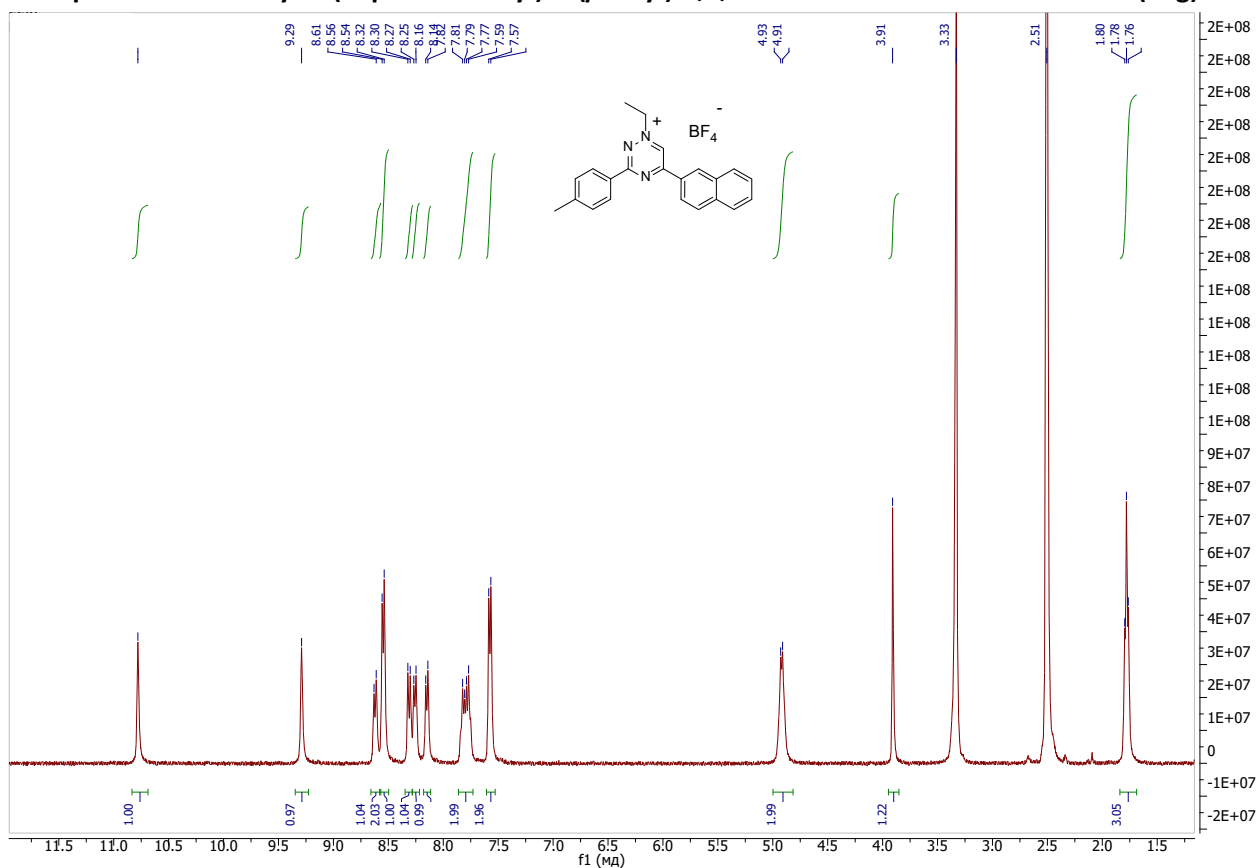


Figure S16. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of **11g**

Spectrum of 1-ethyl-5-phenyl-3-(thiophen-2-yl)-1,2,4-triazin-1-ium tetrafluoroborate (**12a**).

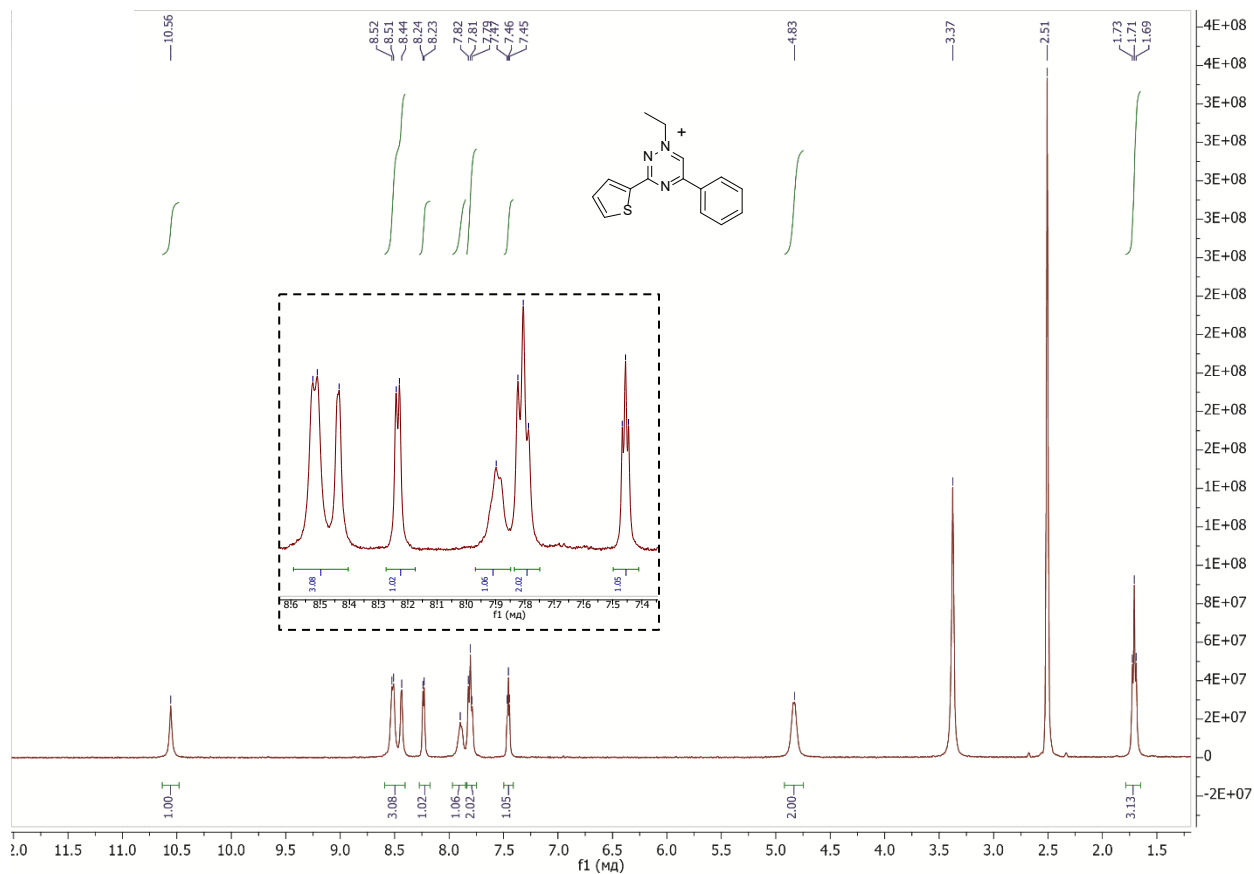


Figure S17. ^1H NMR (400 MHz, $\text{DMSO}-d_6$) spectra of **12a**

Spectrum of 1-ethyl-5-(4-methoxyphenyl)-3-(thiophen-2-yl)-1,2,4-triazin-1-ium tetrafluoroborate (**12f**).

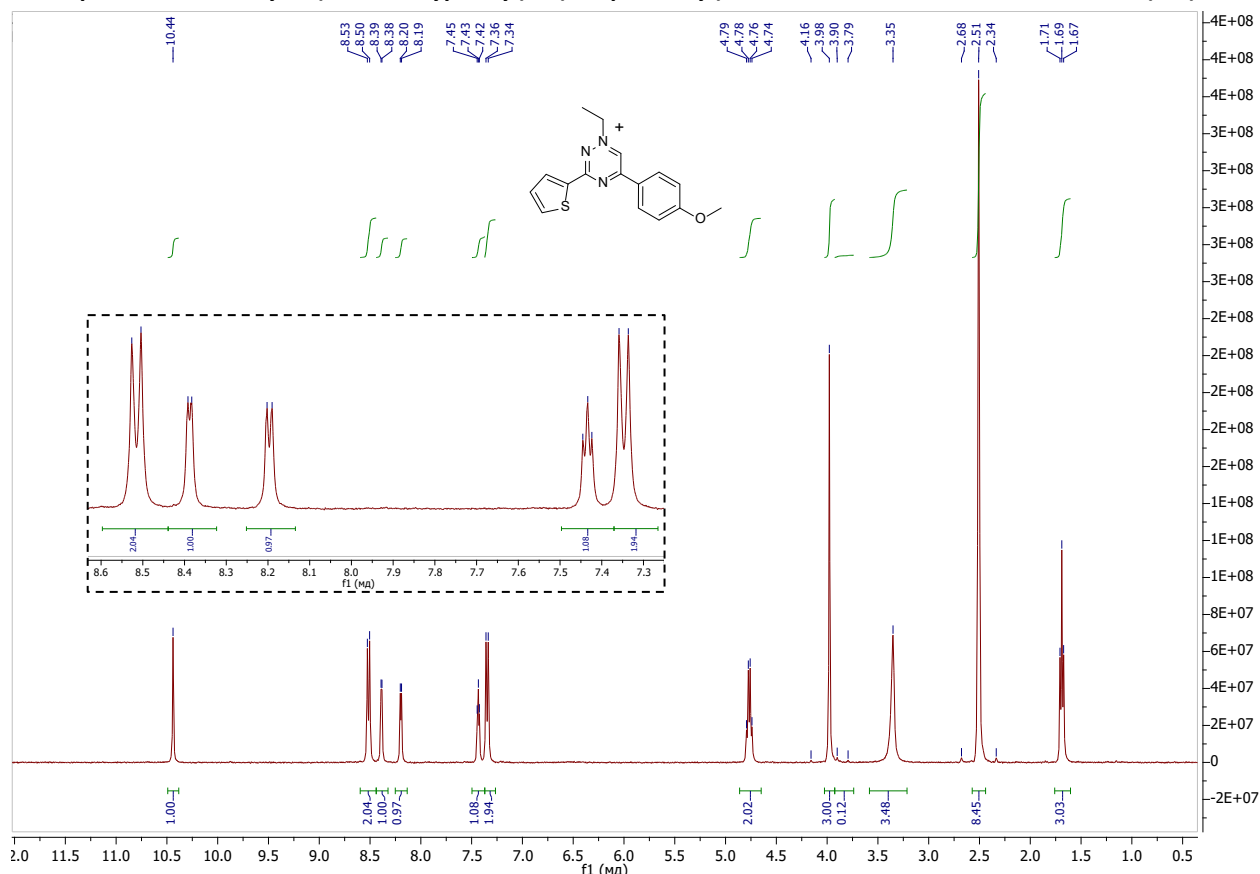


Figure S18. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of **12f**

Spectrum of 1-ethyl-5-(naphthalen-2-yl)-3-(thiophen-2-yl)-1,2,4-triazin-1-ium tetrafluoroborate (**12g**).

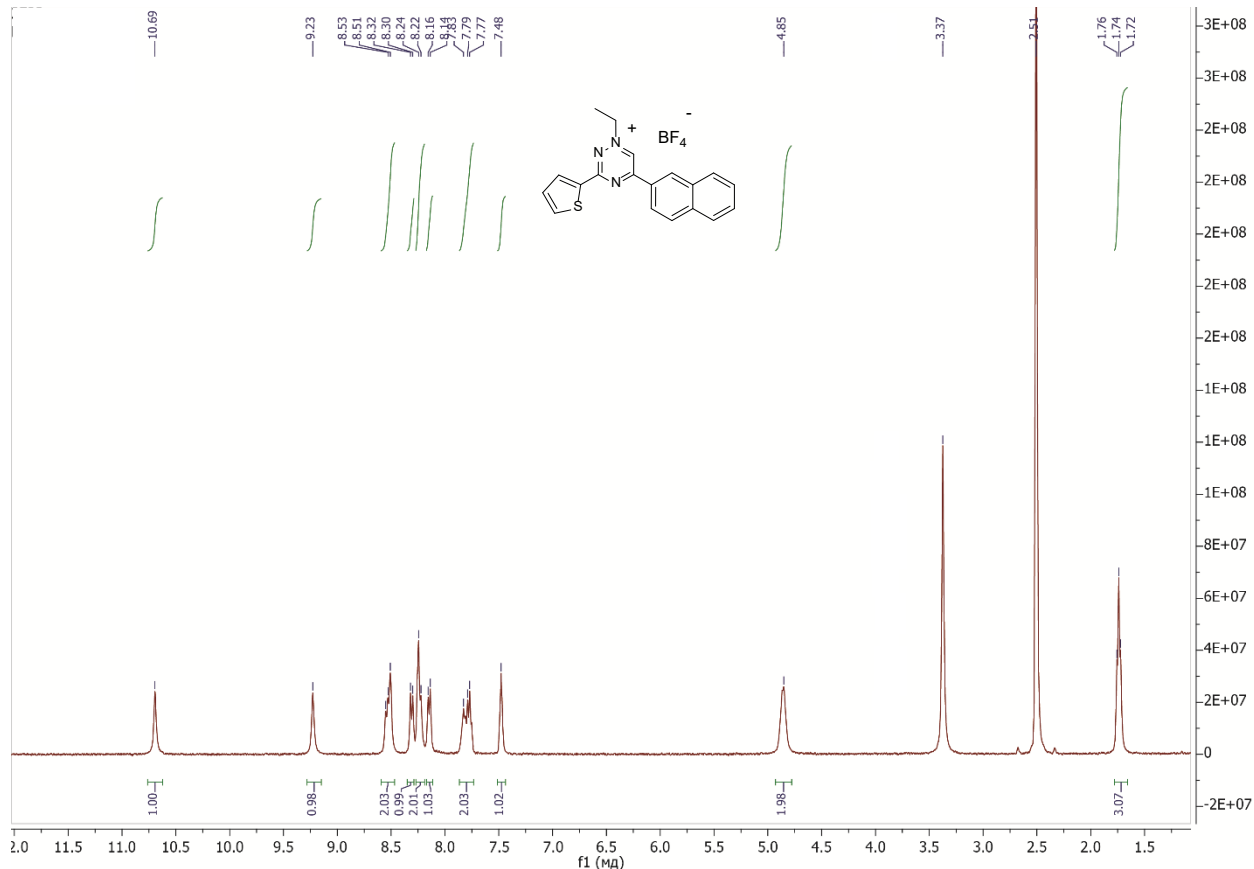


Figure S19. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of **12g**

Spectrum of 1-ethyl-3,5-di(thiophen-2-yl)-1,2,4-triazin-1-ium tetrafluoroborate (**12h**).

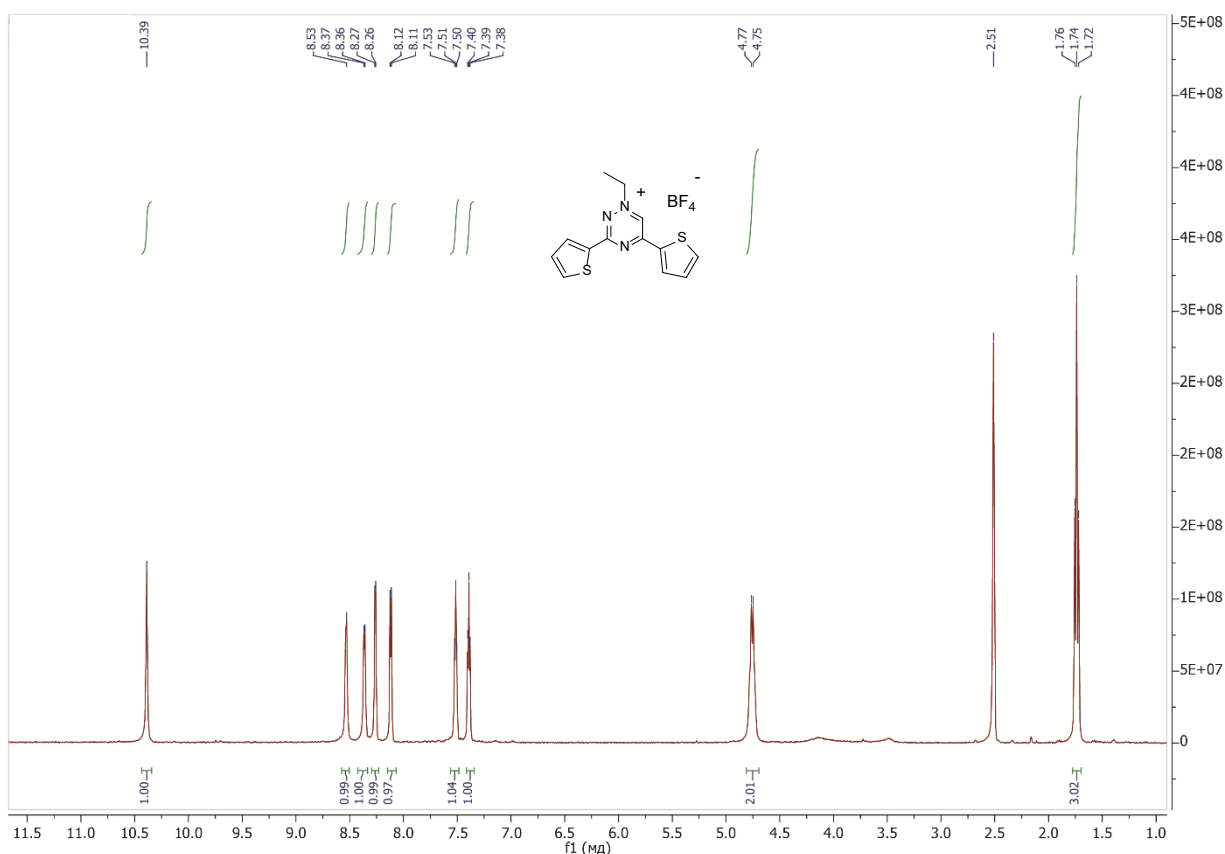


Figure S20. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of **12h**

Spectrum of 3-(4-chlorophenyl)-1-ethyl-5-phenyl-1,2,4-triazin-1-ium tetrafluoroborate (**13a**).

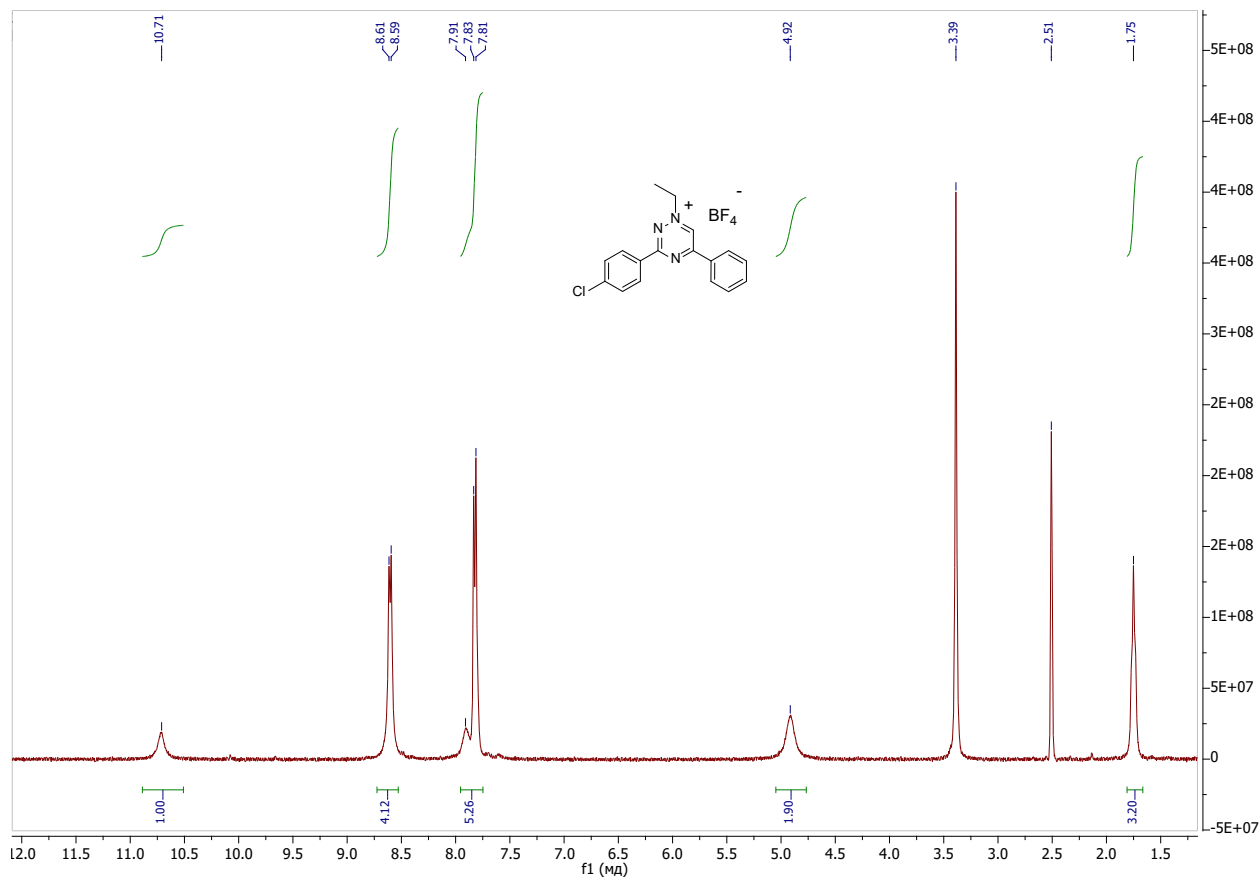


Figure S21. ¹H NMR (400 MHz, DMSO-*d*₆) spectra of **13a**

Spectra of compounds
Dimethyl 7-methyl-2,4-diphenylpyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (14a)

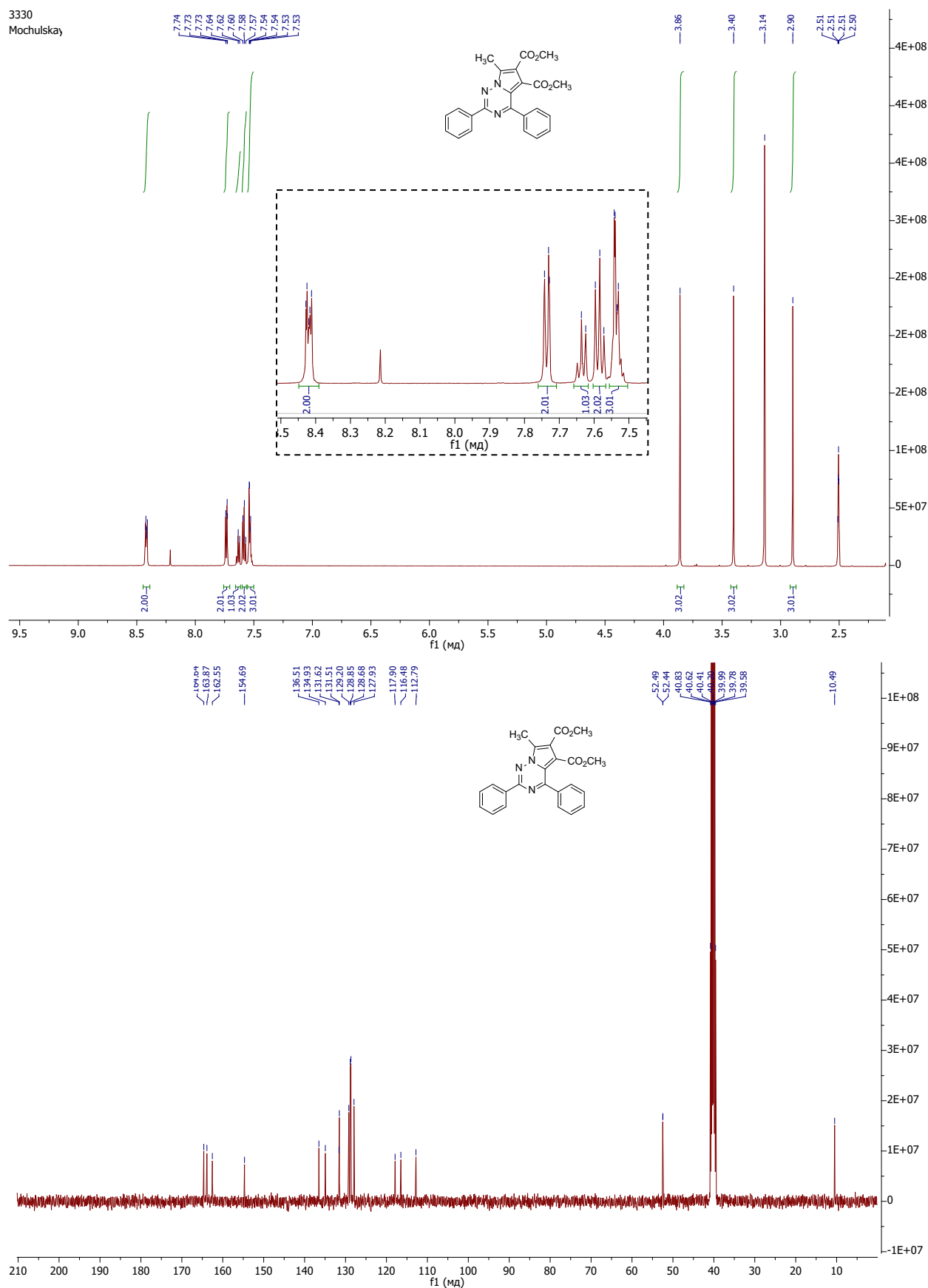


Figure S22. ¹H NMR (600 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆, t = 50 °C) spectra of **14a**

Spectra of compounds
Dimethyl 4-(4-bromophenyl)-7-methyl-2-phenylpyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (14b)

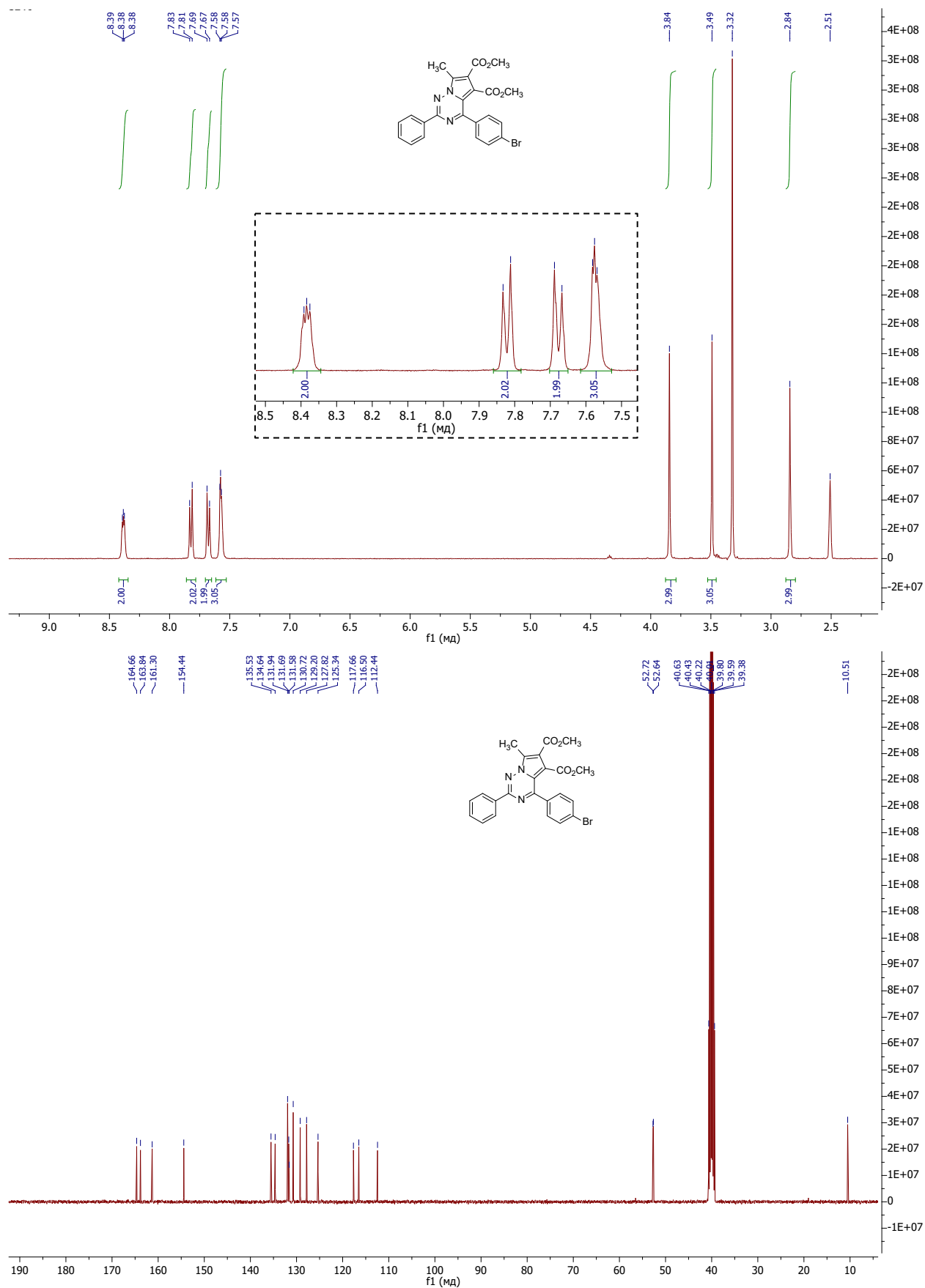


Figure S23. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **14b**

Spectra of compounds
Dimethyl 7-methyl-2-phenyl-4-(*p*-tolyl)pyrrolo[2,1-*f*][1,2,4]triazine-5,6-dicarboxylate (14d**)**

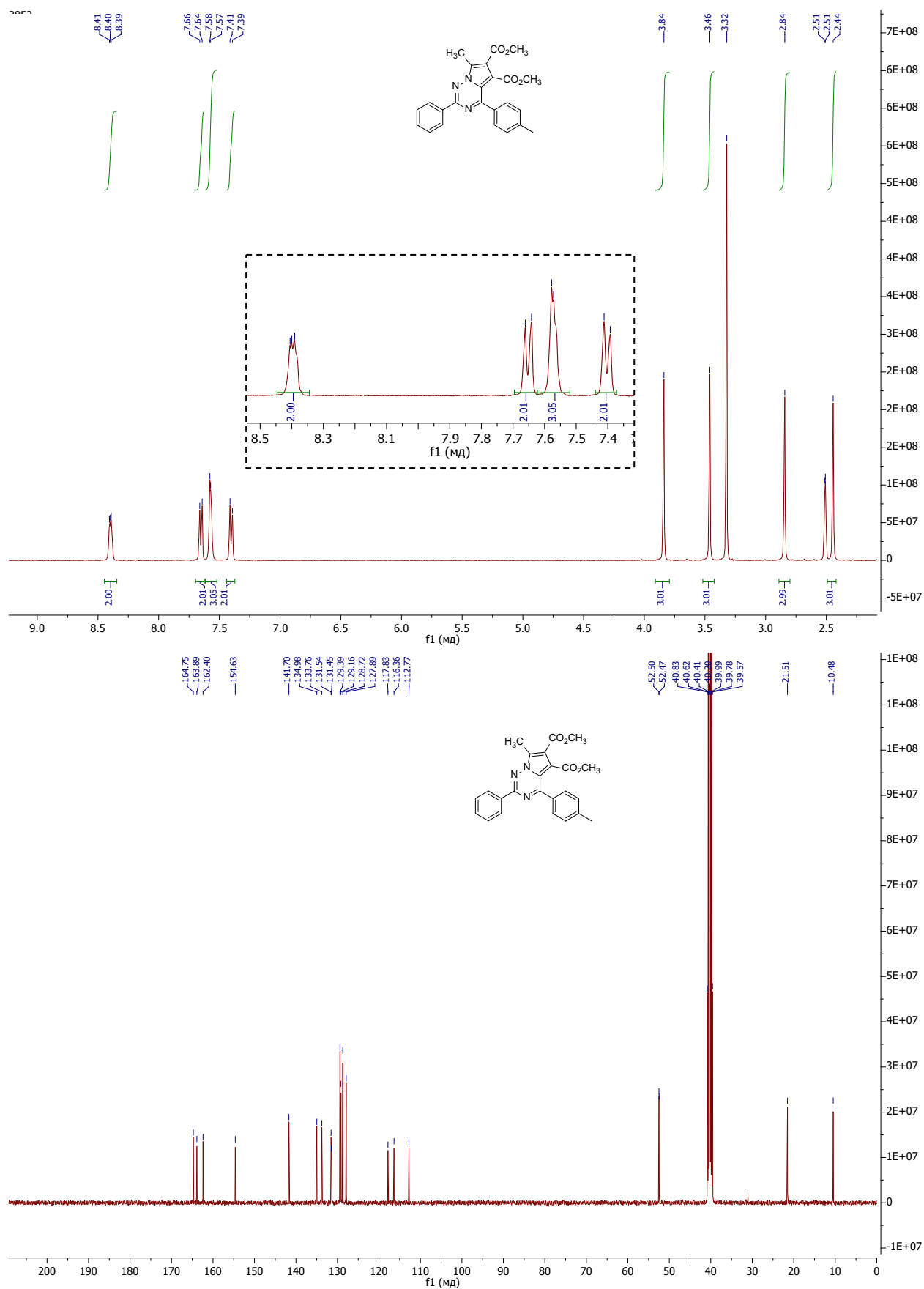


Figure S24. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆, *t* = 50 °C) spectra of **14d**

Spectra of compounds

Dimethyl 4-(3,4-dimethylphenyl)-7-methyl-2-phenylpyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (**14e**)

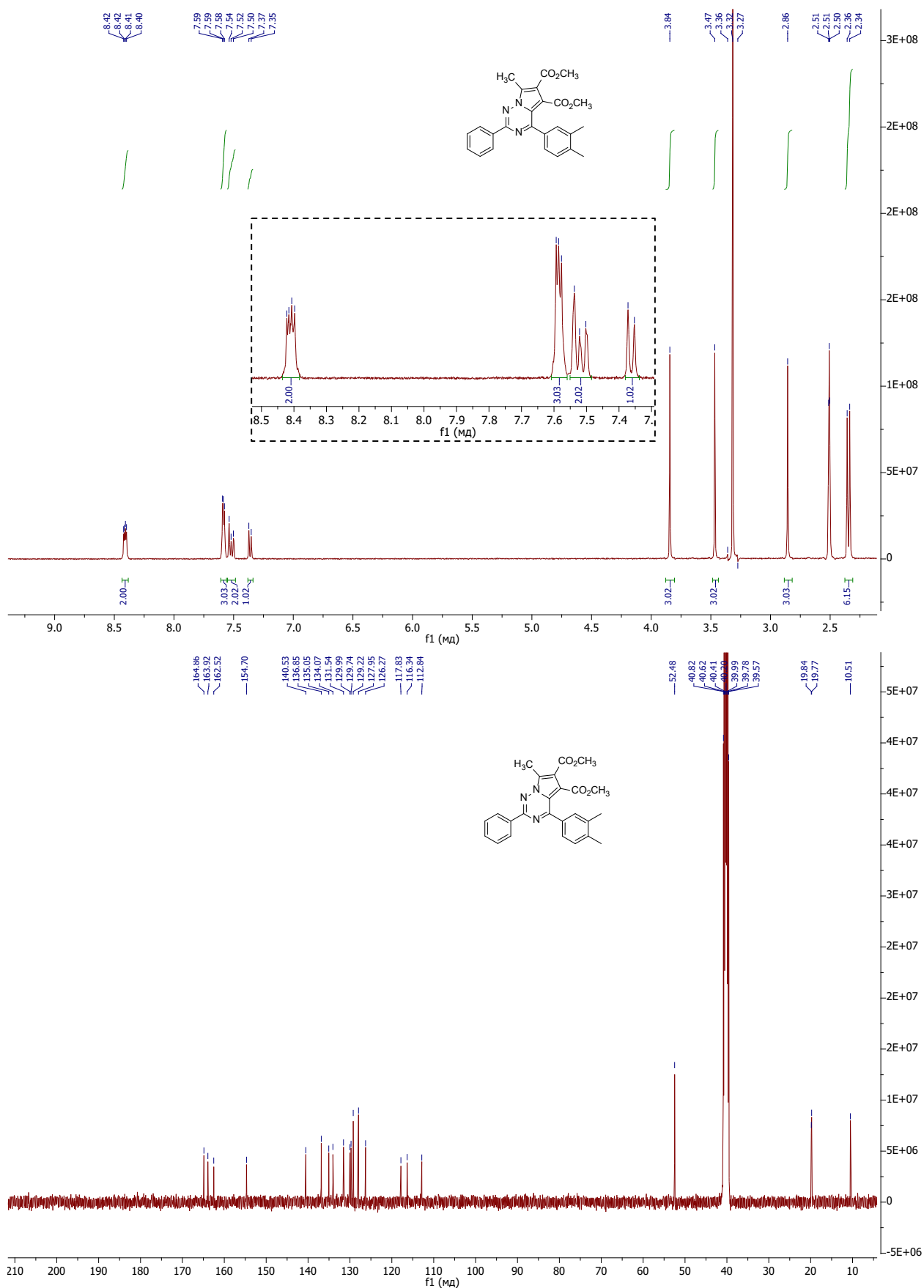


Figure S25. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆, t = 50 °C) spectra of **14d**

Spectra of compounds
Dimethyl 4-(4-methoxyphenyl)-7-methyl-2-phenylpyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (14f)

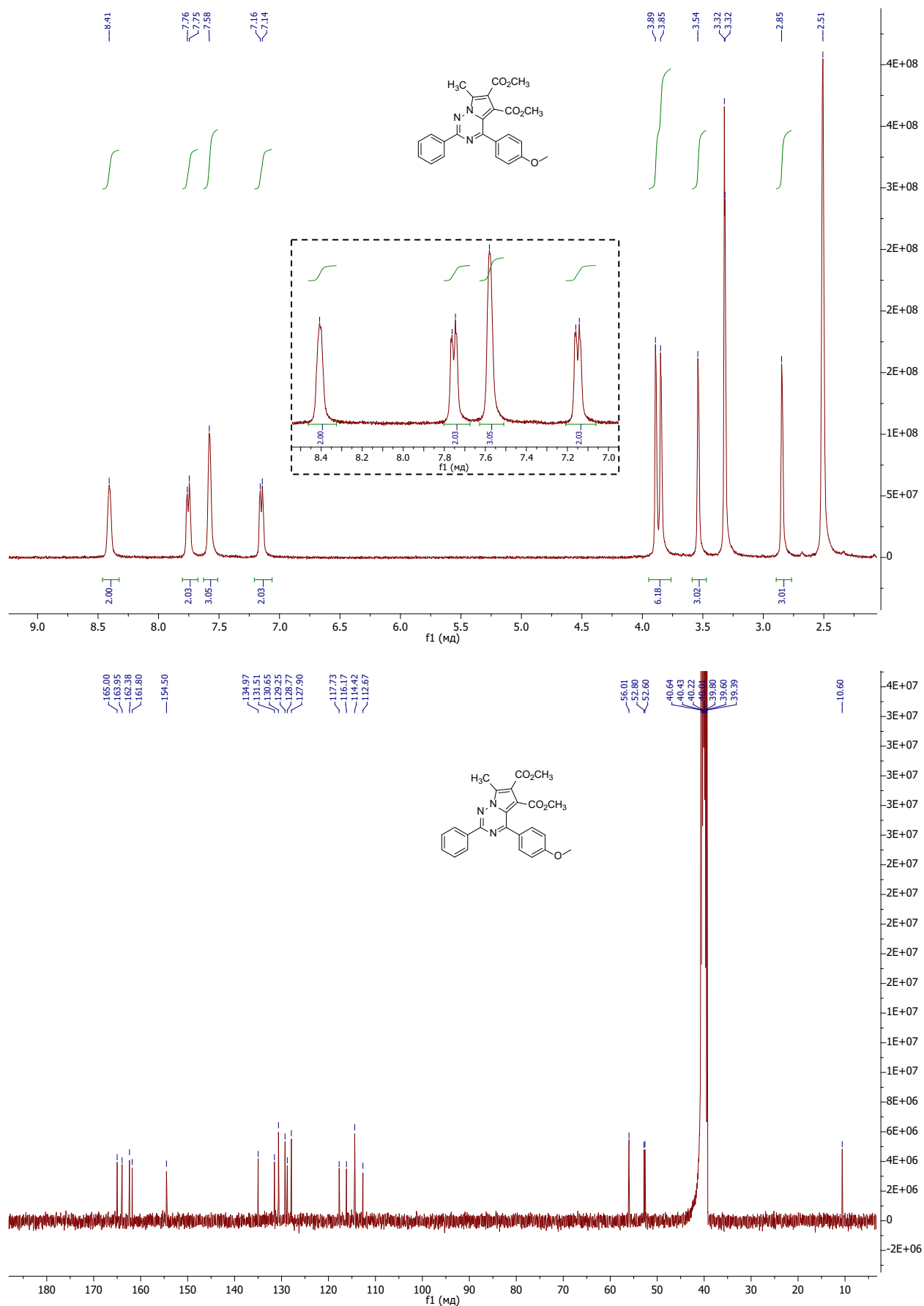


Figure S26. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **14f**

Spectra of compounds

Dimethyl 7-methyl-4-(naphthalen-2-yl)-2-phenylpyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (**14g**)

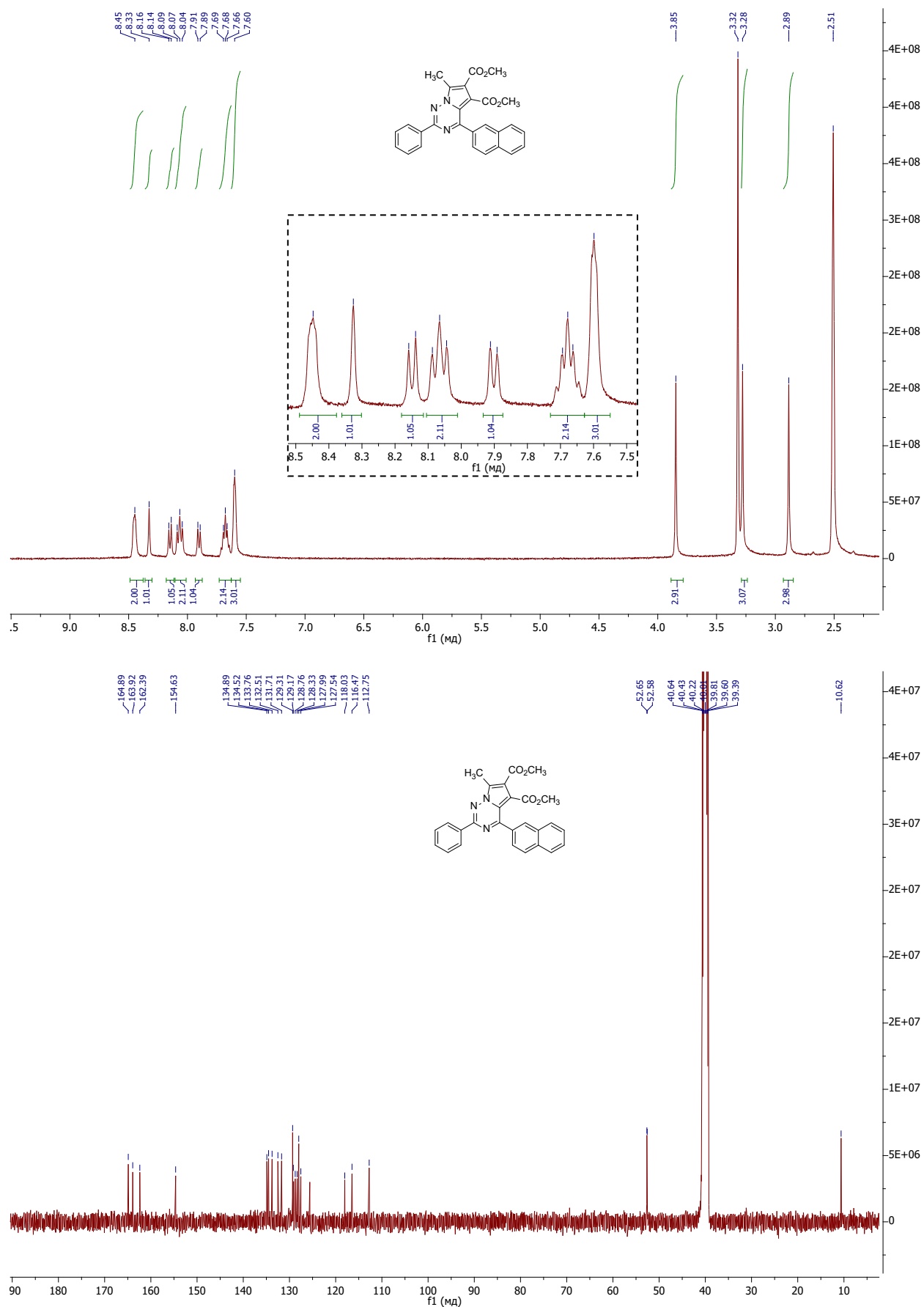


Figure S27. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **14g**

Spectra of compounds
Dimethyl 7-methyl-2-phenyl-4-(thiophen-2-yl)pyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (14h)

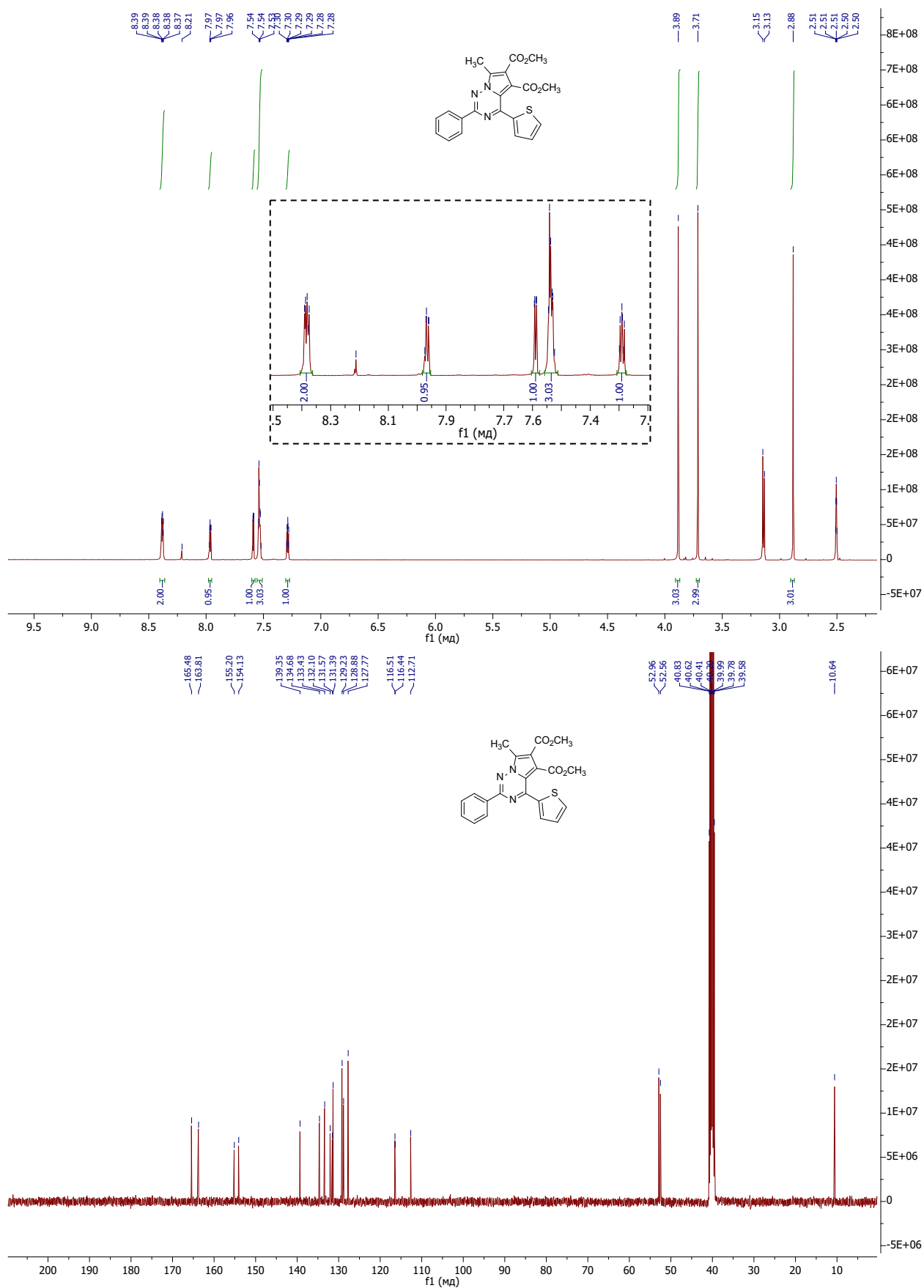


Figure S28. ¹H NMR (600 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆, t = 50 °C) spectra of **14h**

Spectra of compounds
Dimethyl 7-methyl-4-phenyl-2-*p*-tolylpyrrolo[2,1-*f*][1,2,4]triazine-5,6-dicarboxylate (15a**)**

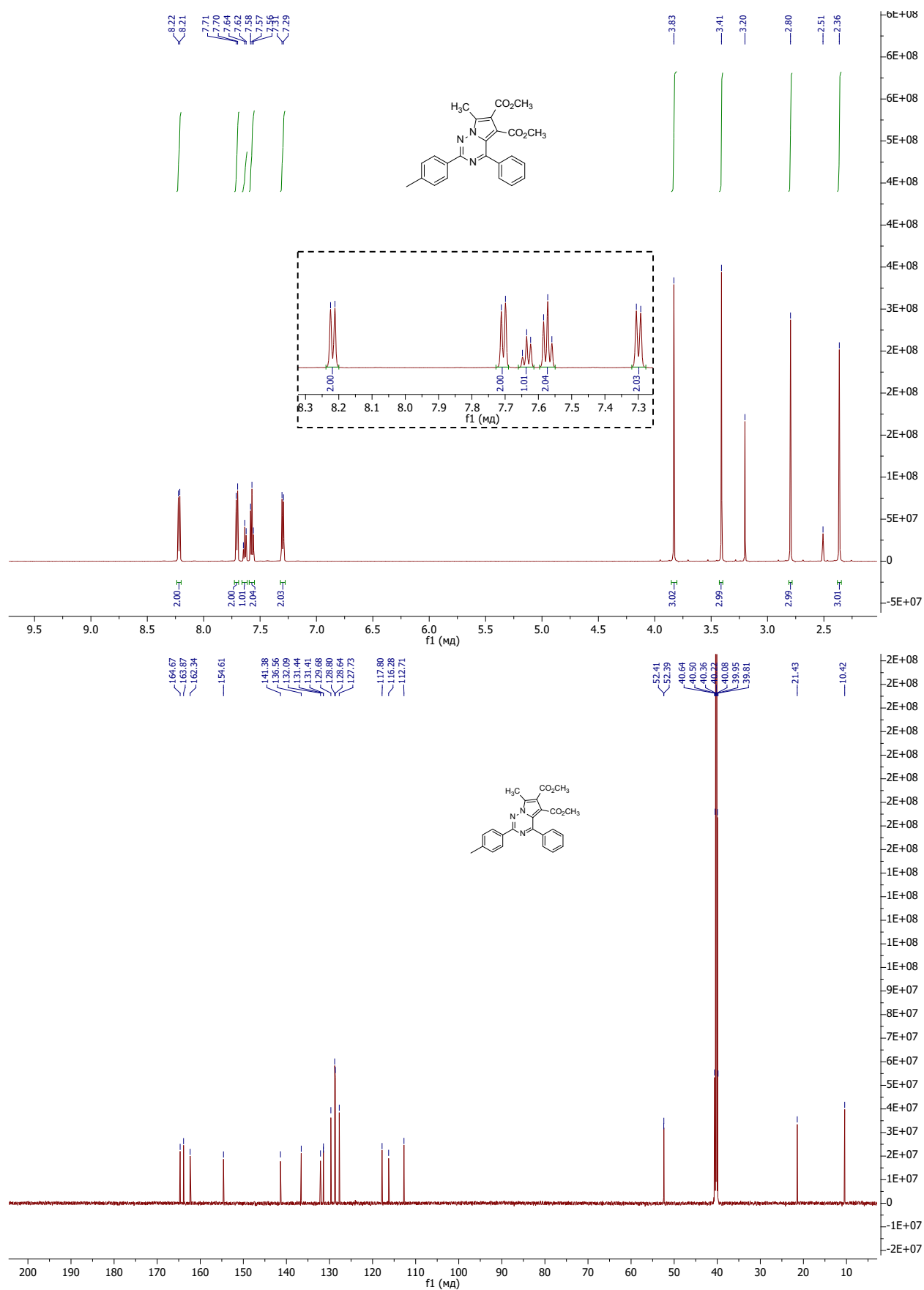


Figure S29. ¹H NMR (600 MHz, DMSO-*d*₆, t = 60 °C) and ¹³C NMR (151 MHz, DMSO-*d*₆, t = 60 °C) spectra of **15a**

Spectra of compounds
Dimethyl 4-(4-bromophenyl)-7-methyl-2-*p*-tolylpyrrolo[2,1-*f*][1,2,4]triazine-5,6-dicarboxylate (15b**)**

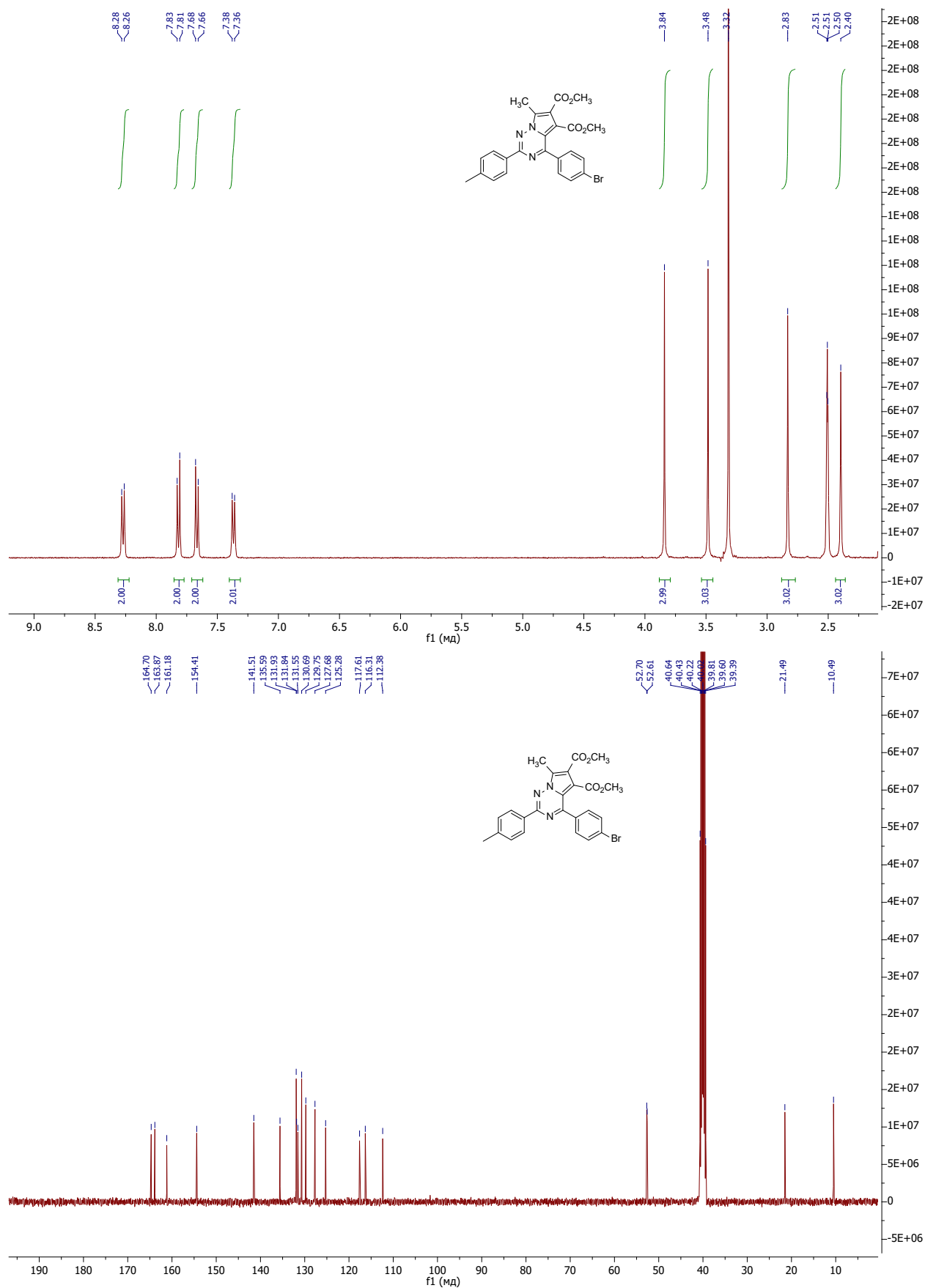


Figure S30. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **15b**

Spectra of compounds
Dimethyl 4-(4-chlorophenyl)-7-methyl-2-*p*-tolylpyrrolo[2,1-*f*][1,2,4]triazine-5,6-dicarboxylate (15c**)**

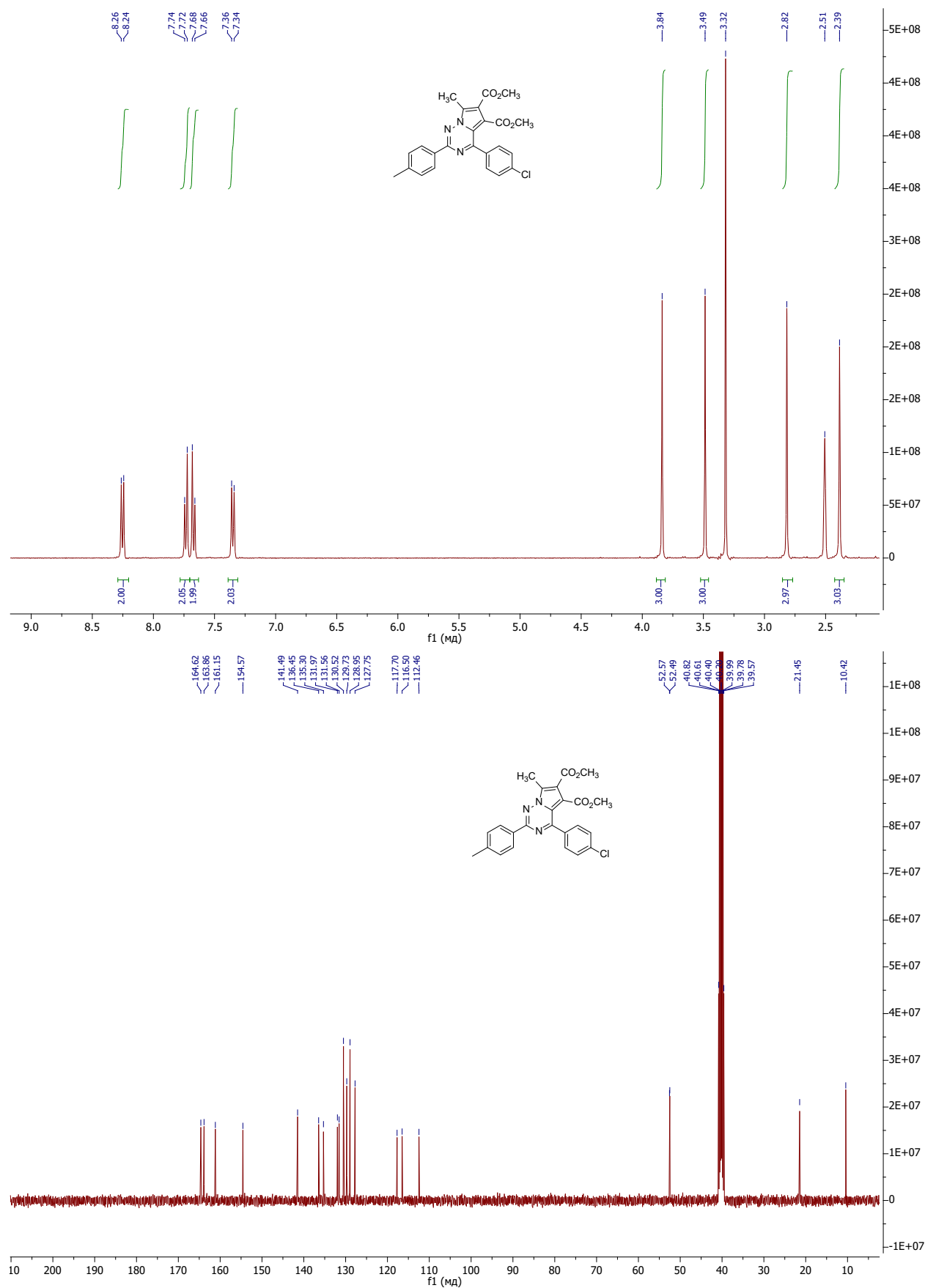


Figure S31. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆, *t* = 50 °C) spectra of **15c**

Spectra of compounds
**Dimethyl 4-(3,4-dimethylphenyl)-7-methyl-2-*p*-tolyl-
pyrrolo[2,1-*f*][1,2,4]triazine-5,6-dicarboxylate (15e)**

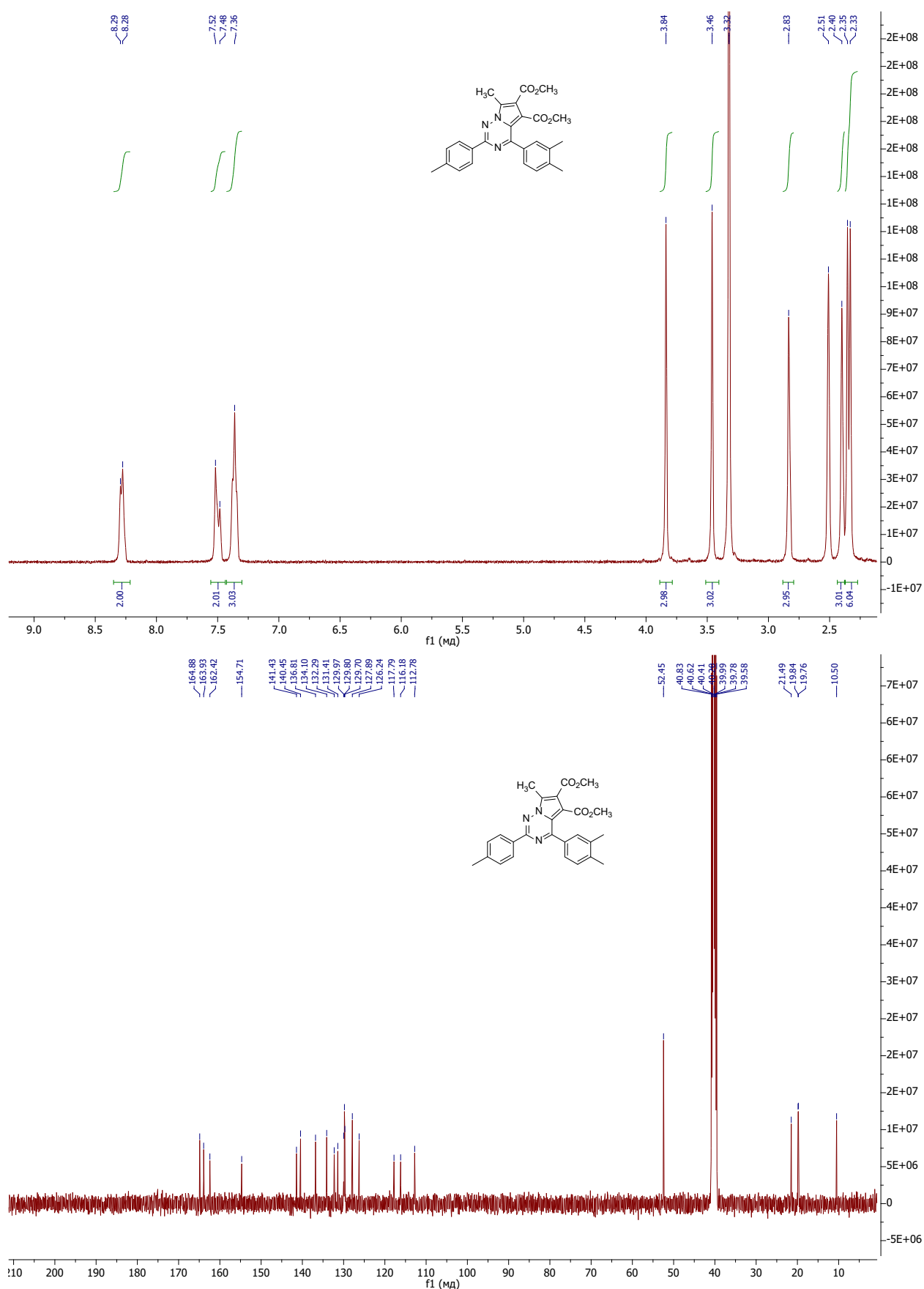


Figure S32. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆, t = 50 °C) spectra of **15e**

Spectra of compounds
Dimethyl 4-(4-methoxyphenyl)-7-methyl-2-*p*-tolylpyrrolo[2,1-*f*][1,2,4]triazine-5,6-dicarboxylate (15f**)**

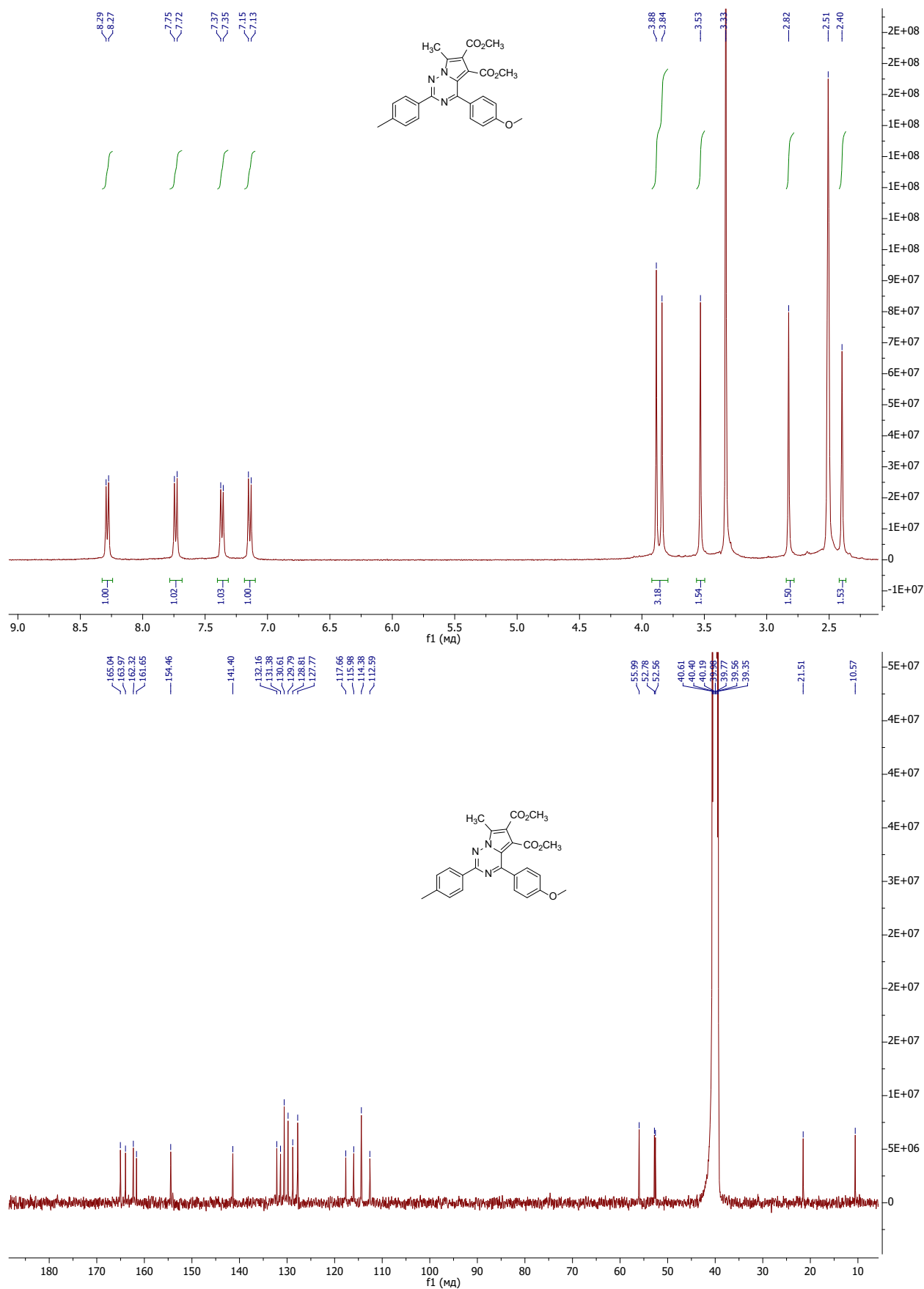


Figure S33. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **15f**

Spectra of compounds

Dimethyl 7-methyl-4-(naphthalen-2-yl)-2-*p*-tolylpyrrolo[2,1-*f*][1,2,4]triazine-5,6-dicarboxylate (**15g**)

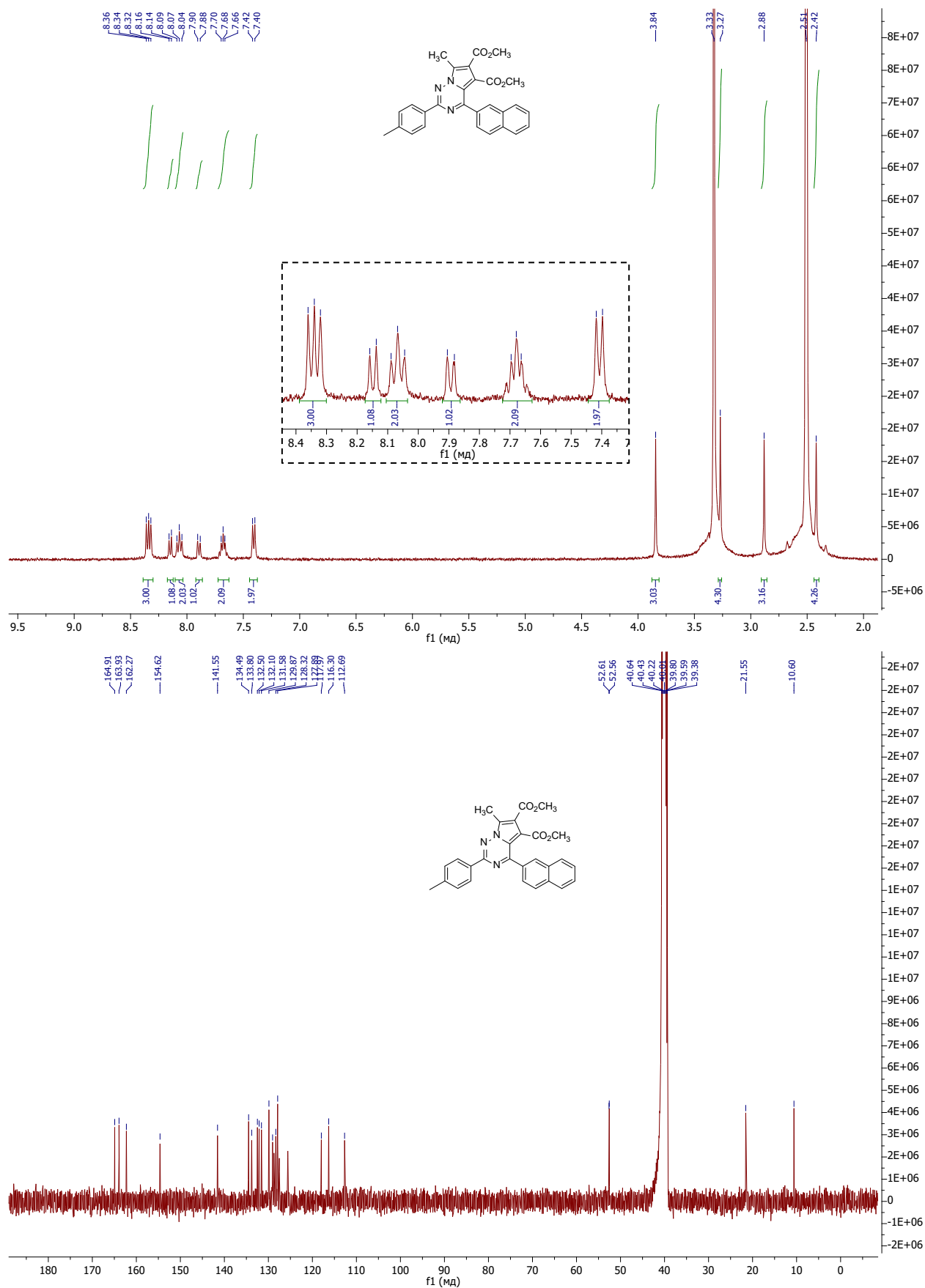


Figure S34. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **15g**

Spectra of compounds
Dimethyl 7-methyl-4-phenyl-2-(thiophen-2-yl)pyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (16a)

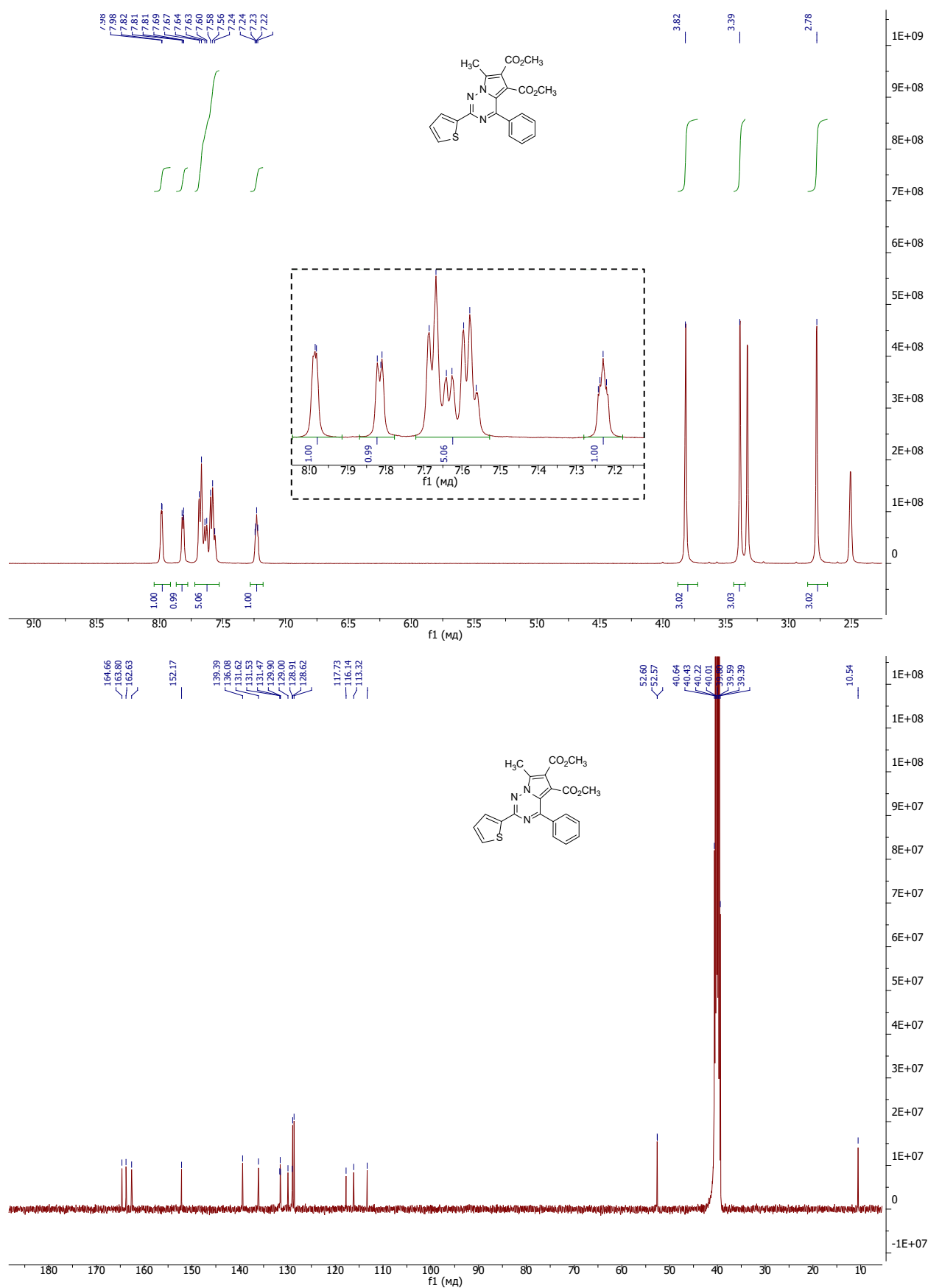


Figure S35. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **16a**

Spectra of compounds
Dimethyl 4-(4-methoxyphenyl)-7-methyl-2-(thiophen-2-yl)-
pyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (16f)

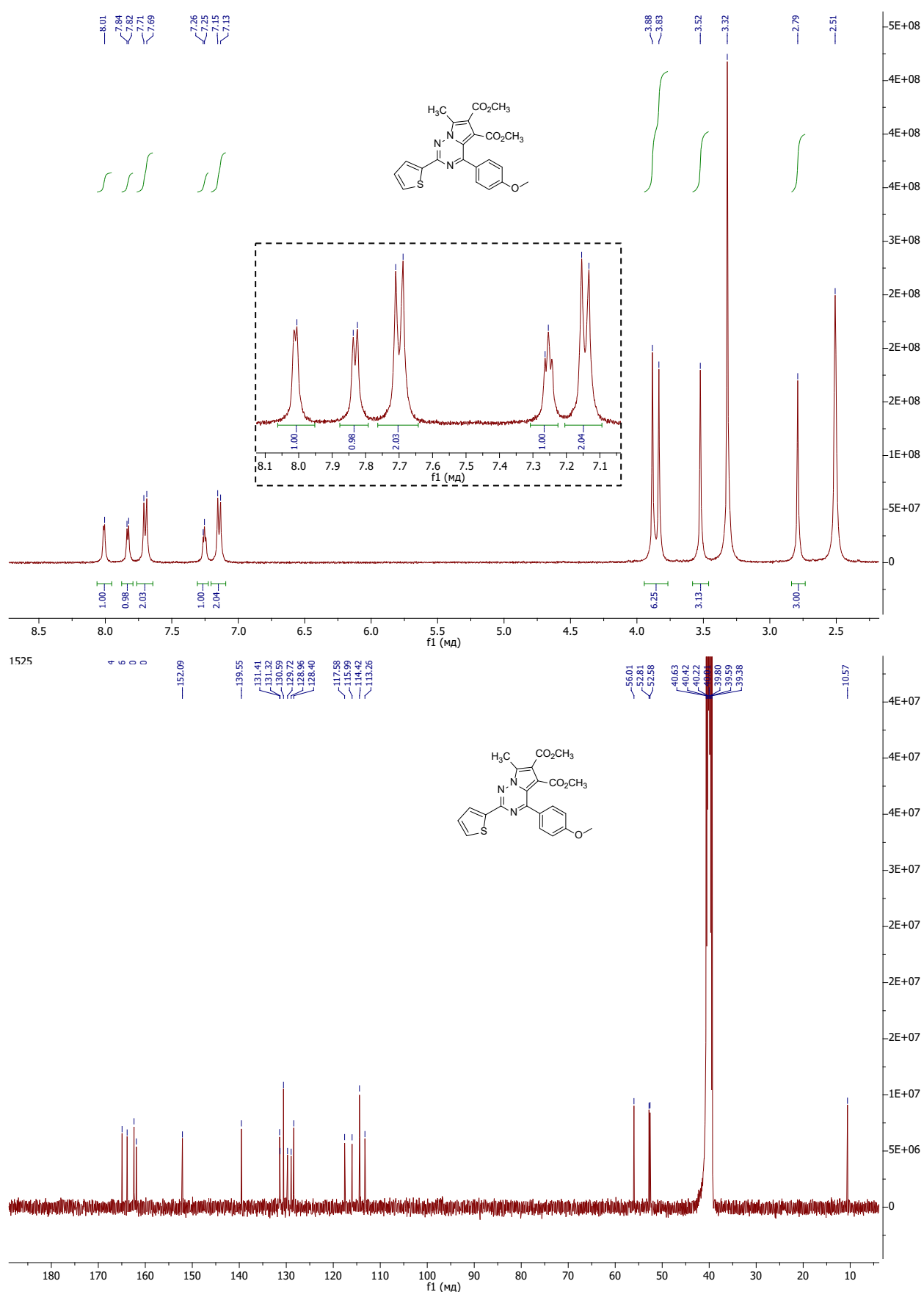


Figure S36. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **16f**

Spectra of compounds
Dimethyl 7-methyl-4-(naphthalen-2-yl)-2-(thiophen-2-yl)-
pyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (16g)

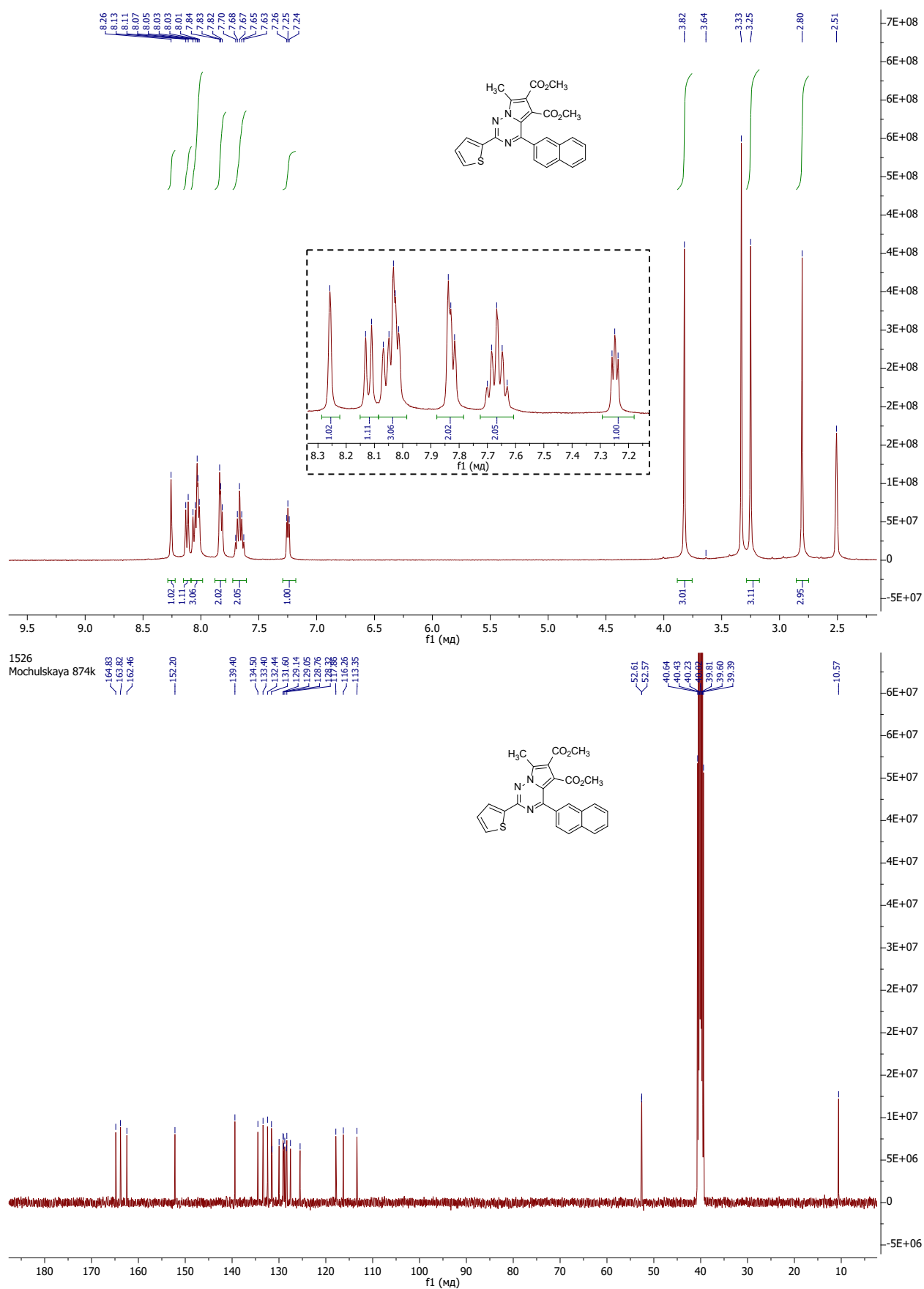


Figure S37. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **16g**

Spectra of compounds
Dimethyl 7-methyl-2,4-di(thiophen-2-yl)pyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (16h)

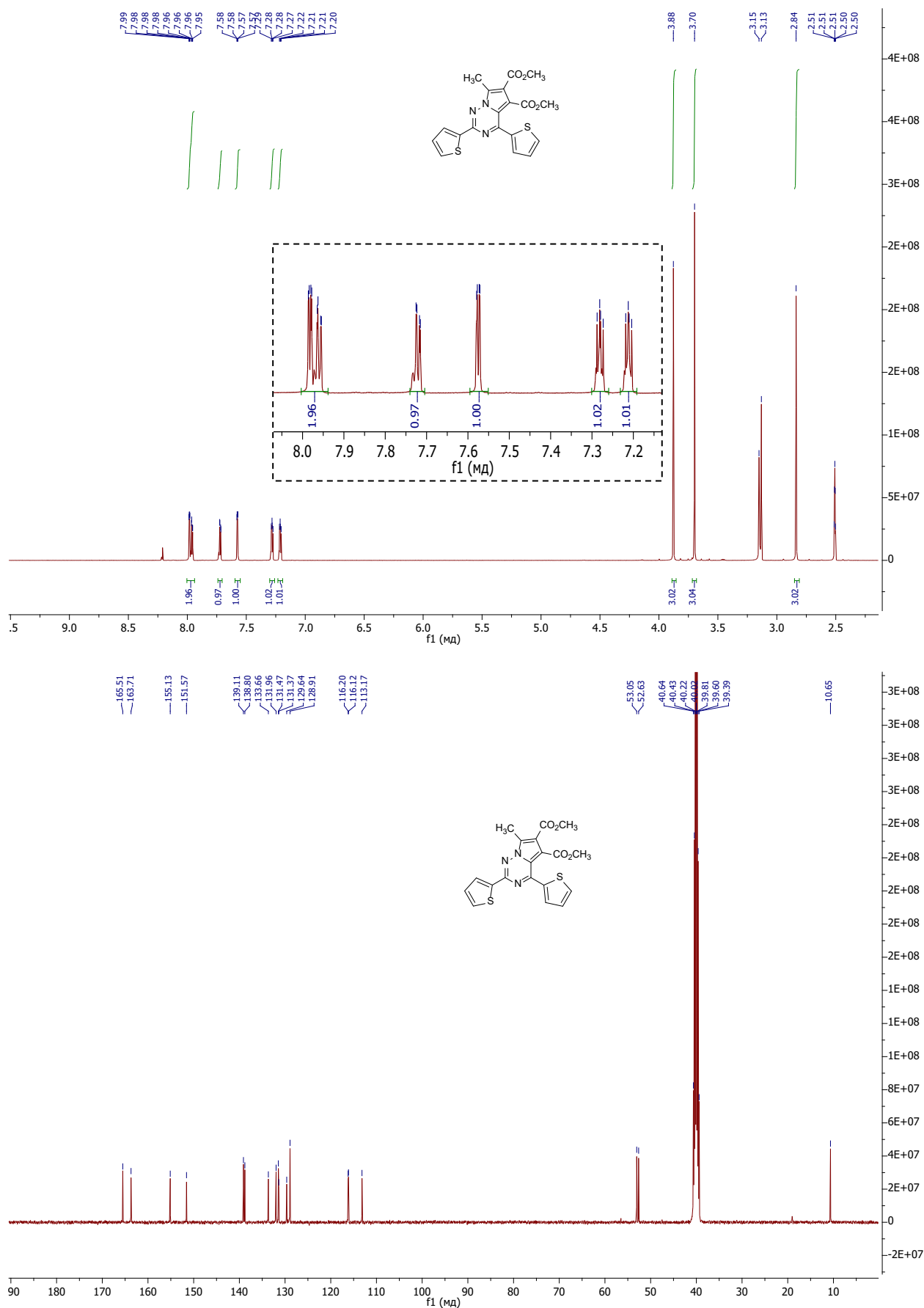


Figure S38. ¹H NMR (600 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆) spectra of **16h**

Spectra of compounds
Dimethyl 2-(4-chlorophenyl)-7-methyl-4-phenylpyrrolo[2,1-f][1,2,4]triazine-5,6-dicarboxylate (17a)

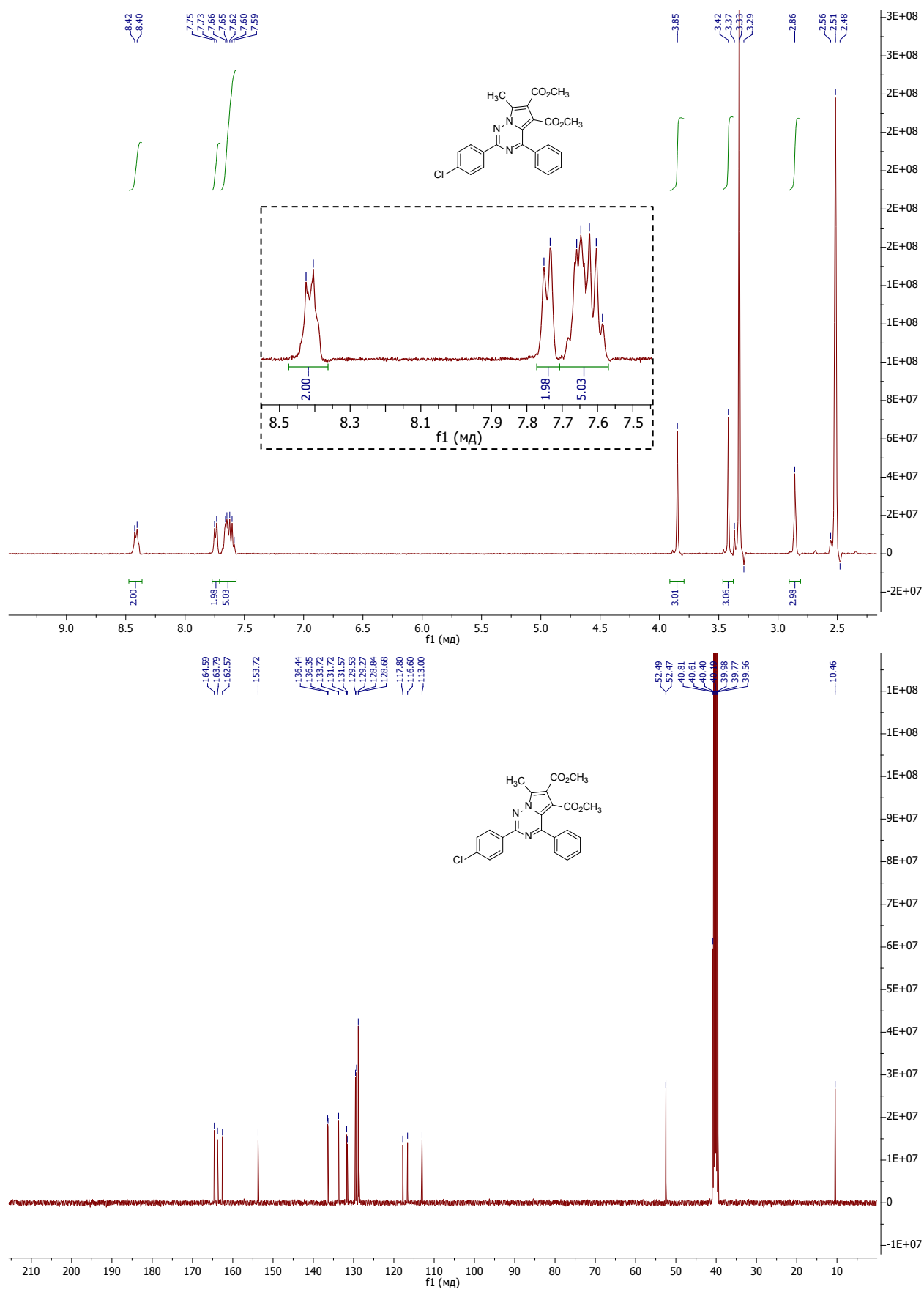


Figure S39. ¹H NMR (400 MHz, DMSO-*d*₆) and ¹³C NMR (101 MHz, DMSO-*d*₆, t = 50 °C) spectra of **17a**