

Acid-Induced Rearrangement of Epoxygermacranolides: Synthesis of Furanoheliangolides and Cadinanes from Nobilin

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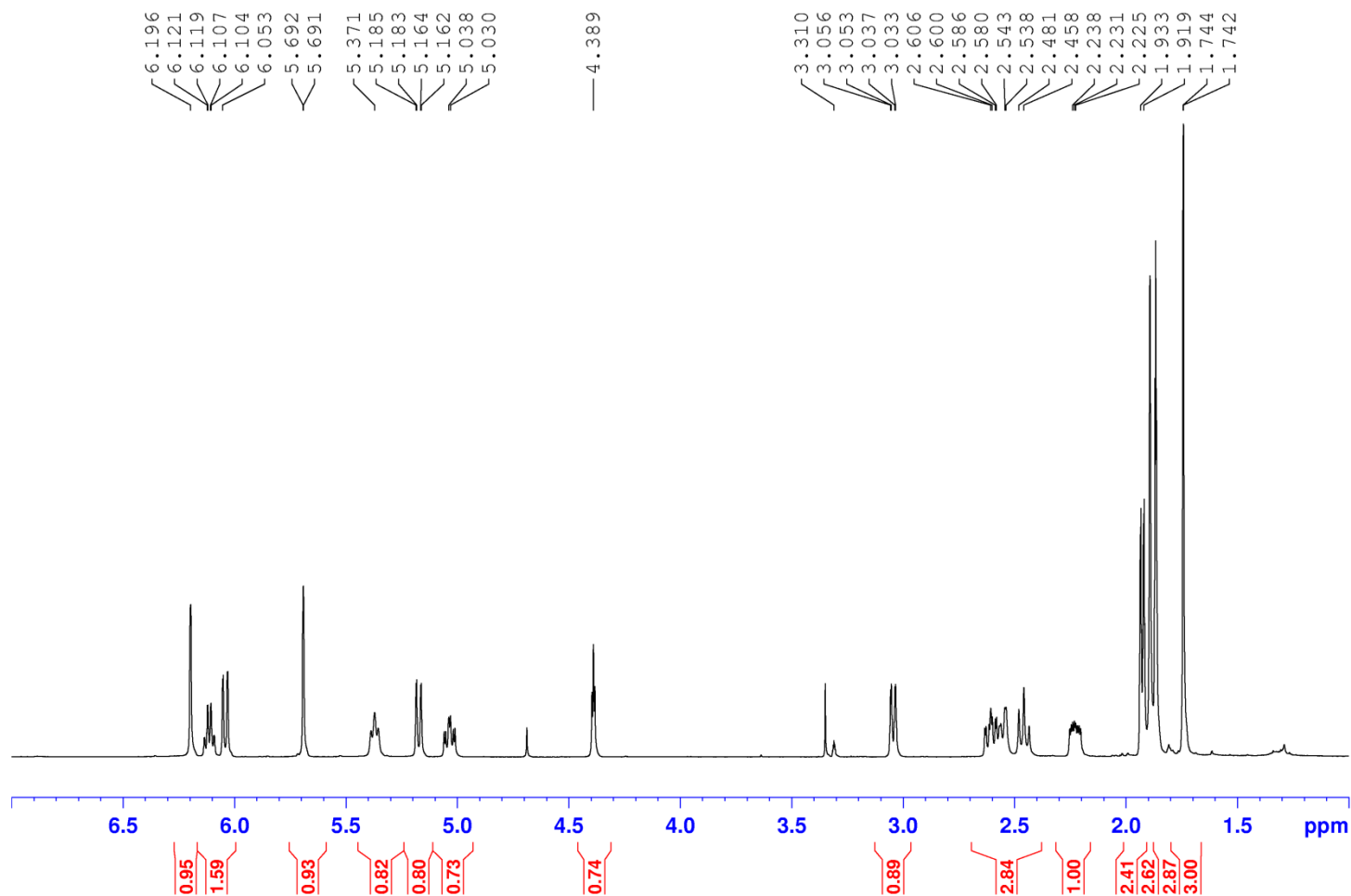


Fig. S1. ¹H NMR spectrum of nobilin 1 in CD₃OD.

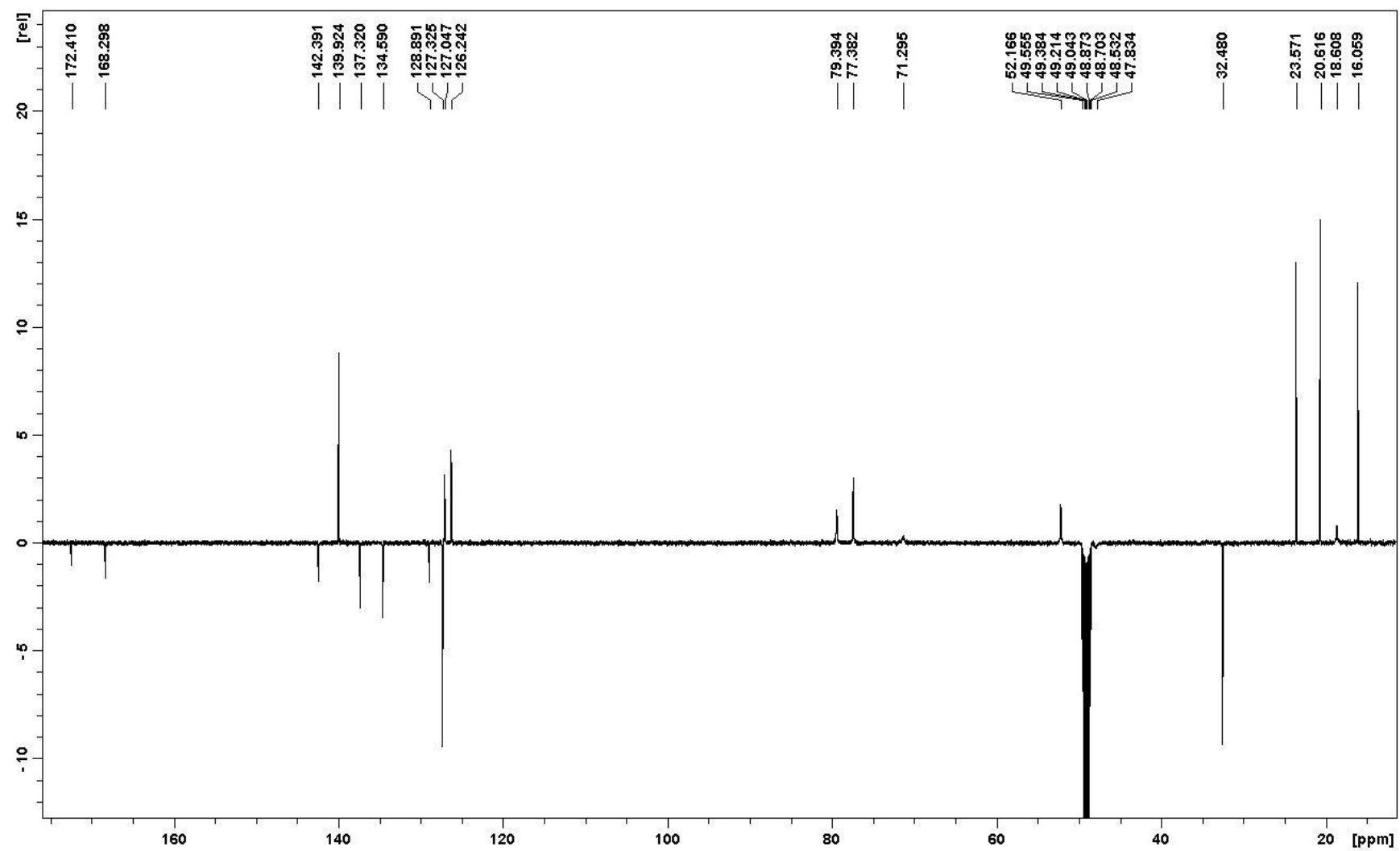


Fig. S2. ¹³C spectrum of nobilin 1 in CD₃OD.

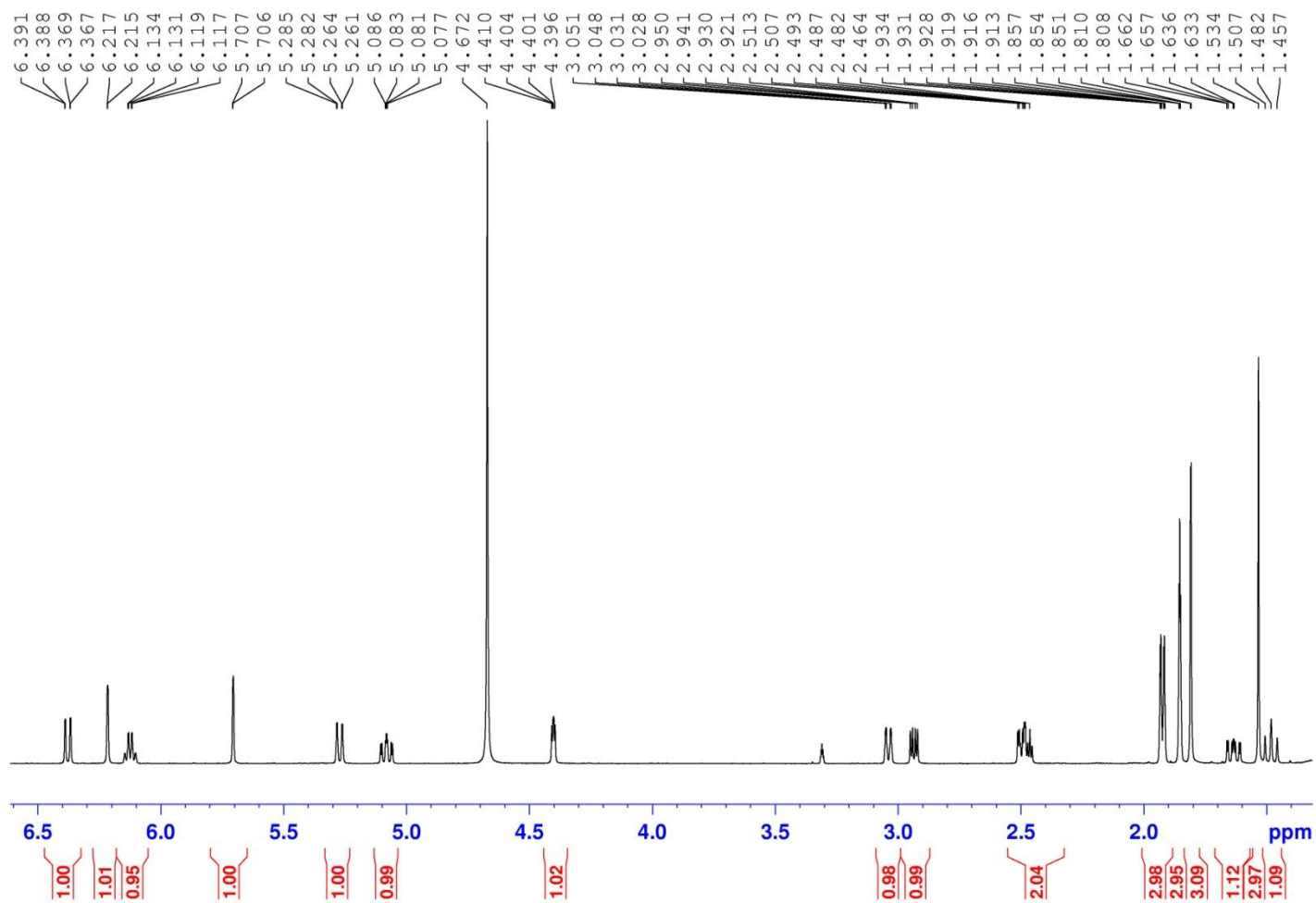


Figure S3. ¹H NMR spectrum of compound 2 in CD₃OD.

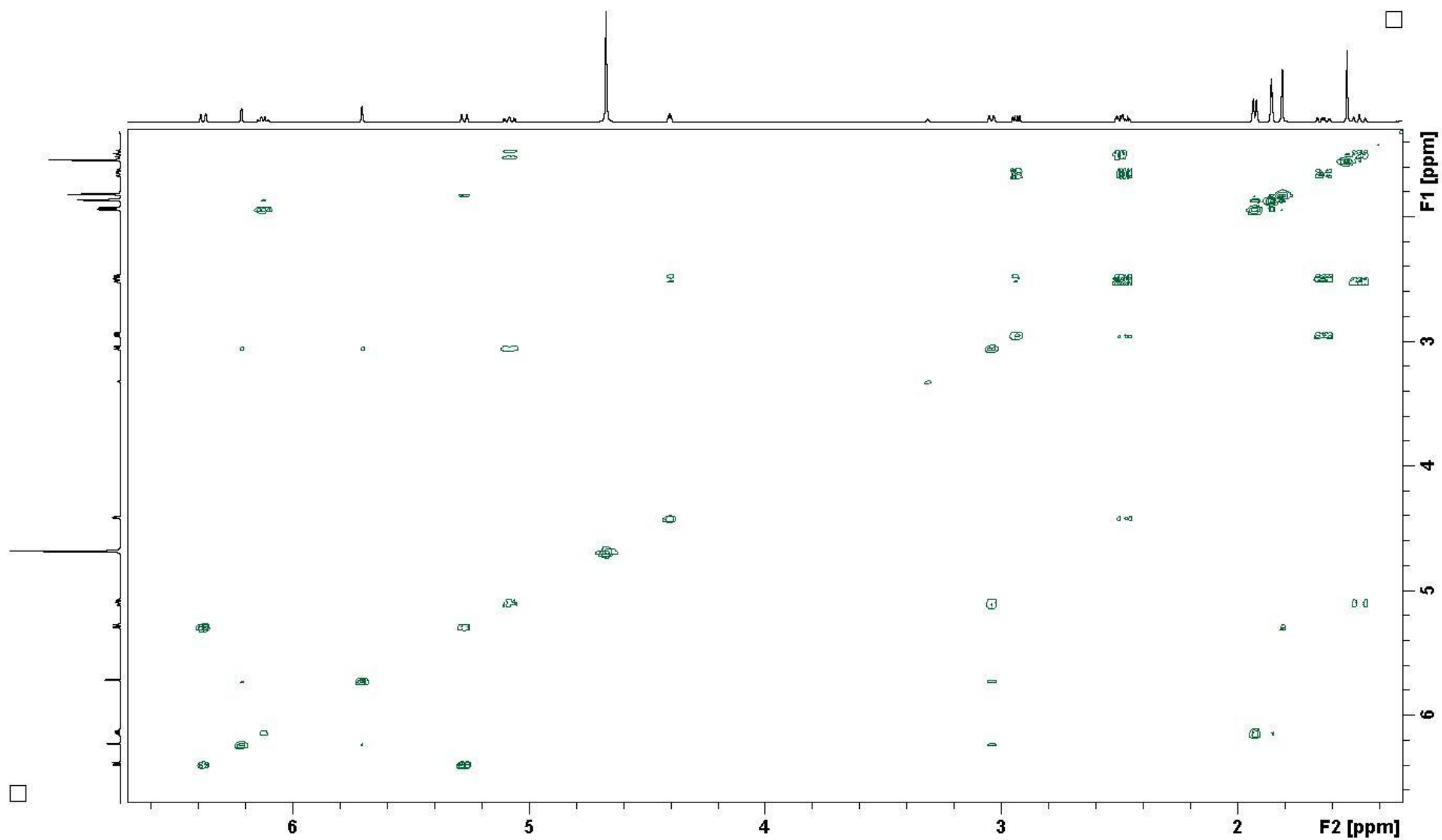


Figure S4. ^1H - ^1H -COSY spectrum of compound 2 in CD_3OD .

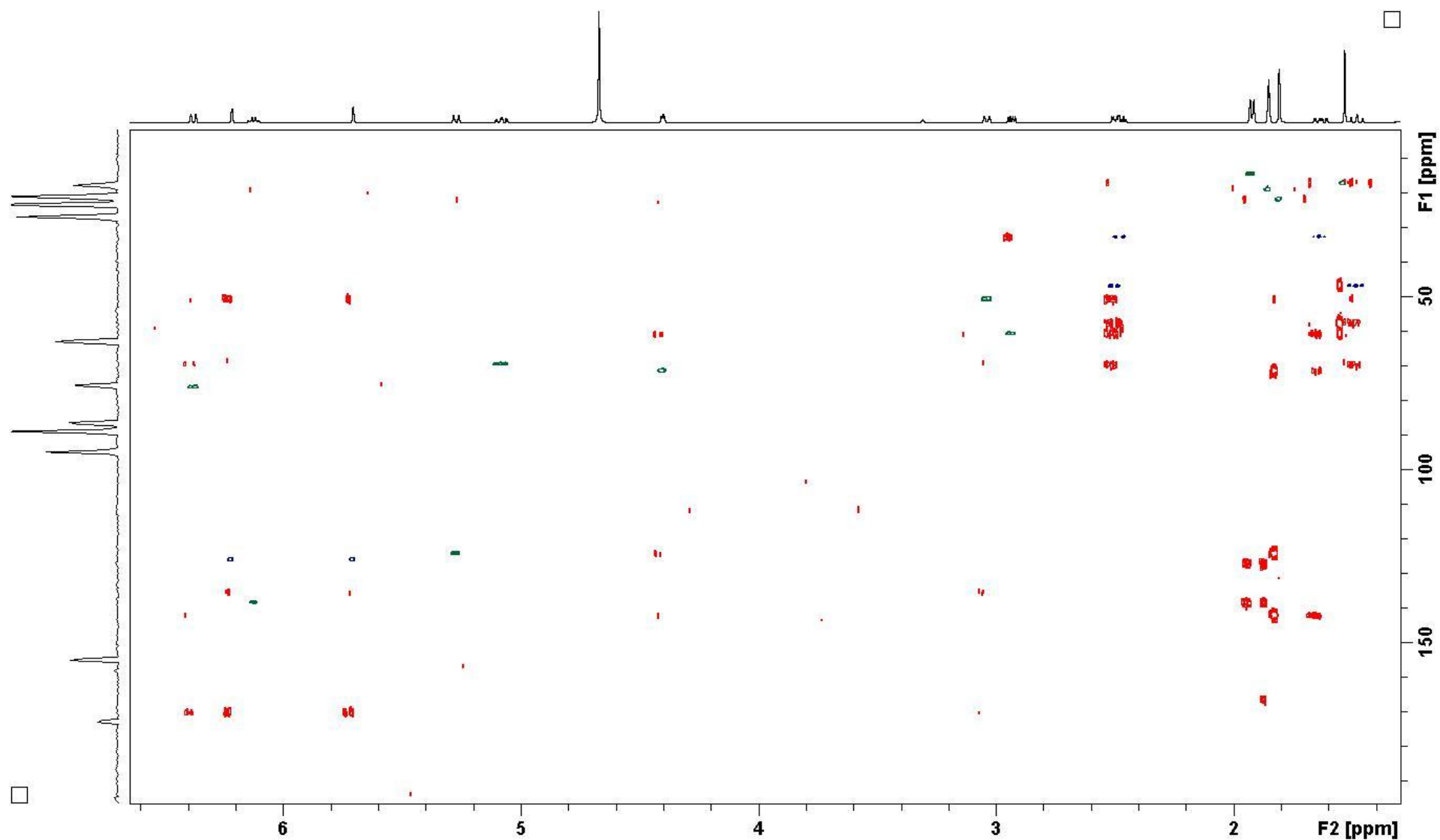


Figure S5. HSQC (green) and HMBC(red) overlaid spectra of compound 2 in CD₃OD.

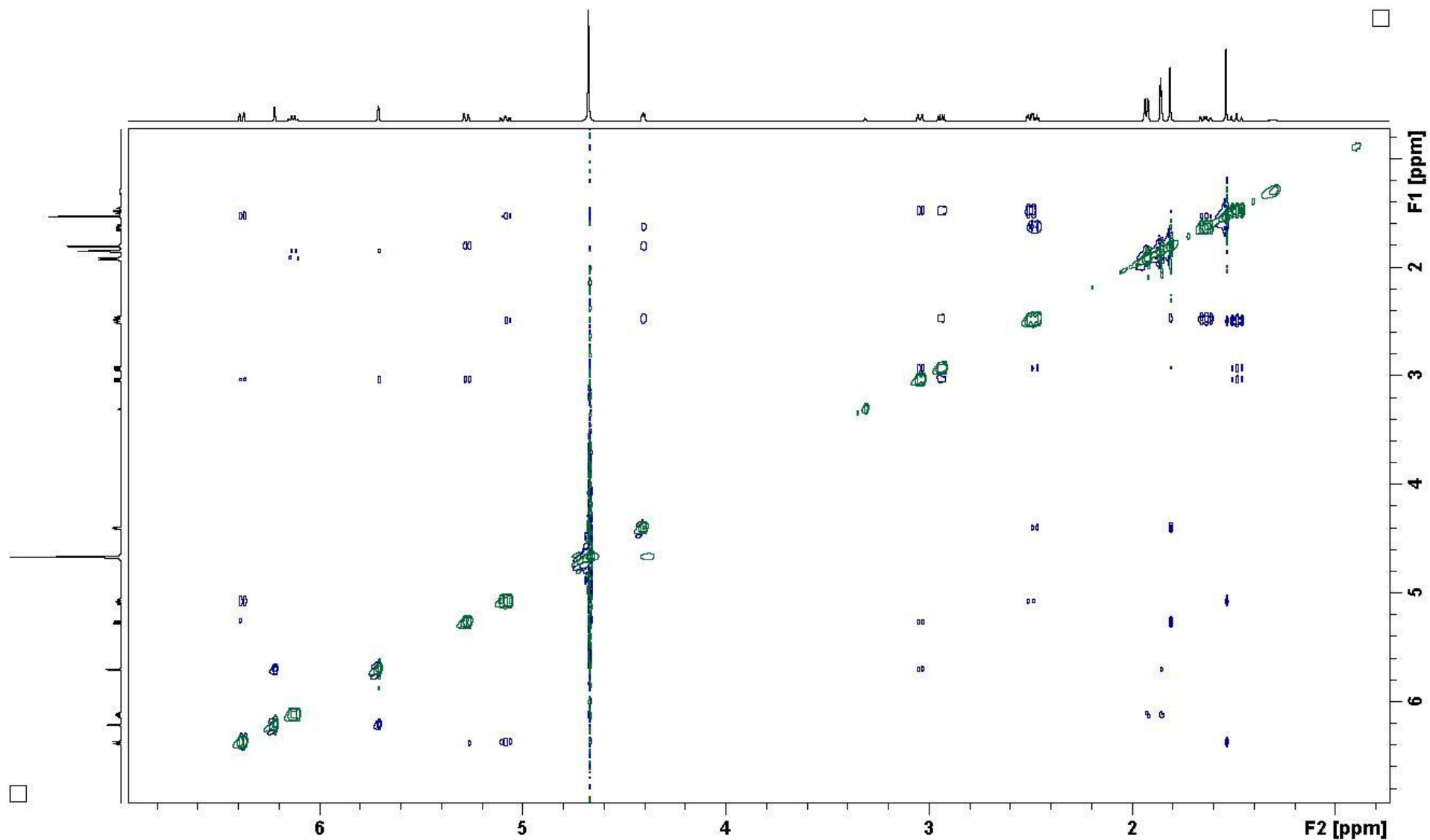


Figure S6: 2D ^1H - ^1H NOESY spectrum of compound 2 in CD_3OD .

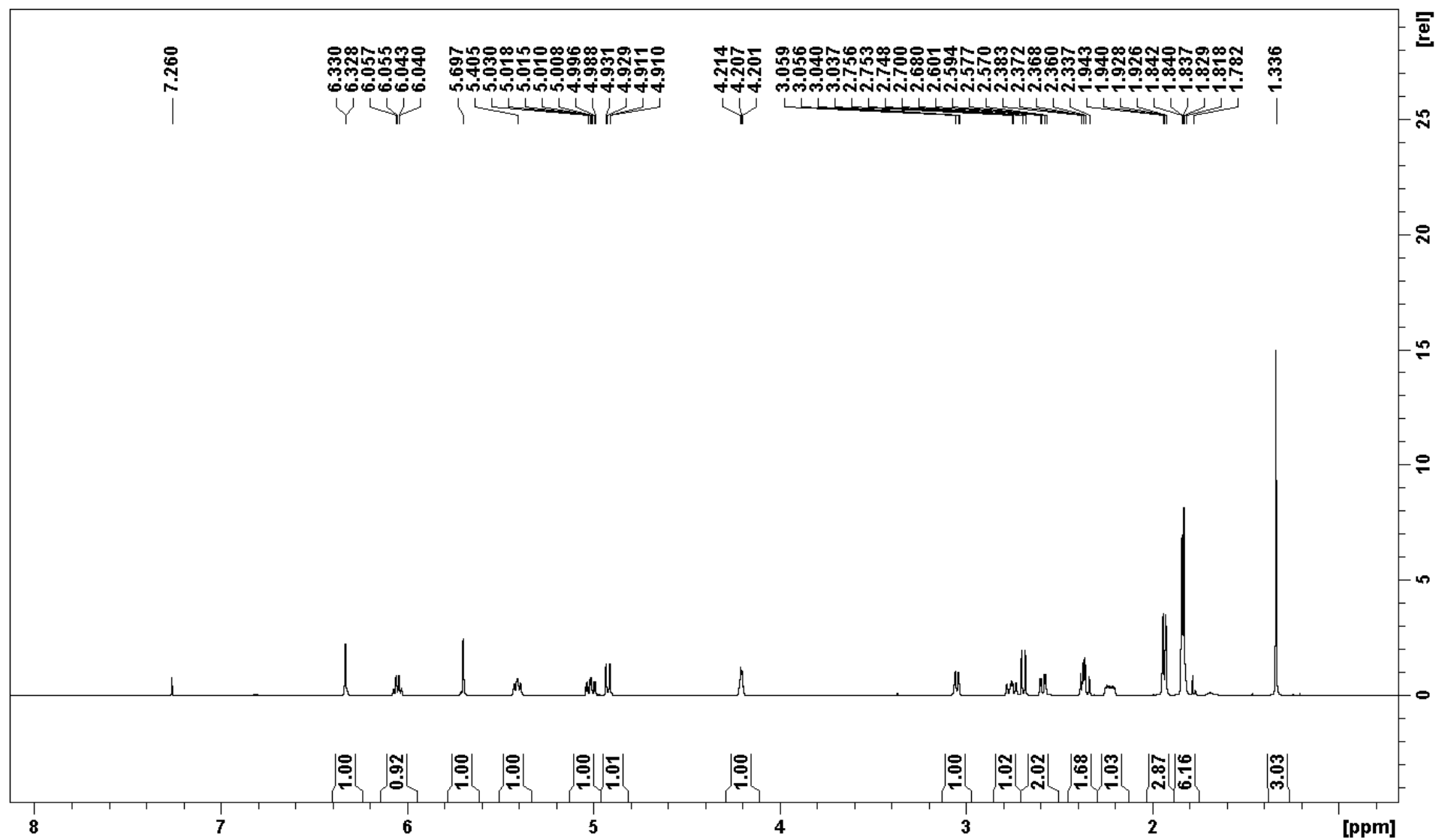
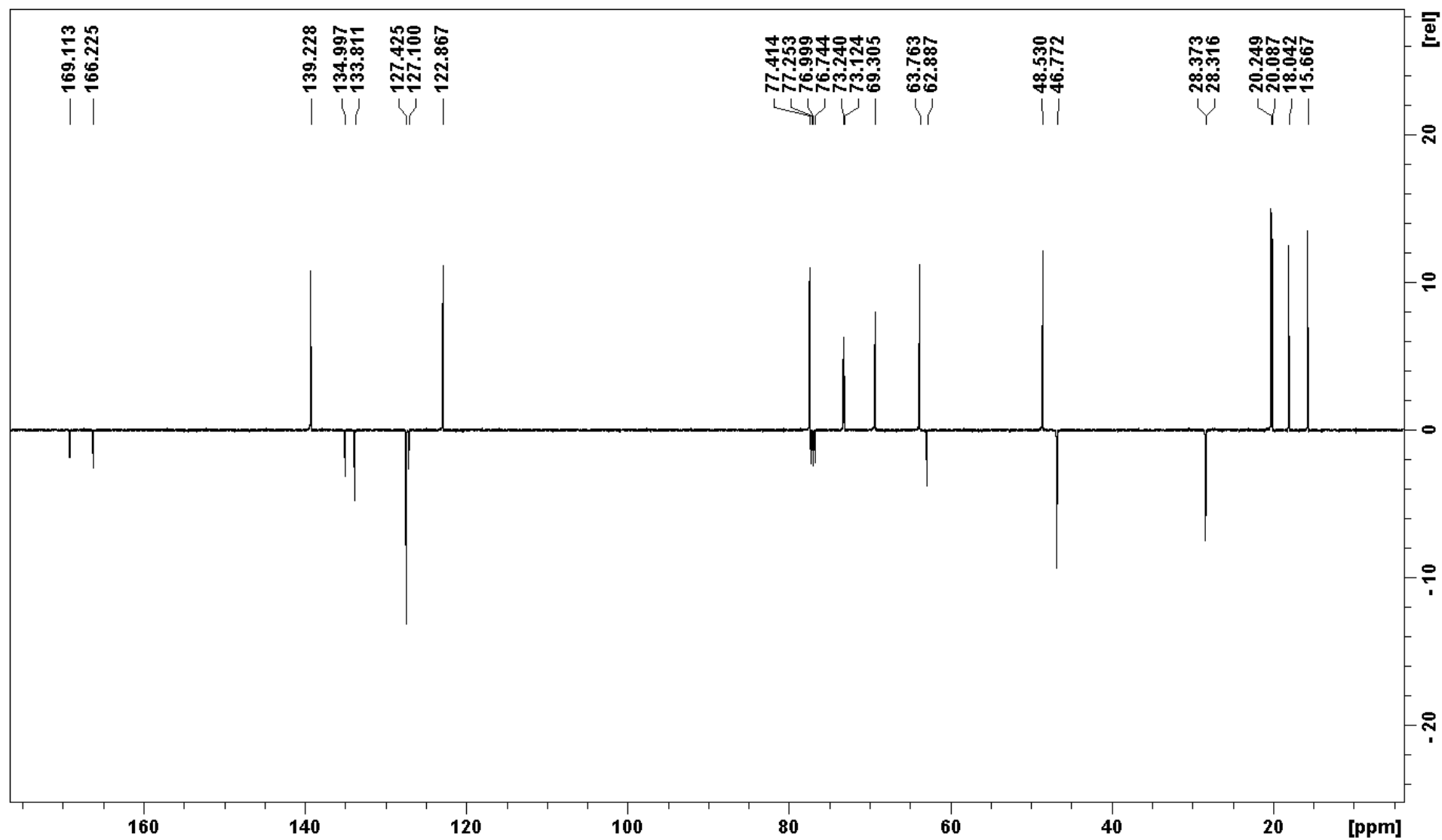


Figure S7. ¹H NMR spectrum of compound 3 in CDCl₃.



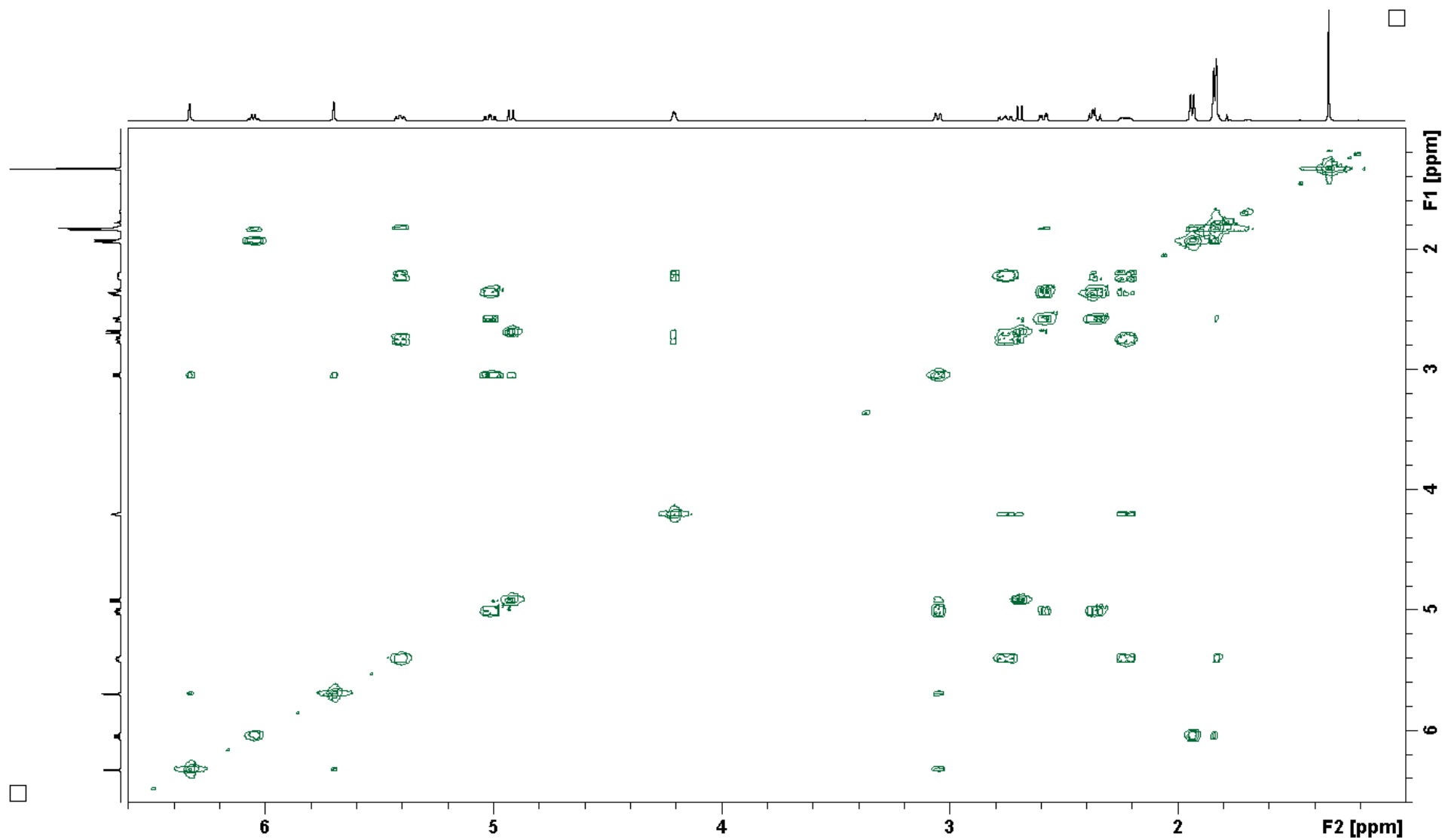


Figure S9. ^1H - ^1H -COSY spectrum of compound 3 in CDCl_3 .

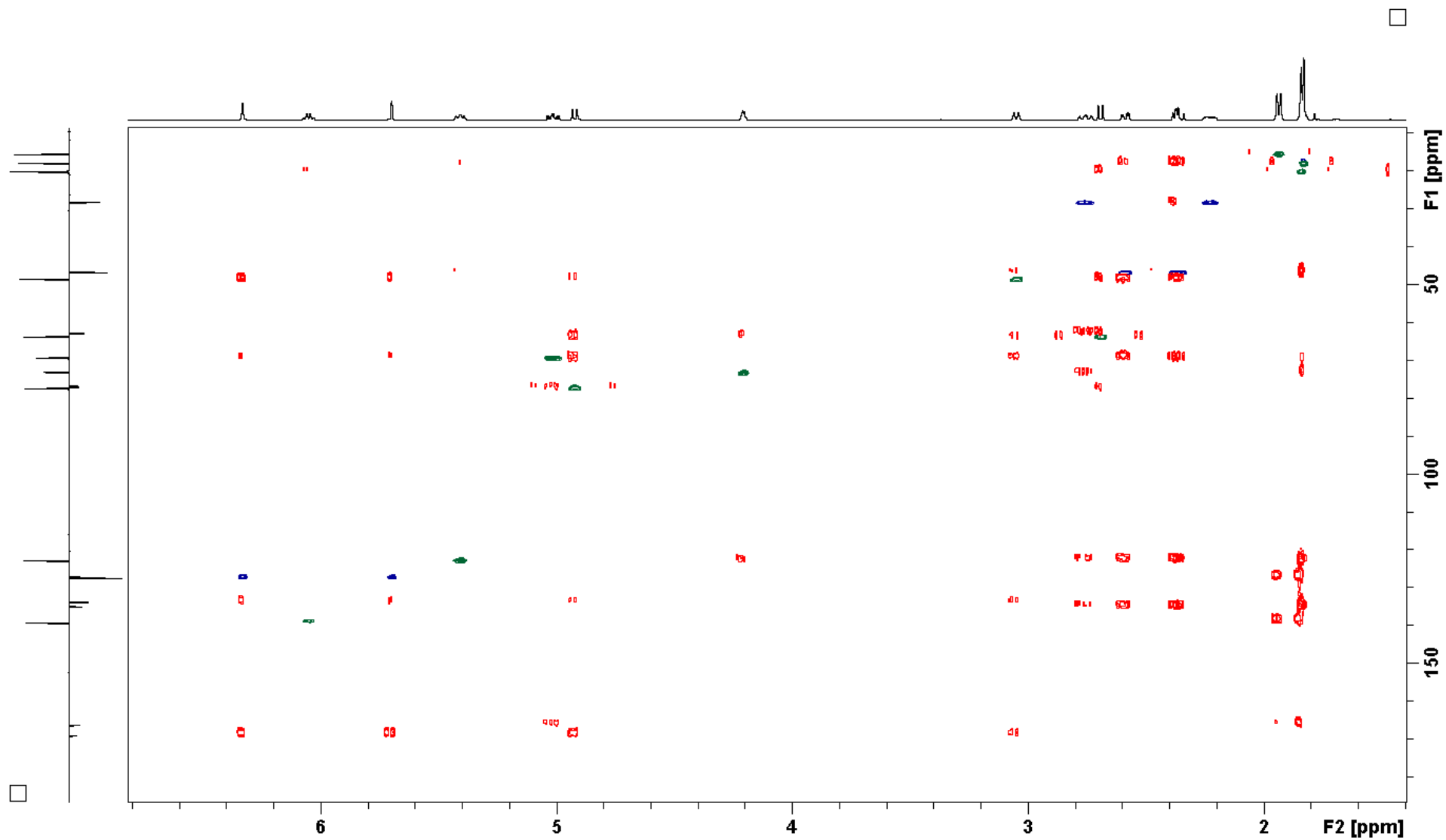


Figure S10. HSQC (green) and HMBC(red) overlaid spectra of compound 3 in CDCl₃.

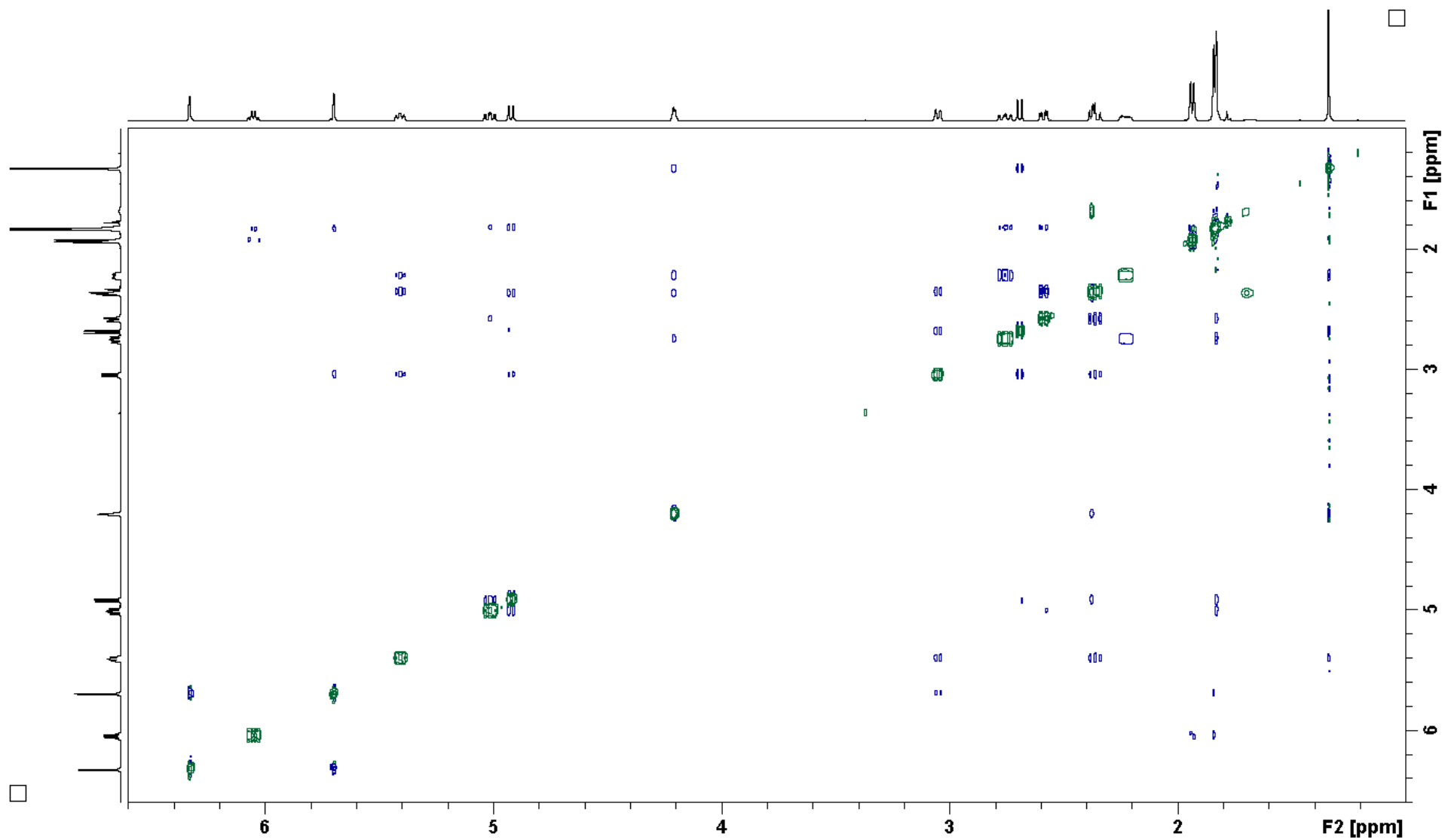


Figure S11: 2D ^1H - ^1H NOESY spectrum of compound 3 in CDCl_3 .

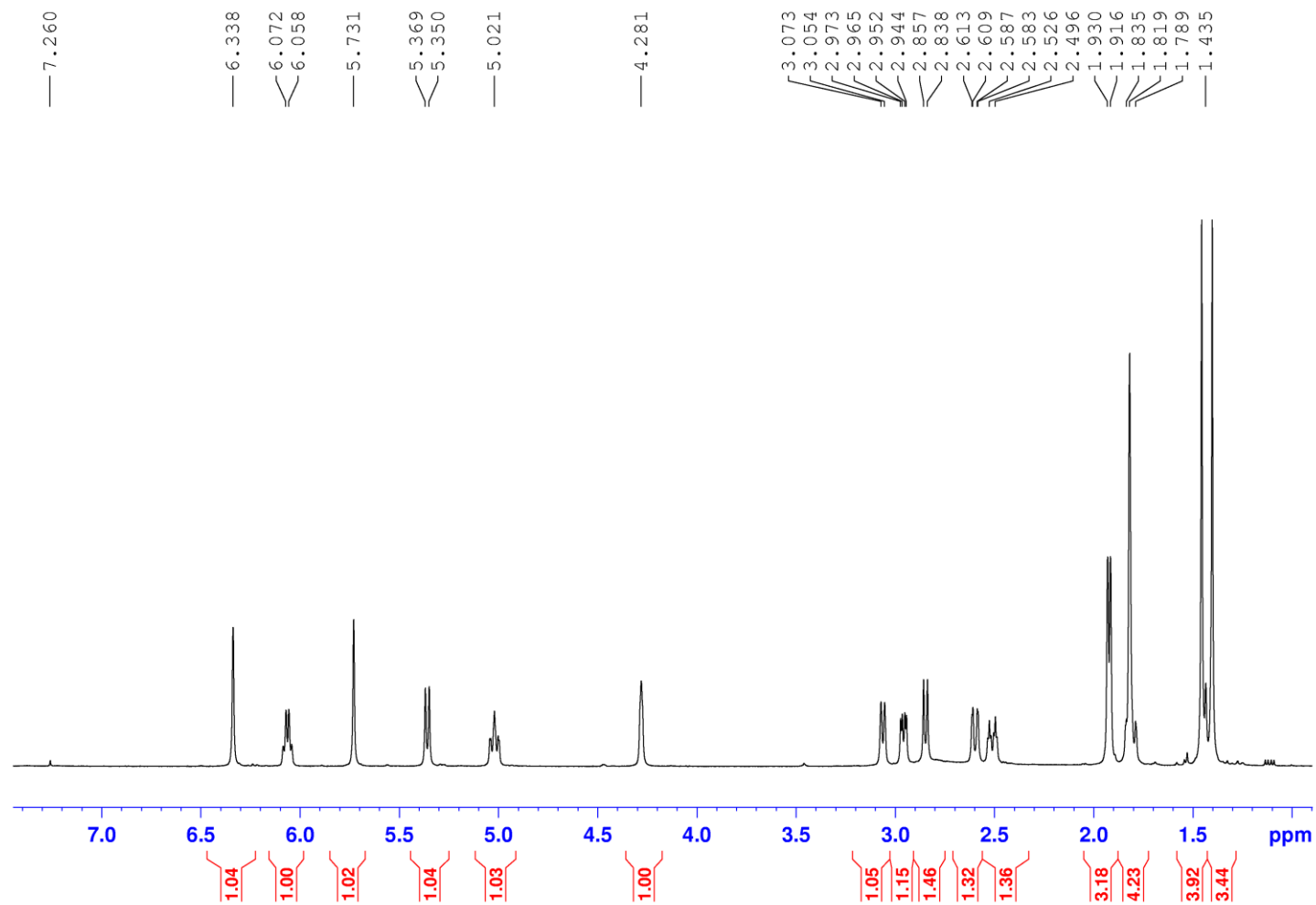


Figure S12. ¹H NMR spectrum of compound 4 in CDCl₃.

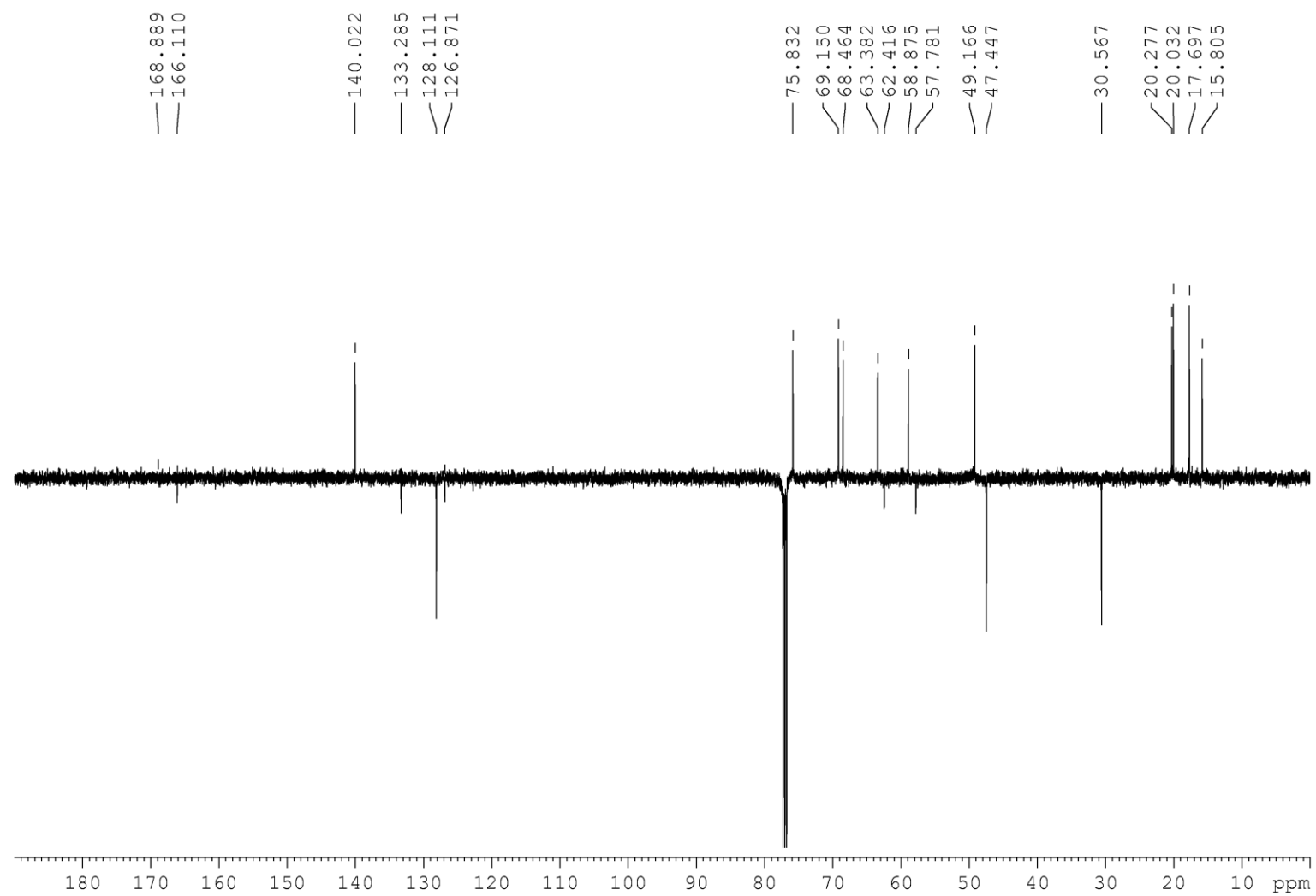


Figure S13: ¹³C spectrum of compound **4** in CDCl₃.

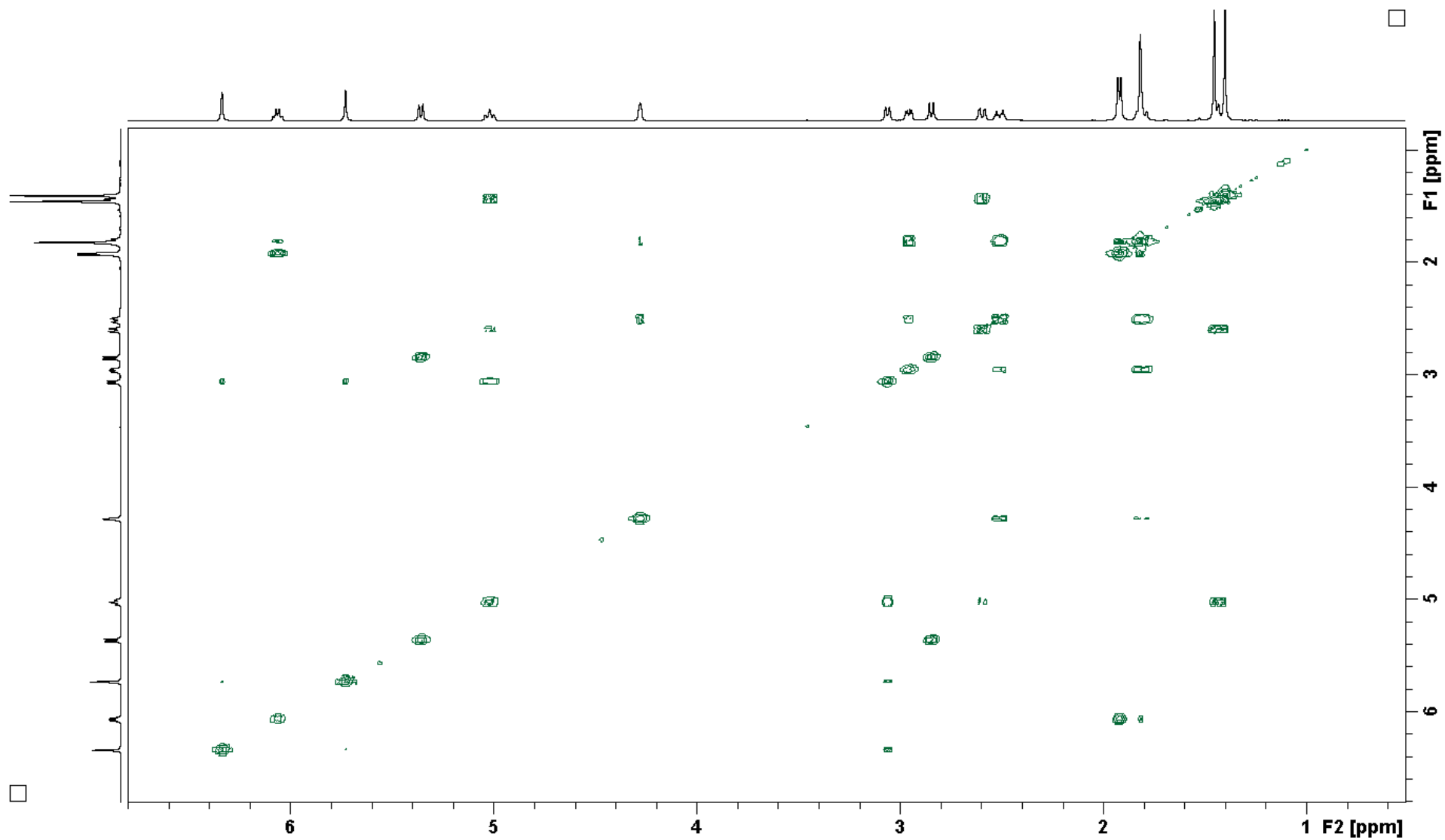


Figure S14. ^1H - ^1H -COSY spectrum of compound **4** in CDCl_3 .

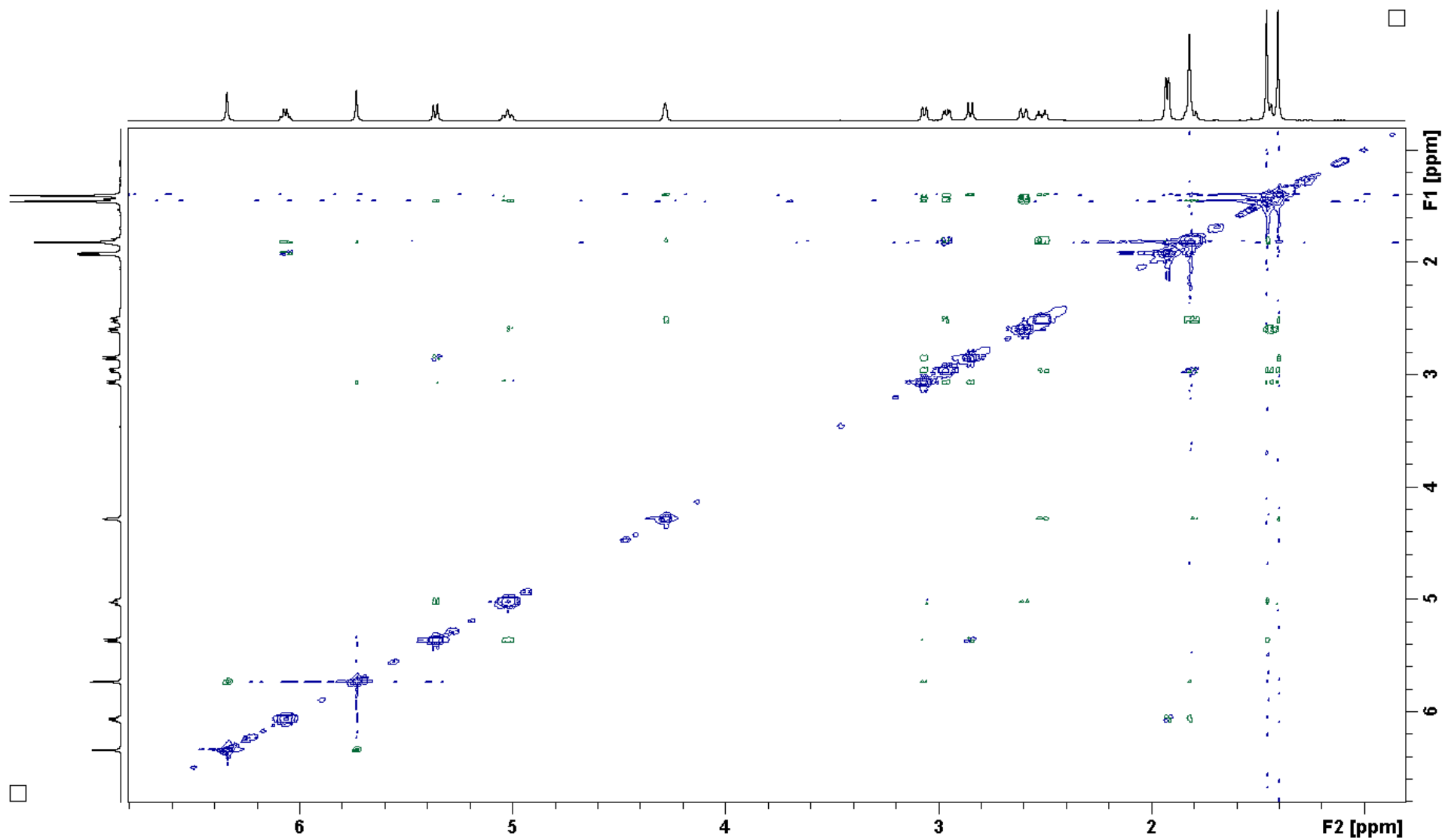


Figure S16: 2D ^1H - ^1H NOESY spectrum of compound **4** in CDCl_3 .

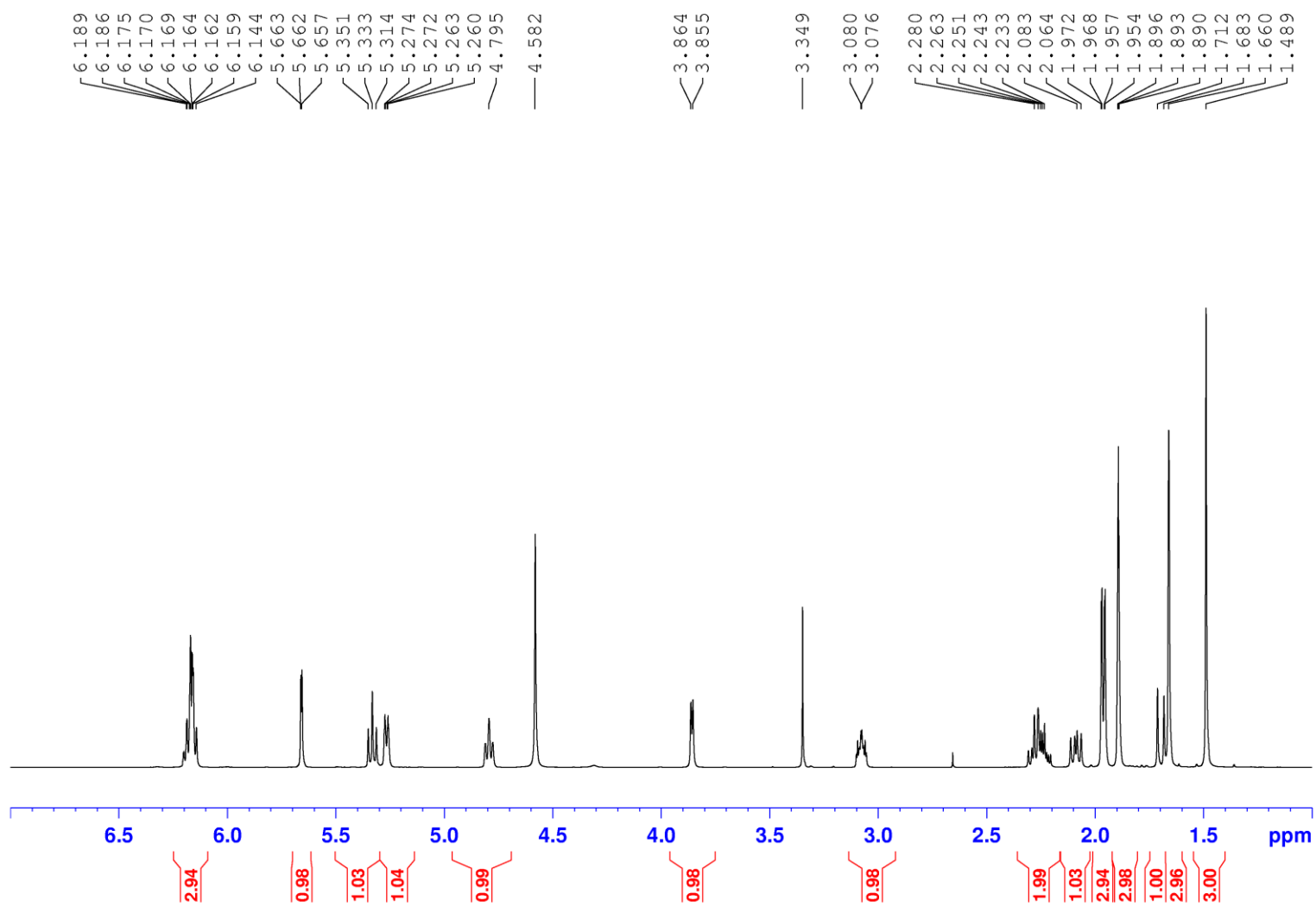


Figure S17: ¹H-NMR spectrum of compound **5** in CD₃OD.

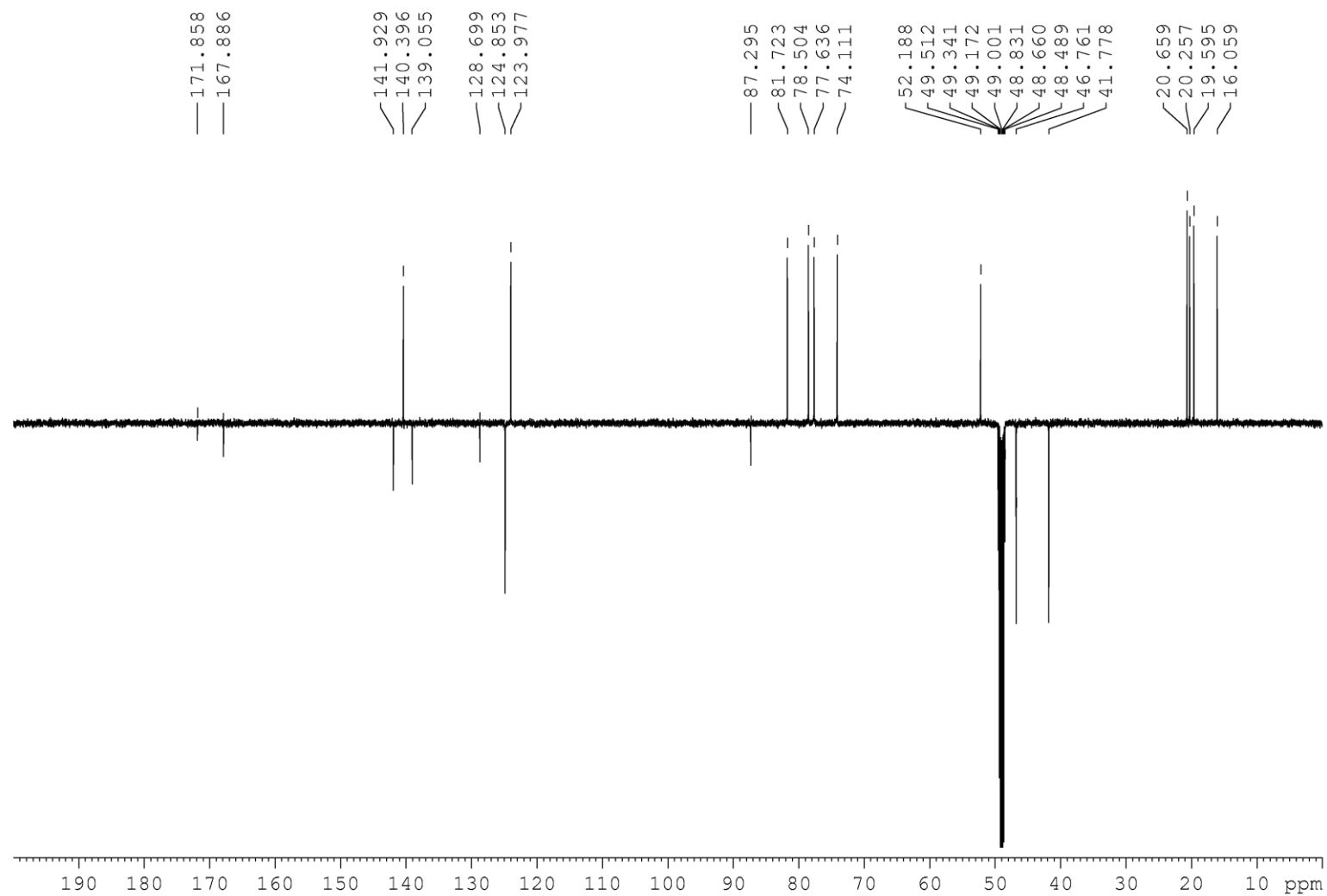


Figure S18: ¹³C spectrum of compound 5 in CD₃OD.

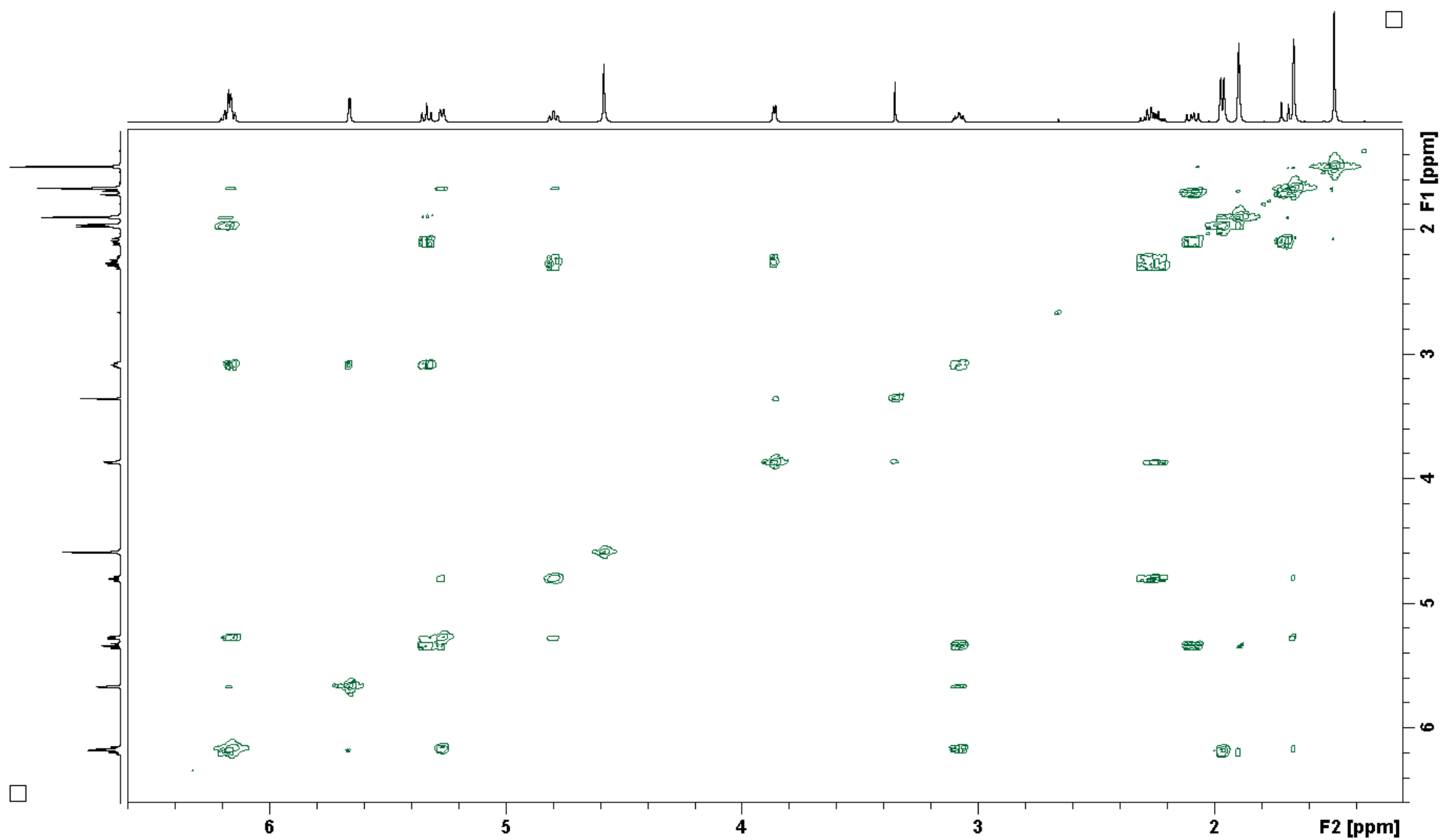


Figure S19: ^1H - ^1H COSY spectrum of compound 5 in CD_3OD .

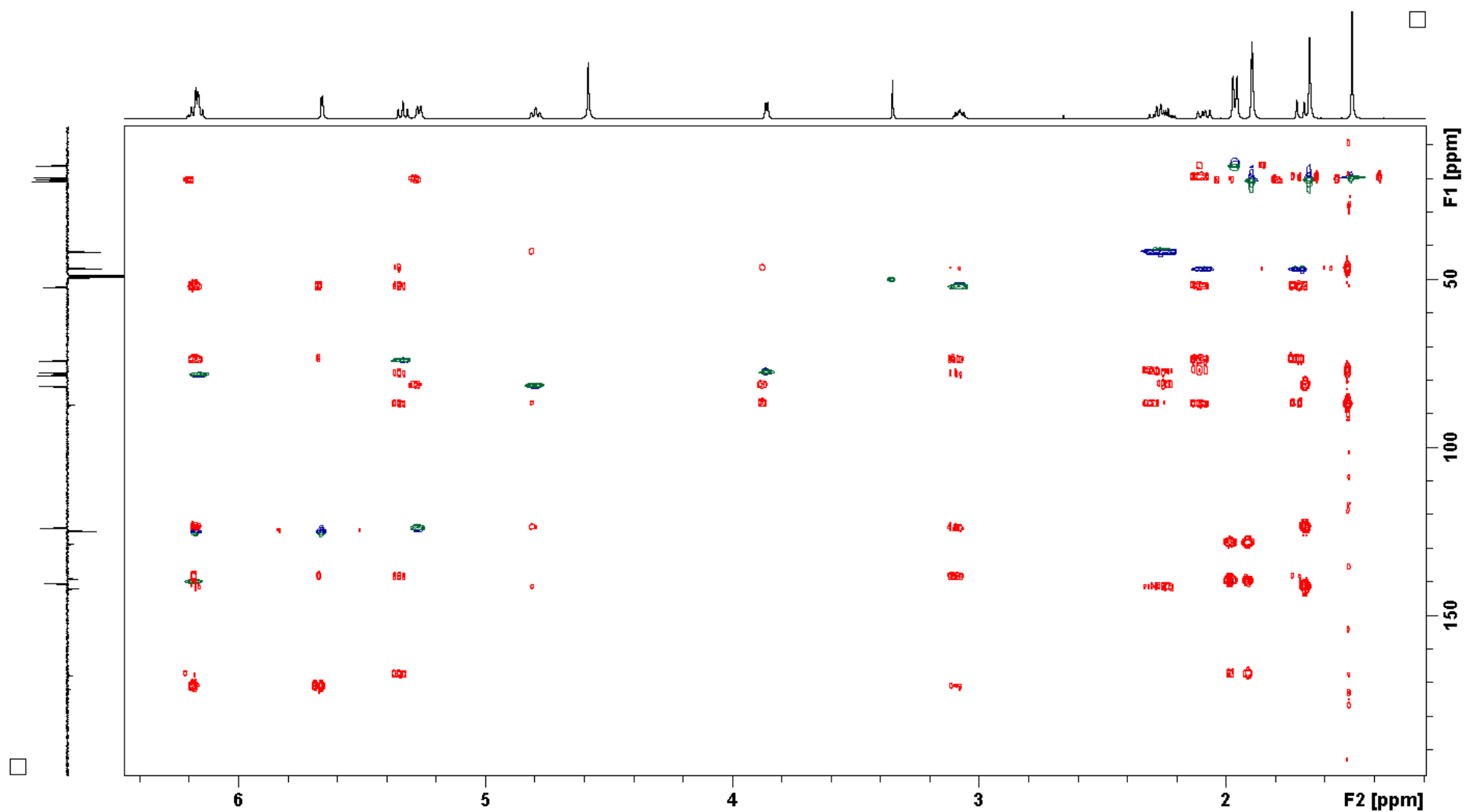


Figure S20: Overlay of HSQC and HMBC spectra of compound 5 in CD_3OD .

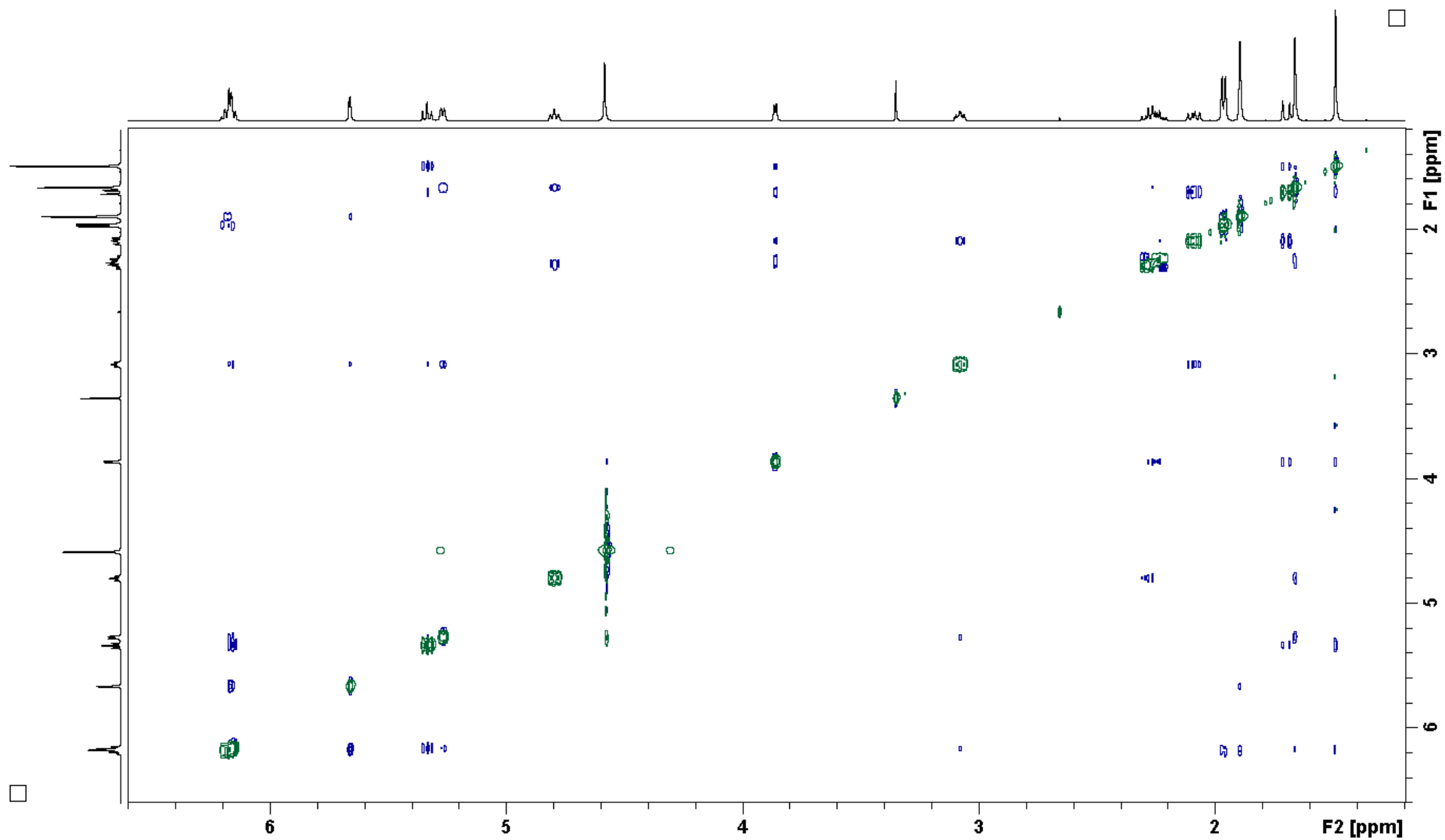


Figure S21: 2D ^1H - ^1H NOESY spectrum of compound 5 in CD_3OD .

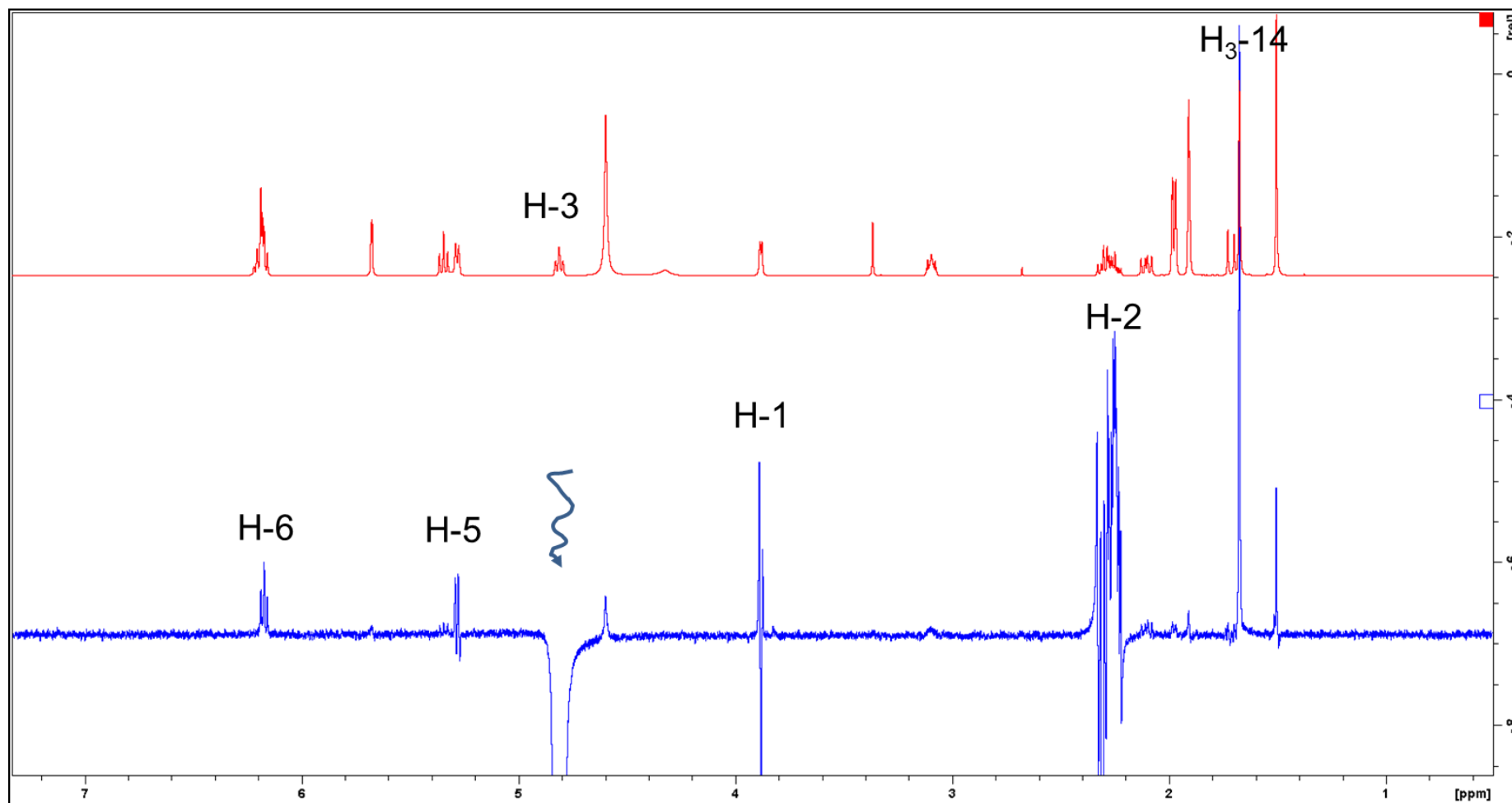


Figure S22: 1D Selective NOESY spectrum of compound **5** in CD₃OD (D8 = 0.3 sec).

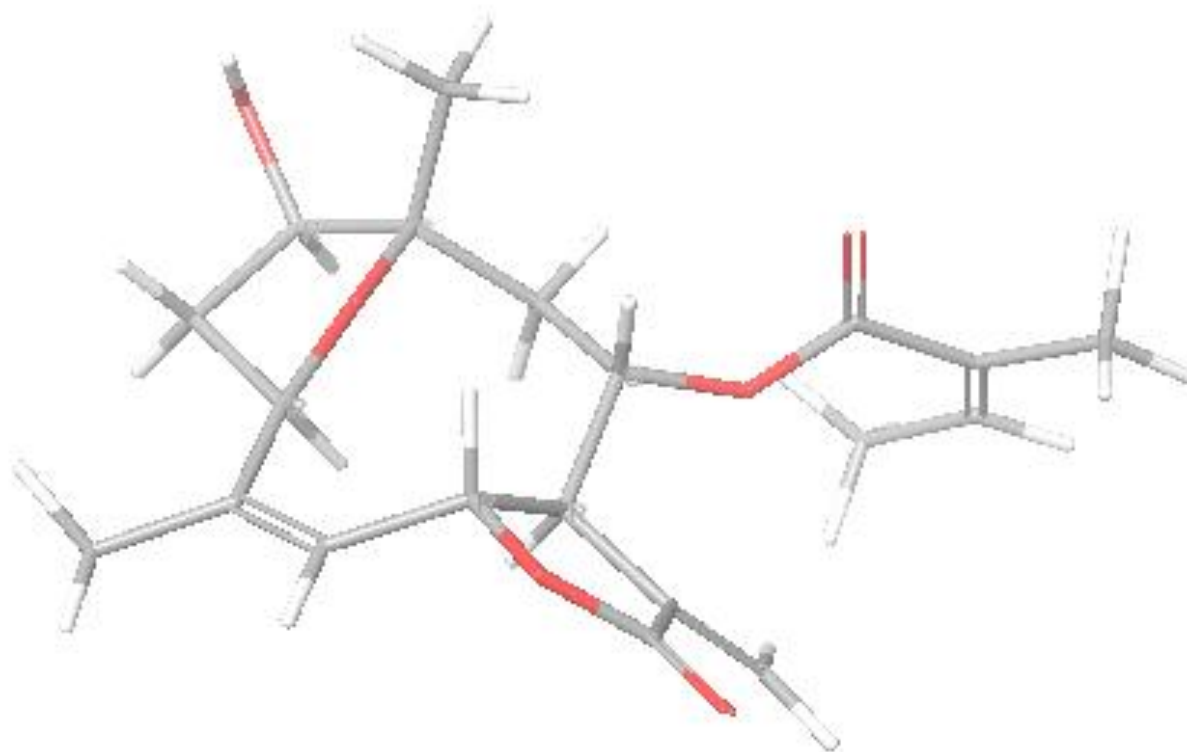


Figure S23: DFT 6-31+G(d,p) optimized structure of **5**.

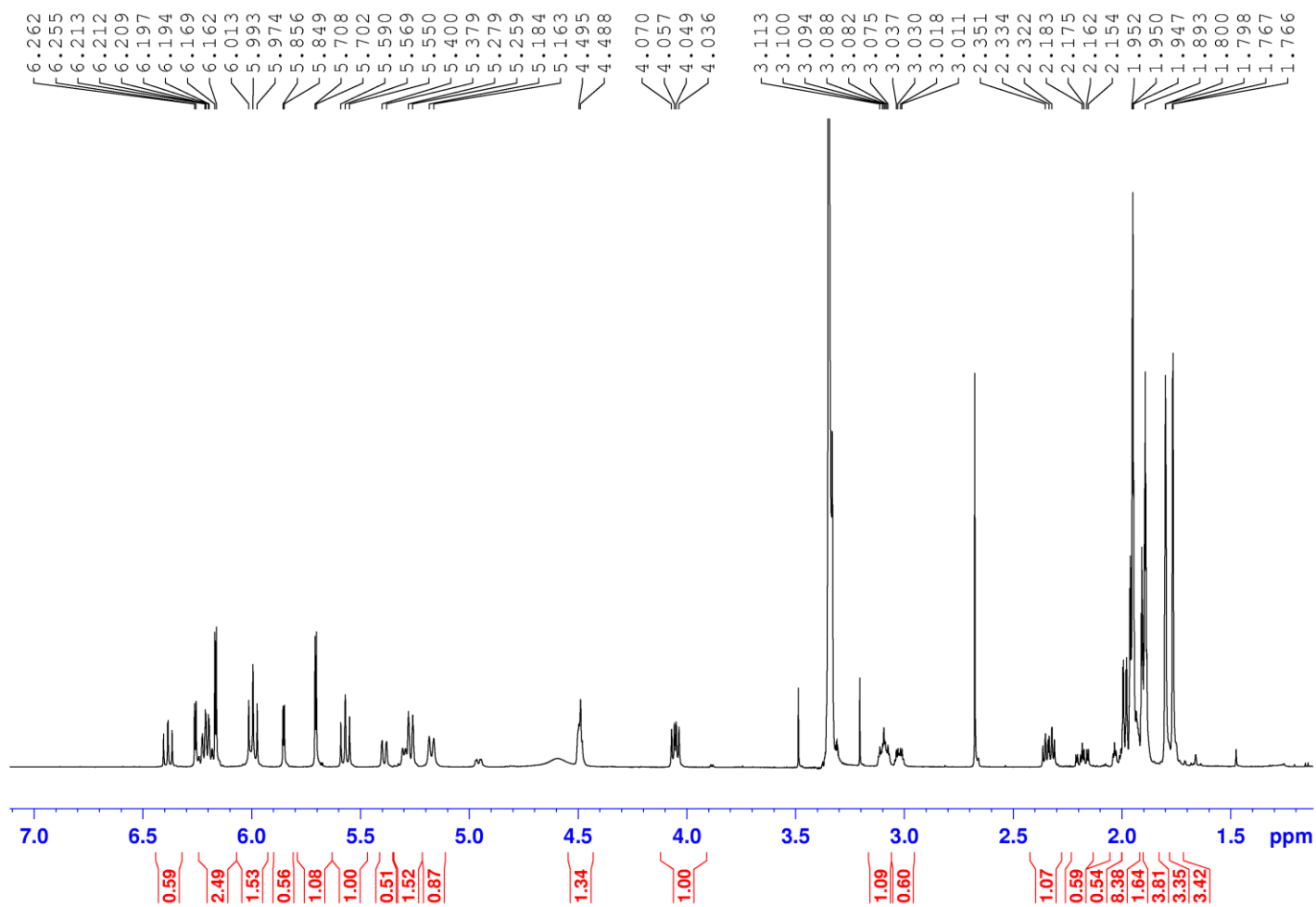


Figure S24: ¹H-NMR spectrum of compounds 6-7 in CD₃OD.

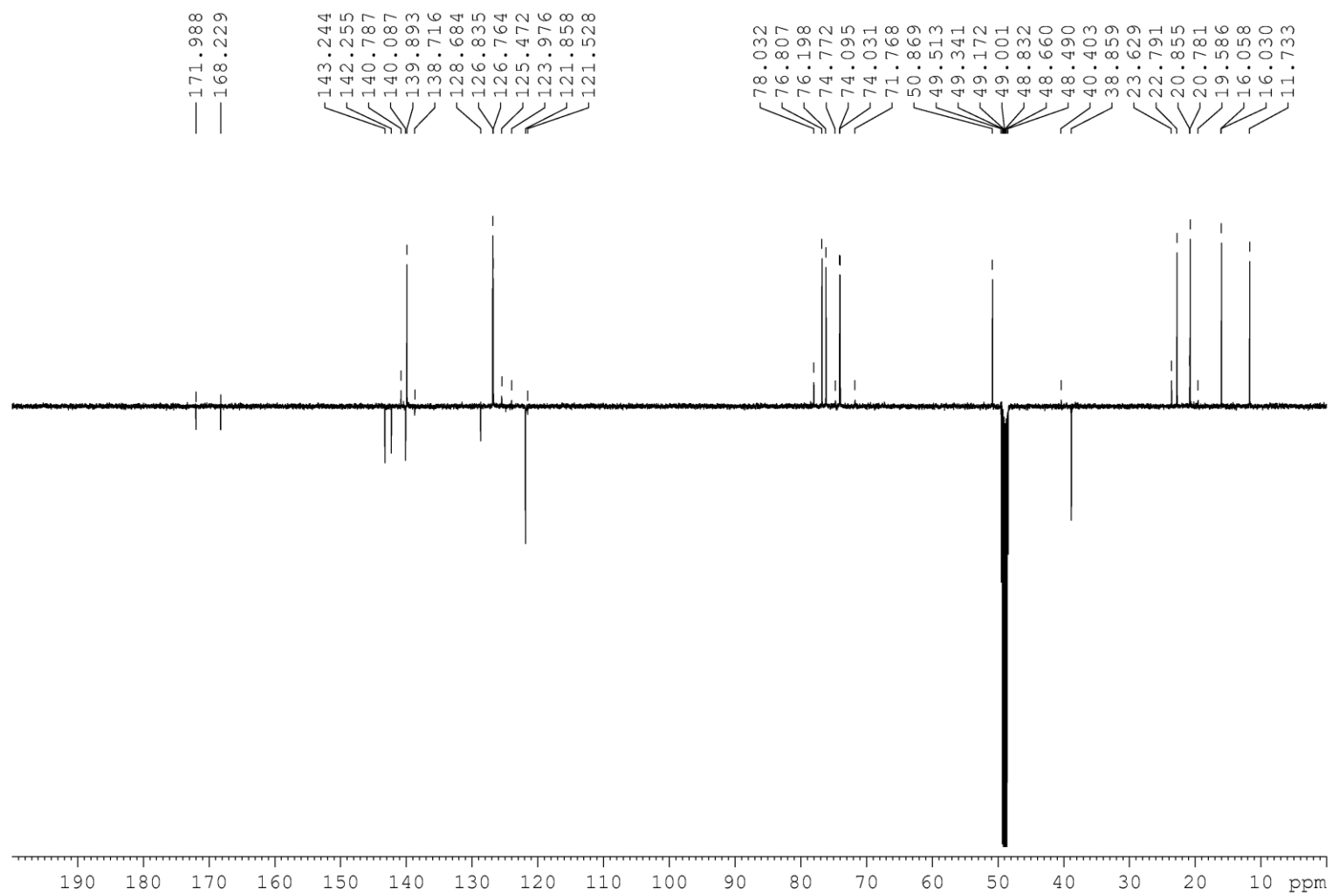


Figure S25: ^{13}C spectrum of compounds 6-7 in CD_3OD .

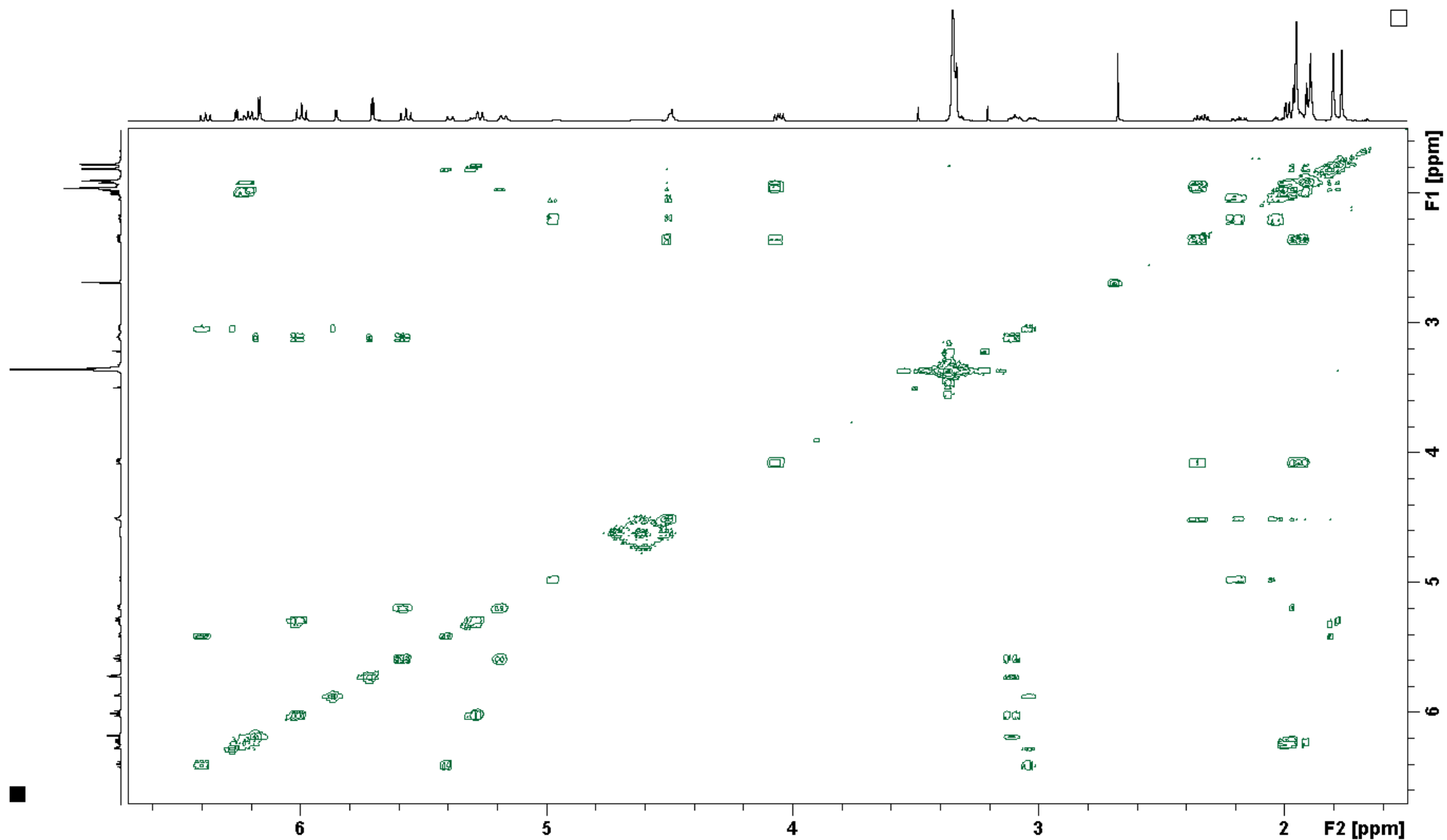


Figure S26: ^1H - ^1H COSY spectrum of compounds 6-7 in CD_3OD .

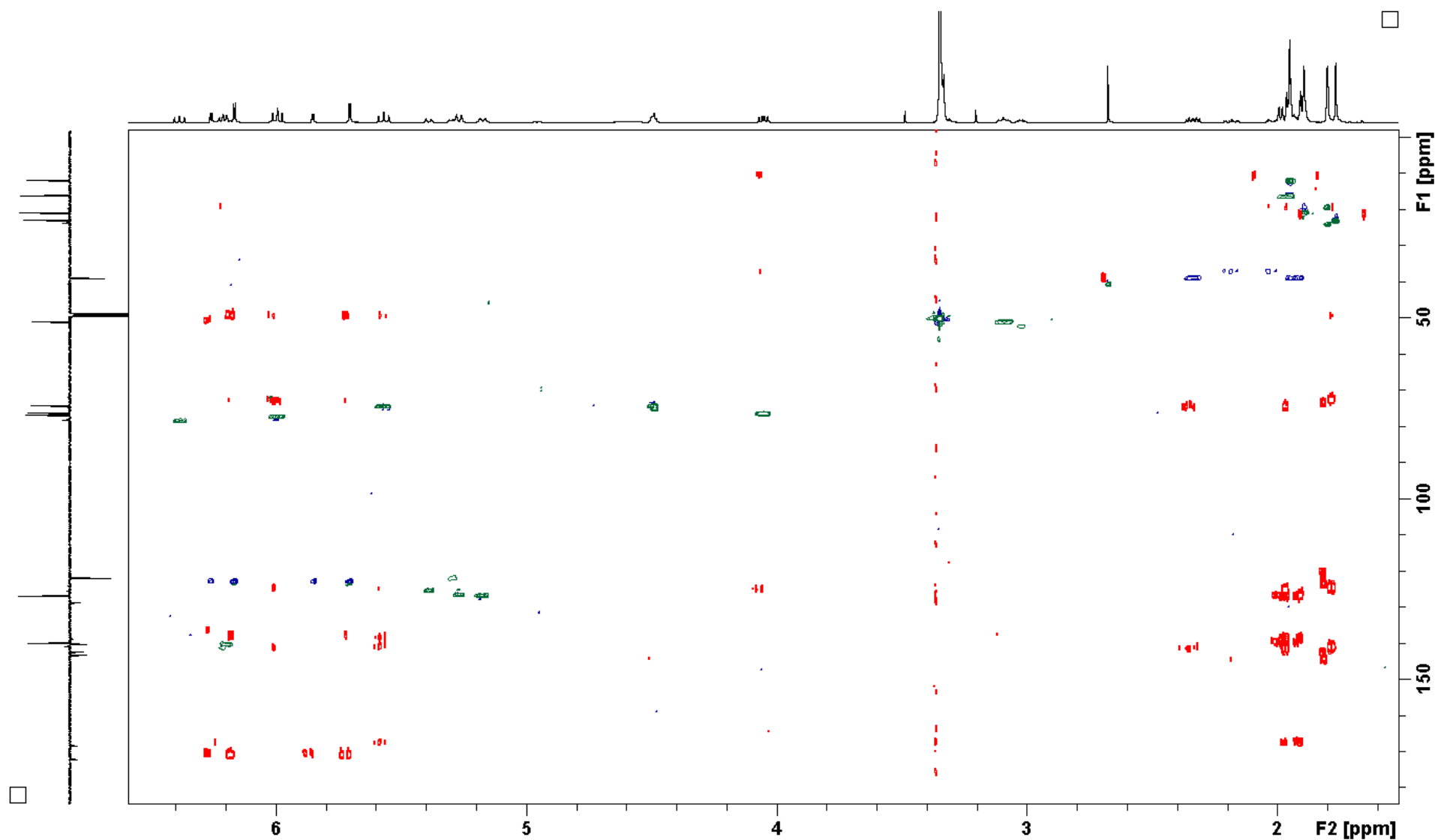


Figure S27: Overlay of HSQC and HMBC spectra of compounds **6-7** in CD₃OD.

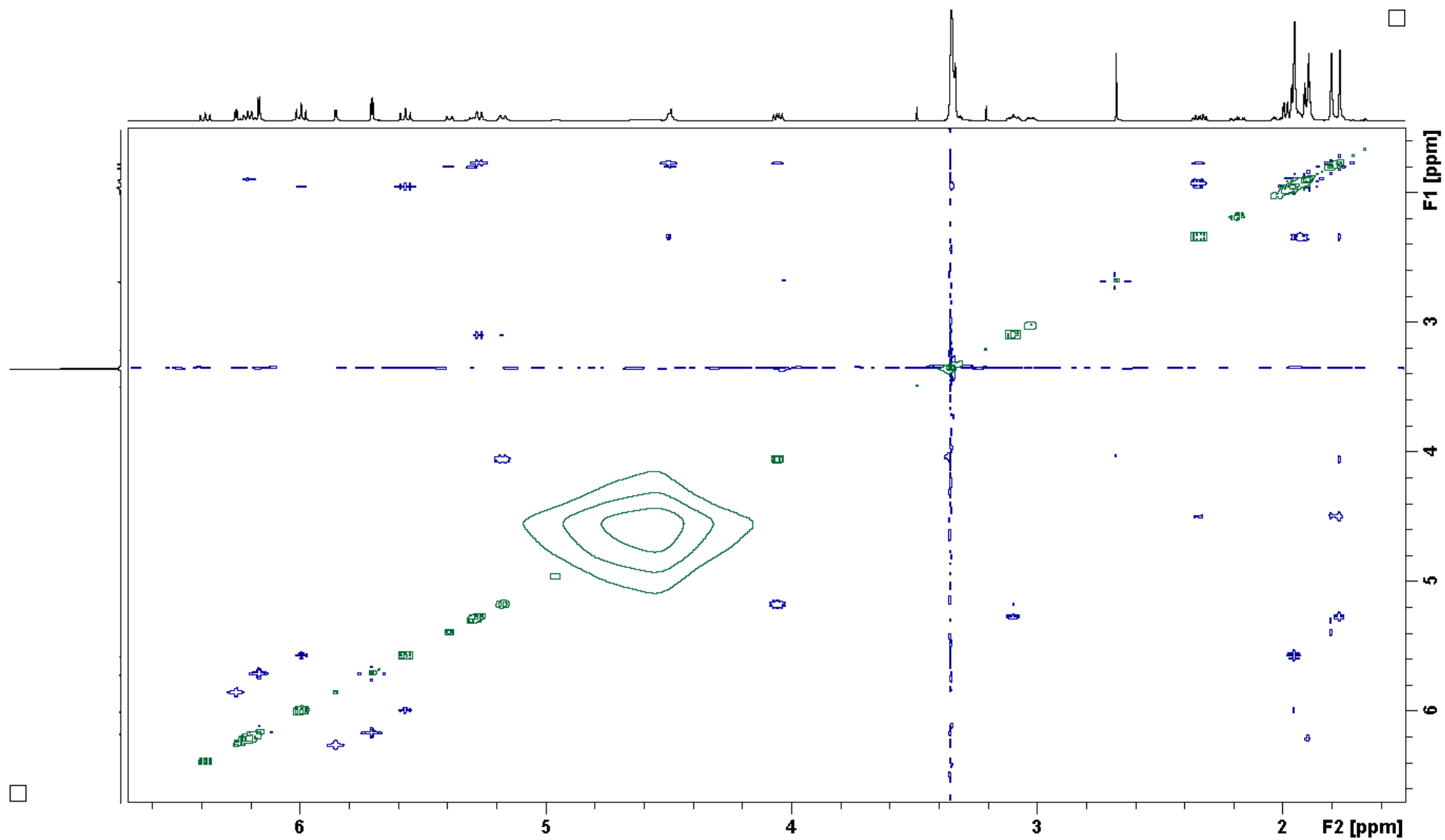


Figure S28: 2D ^1H - ^1H NOESY spectrum of compounds 6-7 in CD_3OD .

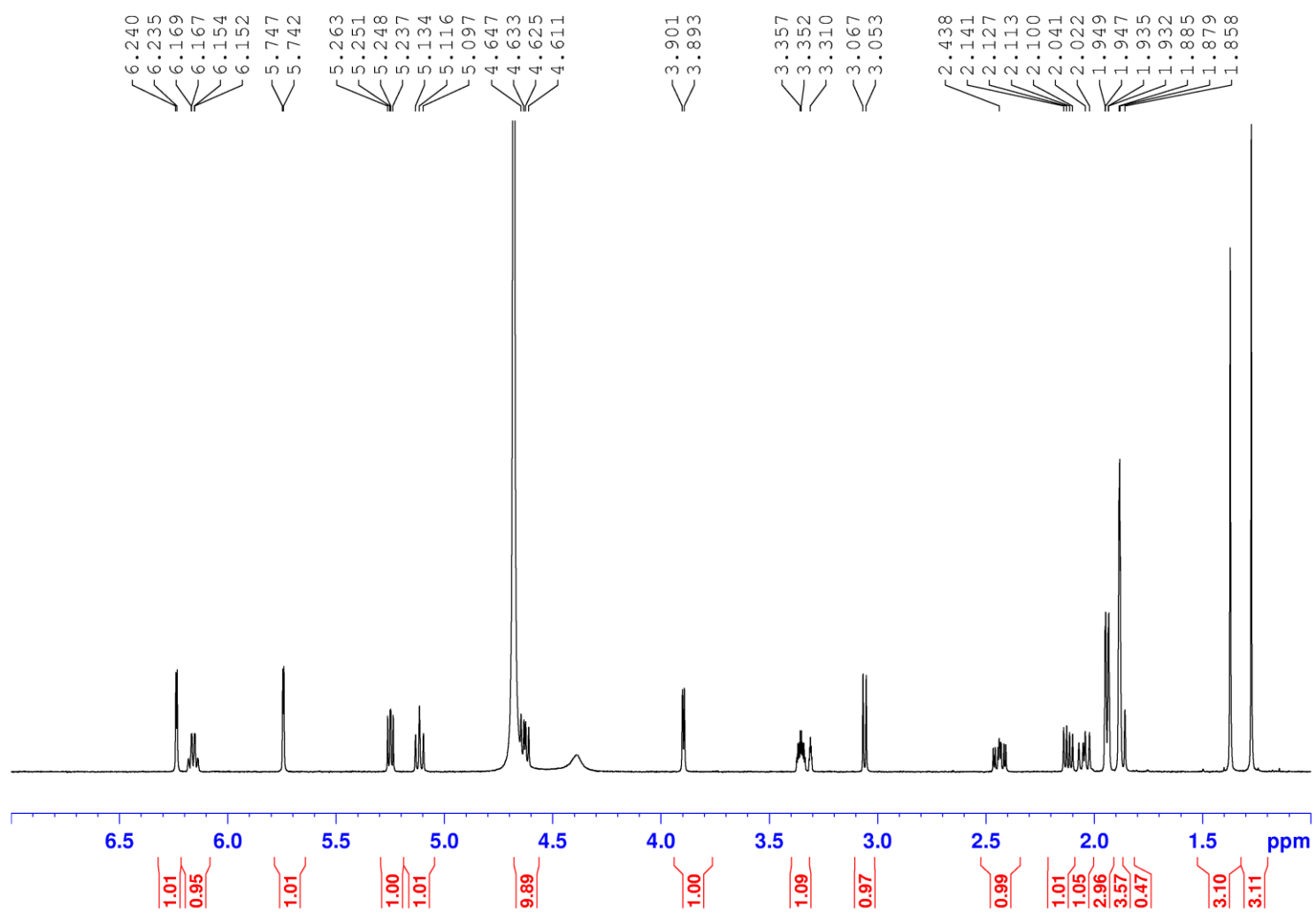


Figure S29: ¹H-NMR spectrum of compound 8 in CD₃OD.

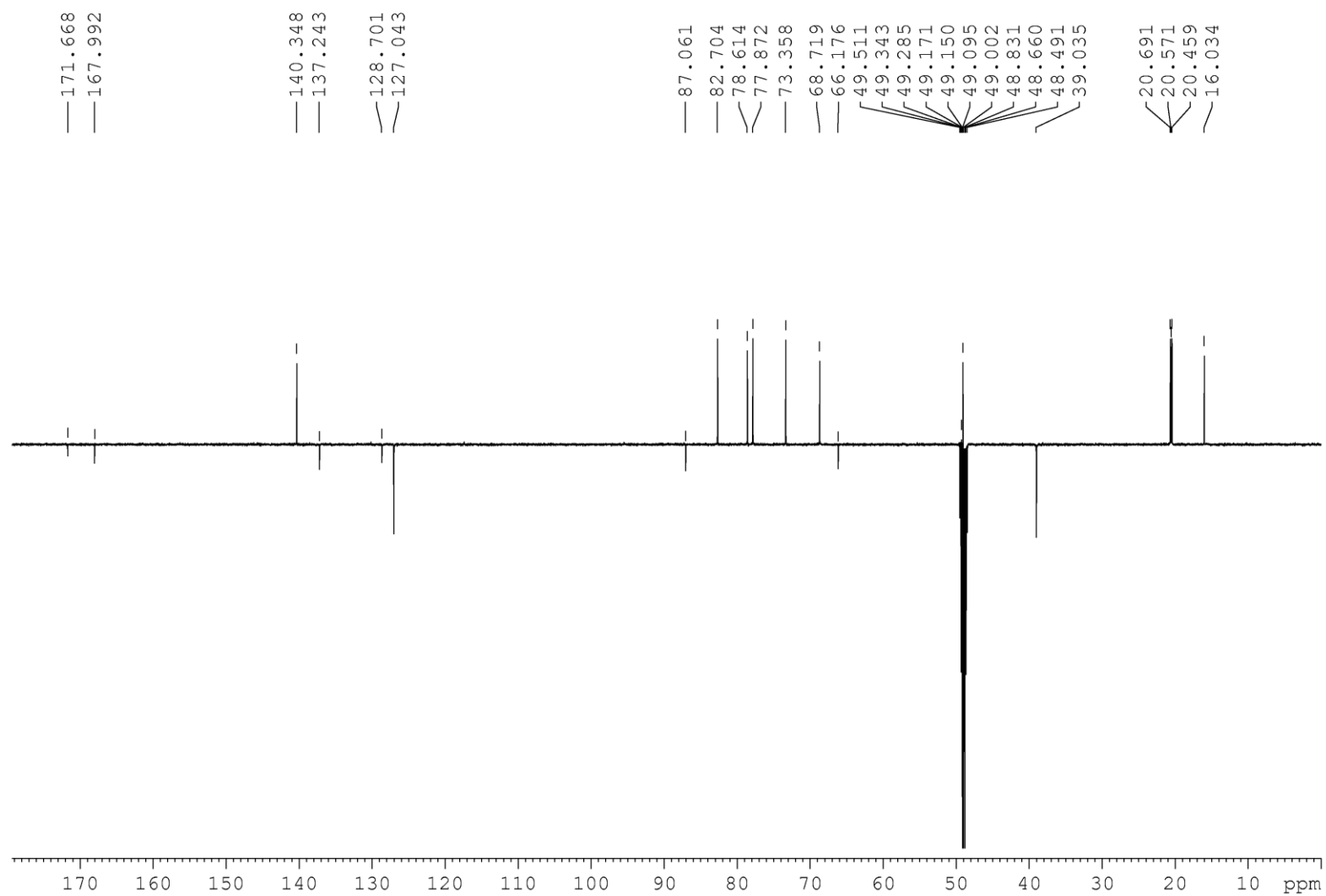


Figure S30: ¹³C spectrum of compound 8 in CD₃OD.

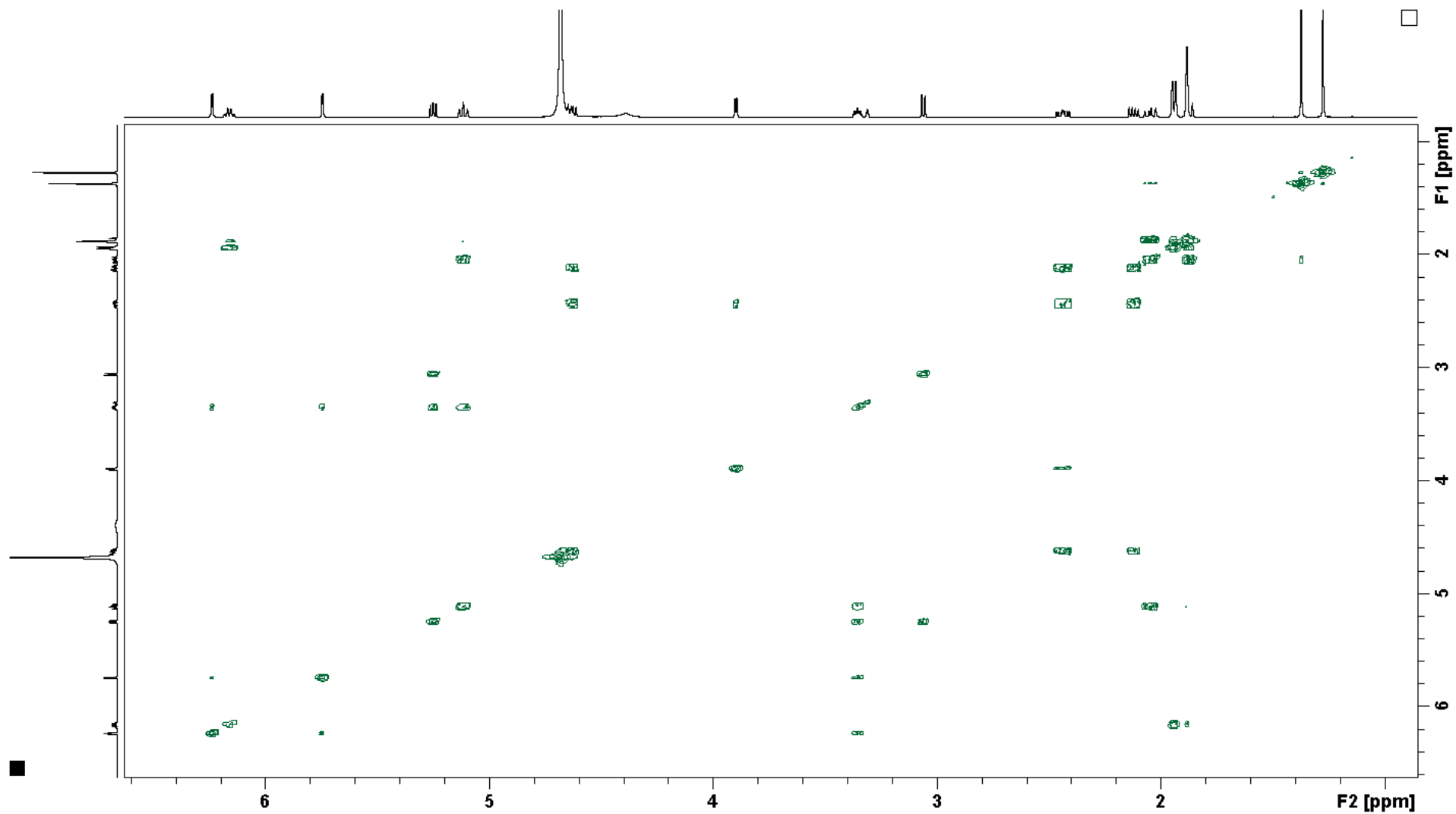


Figure S31: ^1H - ^1H COSY spectrum of compound **8** in CD_3OD .

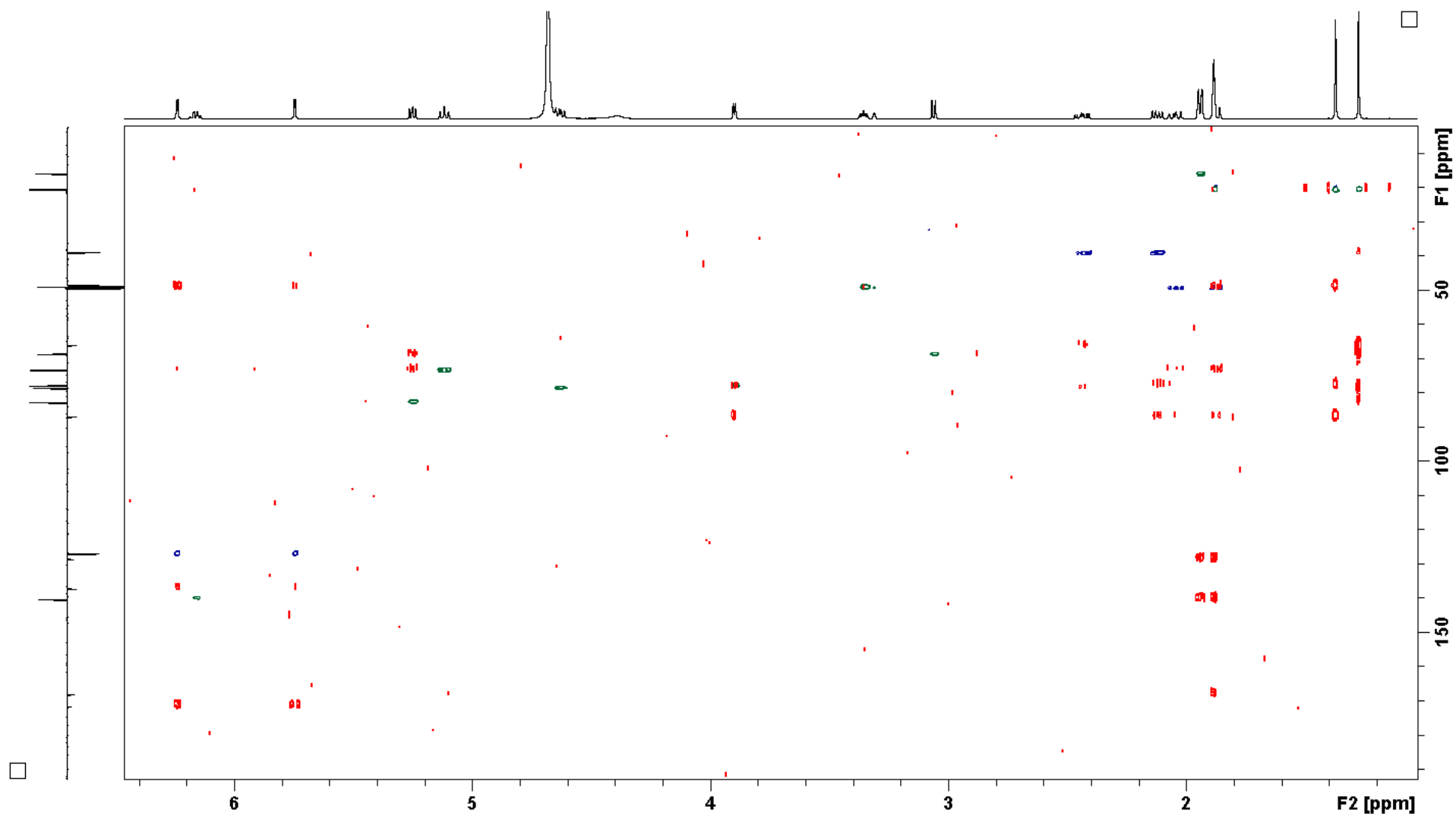


Figure S32: Overlay of HSQC and HMBC spectra of compound **8** in CD₃OD.

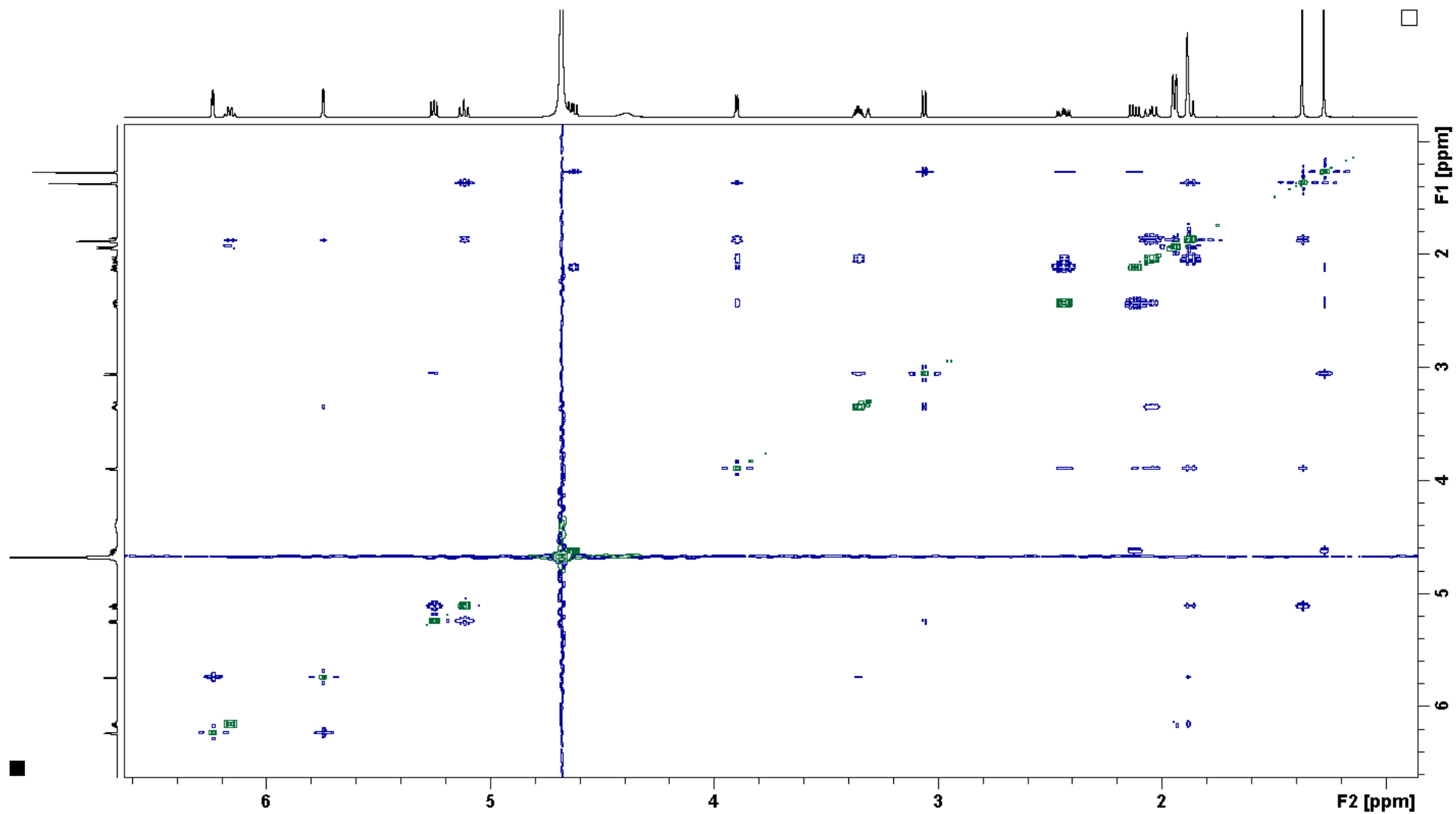


Figure S33: 2D ^1H - ^1H NOESY spectrum of compound 8 in CD_3OD .

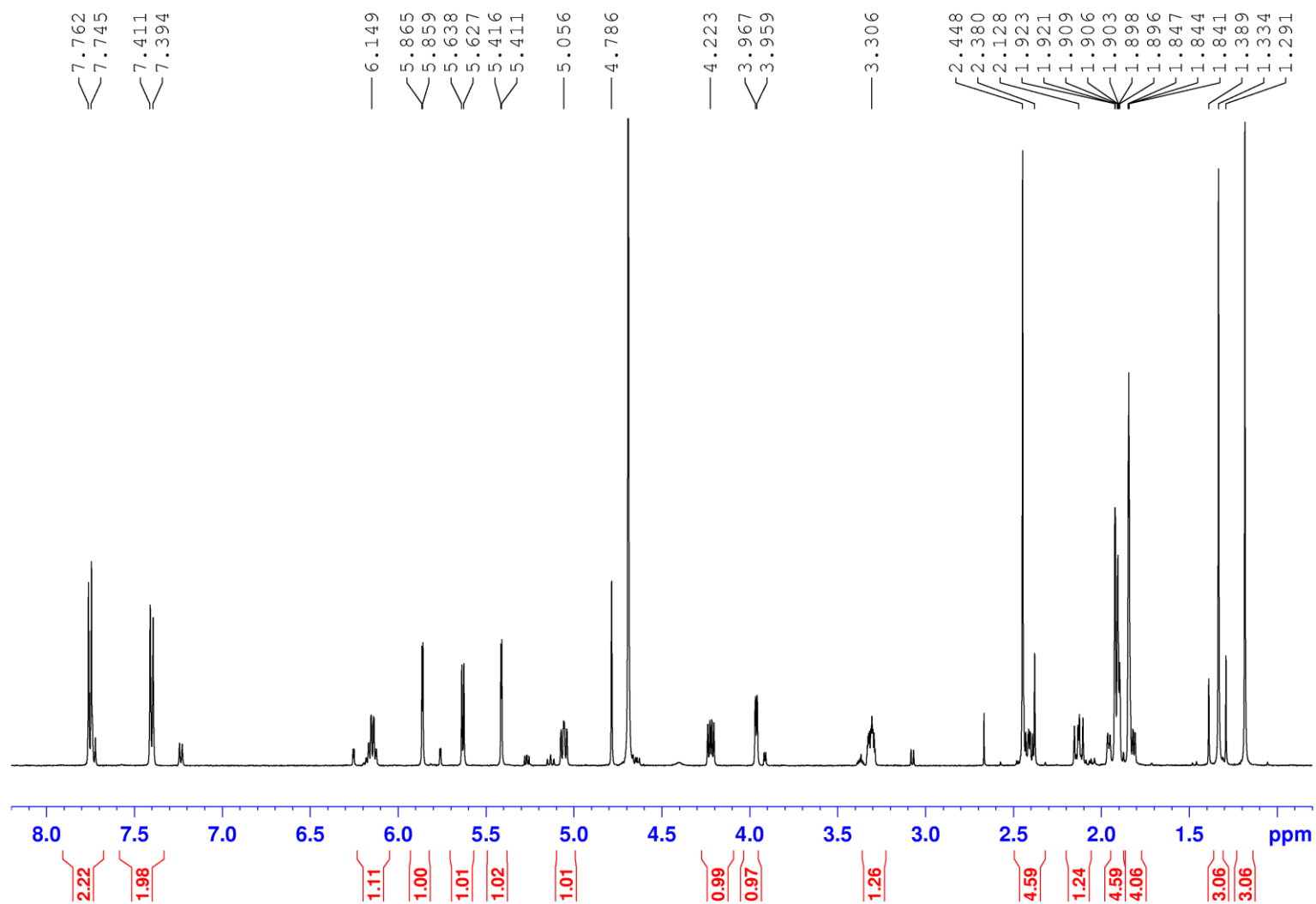


Figure S34: ¹H-NMR spectrum of compound **9** in CD₃OD.

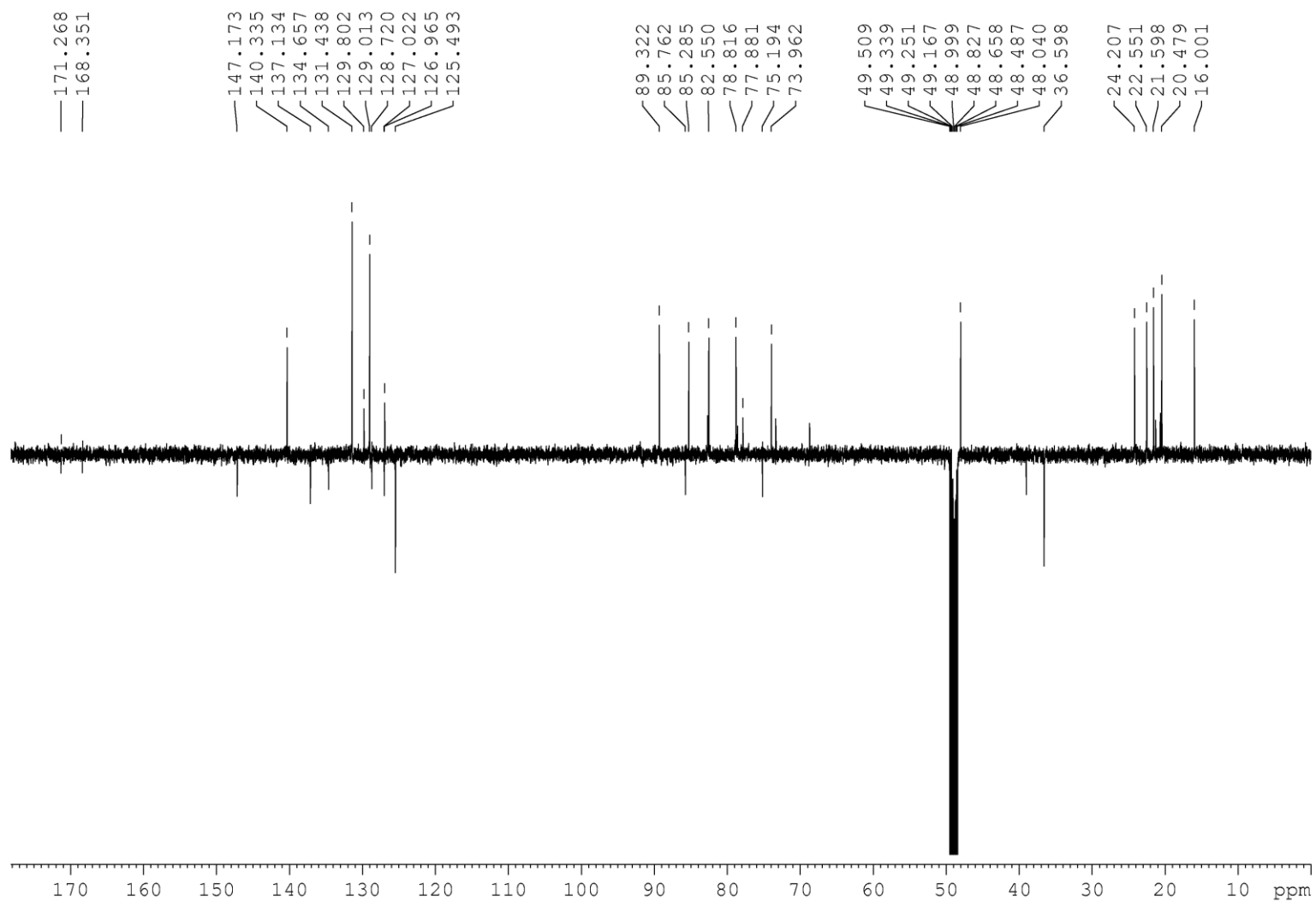


Figure S35: ¹³C spectrum of compound 9 in CD₃OD.

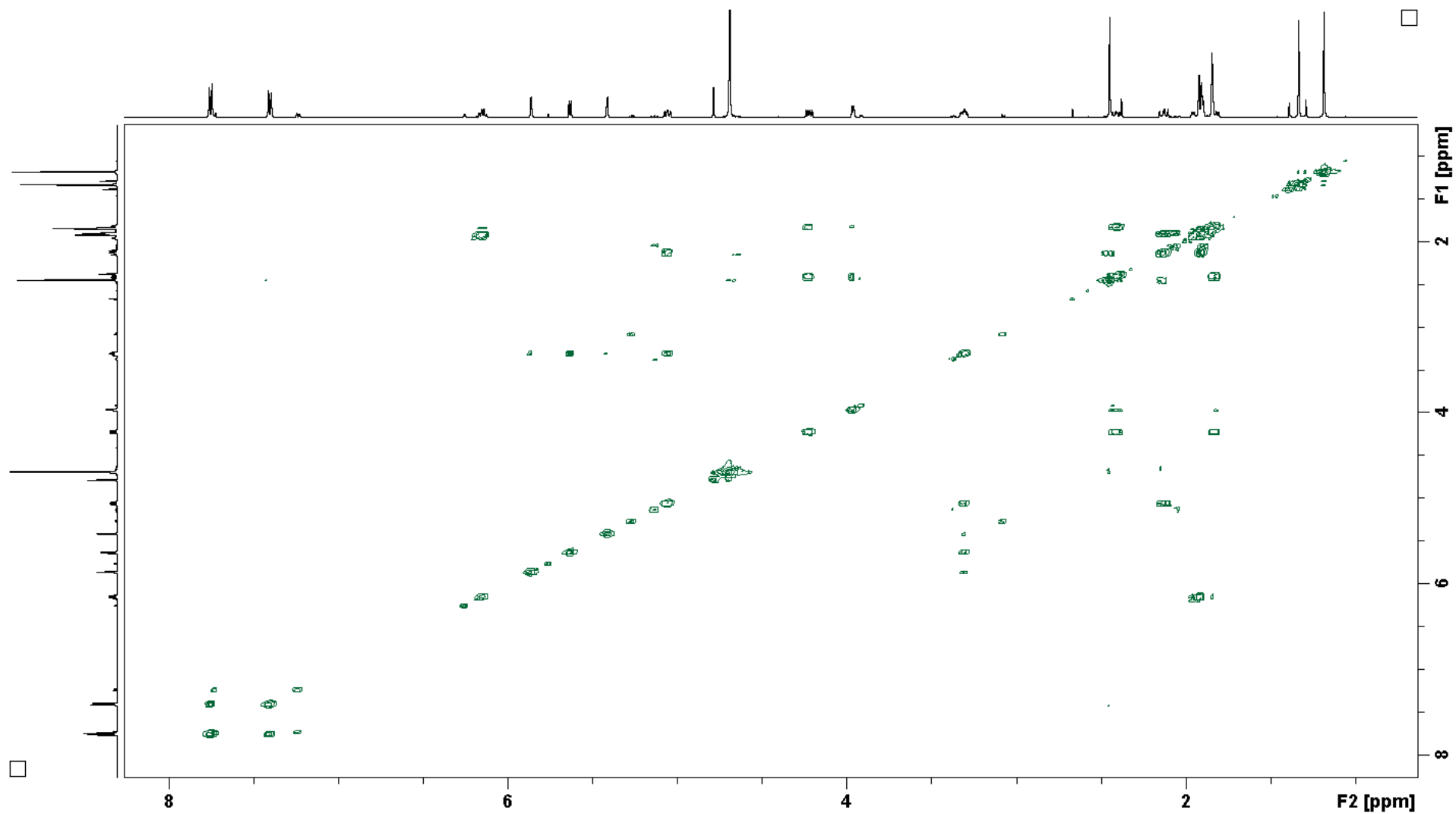


Figure S36: ^1H - ^1H COSY spectrum of compound 9 in CD_3OD .

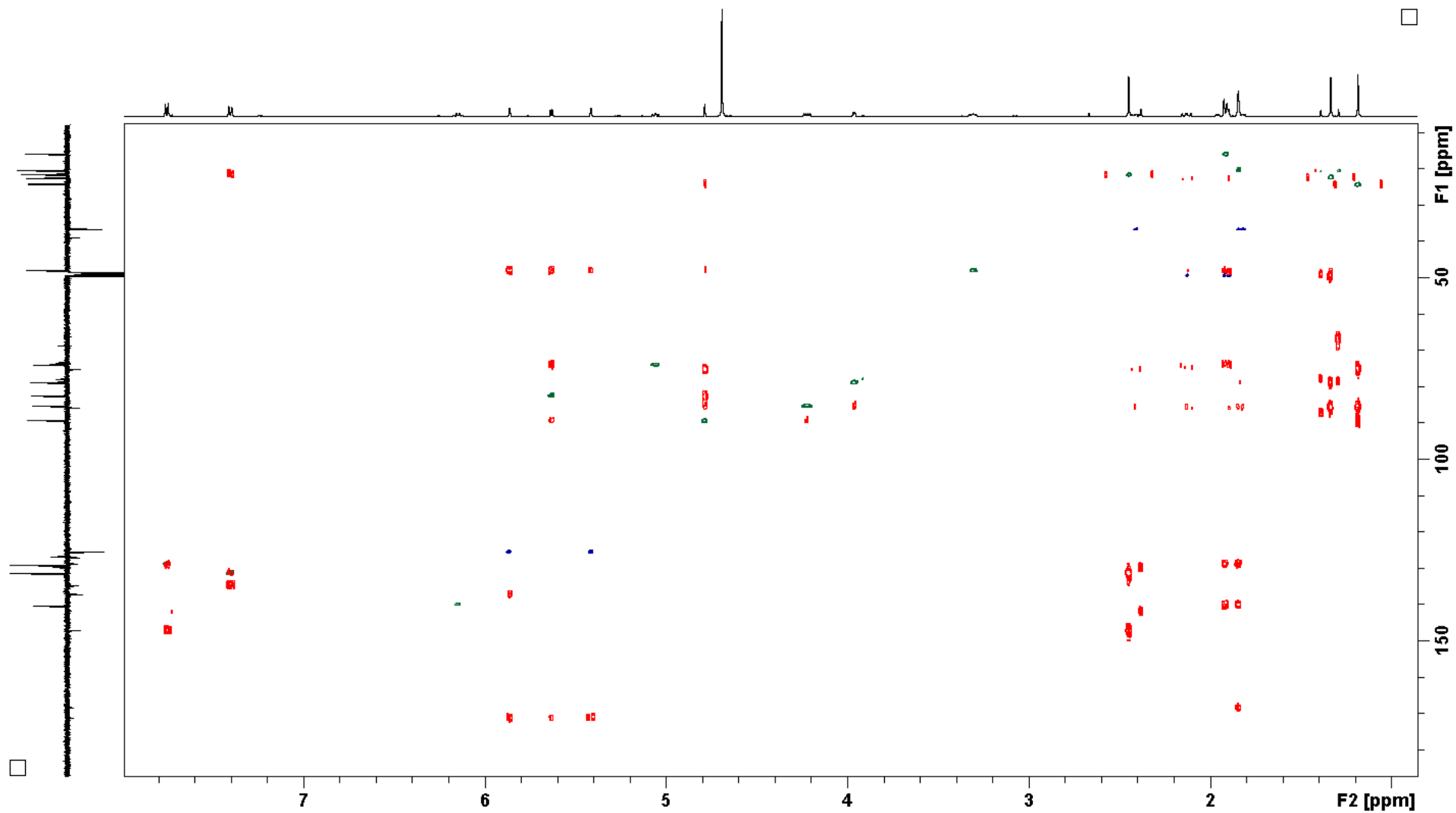


Figure S37: Overlay of HSQC and HMBC spectra of compound 9 in CD₃OD.

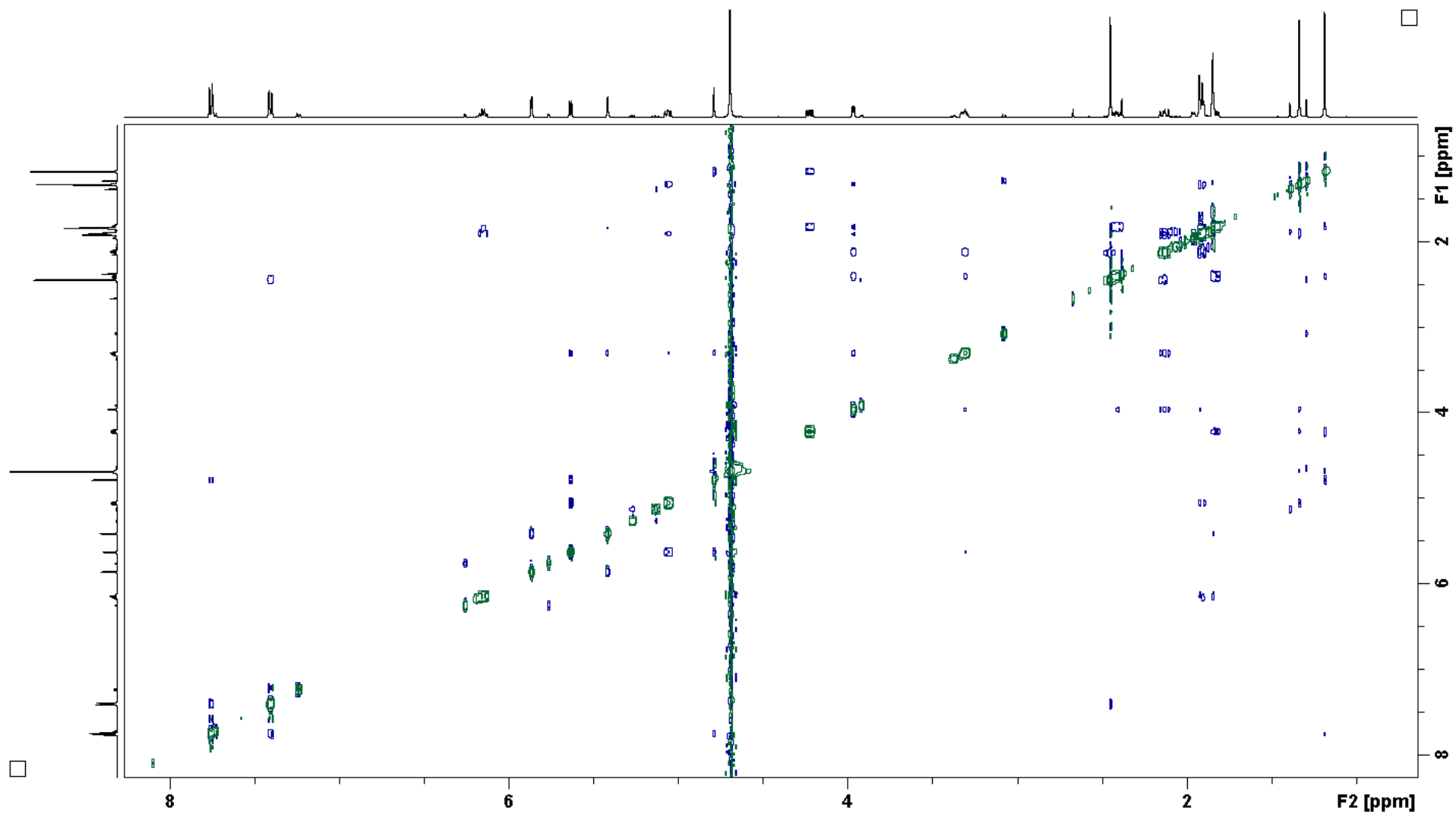


Figure S38: 2D ^1H - ^1H NOESY spectrum of compound 9 in CD_3OD .

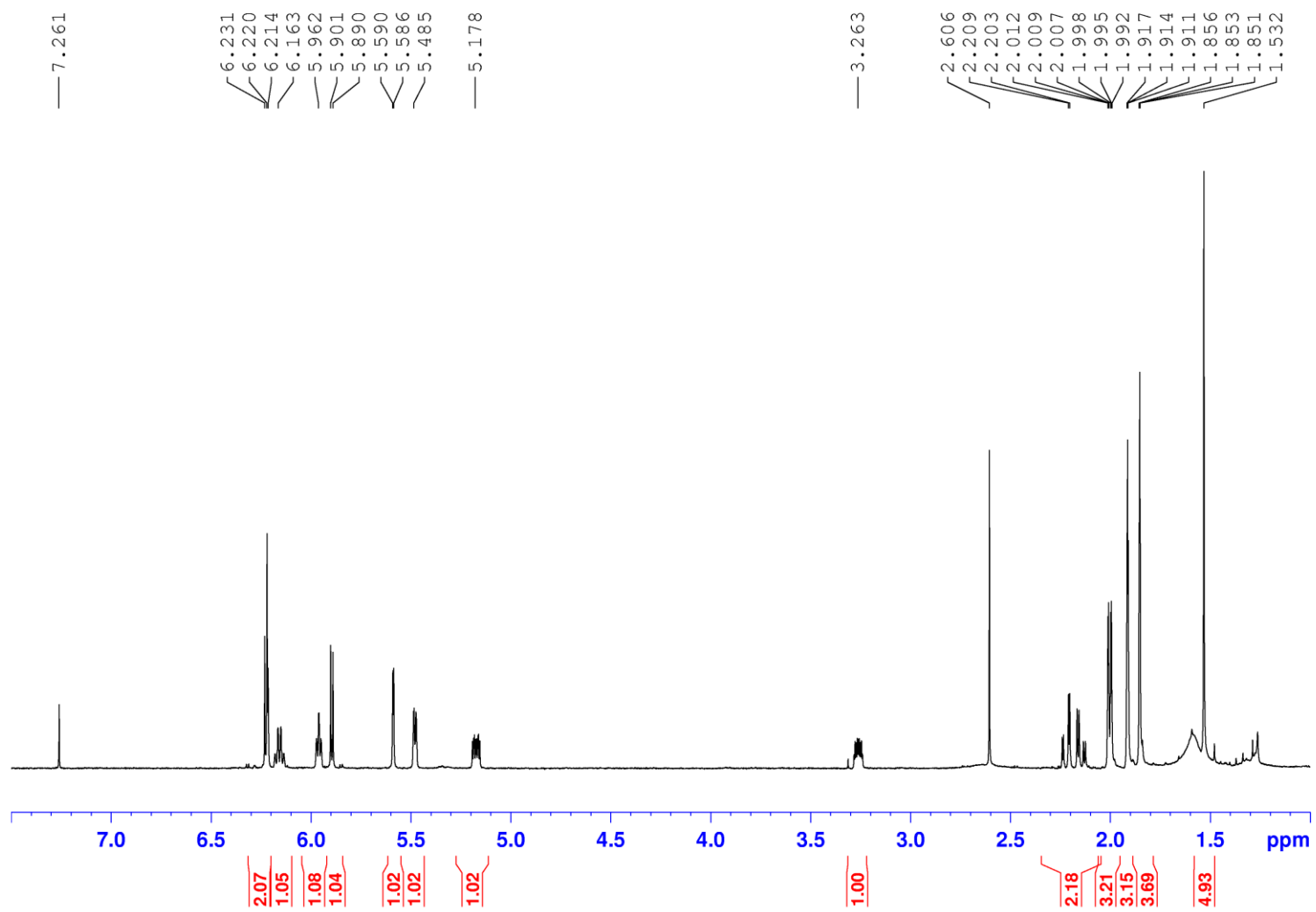


Figure S39. ¹H NMR spectrum of compound **10** in CD₃OD.

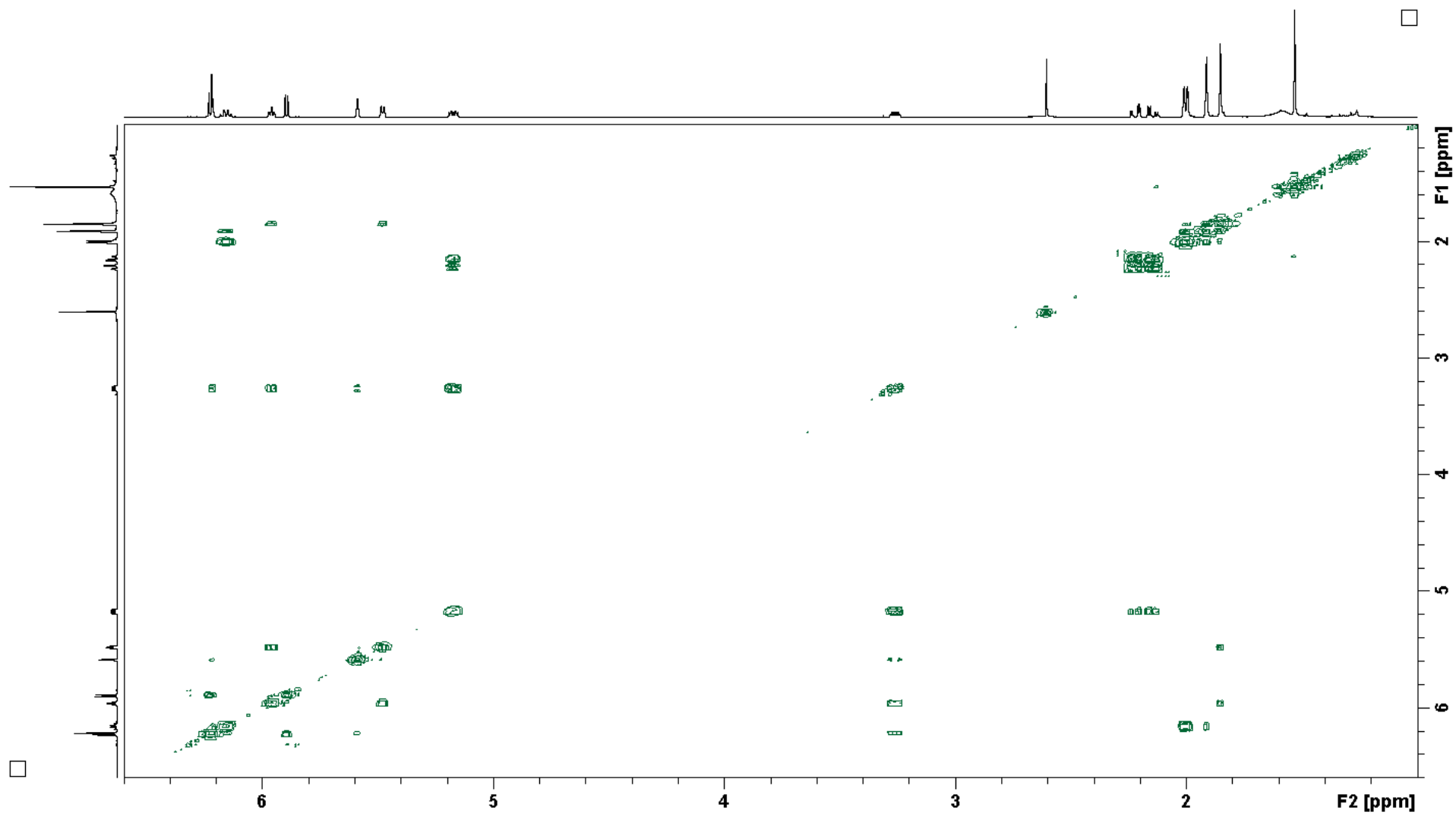


Figure S40. ^1H - ^1H -COSY spectrum of compound 10 in CD_3OD .

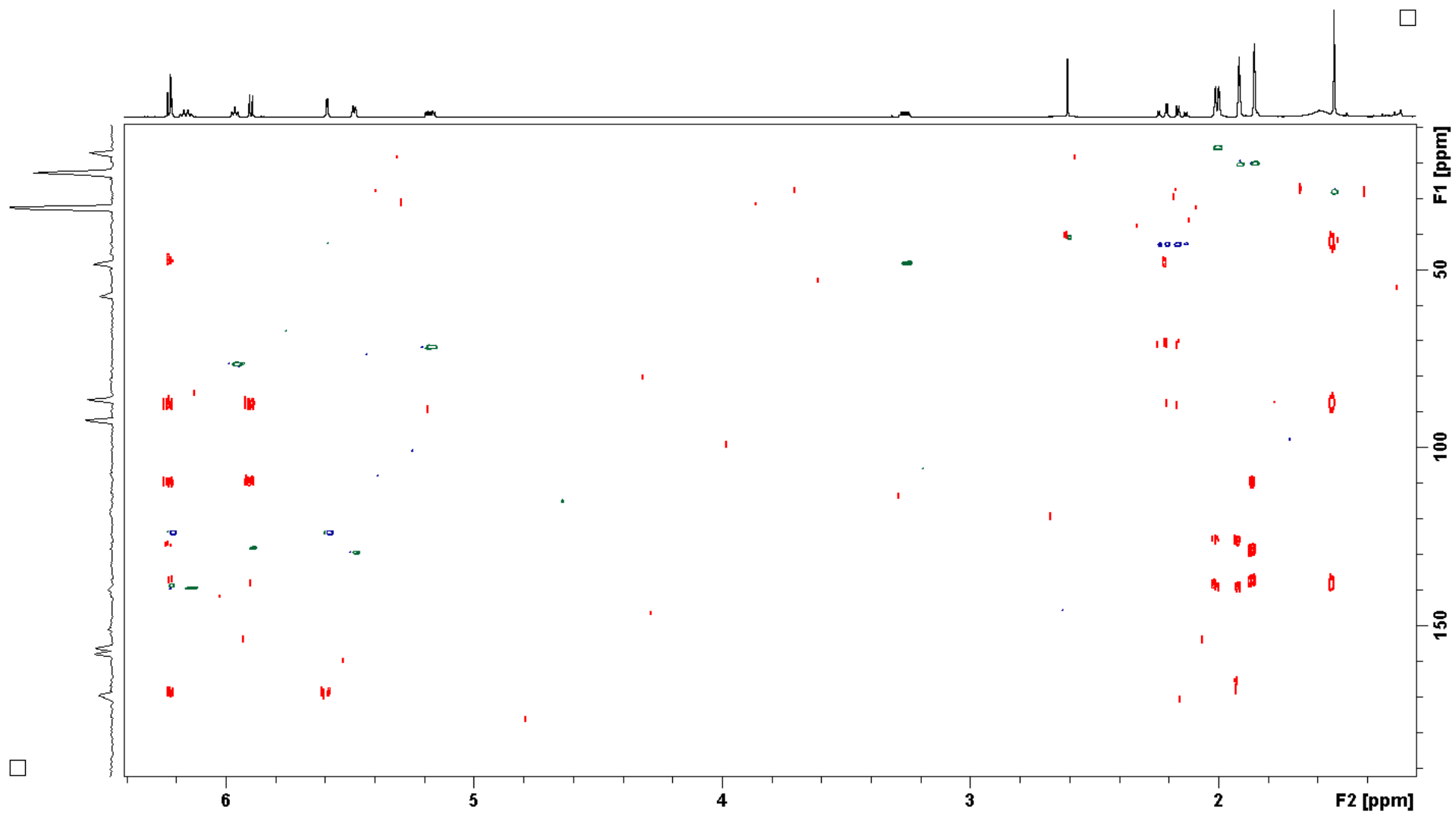


Figure S41. HSQC (green) and HMBC (red) overlaid spectra of compound **10** in CD₃OD.

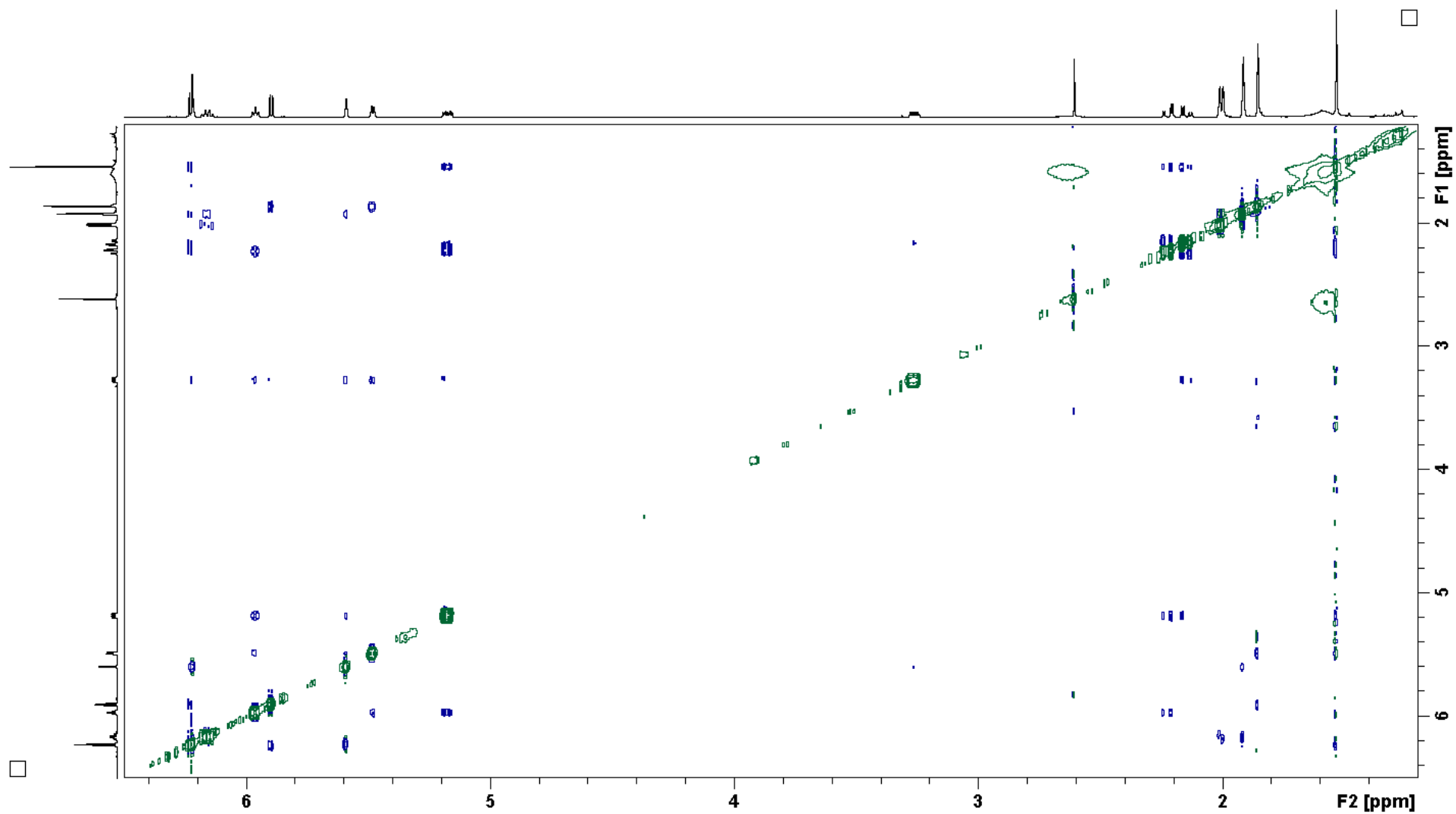


Figure S42: 2D ^1H - ^1H NOESY spectrum of compound **10** in CD_3OD .

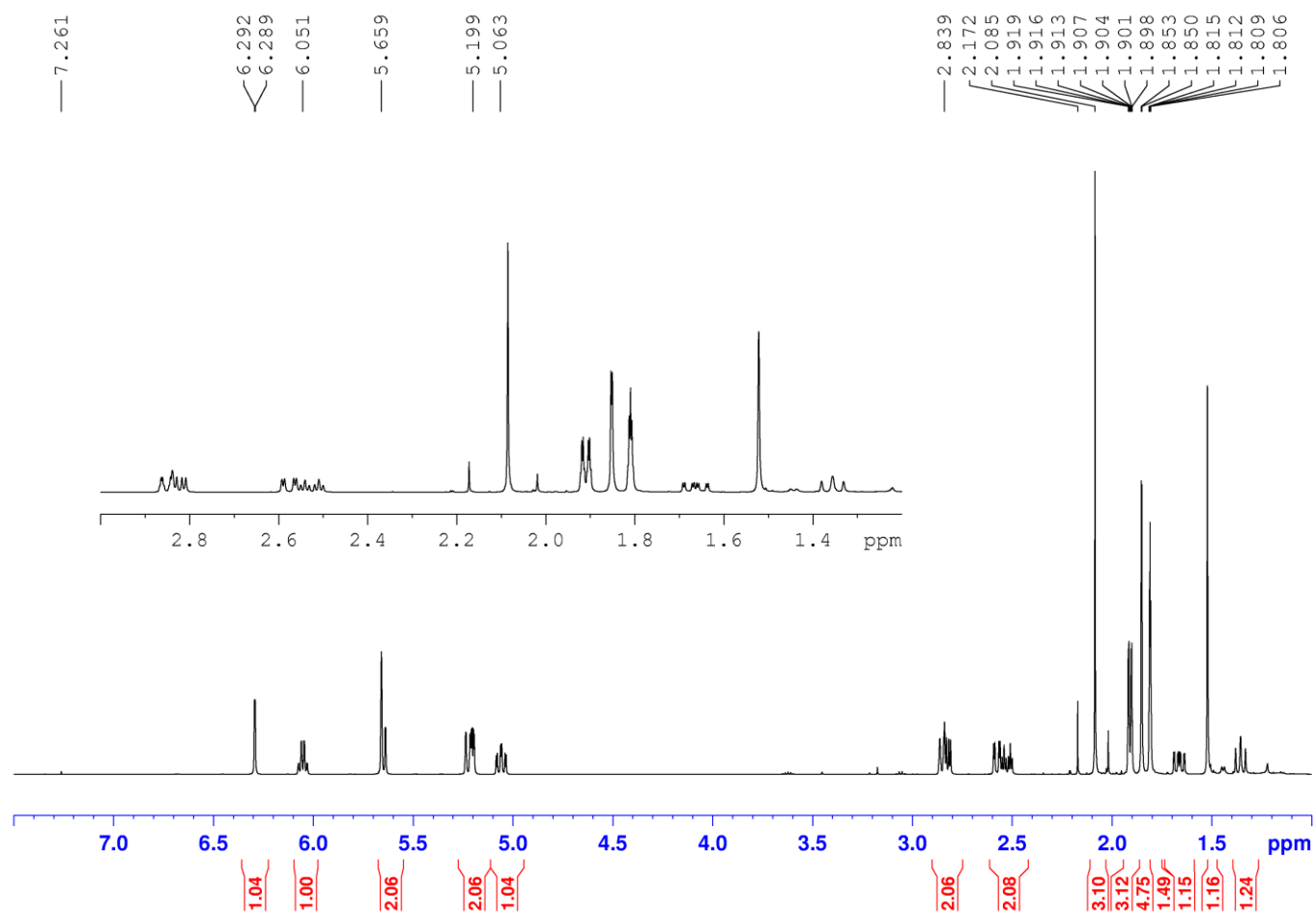


Figure S43: ¹H-NMR spectrum of compound **11** in CDCl₃.

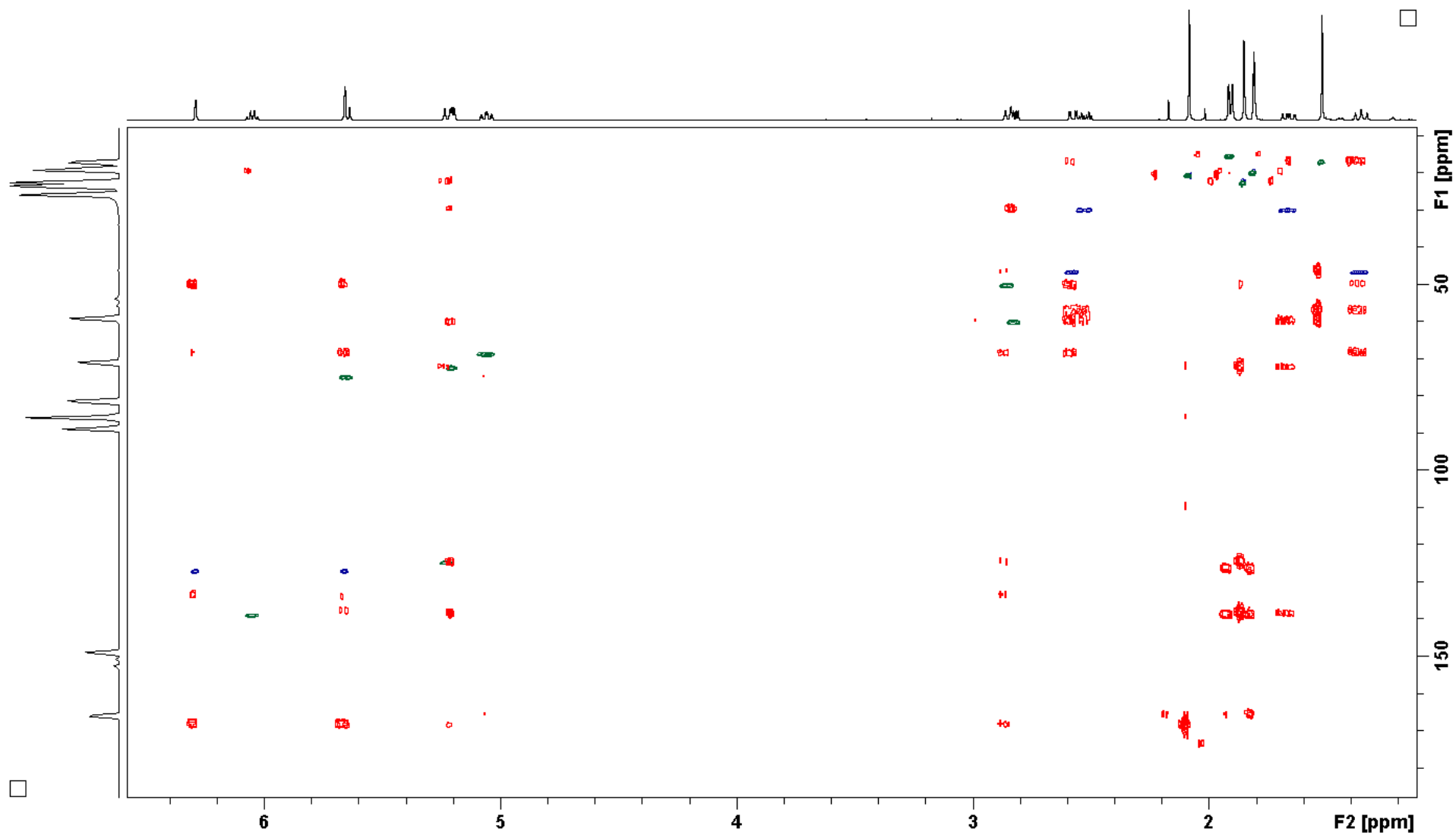


Figure S44: Overlay of HSQC and HMBC spectra of compound **11** in CDCl₃.

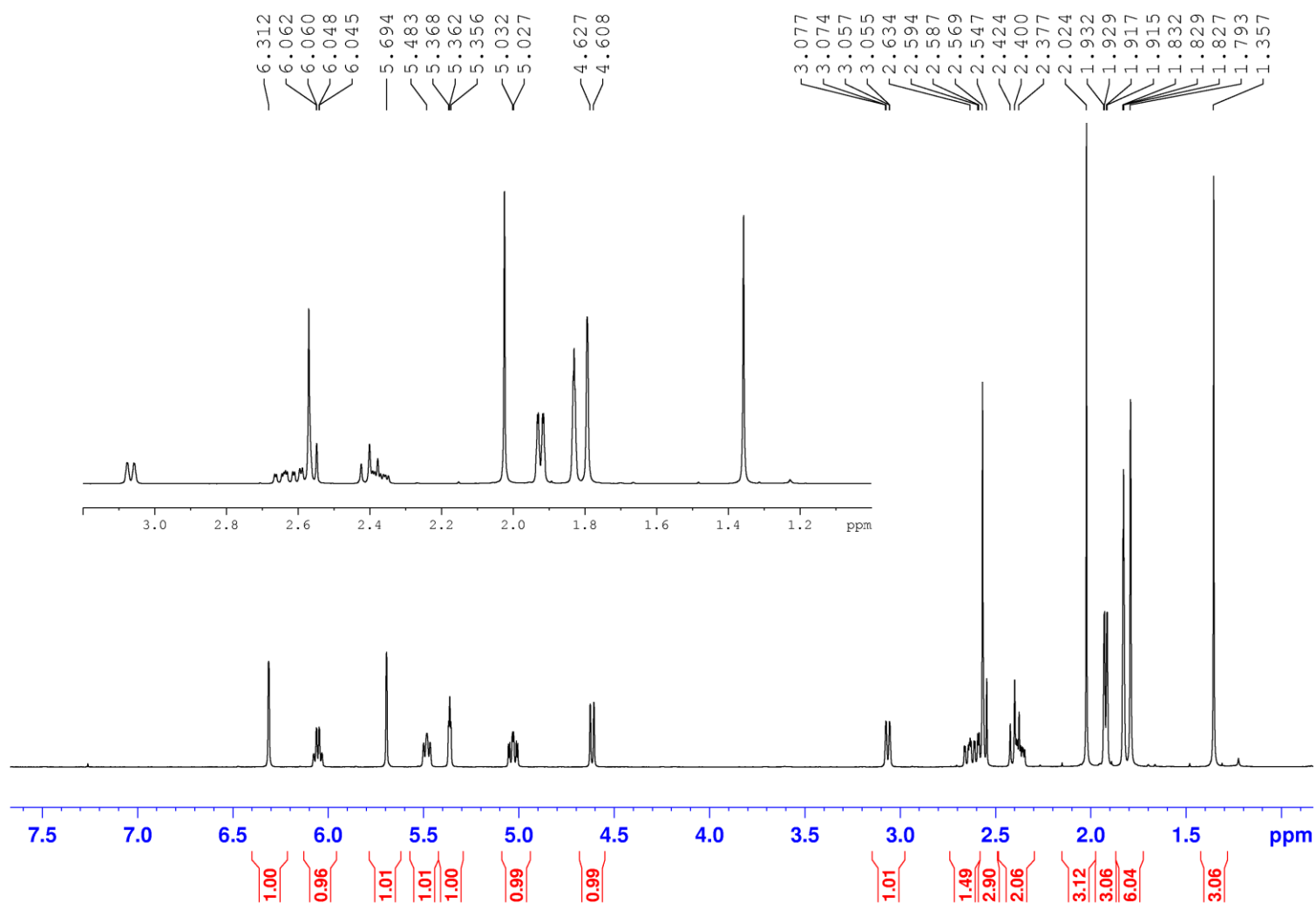


Figure S45: ^1H -NMR spectrum of compound **12** in CDCl_3 .

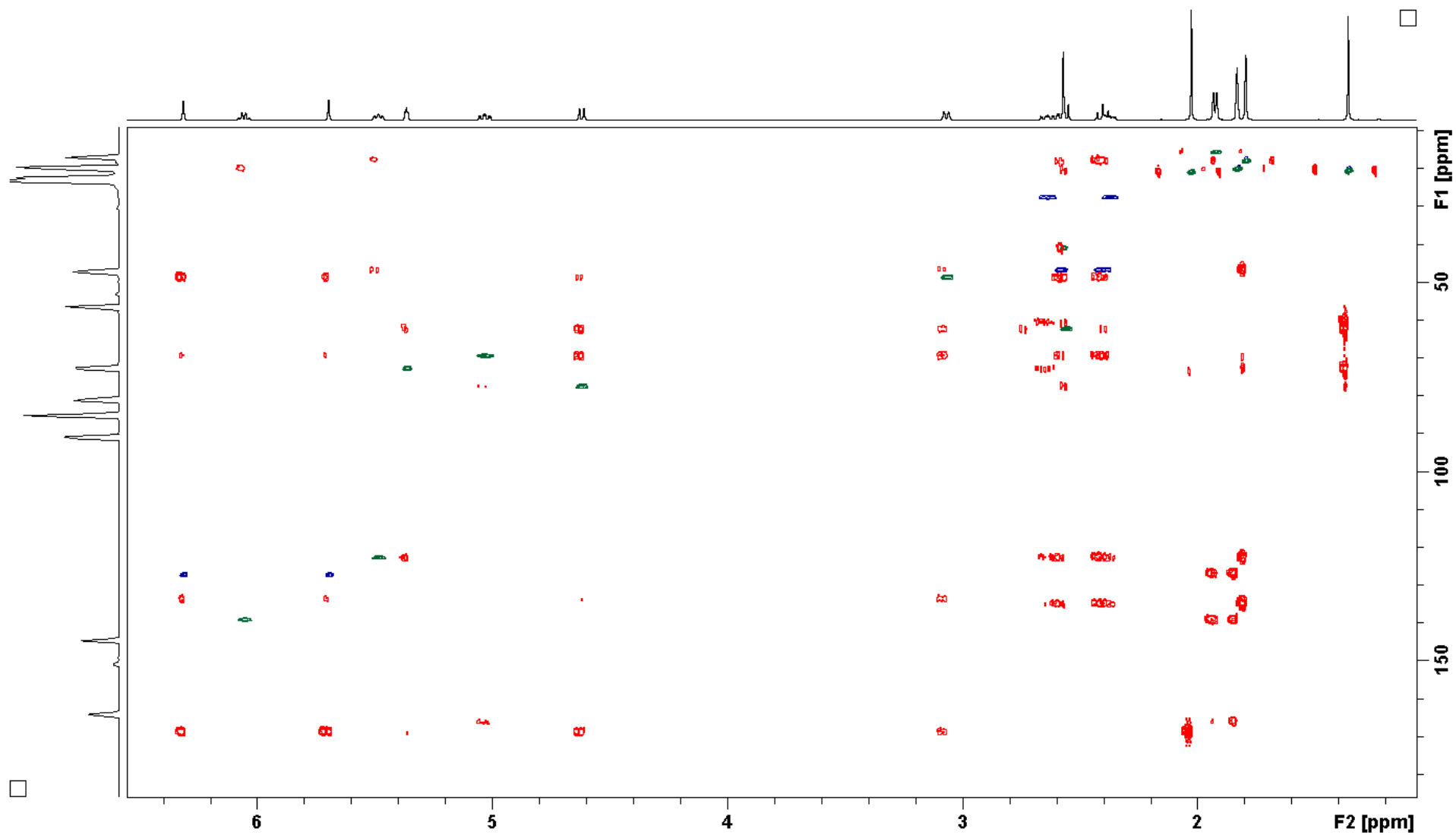


Figure S46: Overlay of HSQC and HMBC spectra of compound **12** in CDCl₃.

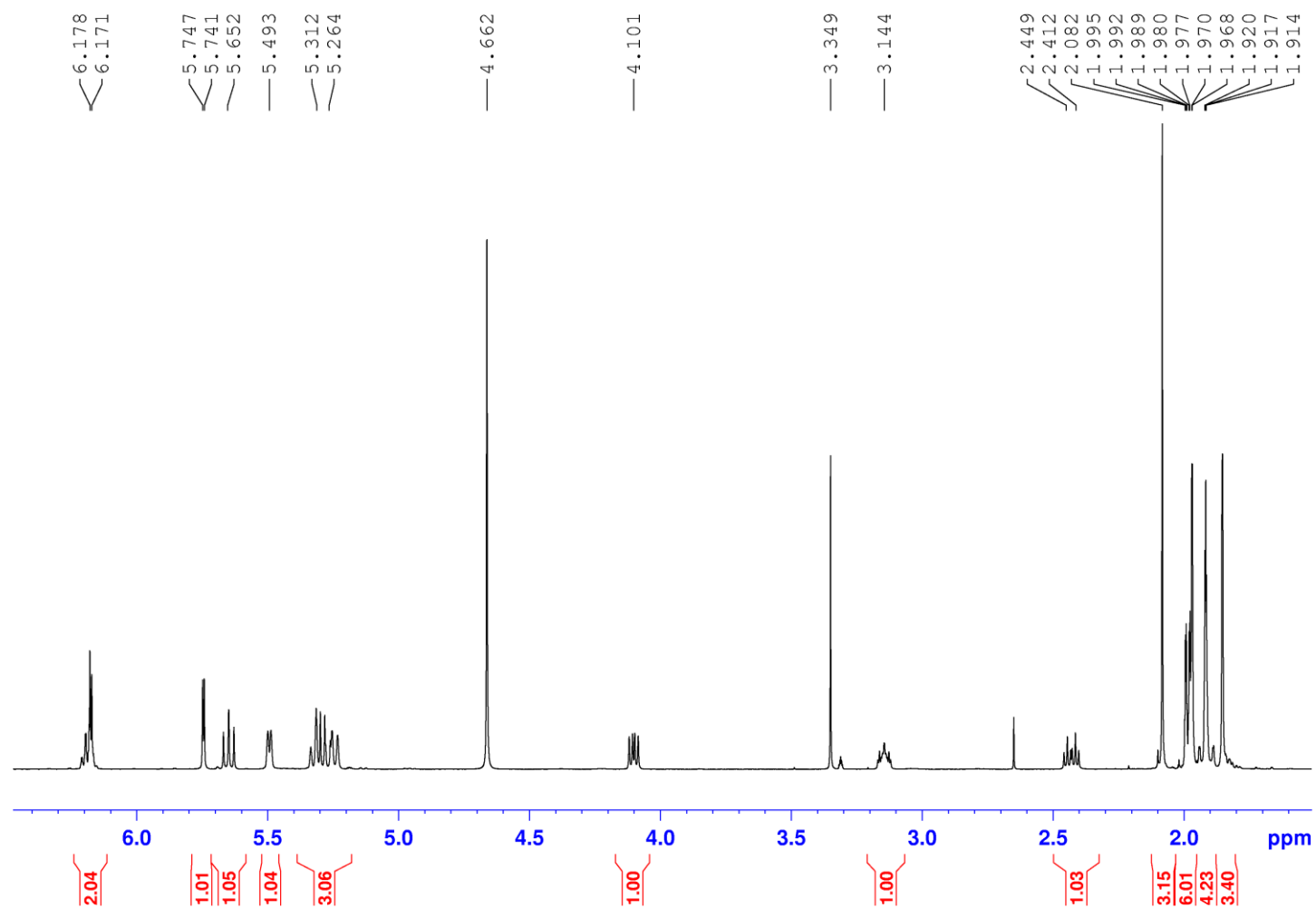


Figure S47: ¹H NMR spectrum of compound 13 in CD₃OD.

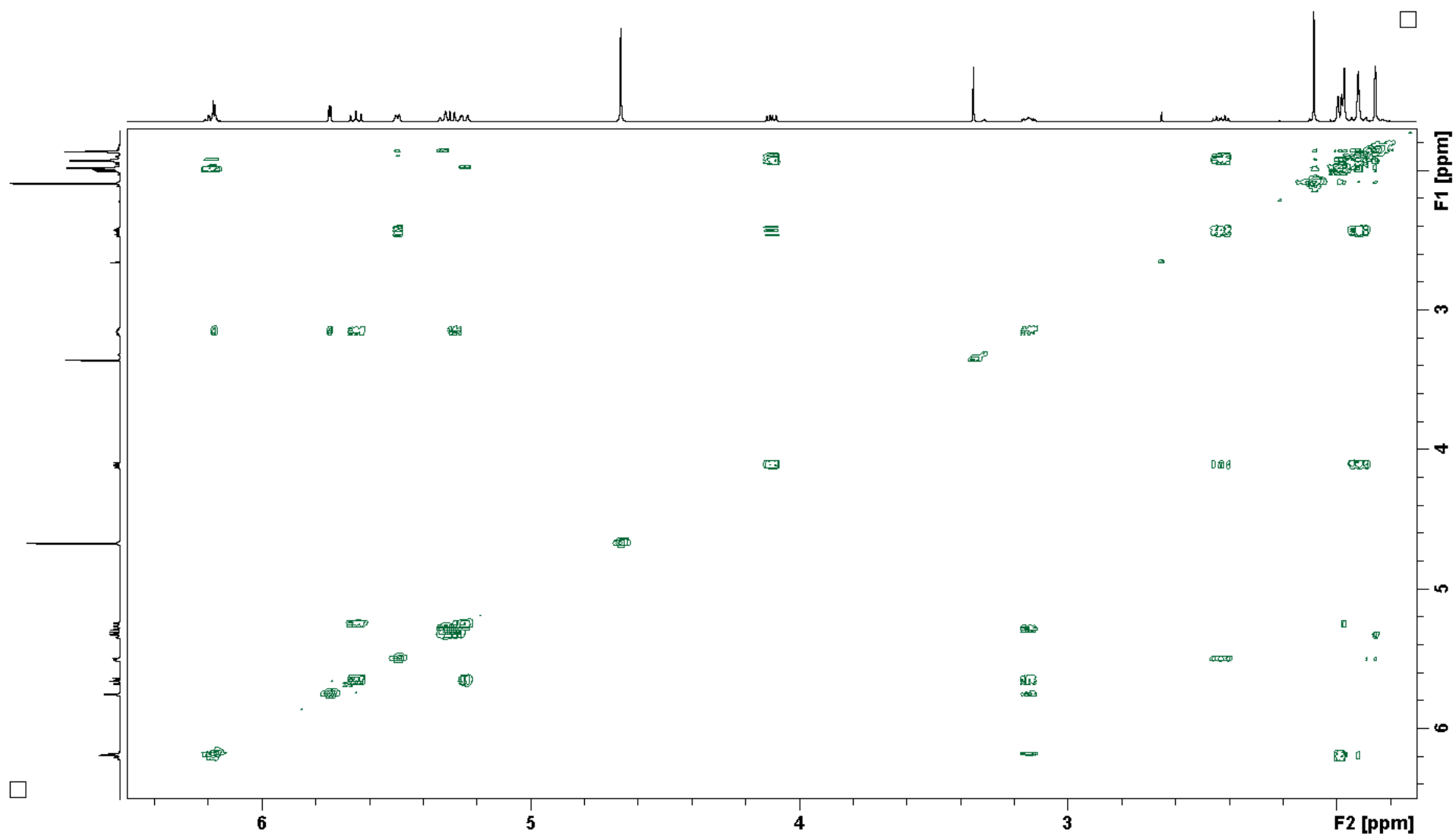


Figure S48: ^1H - ^1H -COSY spectrum of compound 13 in CD_3OD .

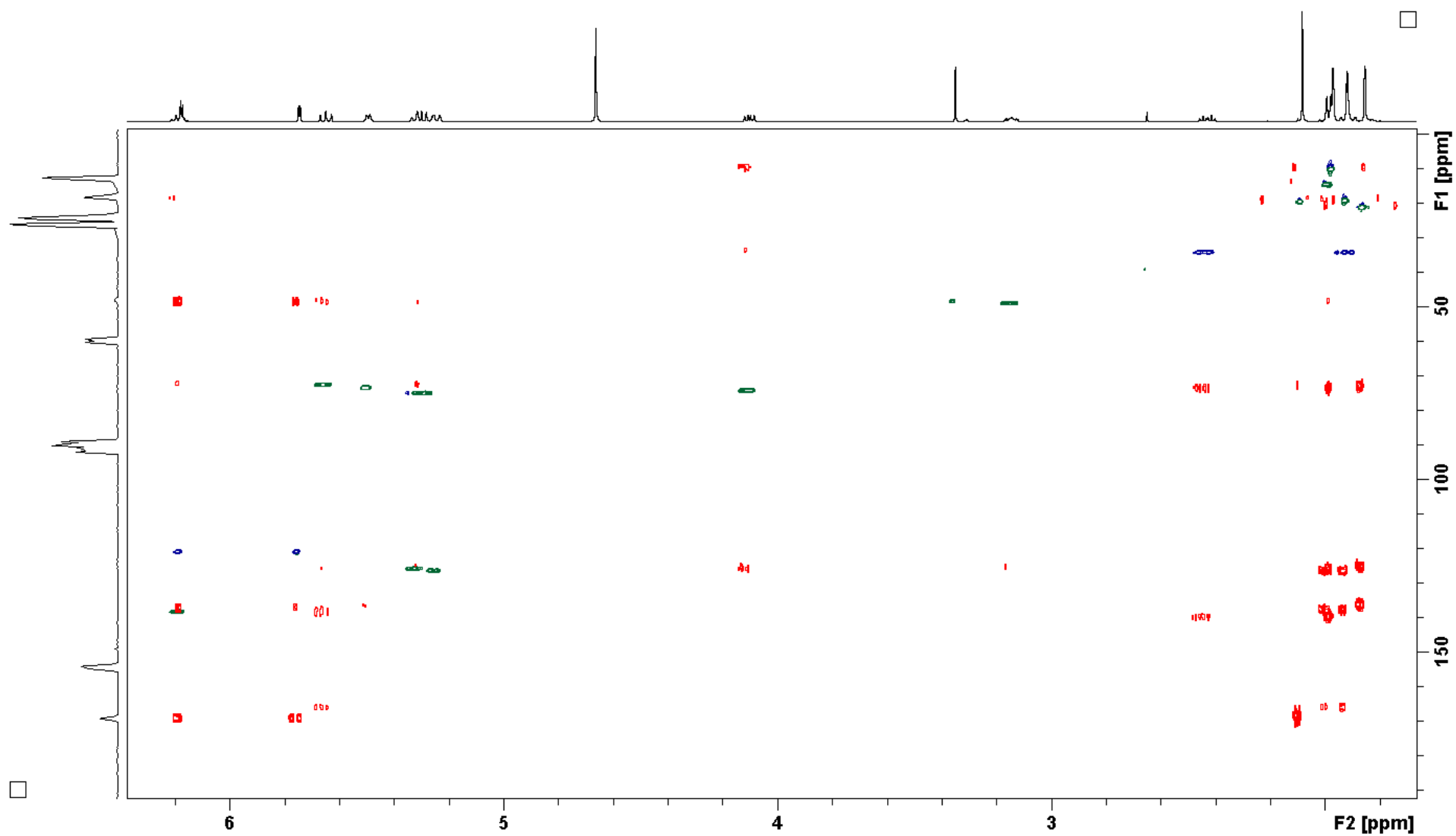


Figure S49: HSQC (green) and HMBC (red) overlaid spectra of compound **13** in CD₃OD.

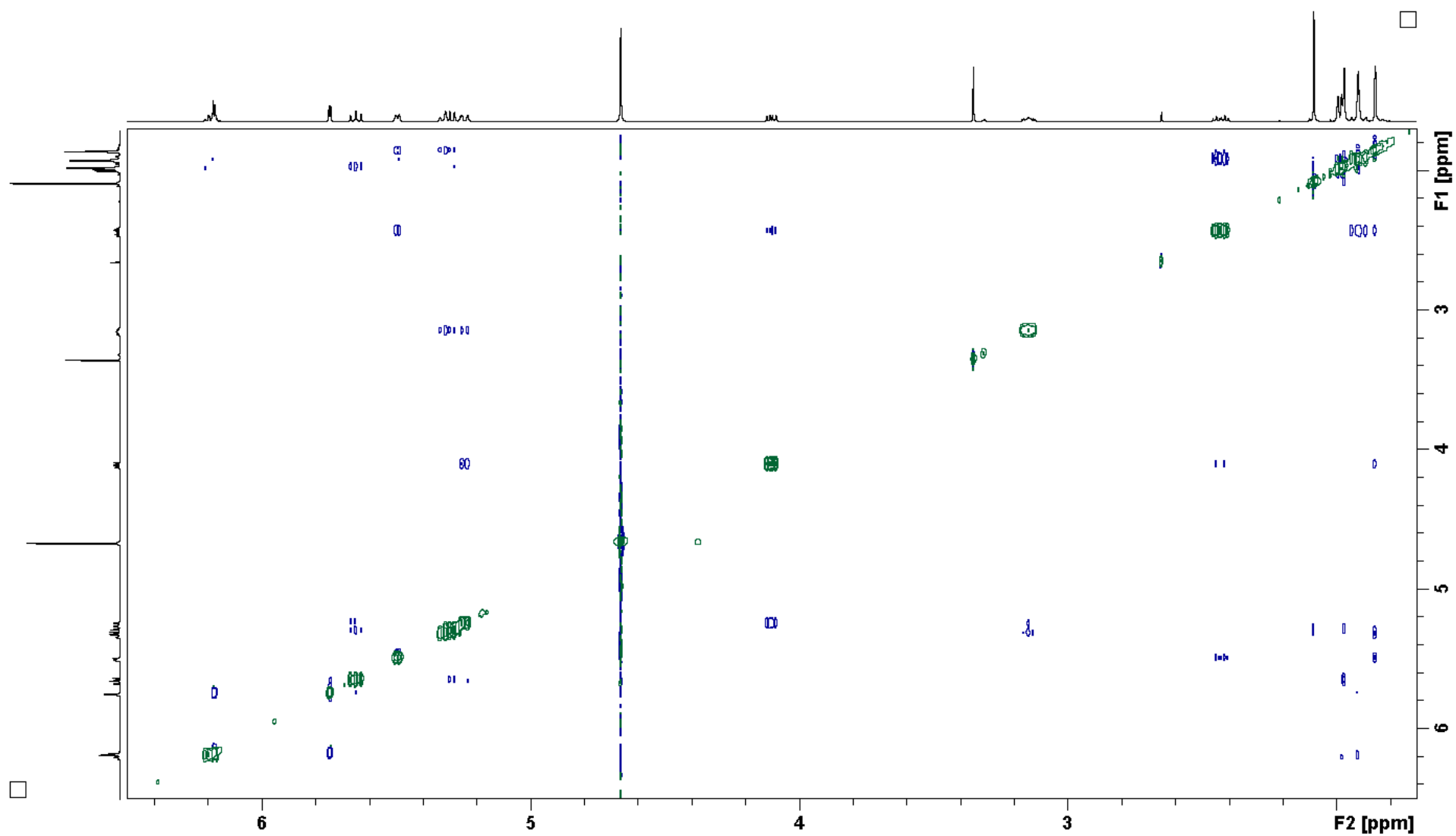


Figure S50: 2D ^1H - ^1H NOESY spectrum of compound **13** in CD_3OD .

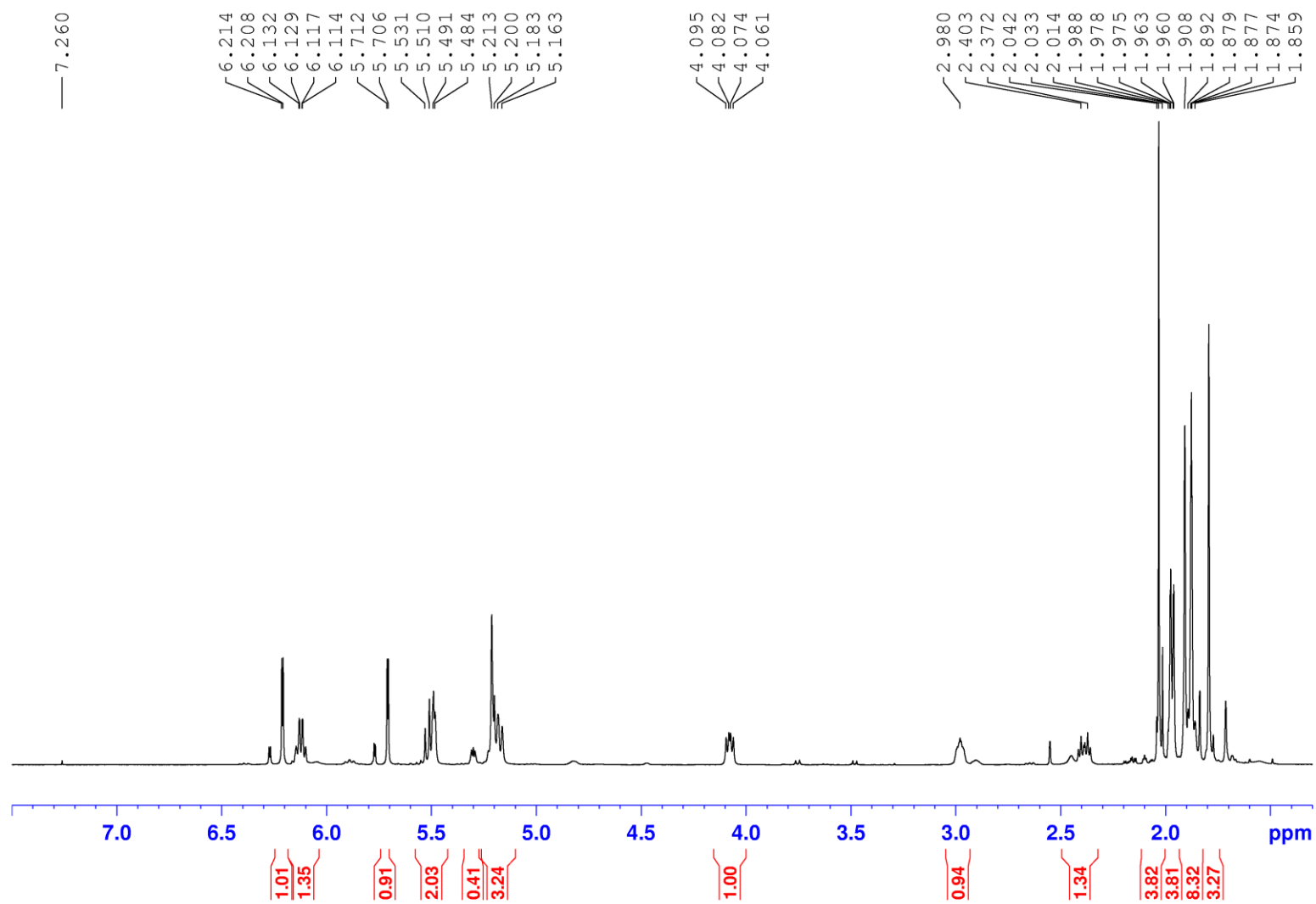


Figure S51: ¹H NMR spectrum of compound **14** in CD₃OD.

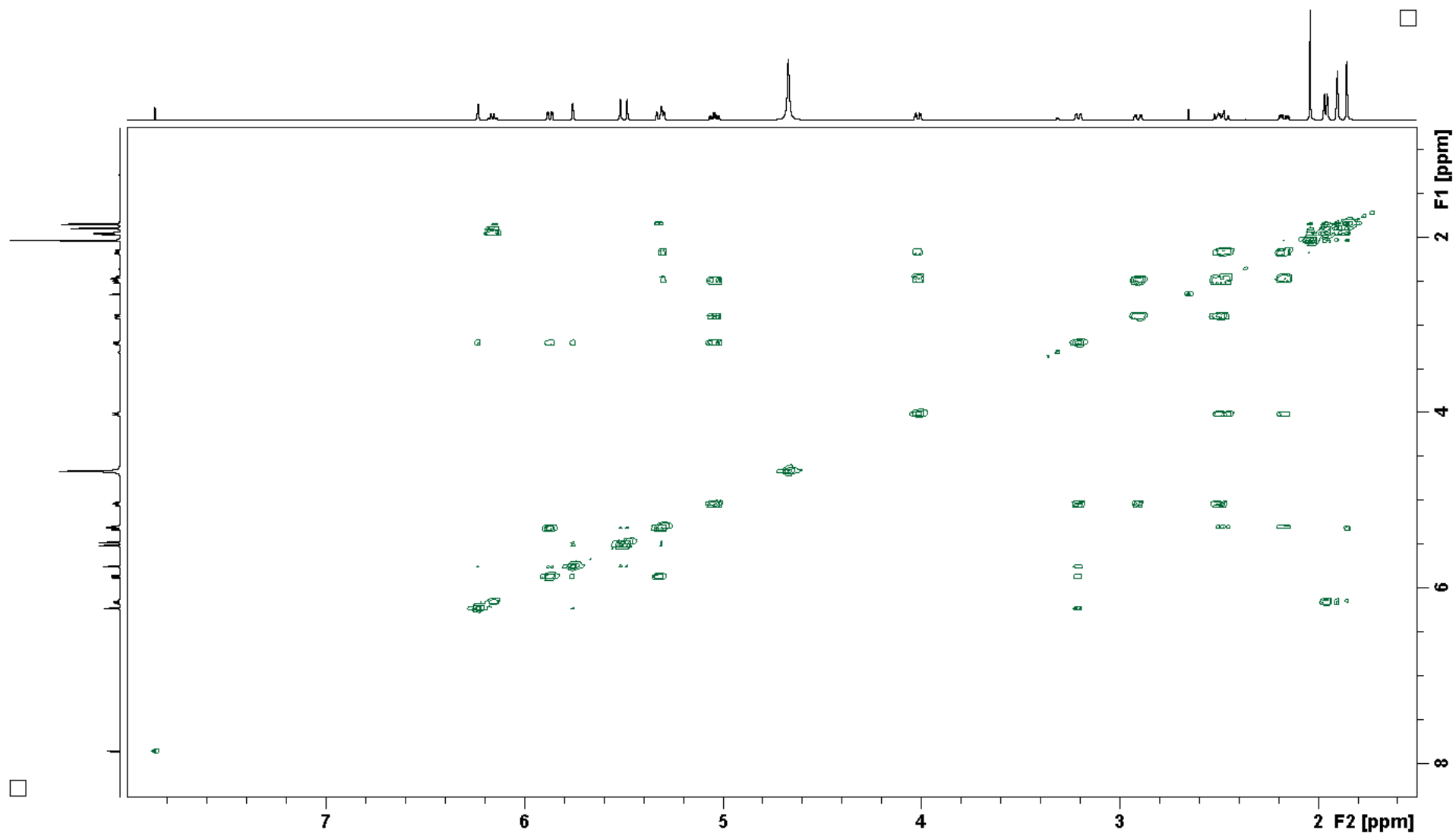


Figure S52: ^1H - ^1H -COSY spectrum of compound **14** in CD_3OD .

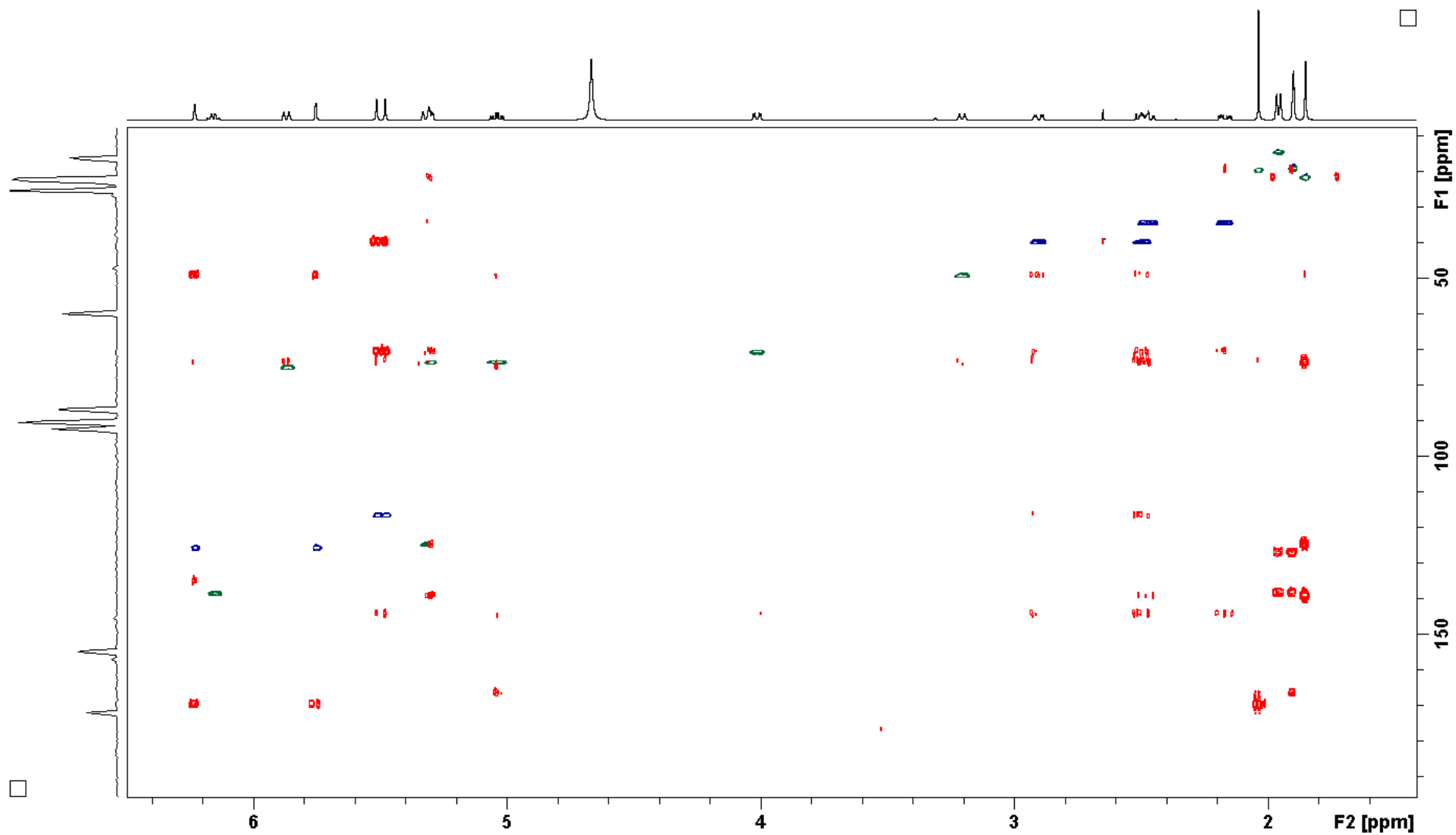


Figure S53: HSQC (green) and HMBC (red) overlaid spectra of compound **14** in CD_3OD .

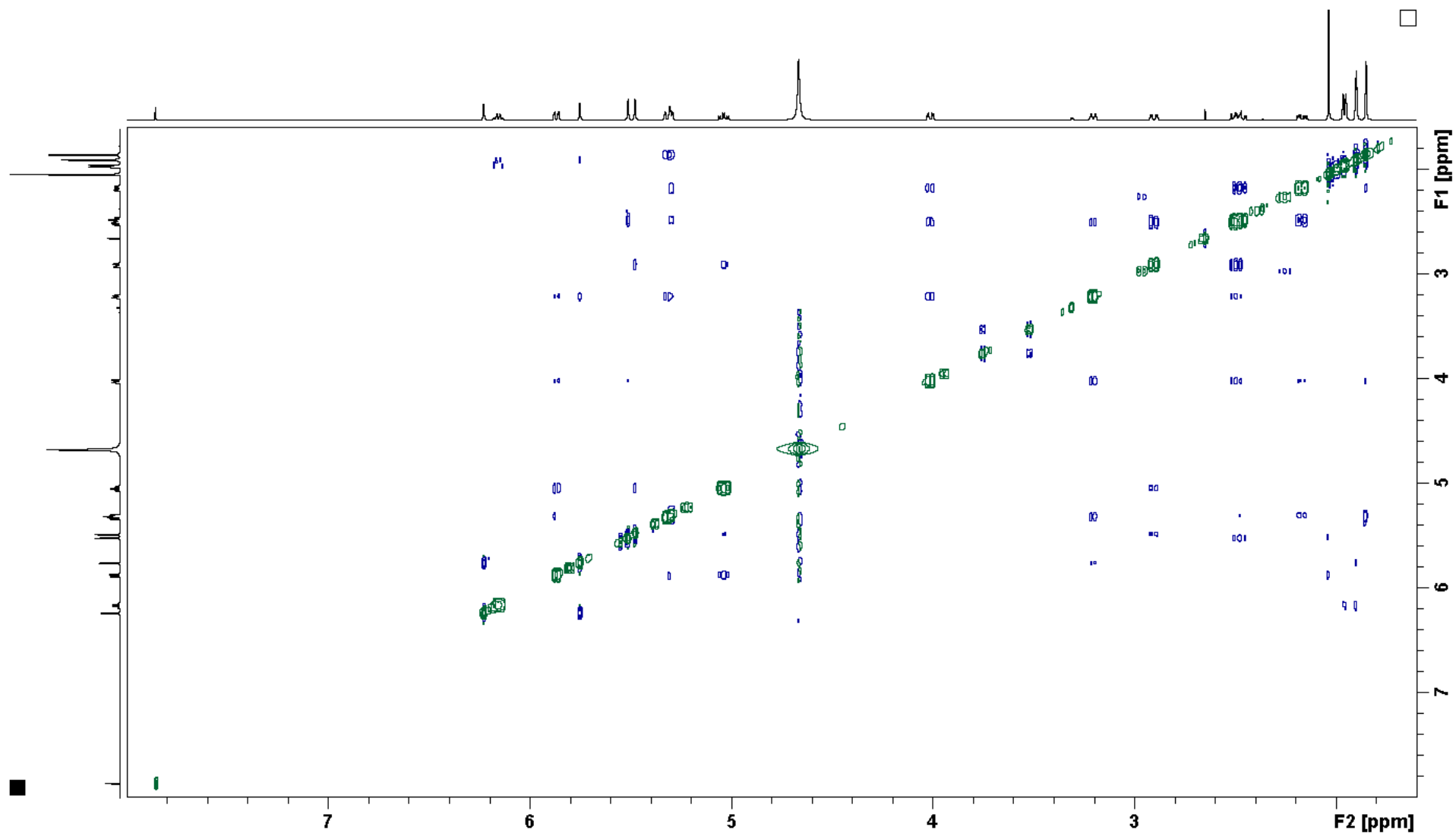


Figure S54: 2D ^1H - ^1H NOESY spectrum of compound **14** in CD_3OD .

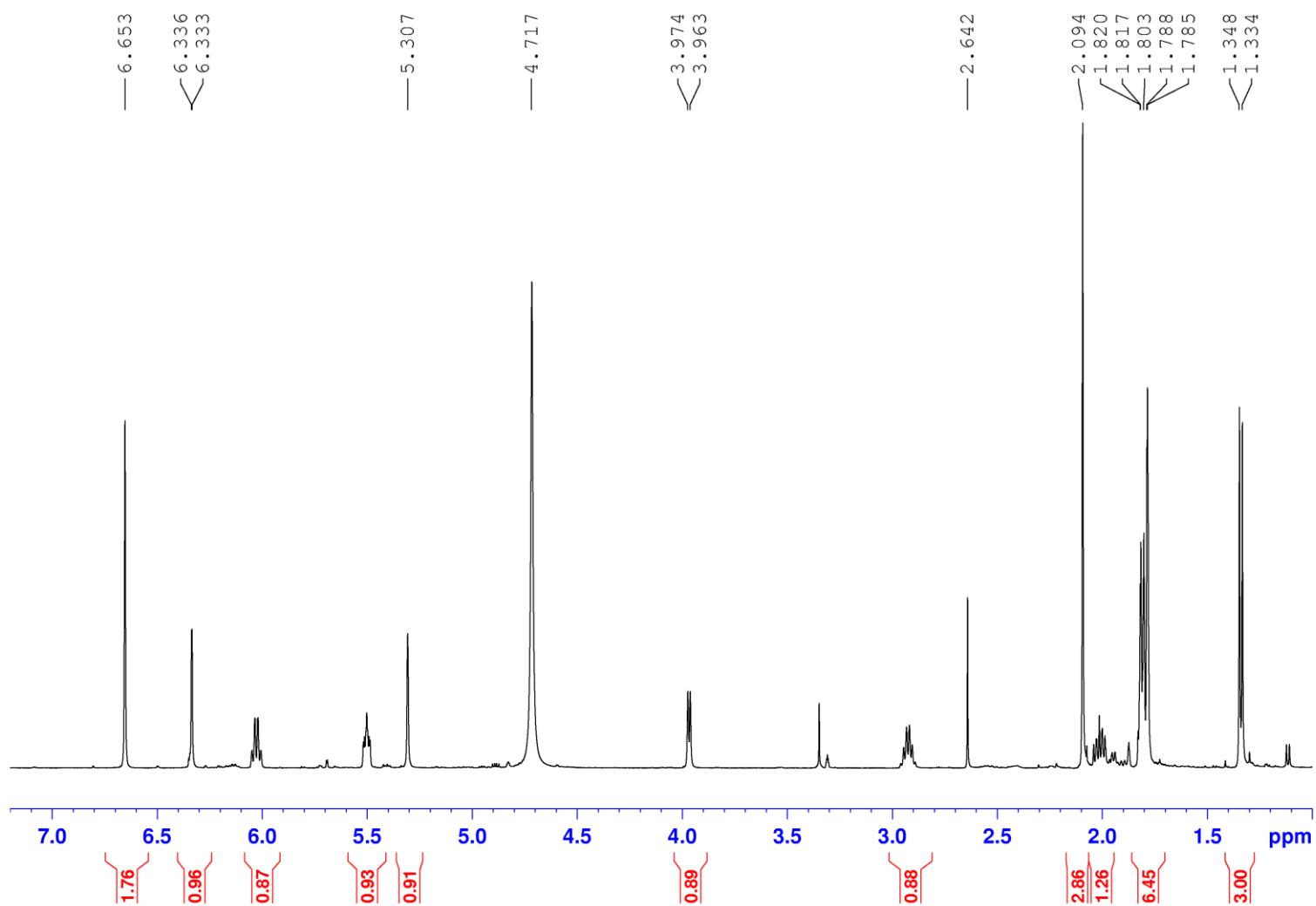


Figure S55: ¹H NMR spectrum of compound **15** in CD₃OD.

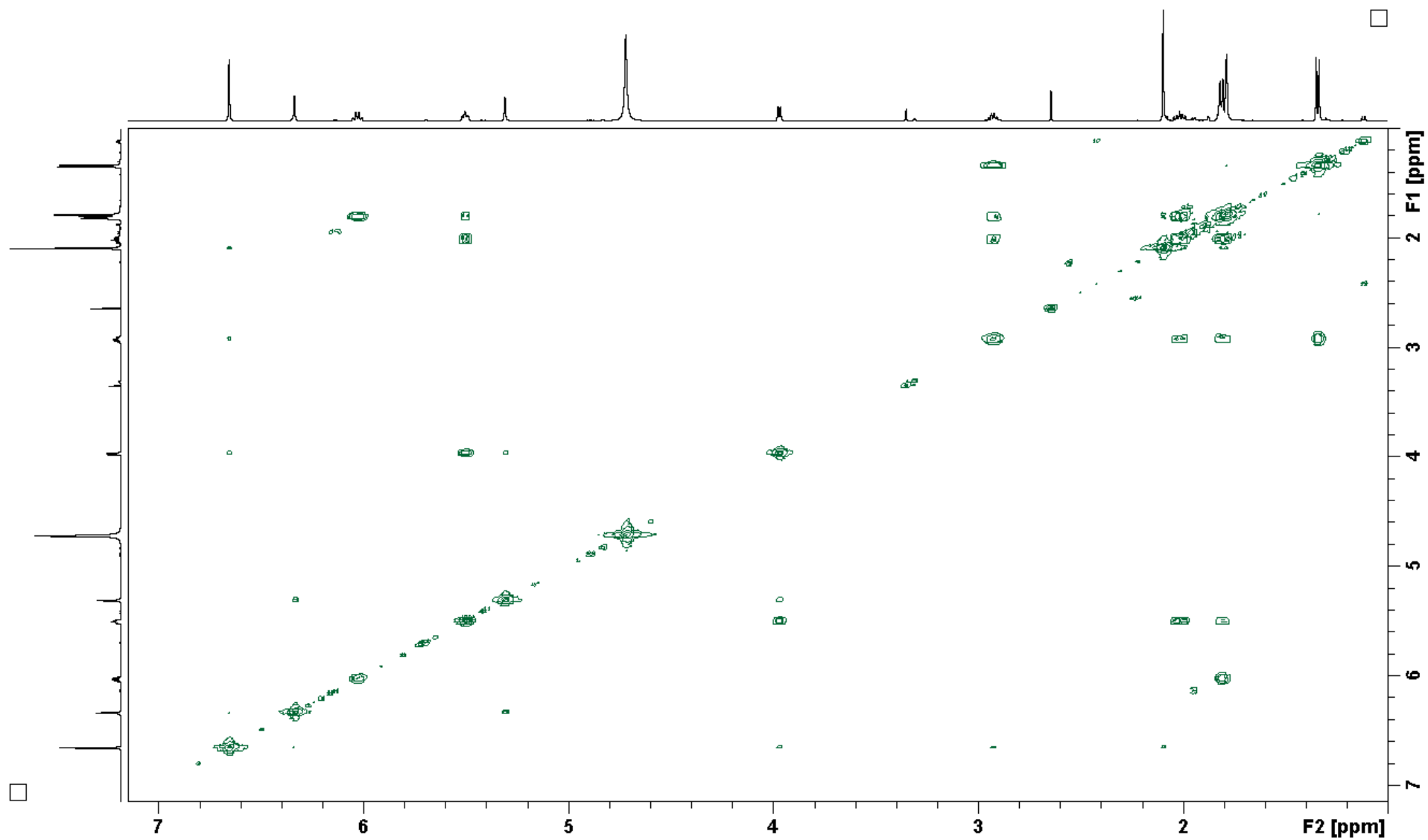


Figure S56: ^1H - ^1H -COSY spectrum of compound 15 in CD_3OD .

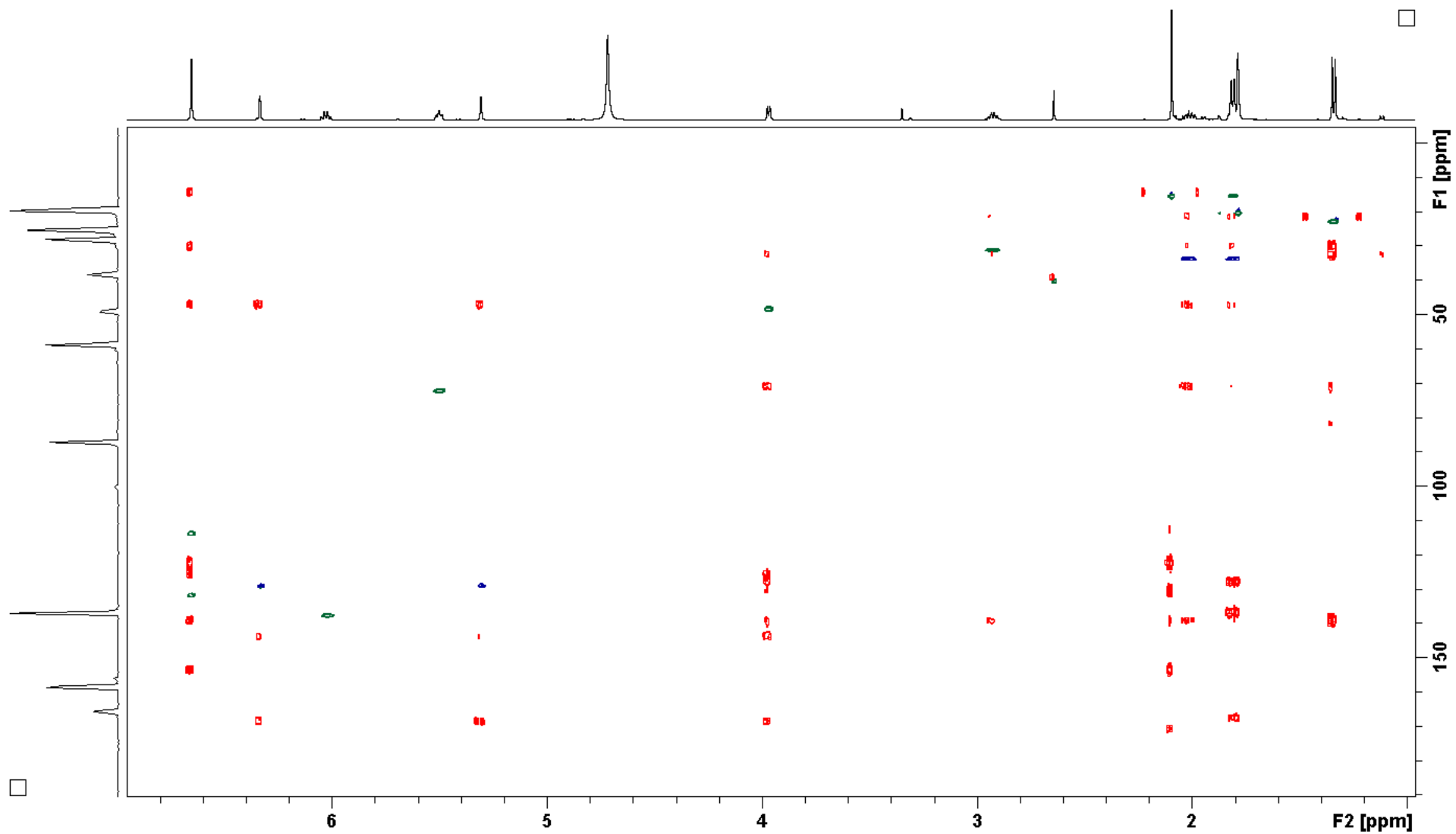


Figure S57: HSQC (green) and HMBC (red) overlaid spectra of compound **15** in CD₃OD.

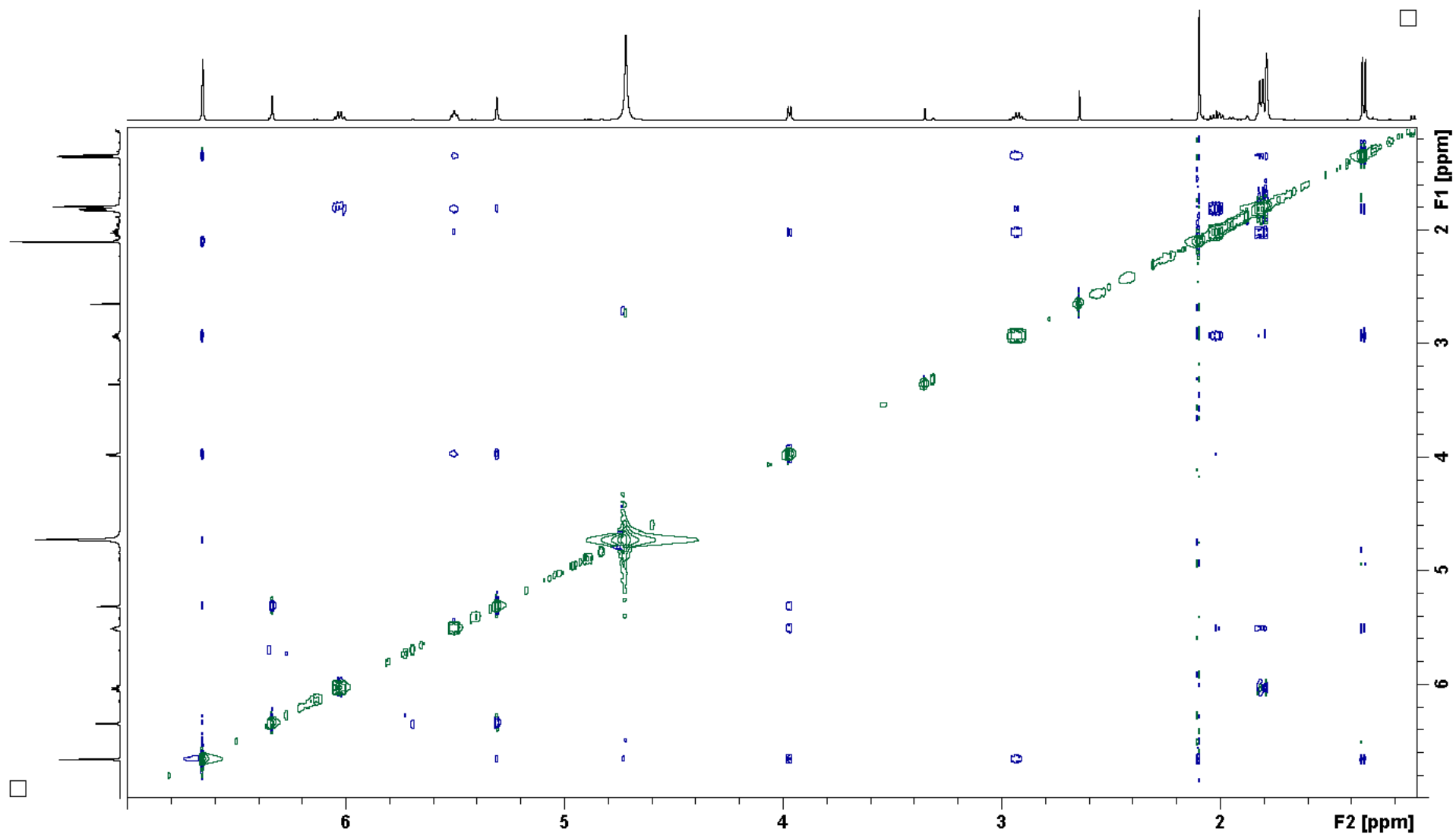


Figure S58: 2D ^1H - ^1H NOESY spectrum of compound **15** in CD_3OD .

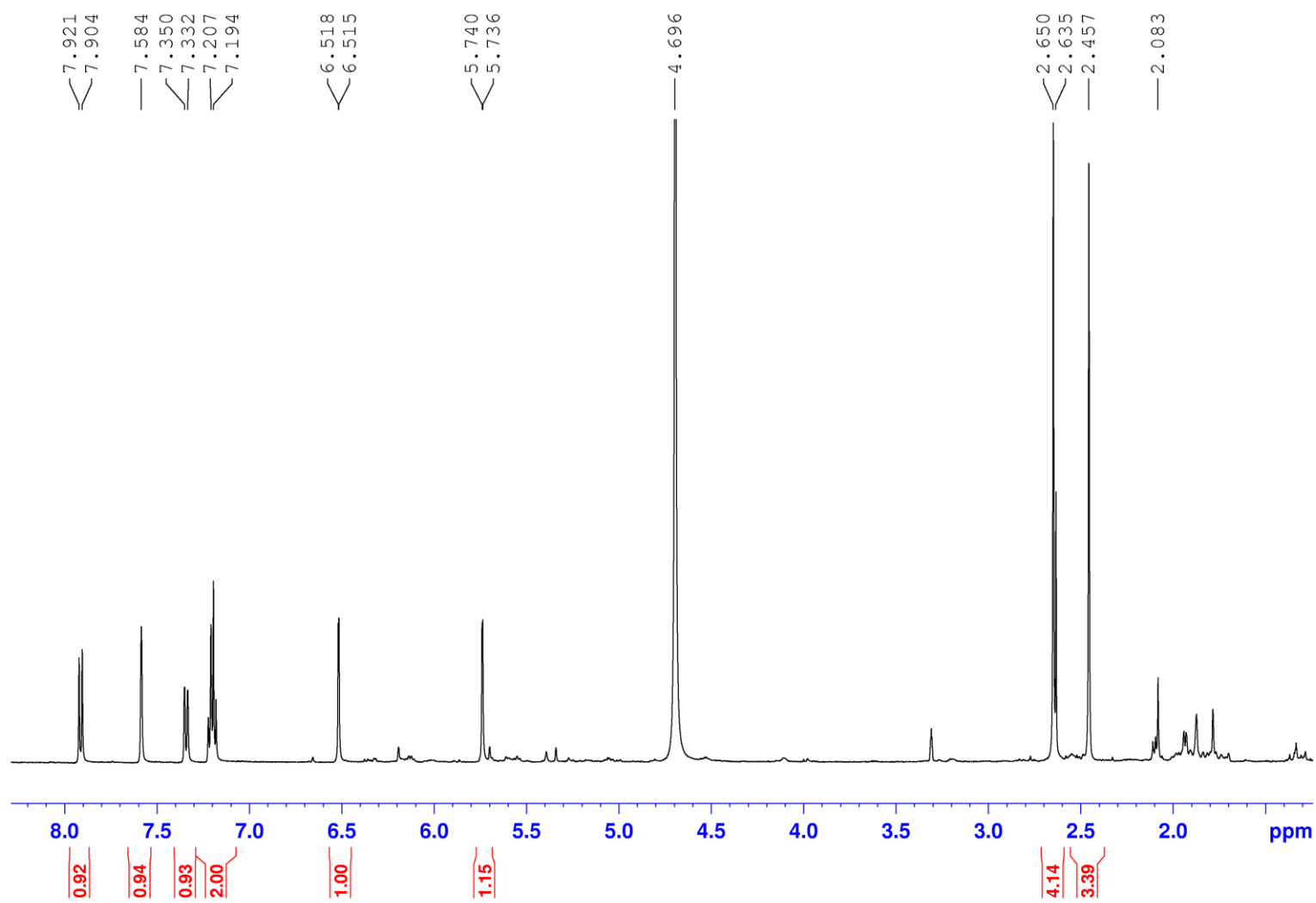


Figure S59: ¹H NMR spectrum of compound 16 in CD₃OD.

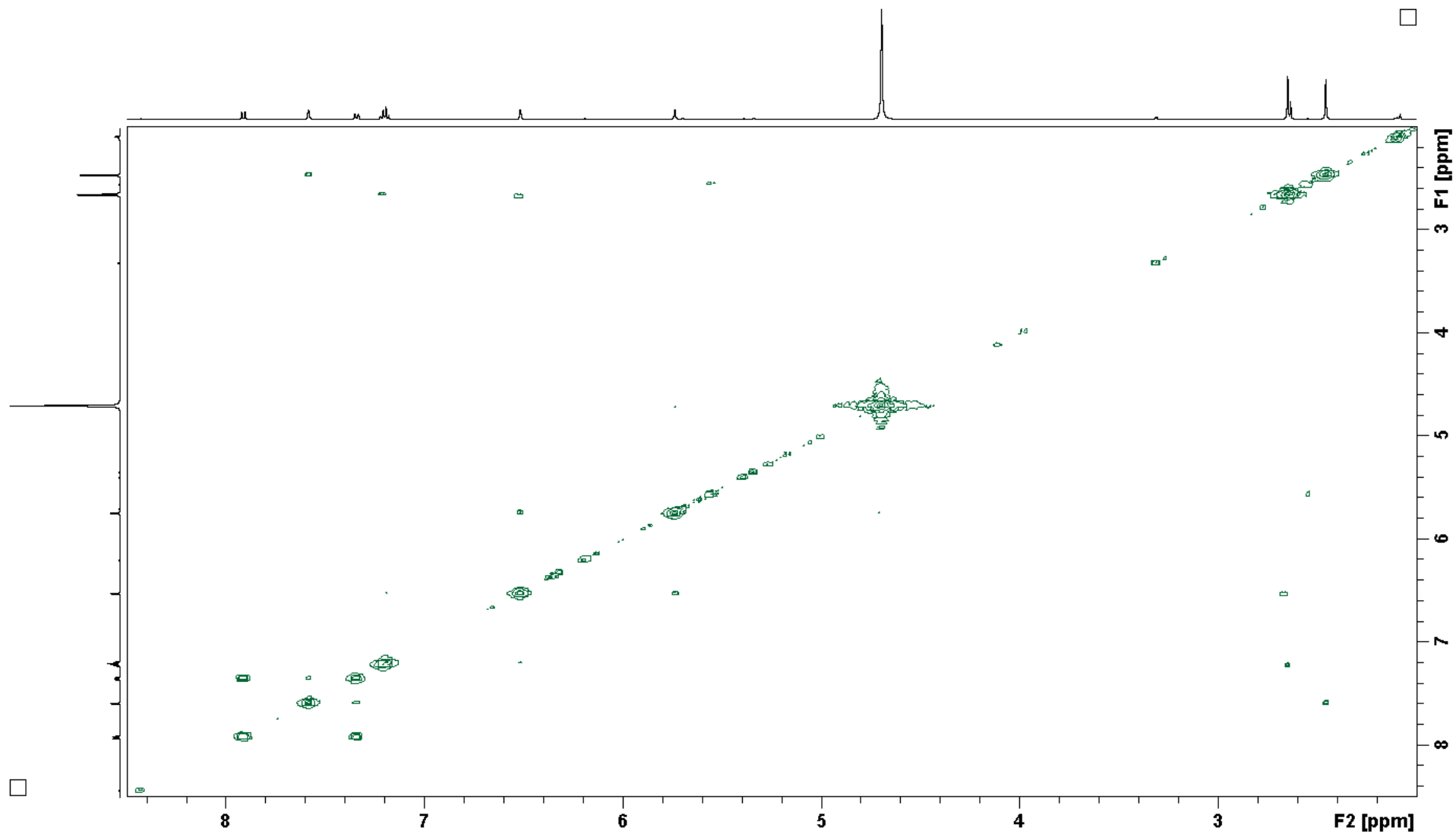


Figure S60: ^1H - ^1H -COSY spectrum of compound 16 in CD_3OD .

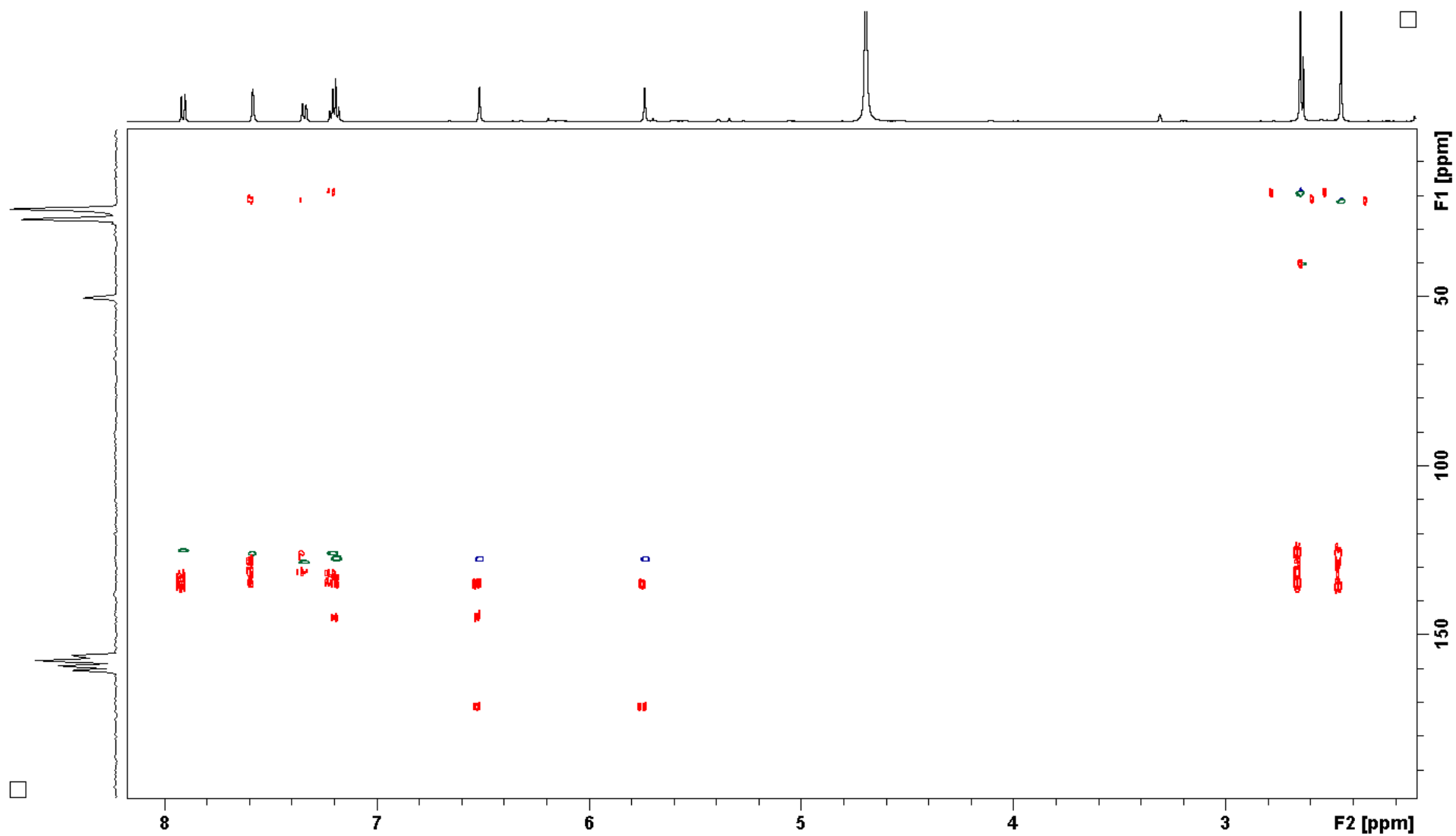


Figure S61: HSQC (green) and HMBC (red) overlaid spectra of compound **16** in CD₃OD.

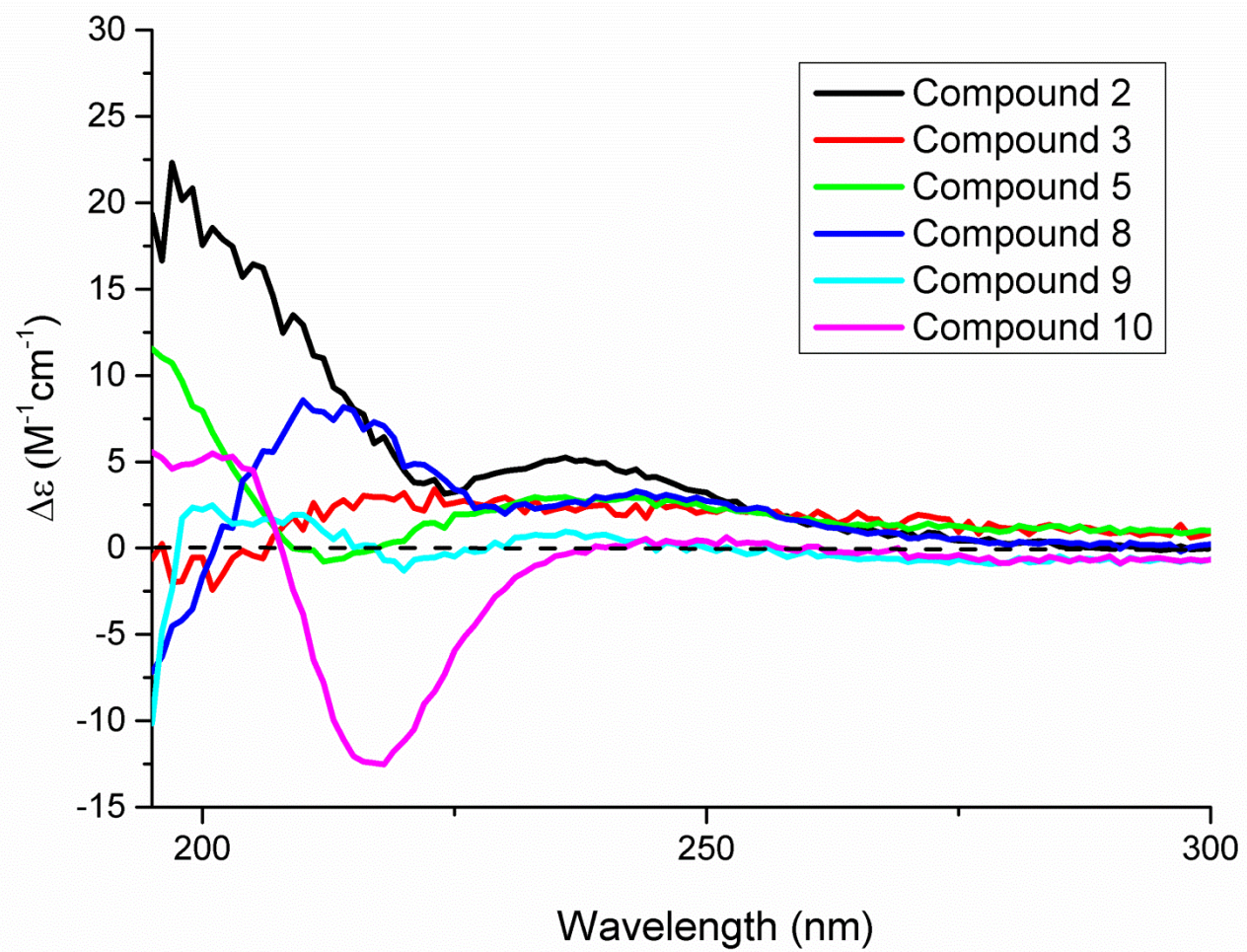


Figure S62: ECD spectra in MeOH of compounds 2, 3, 5, 8-10.

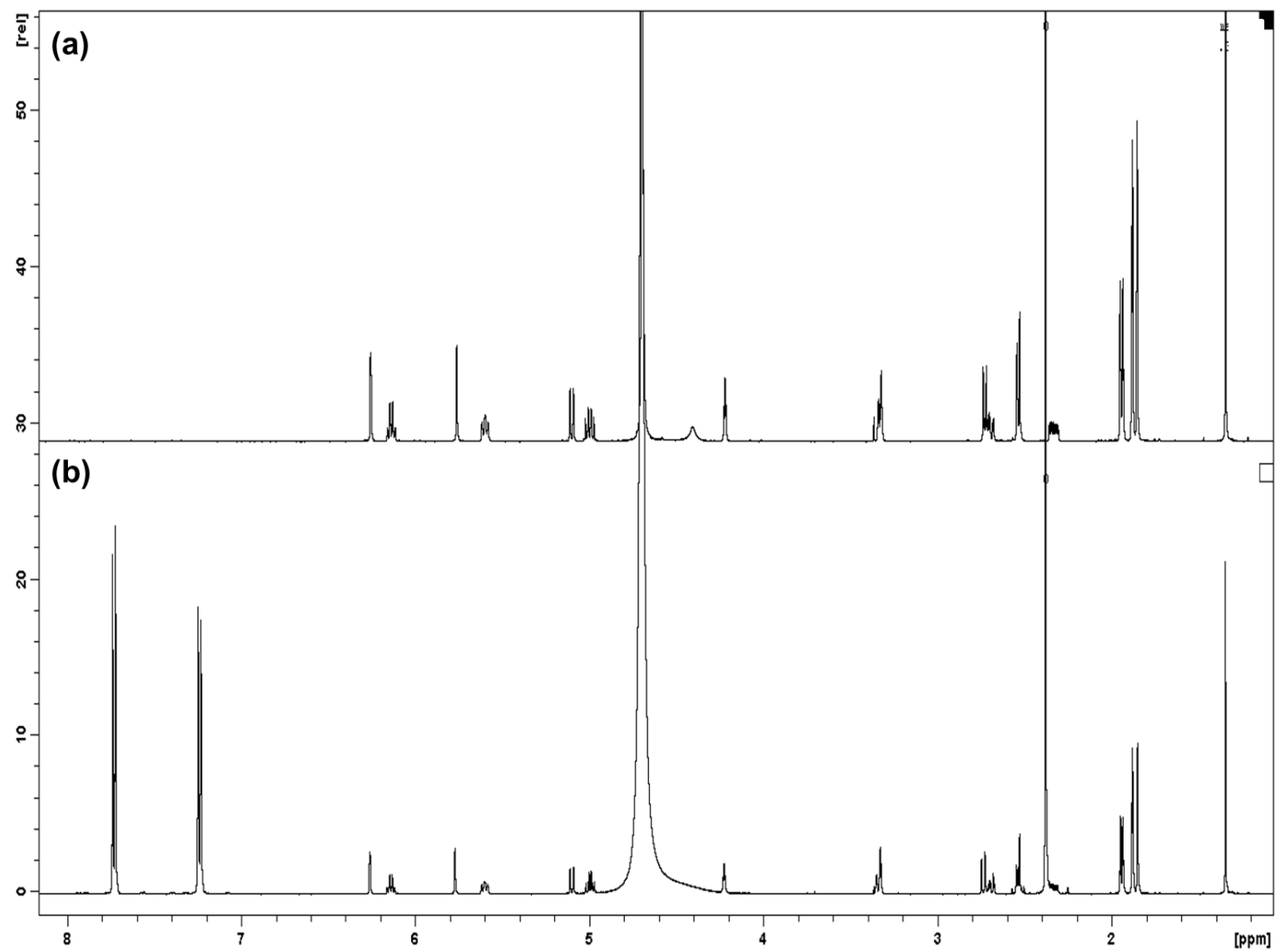


Figure S63: Overlay of ¹H NMR spectra of **3** (a) and of the reaction of **3** with *p*TSA after 24 hours (b).