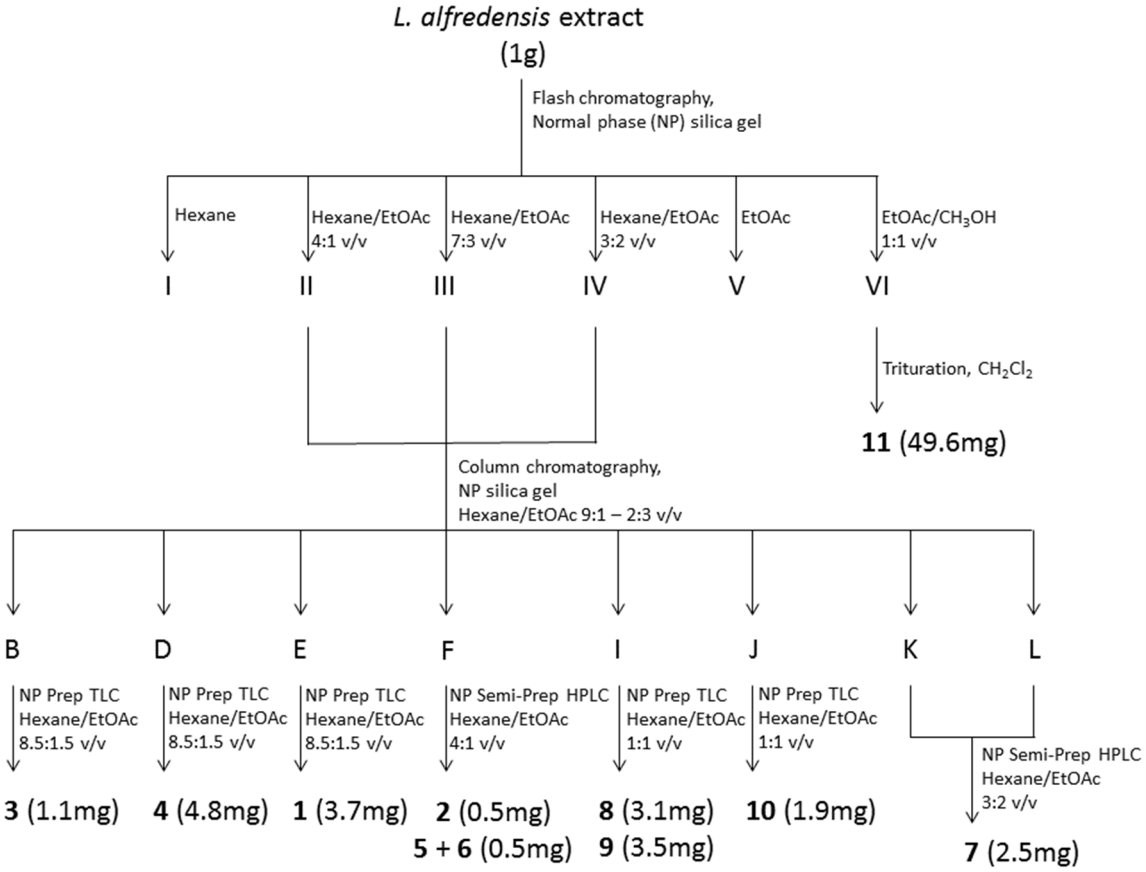
# Supplementary Materials: Isolation, characterization and antiproliferative activity of new metabolites from the South African endemic red algal species *Laurencia alfredensis*

**Godwin A. Dziwornu, Mino R. Caira, Jo-Anne de la Mare, Adrienne L. Edkins, John J. Bolton, Denzil R. Beukes, Suthananda N. Sunassee**

Table of Contents:




**Scheme S1**. Isolation of compounds **1** – **11** from *Laurencia alfredensis*

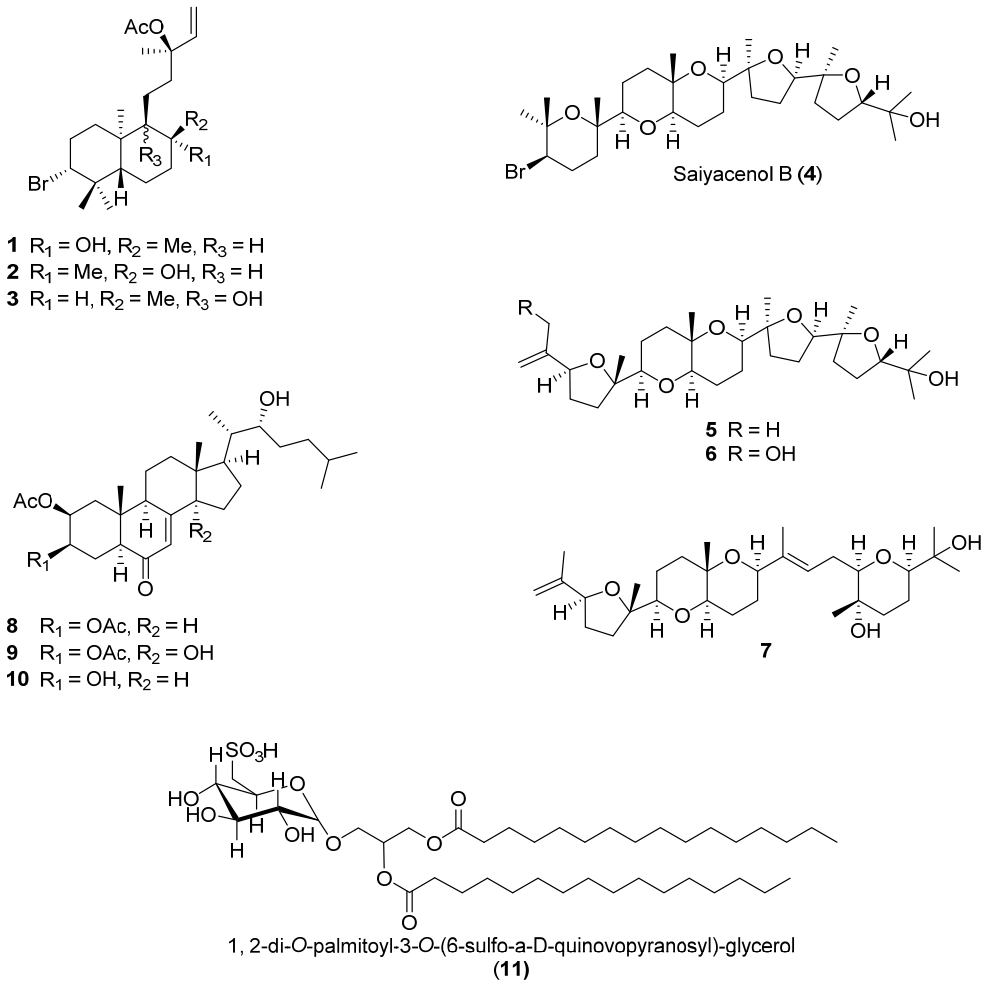



**Figure S1**. The structures of compounds **1 – 11** isolated from *Laurencia alfredensis*.

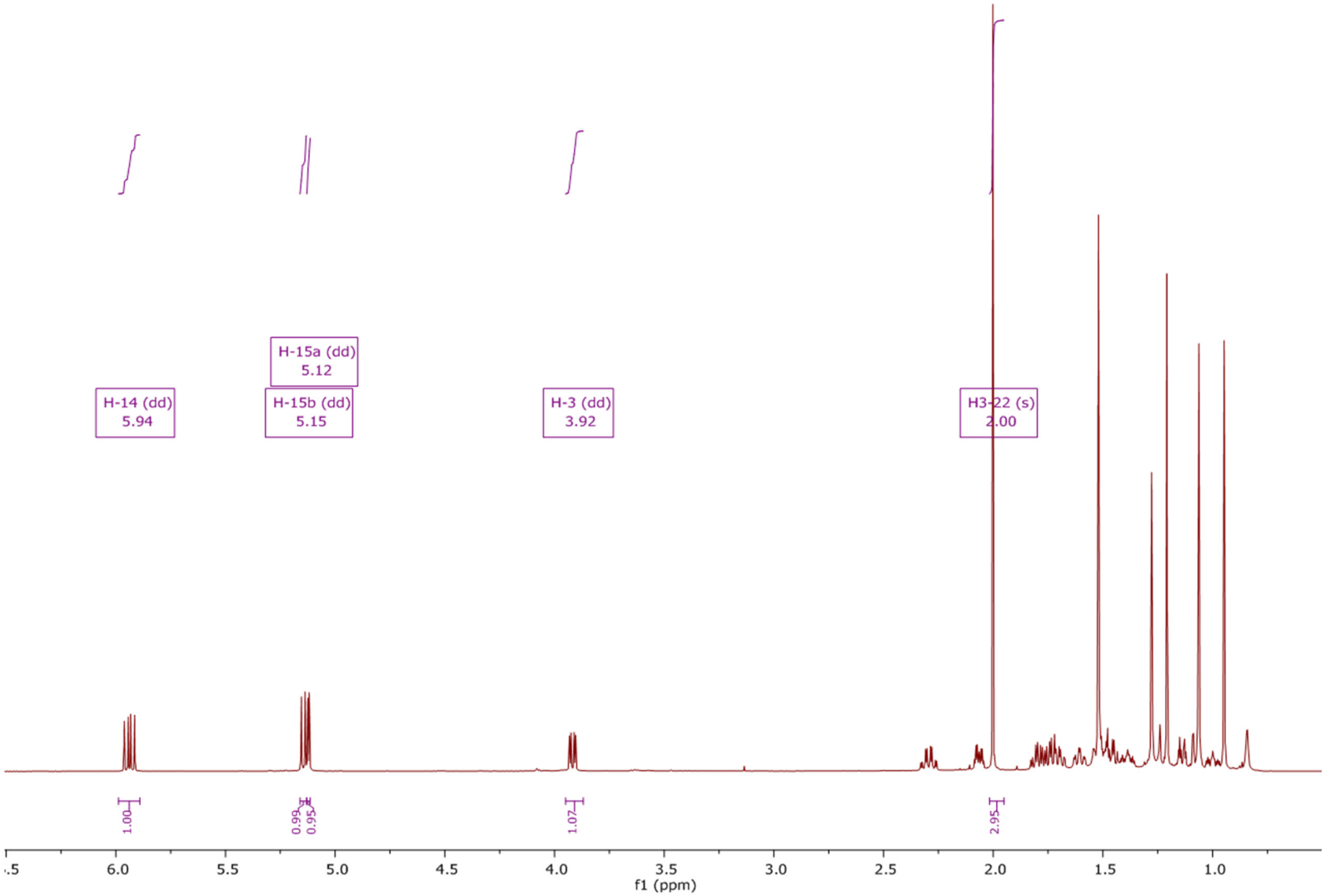



**Figure S2**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **1**

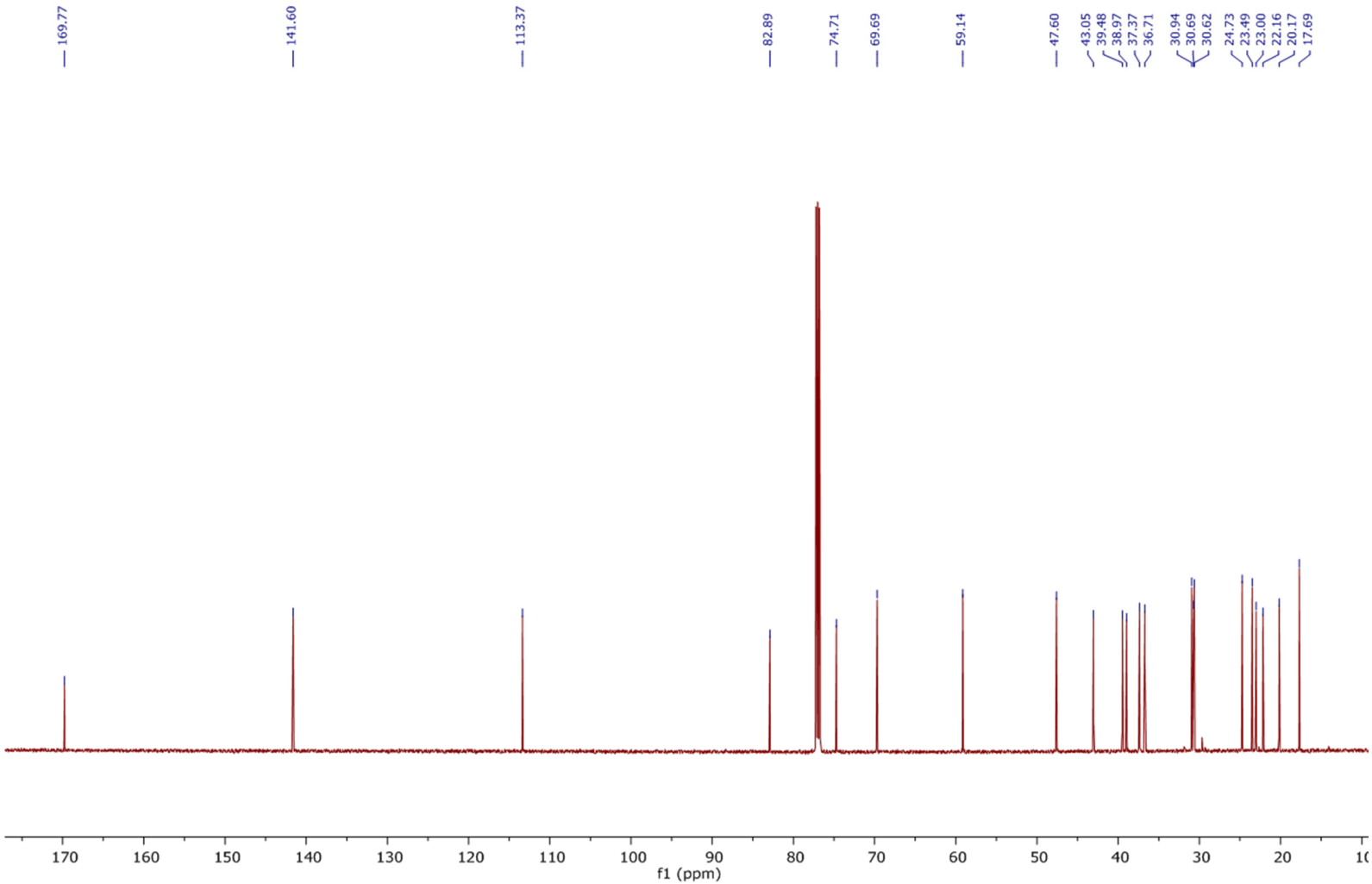



**Figure S3**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compound **1**

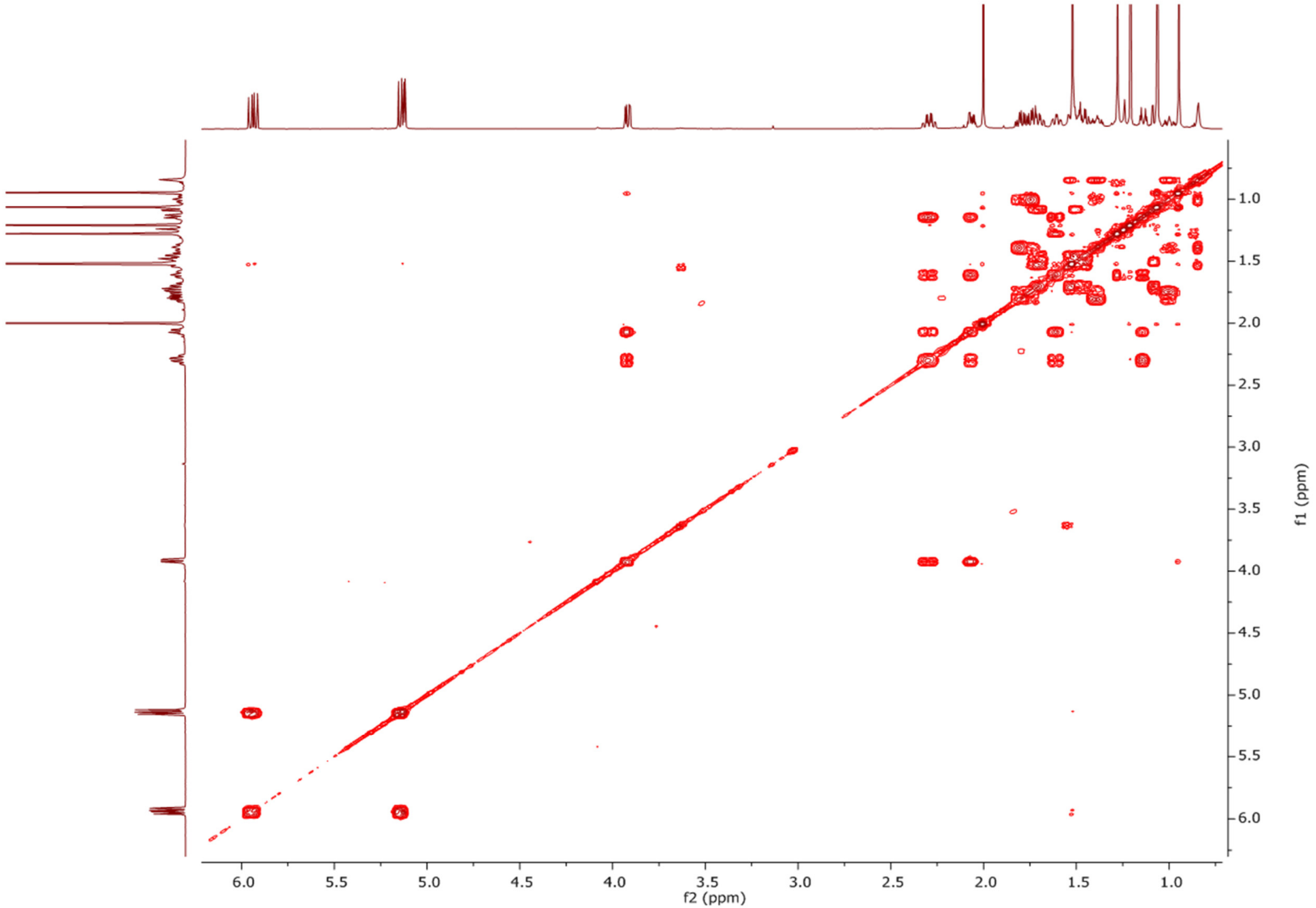



**Figure S4**. $^{1}H$-$^{1}H$ COSY spectrum (600MHz, $CDCl_3$, 303K) of compound **1**

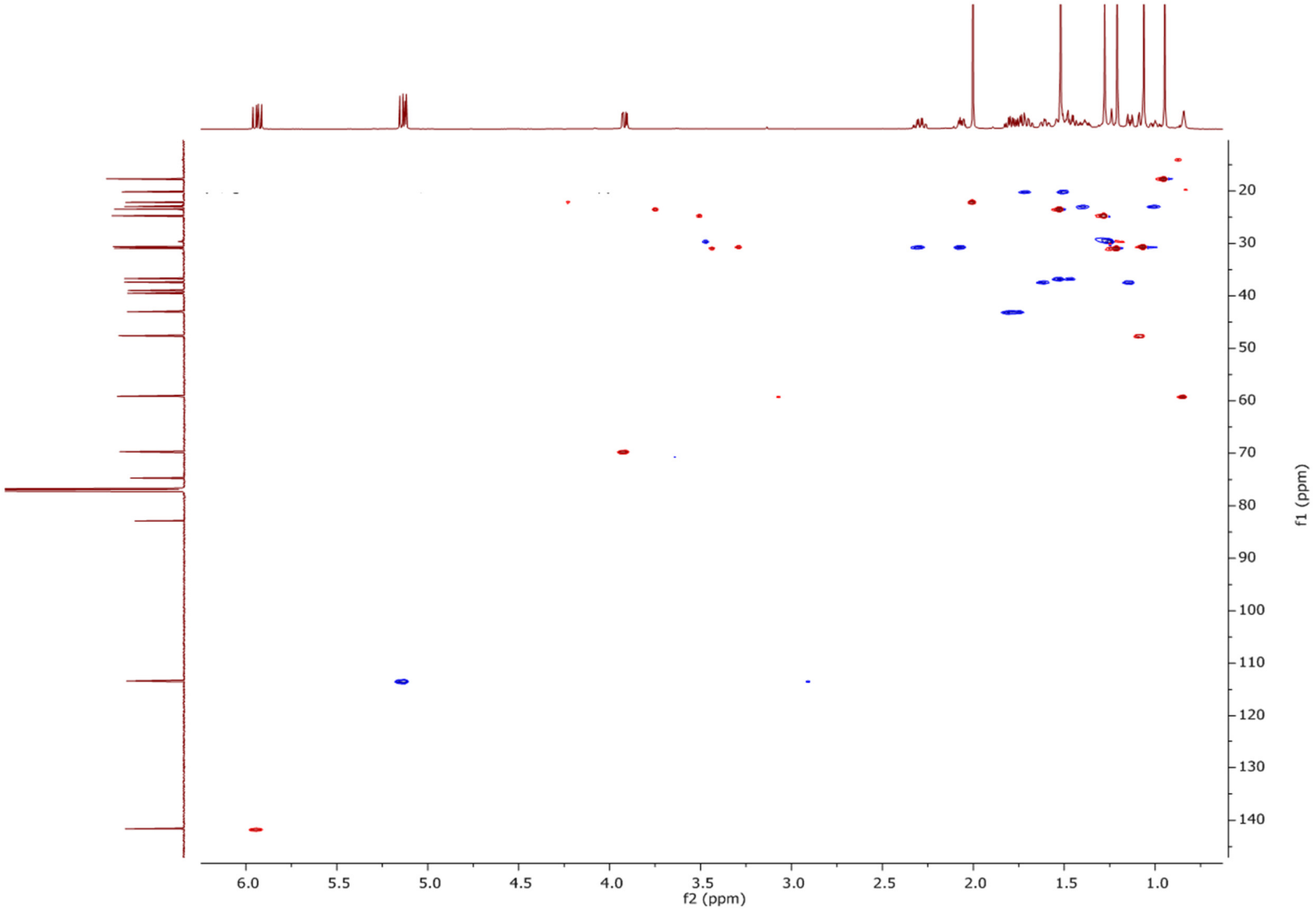



**Figure S5**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **1**

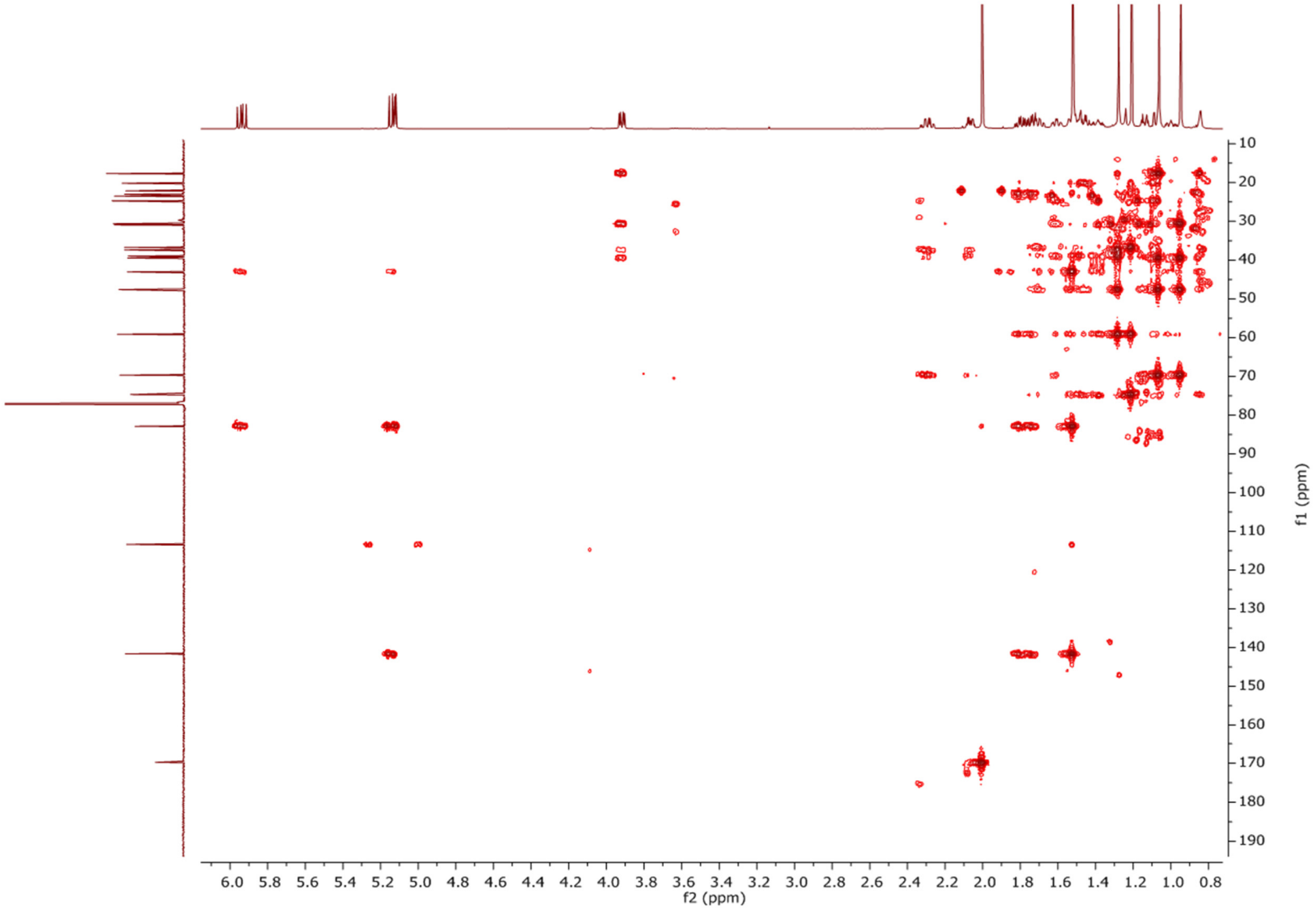



**Figure S6**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **1**

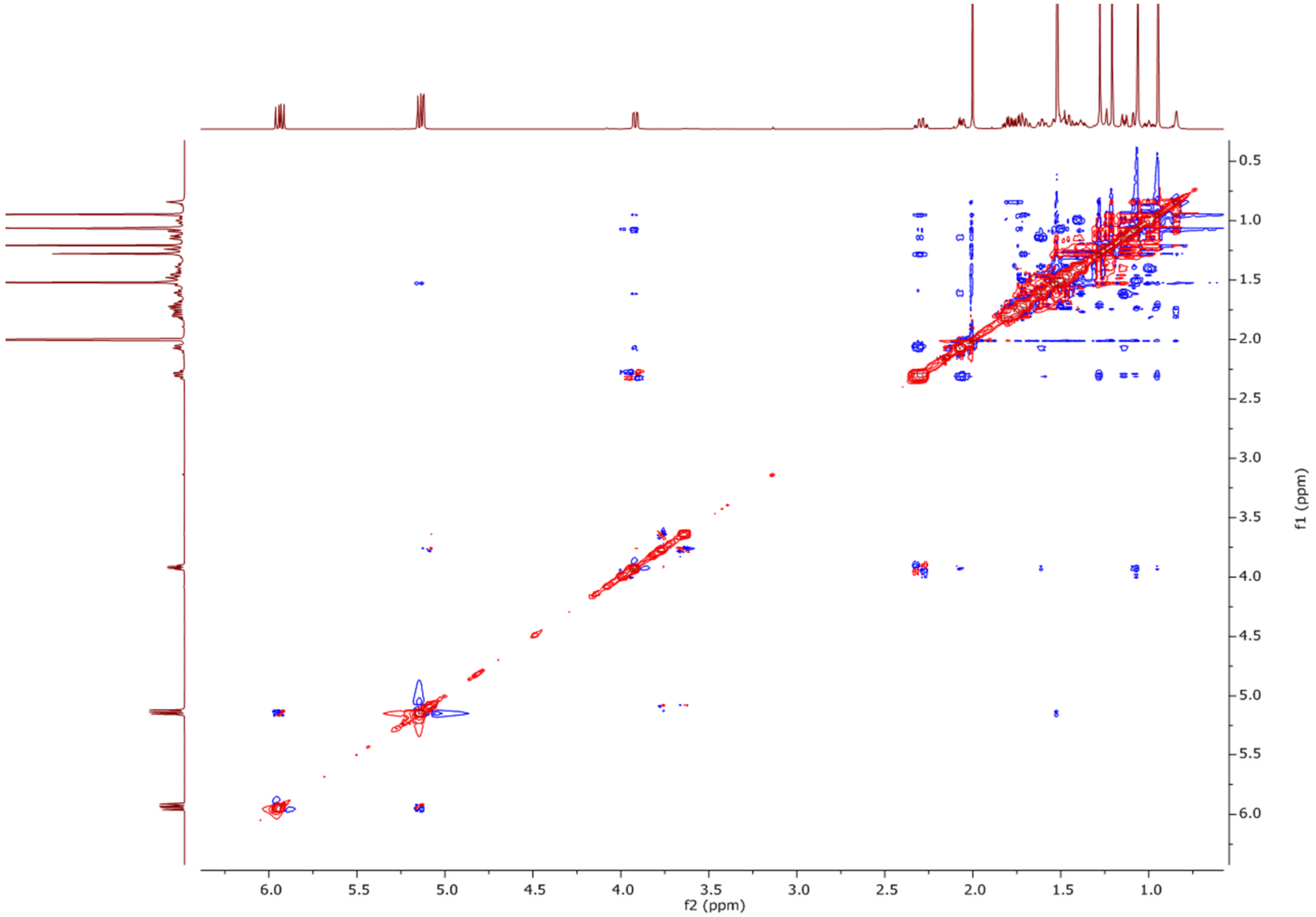



**Figure S7**. ROESY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **1**

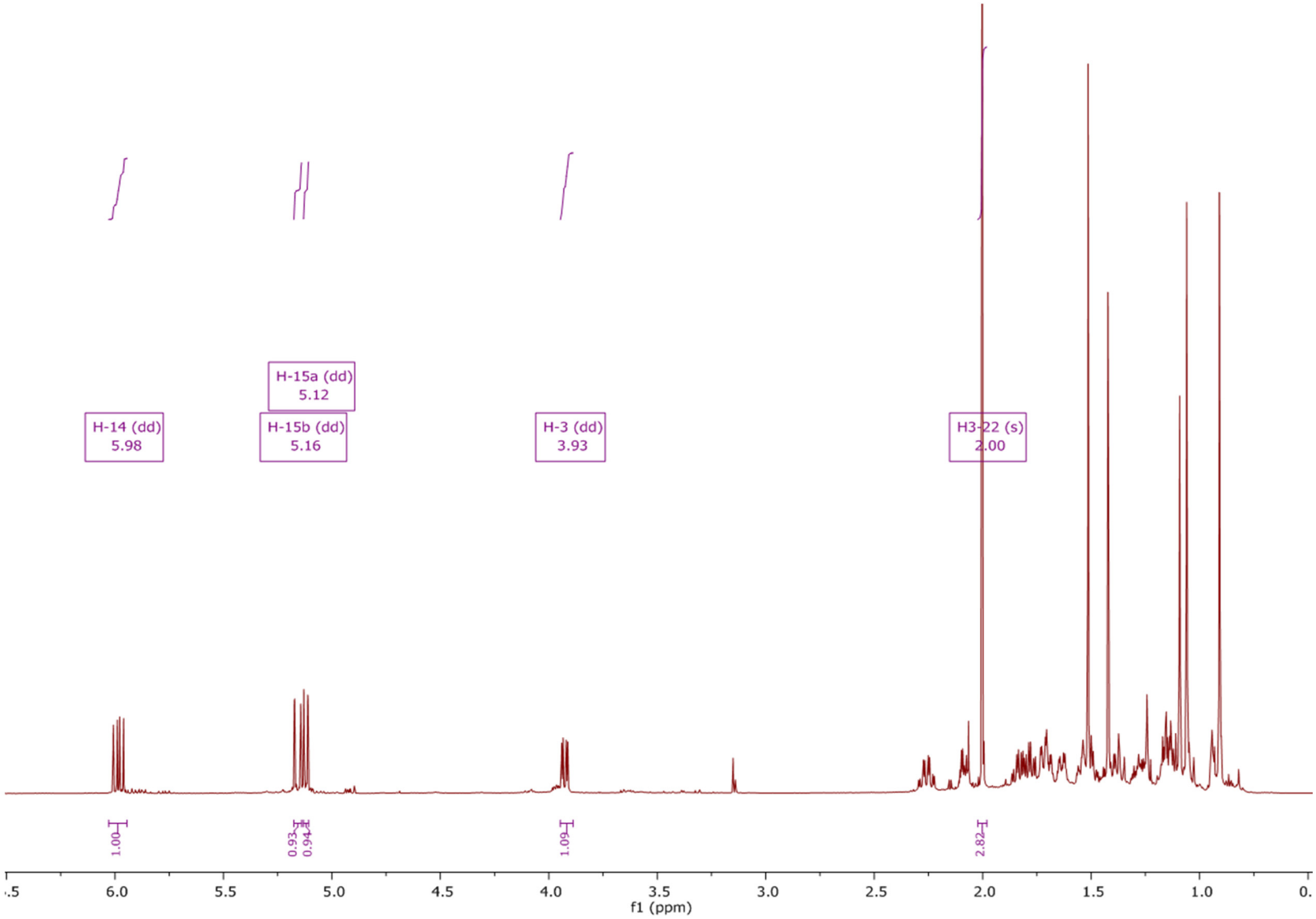



**Figure S8**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **2**

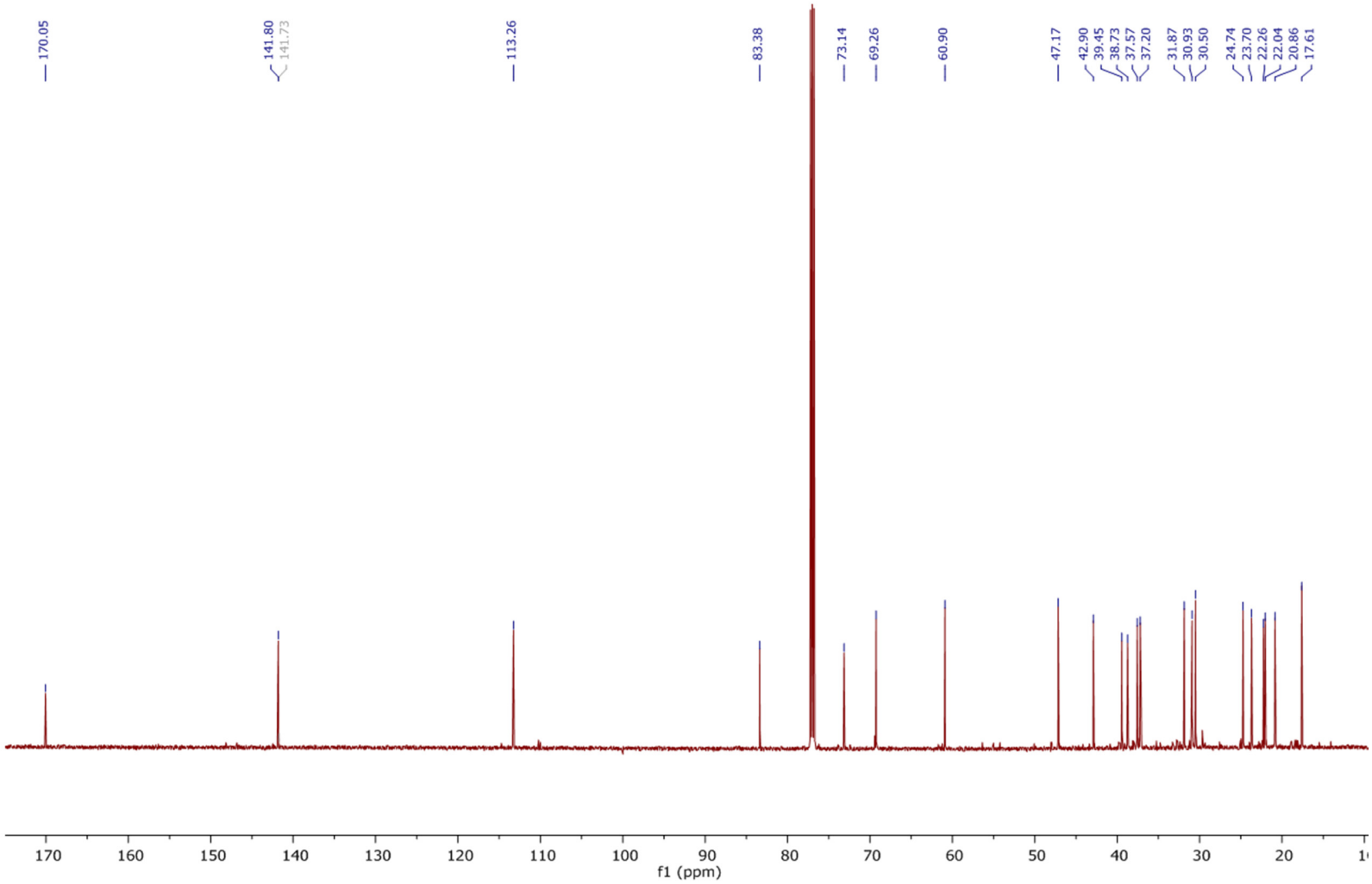



**Figure S9**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compound **2**

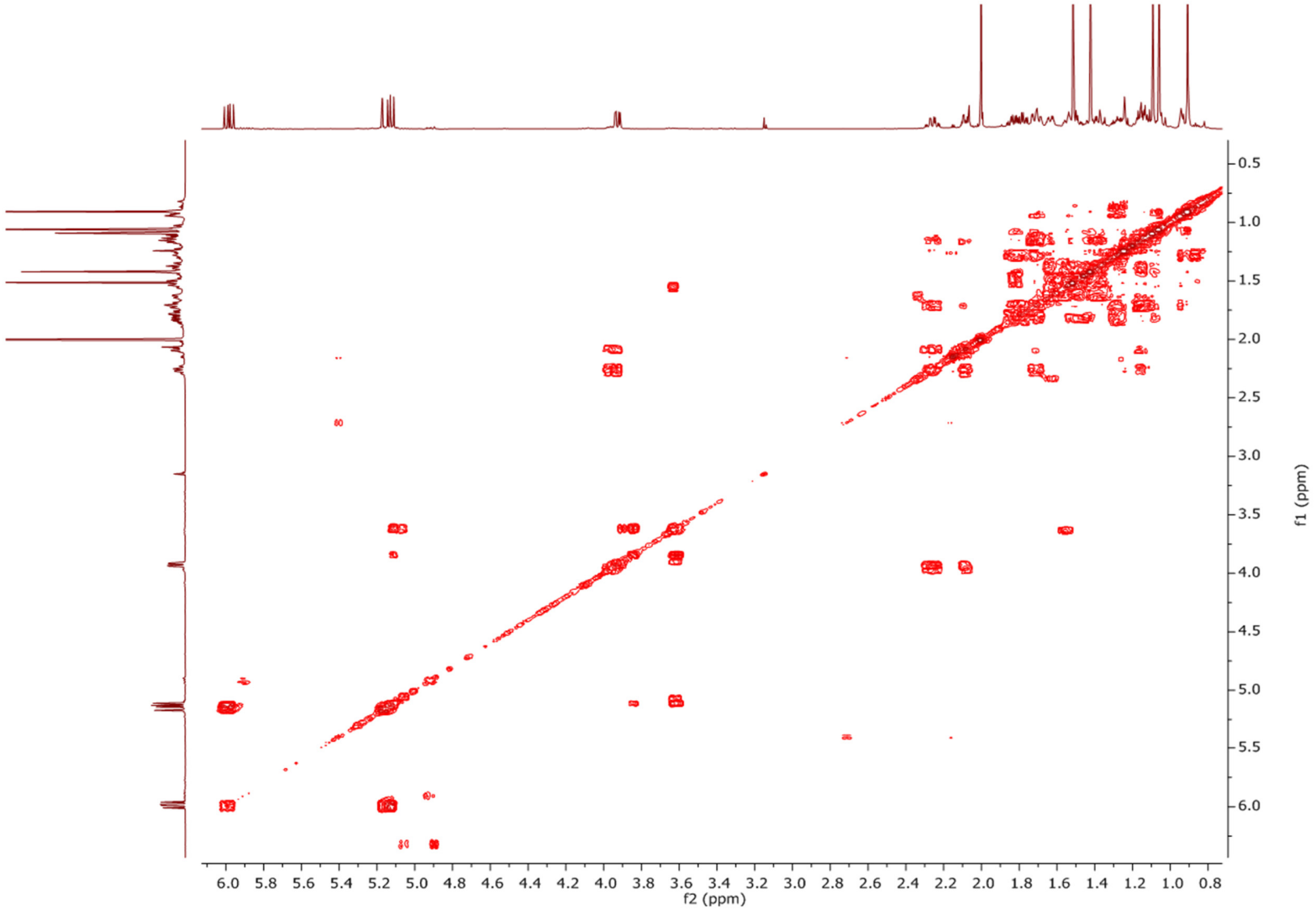



**Figure S10**. $^{1}H$-$^{1}H$ COSY NMR spectrum (600MHz, $CDCl_3$), 303K of compound **2**

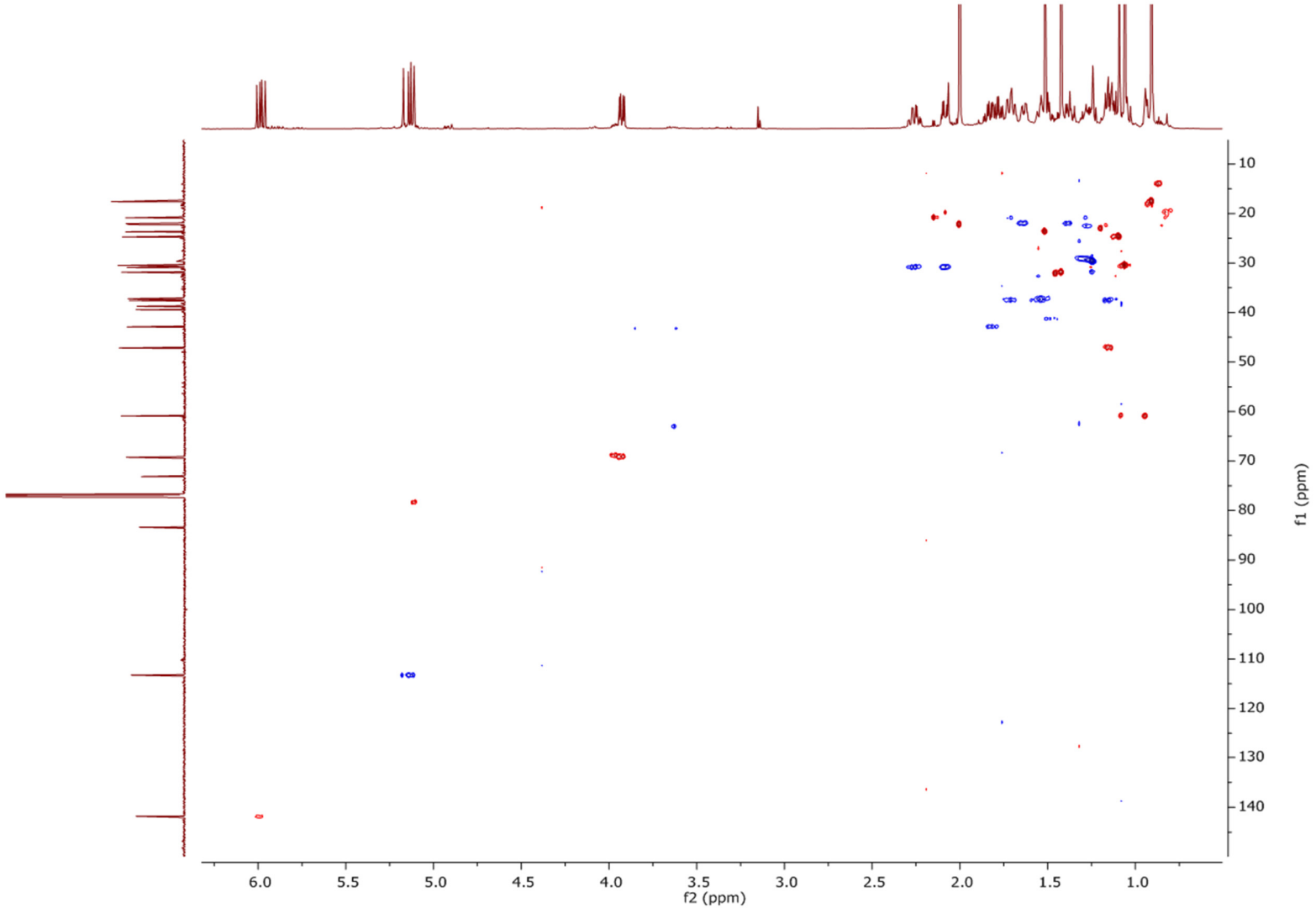



**Figure S11**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **2**

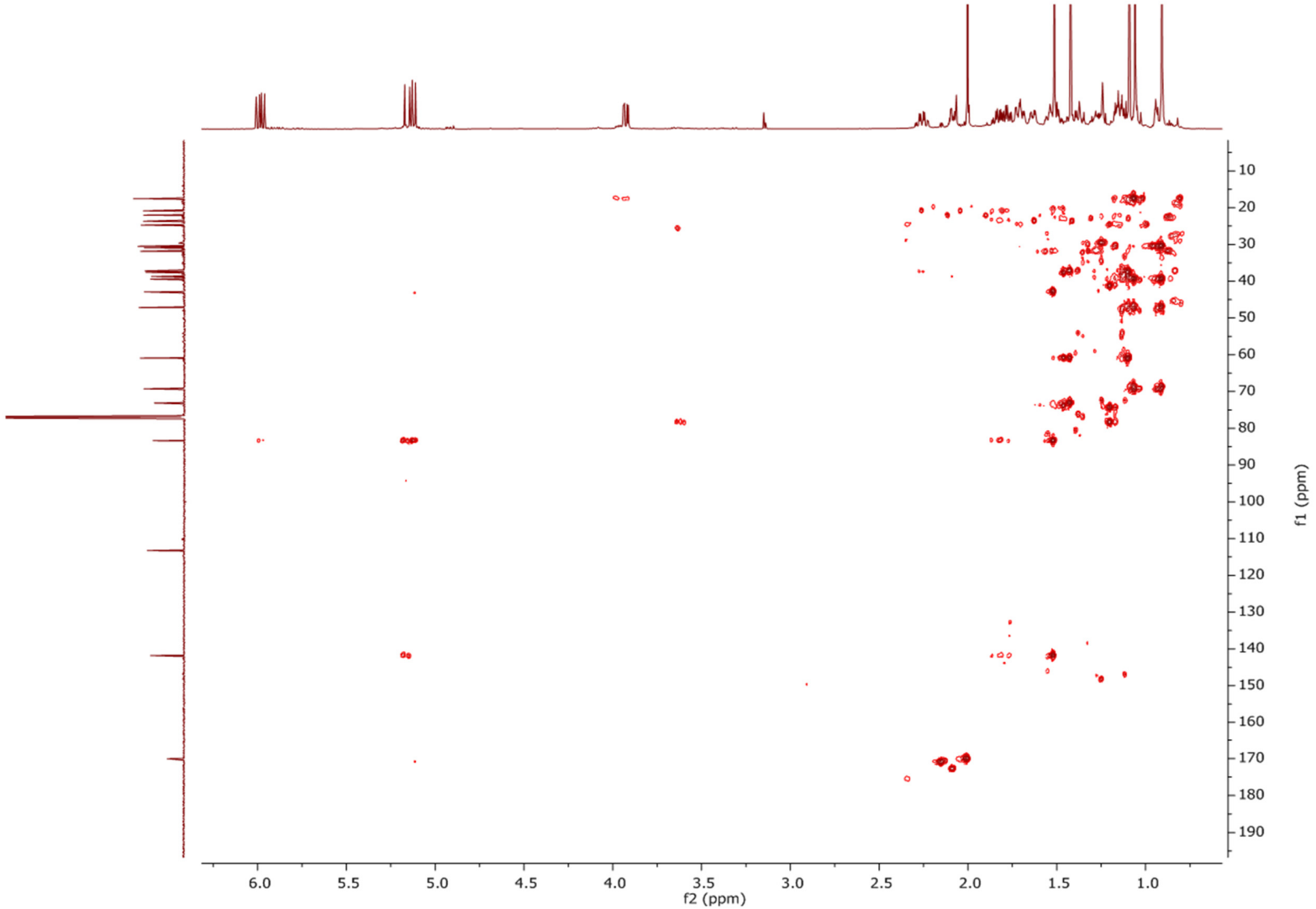



**Figure S12**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **2**

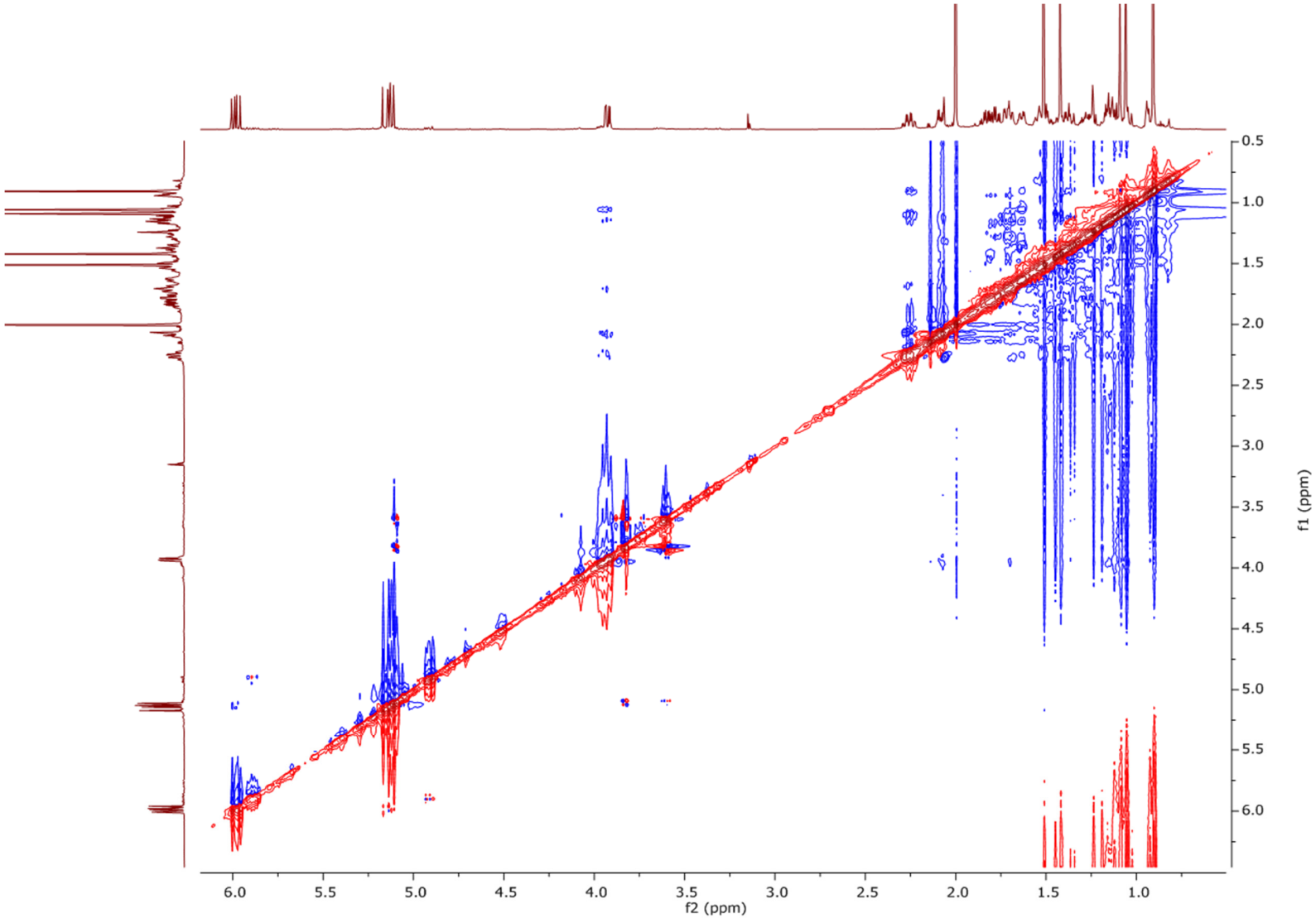



**Figure S13**. ROESY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **2**

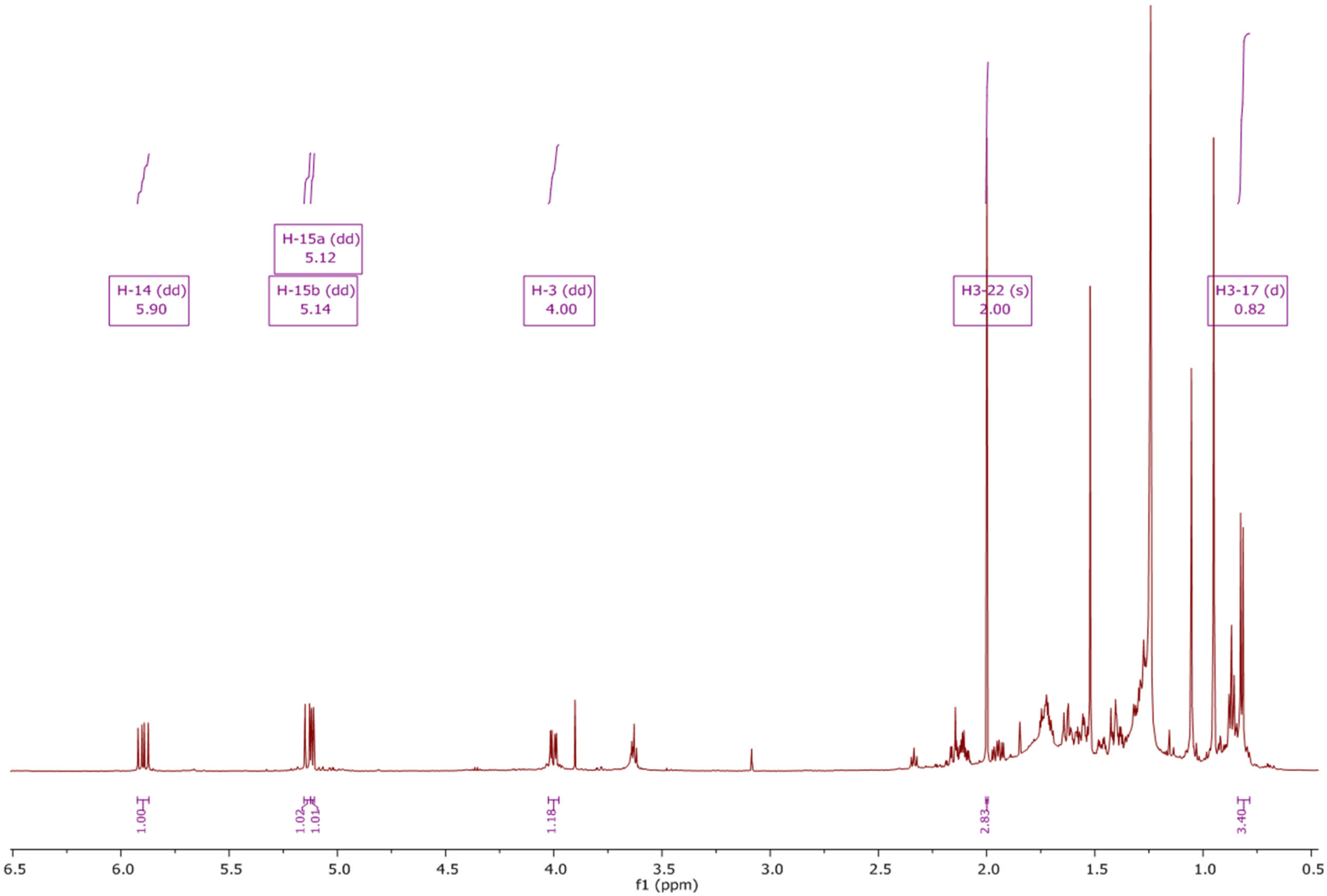



**Figure S14**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **3**

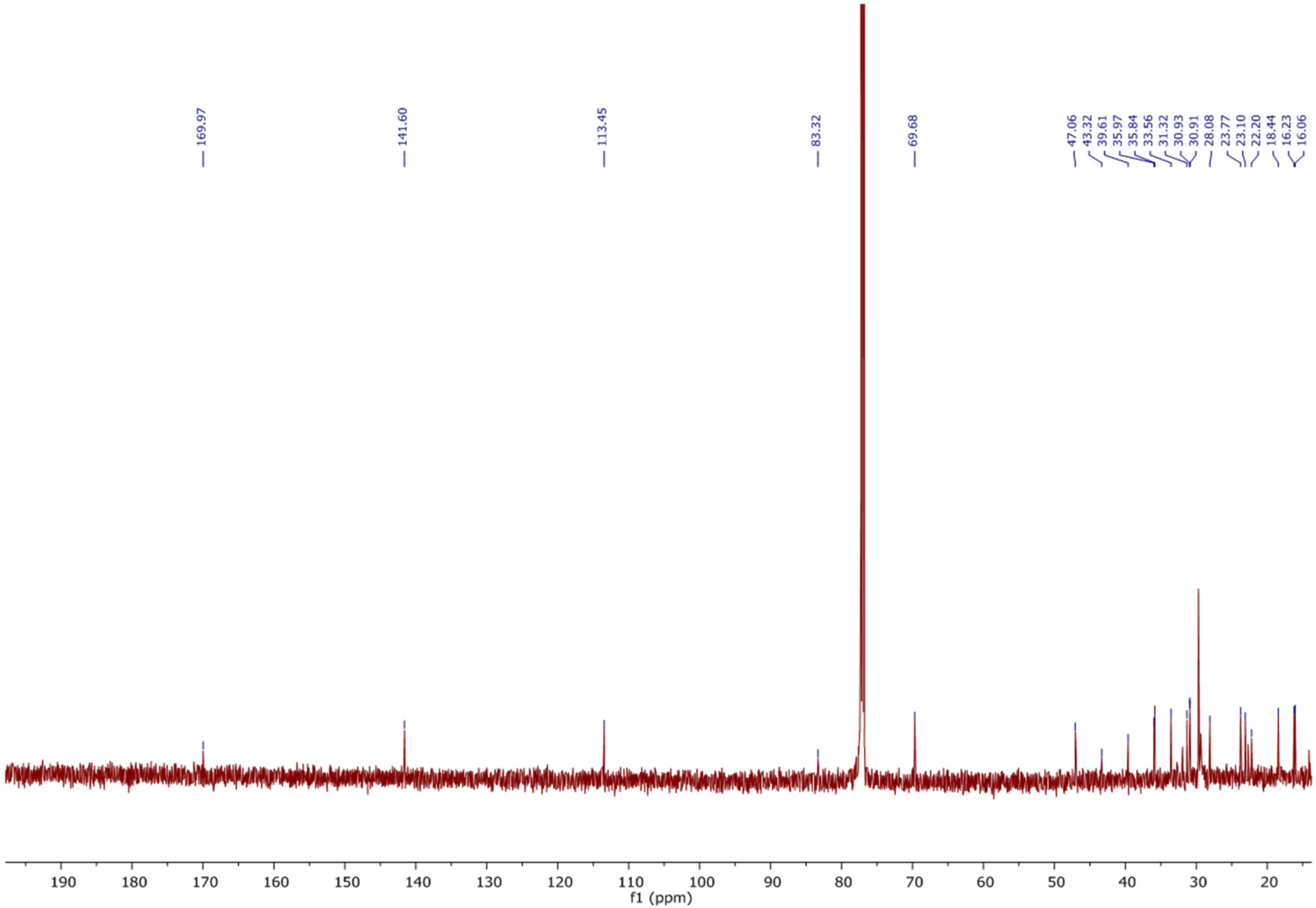



**Figure S15**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compound **3**

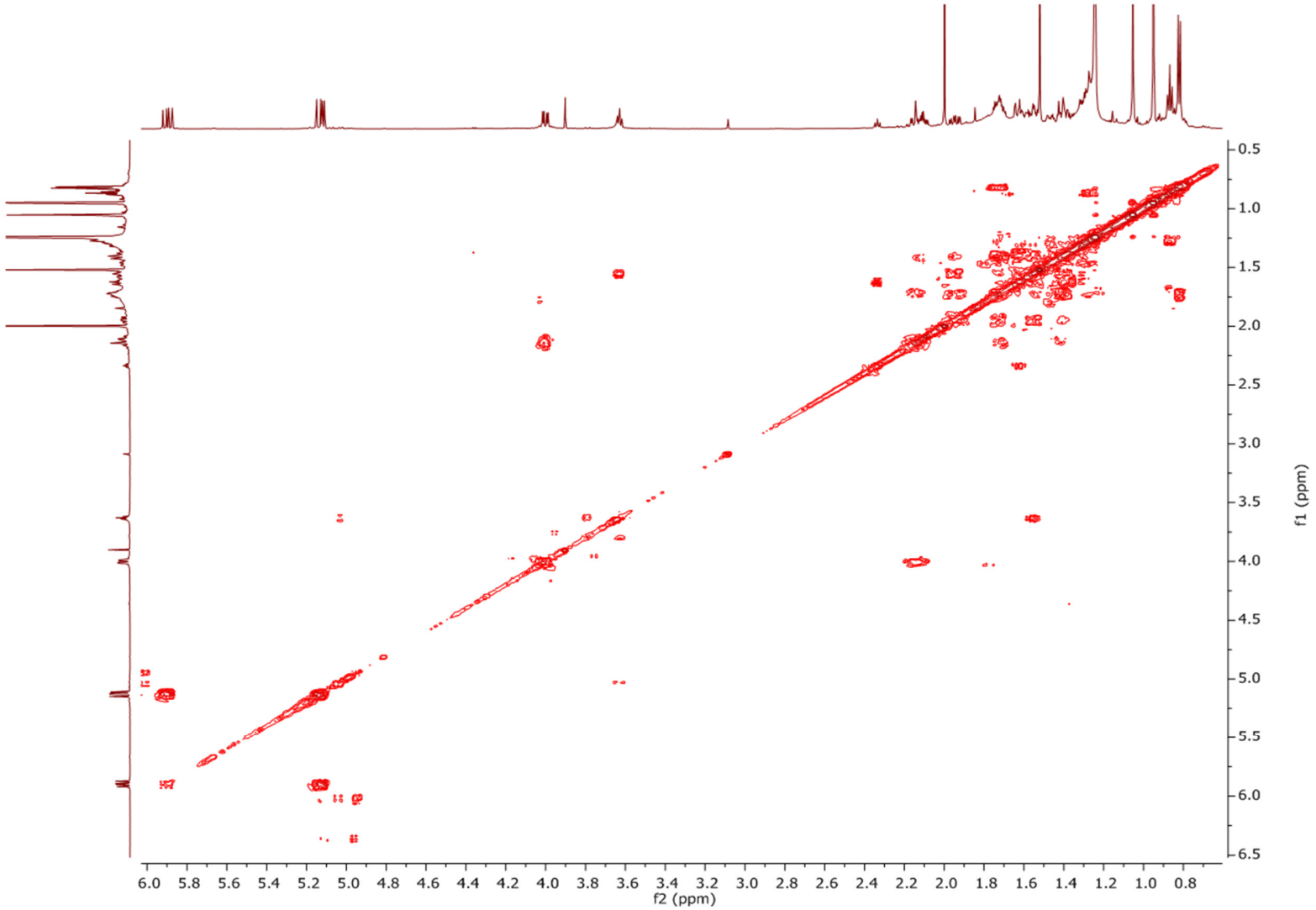



**Figure S16**. $^{1}H$-$^{1}H$ COSY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **3**

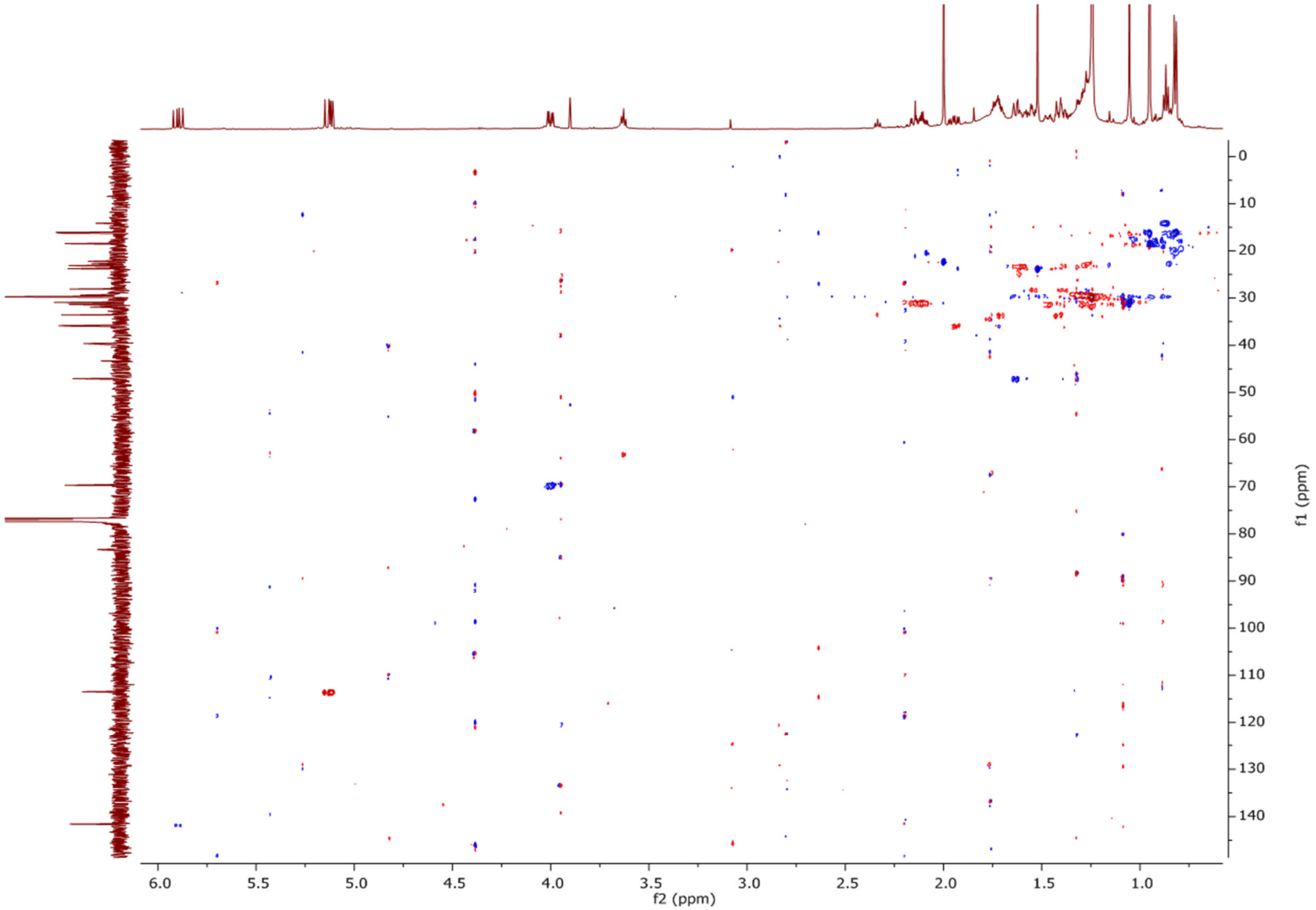



**Figure S17**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **3**

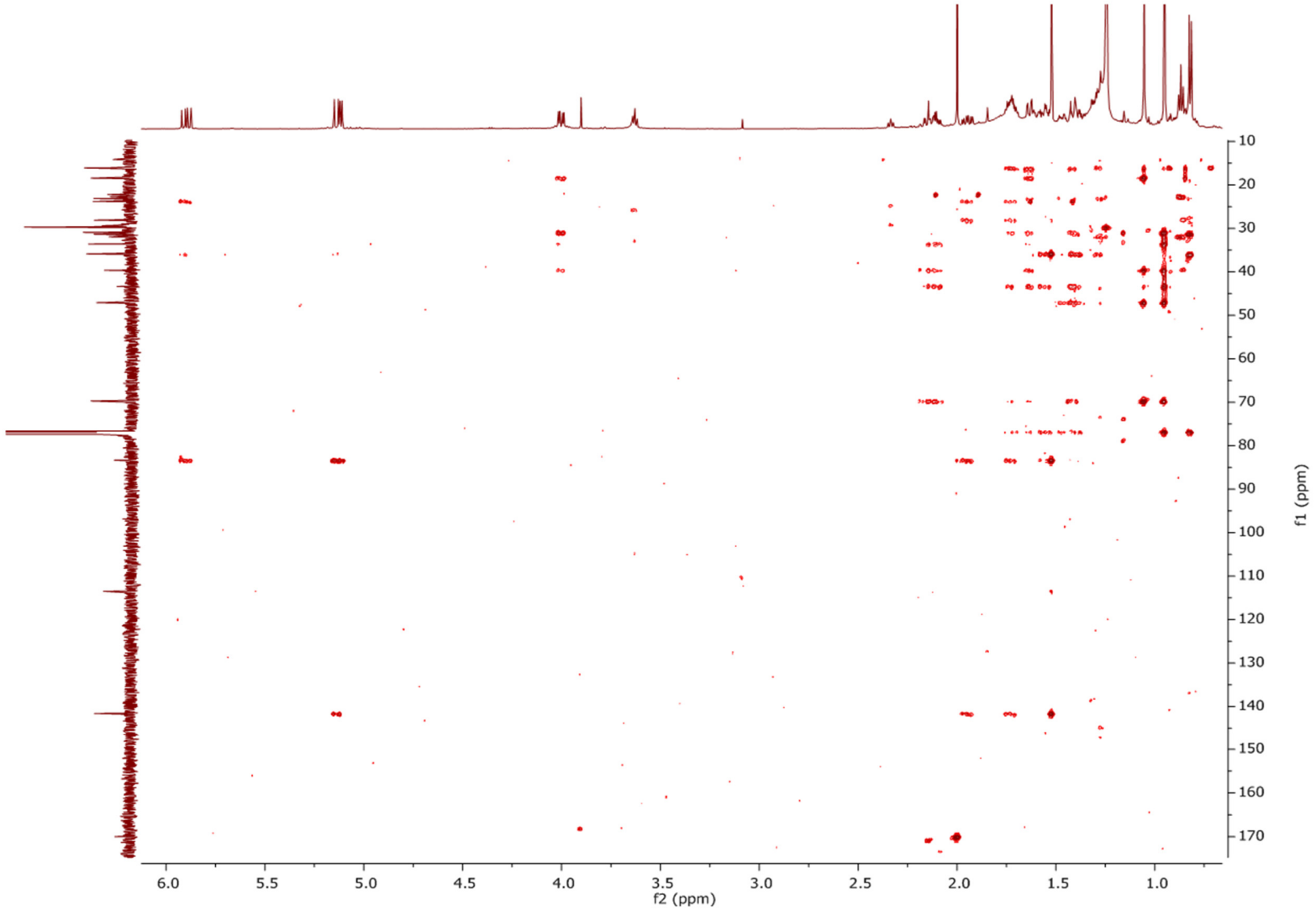



**Figure S18**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **3**

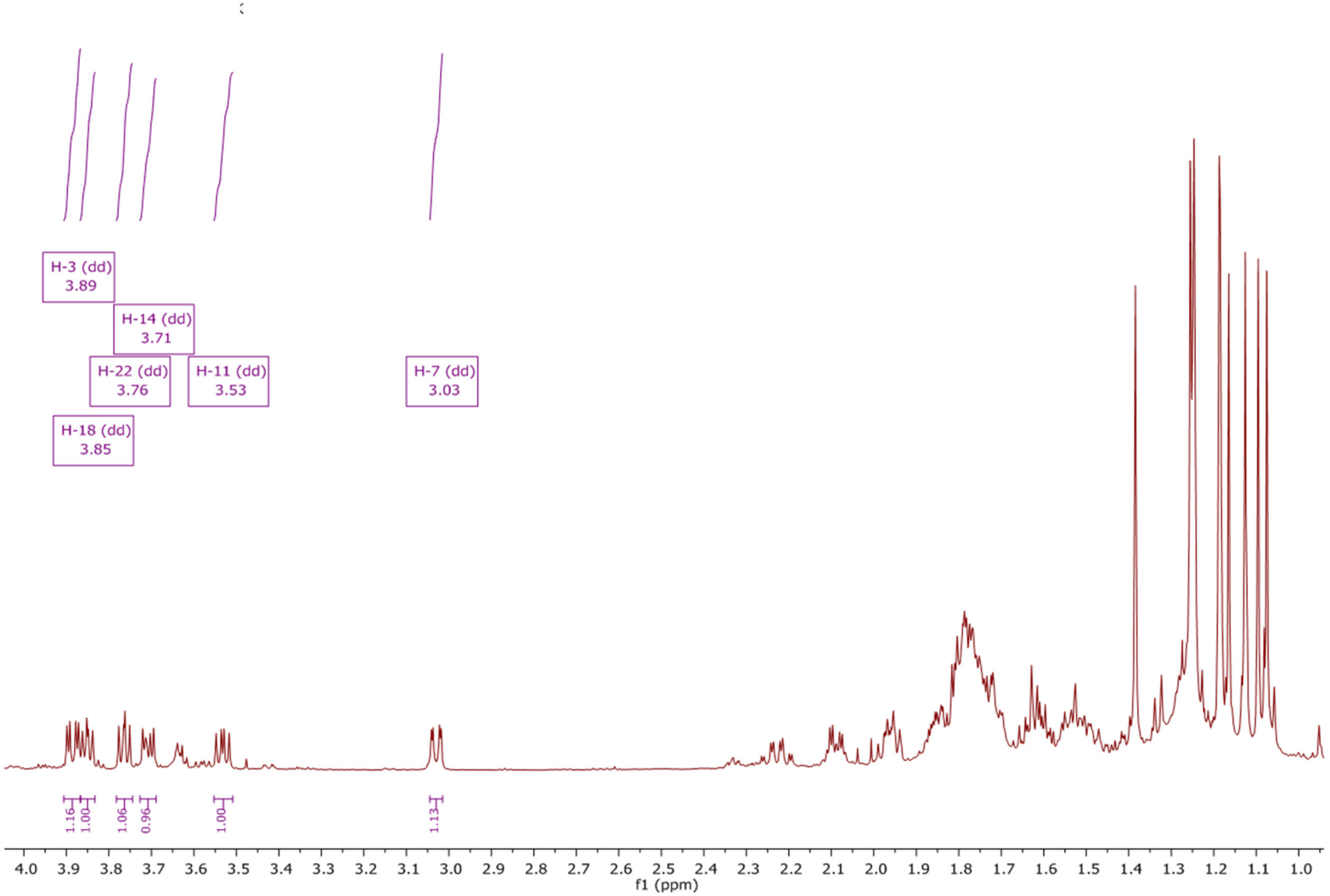



**Figure S19**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **4**

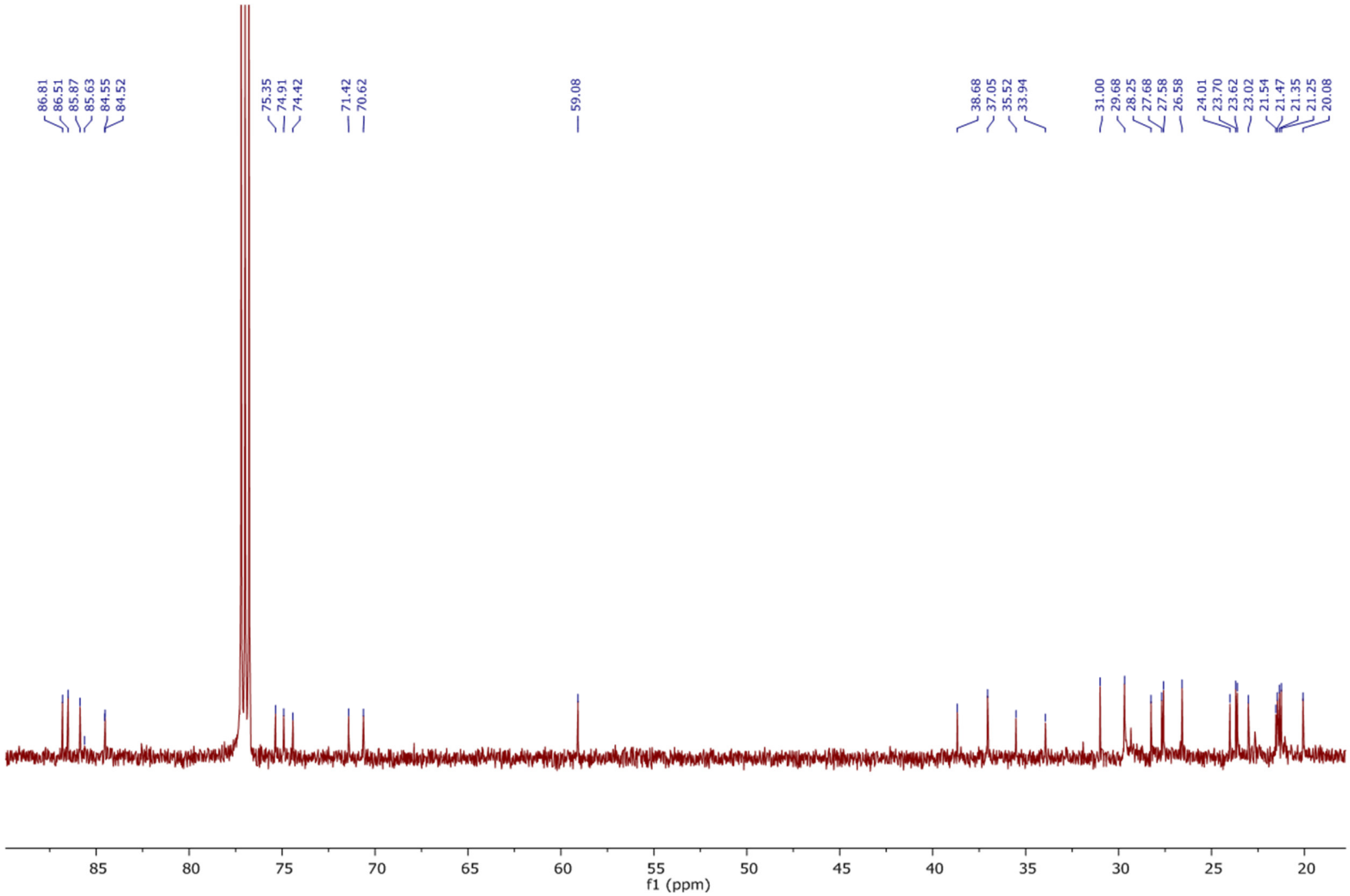



**Figure S20**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compound **4**

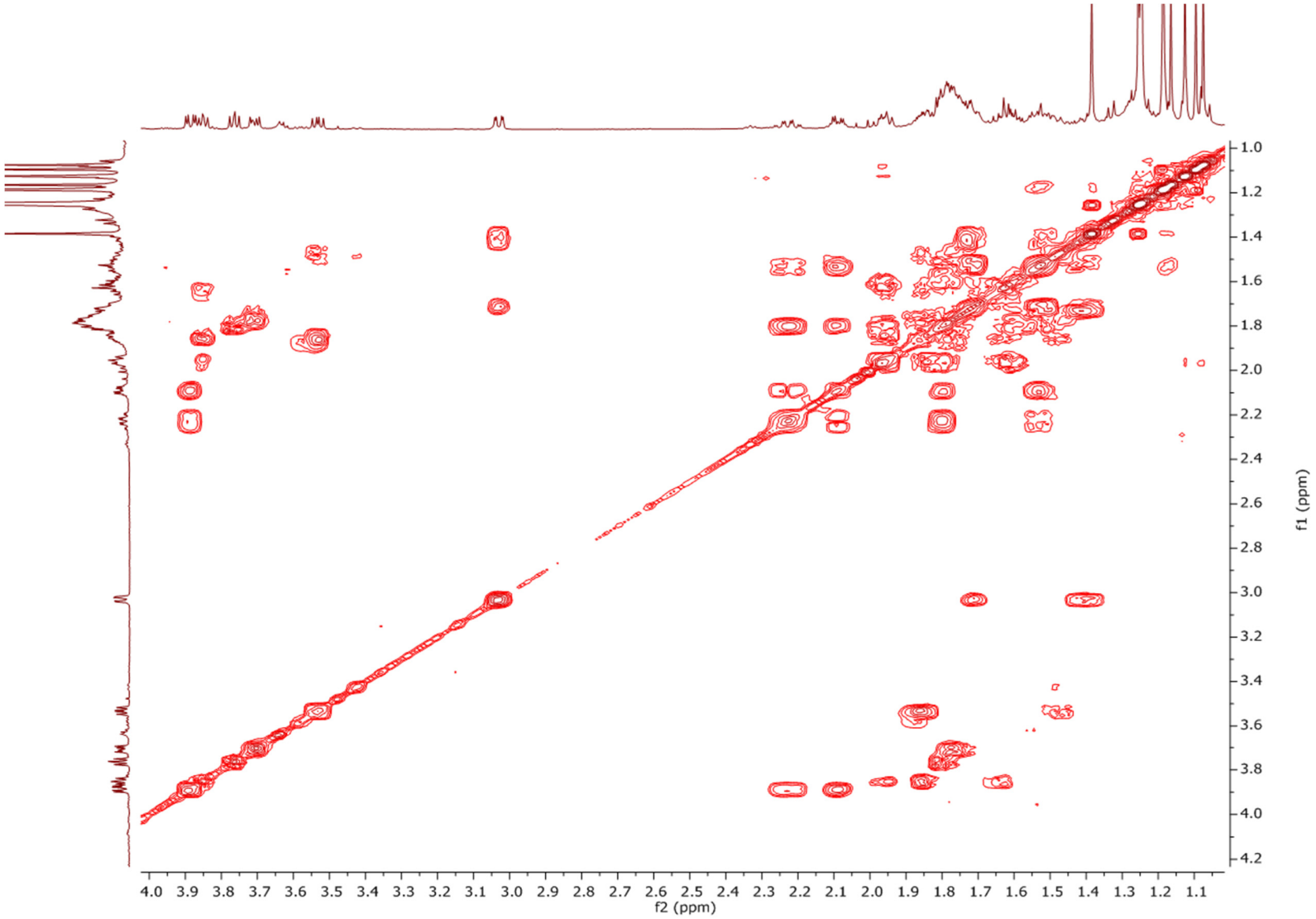



**Figure S21**. $^{1}H$-$^{1}H$ COSY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **4**

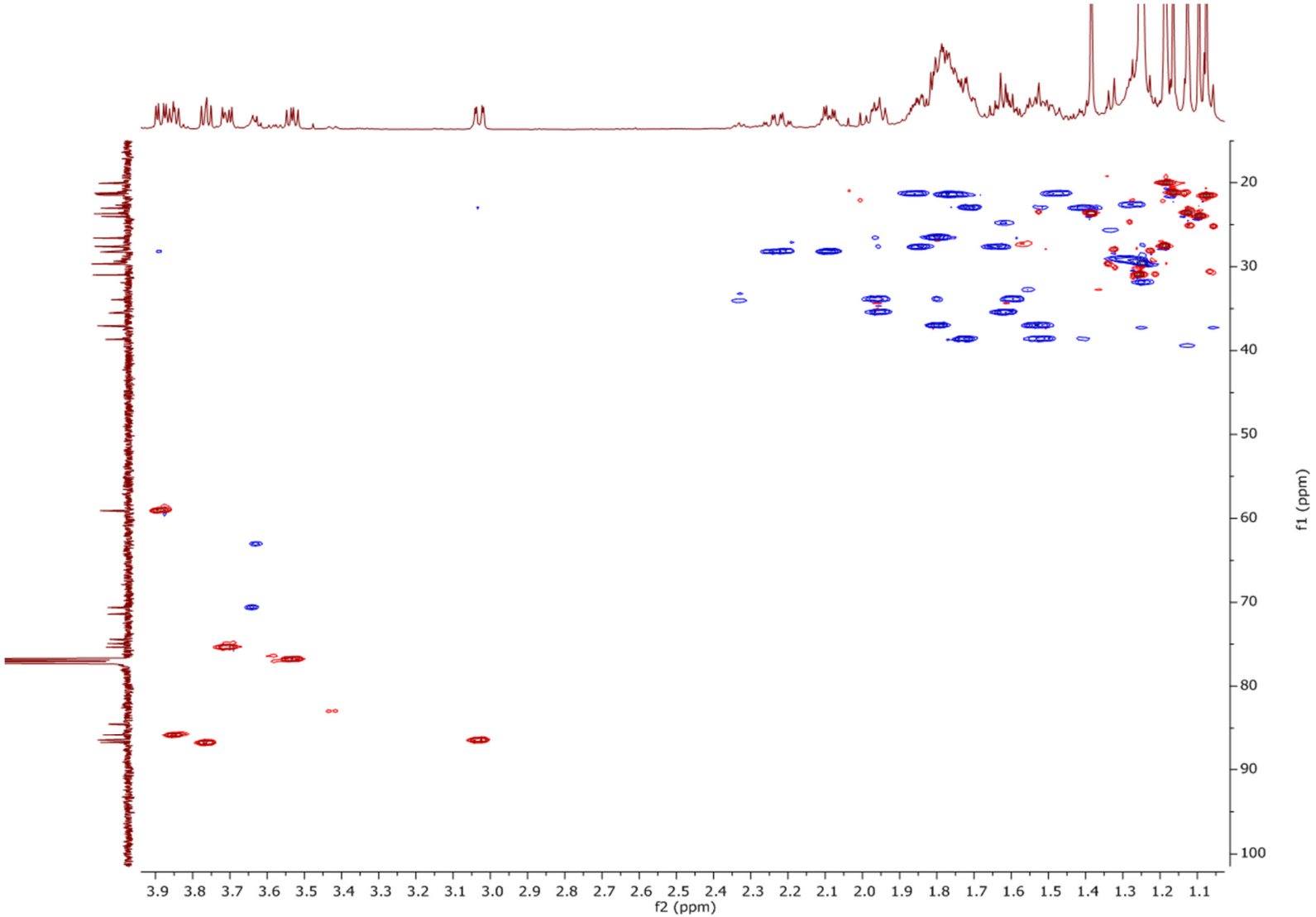



**Figure S22**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **4**

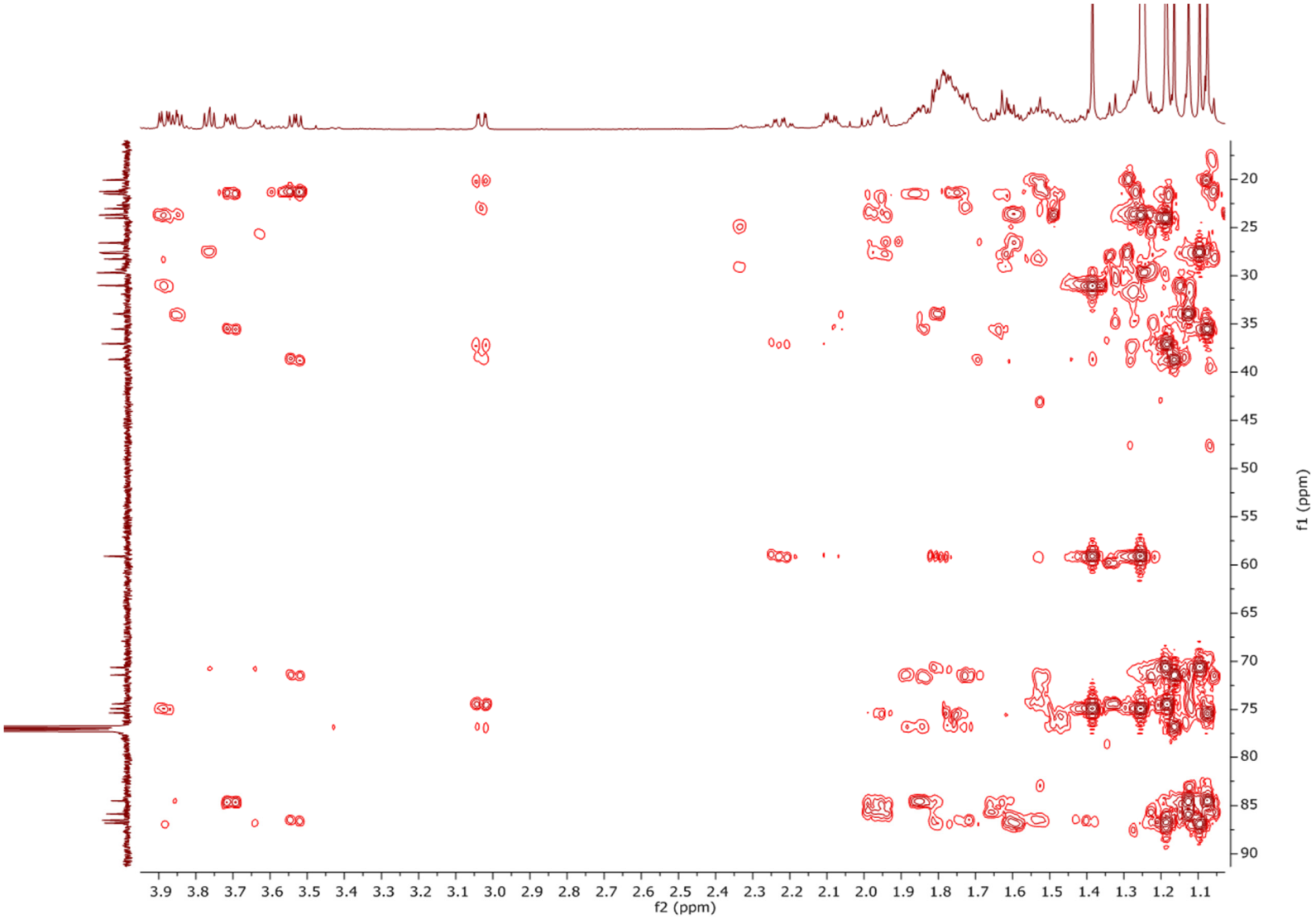



**Figure S23**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **4**

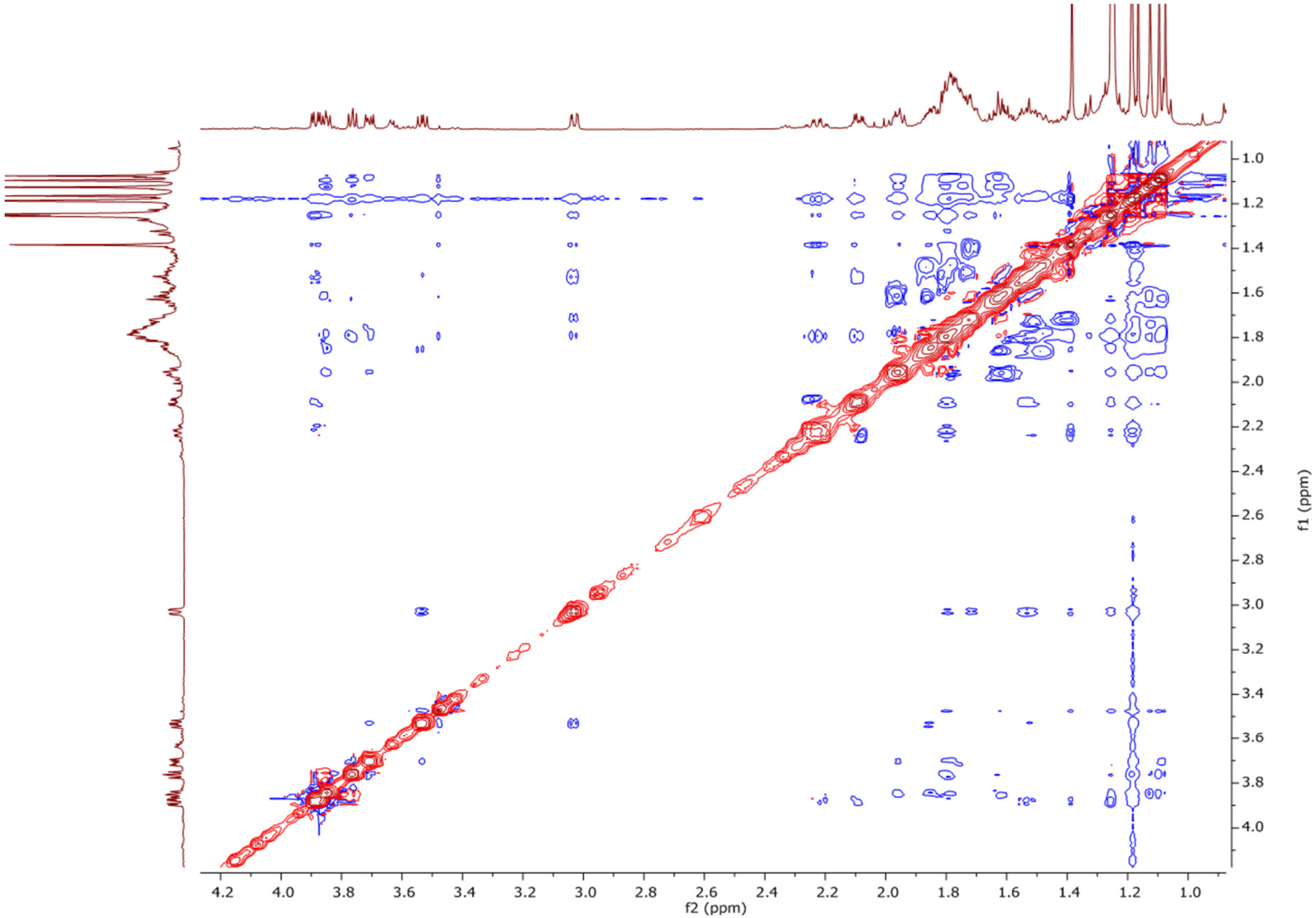



**Figure S24**. ROESY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **4**

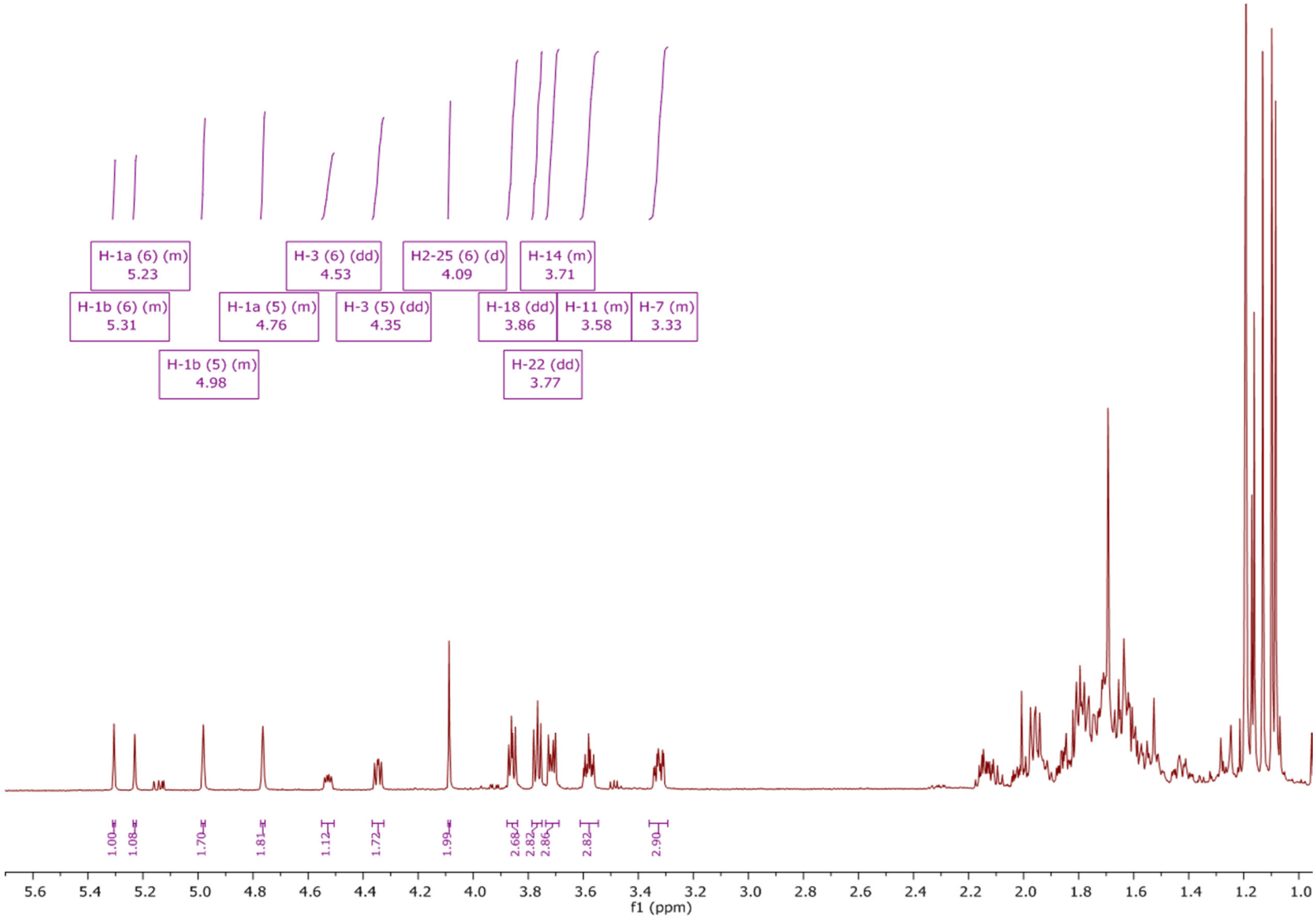



**Figure S25**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compounds **5** and **6**

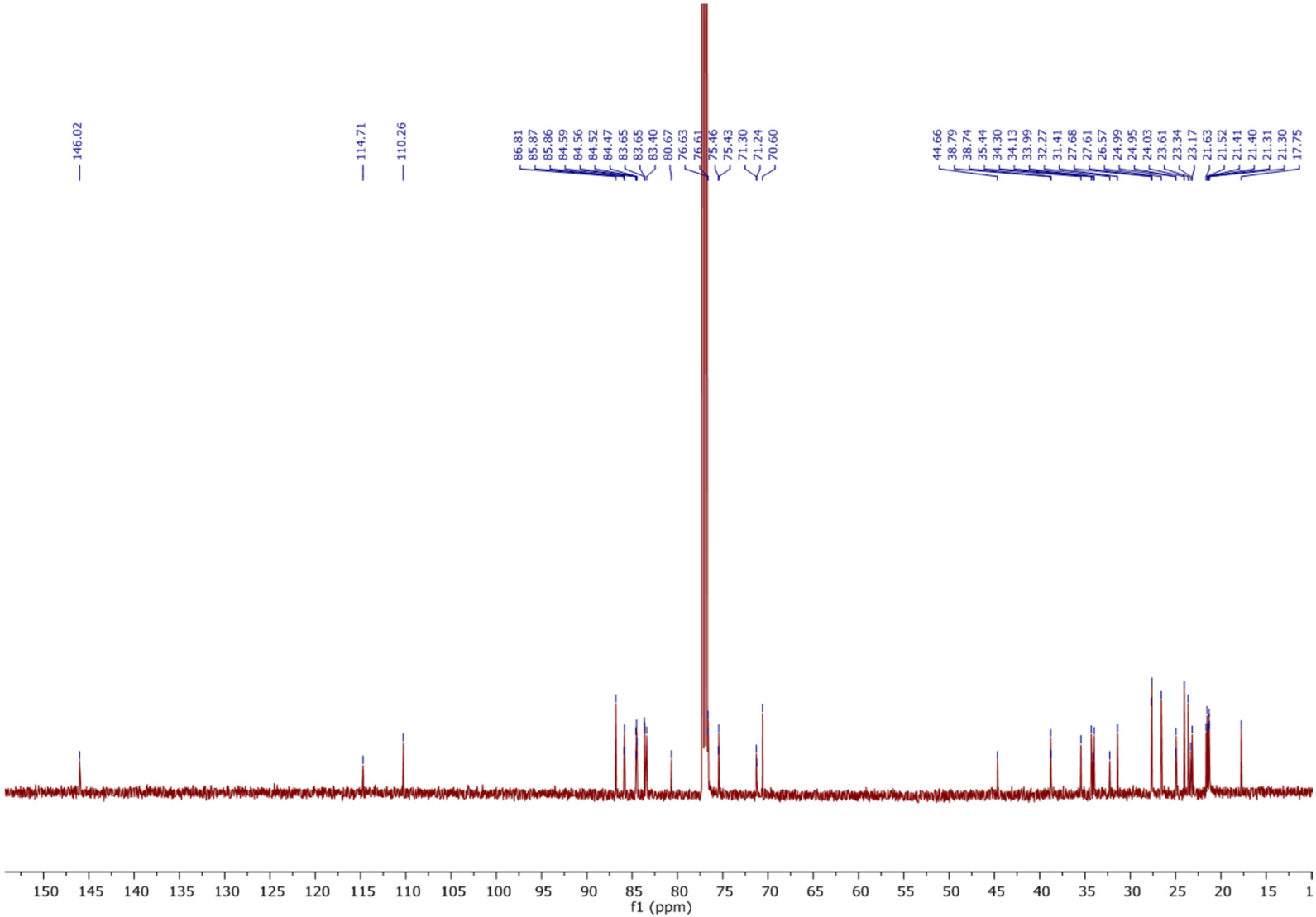



**Figure S26**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compounds **5** and **6**

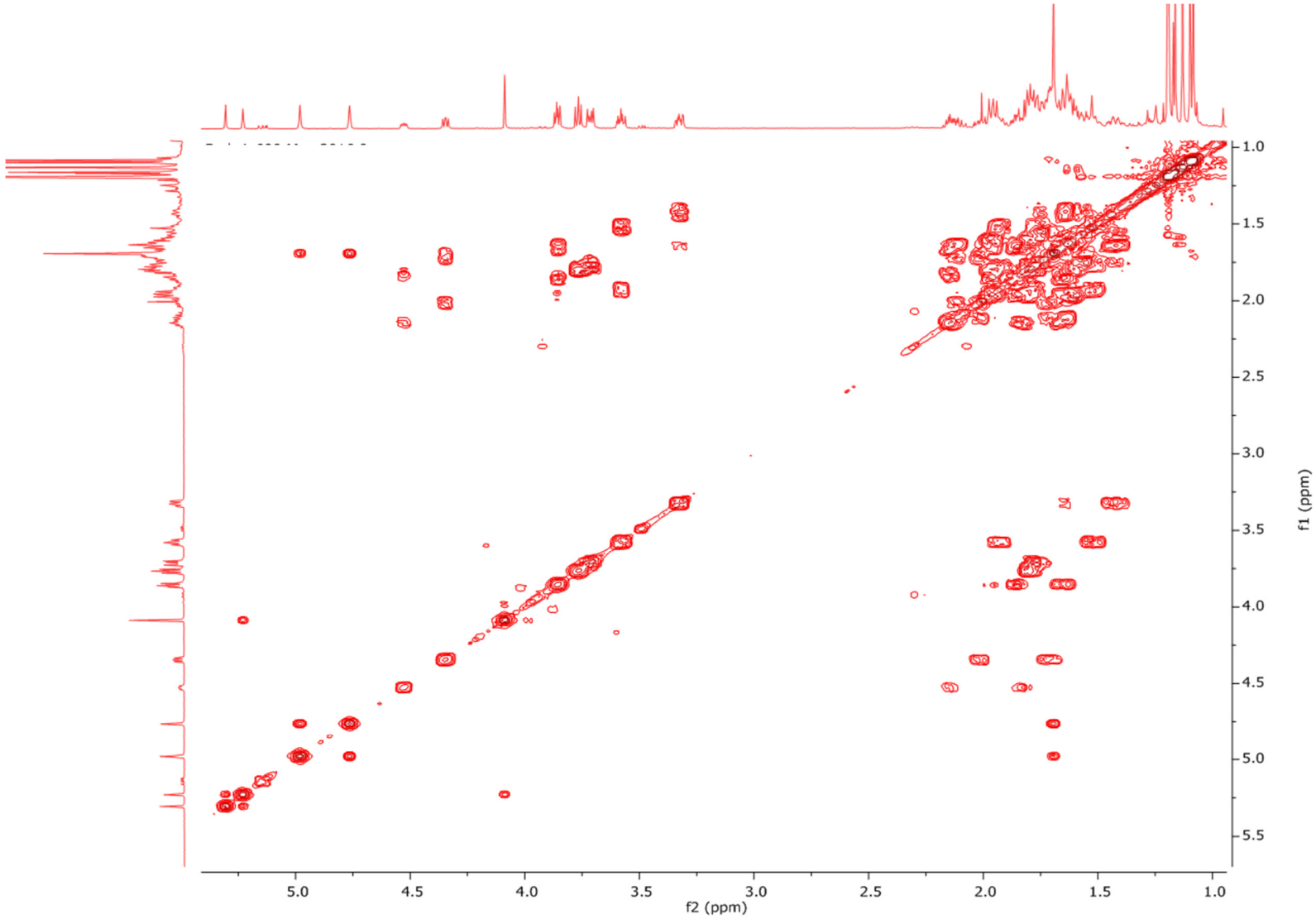



**Figure S27**. $^{1}H$-$^{1}H$ COSY NMR spectrum (600MHz, $CDCl_3$, 303K) of compounds **5** and **6**

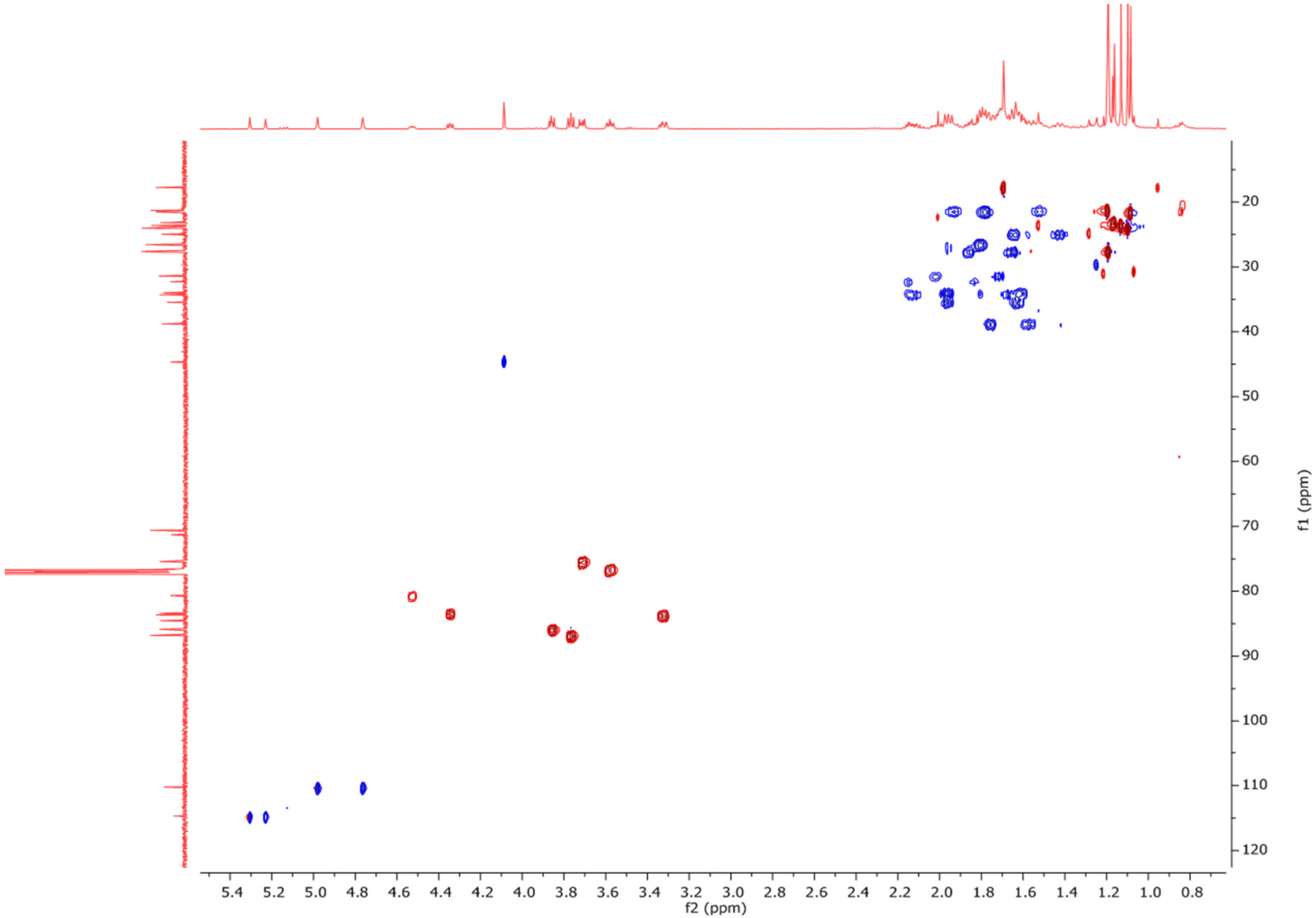



**Figure S28**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compounds **5** and **6**

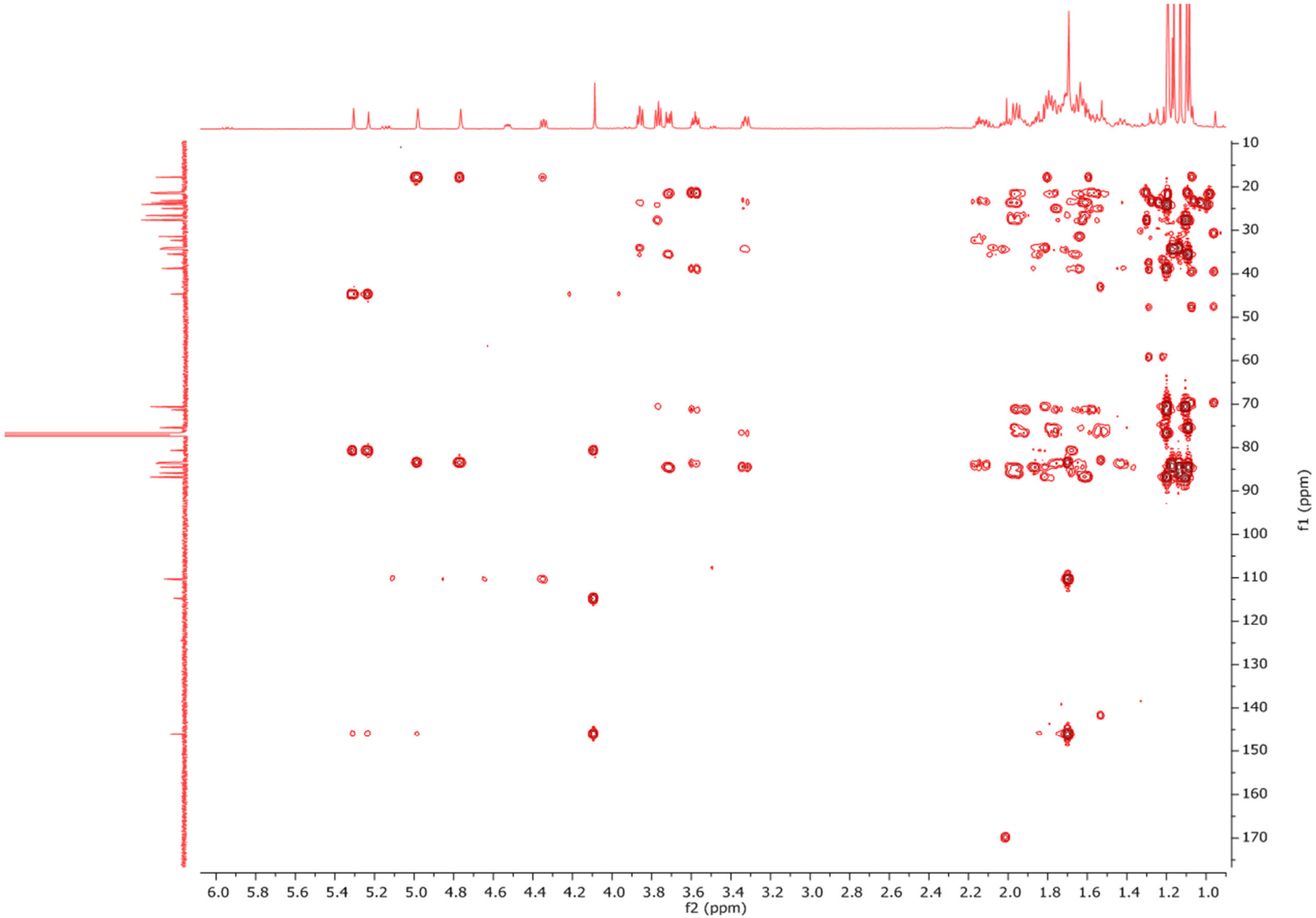



**Figure S29**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compounds **5** and **6**

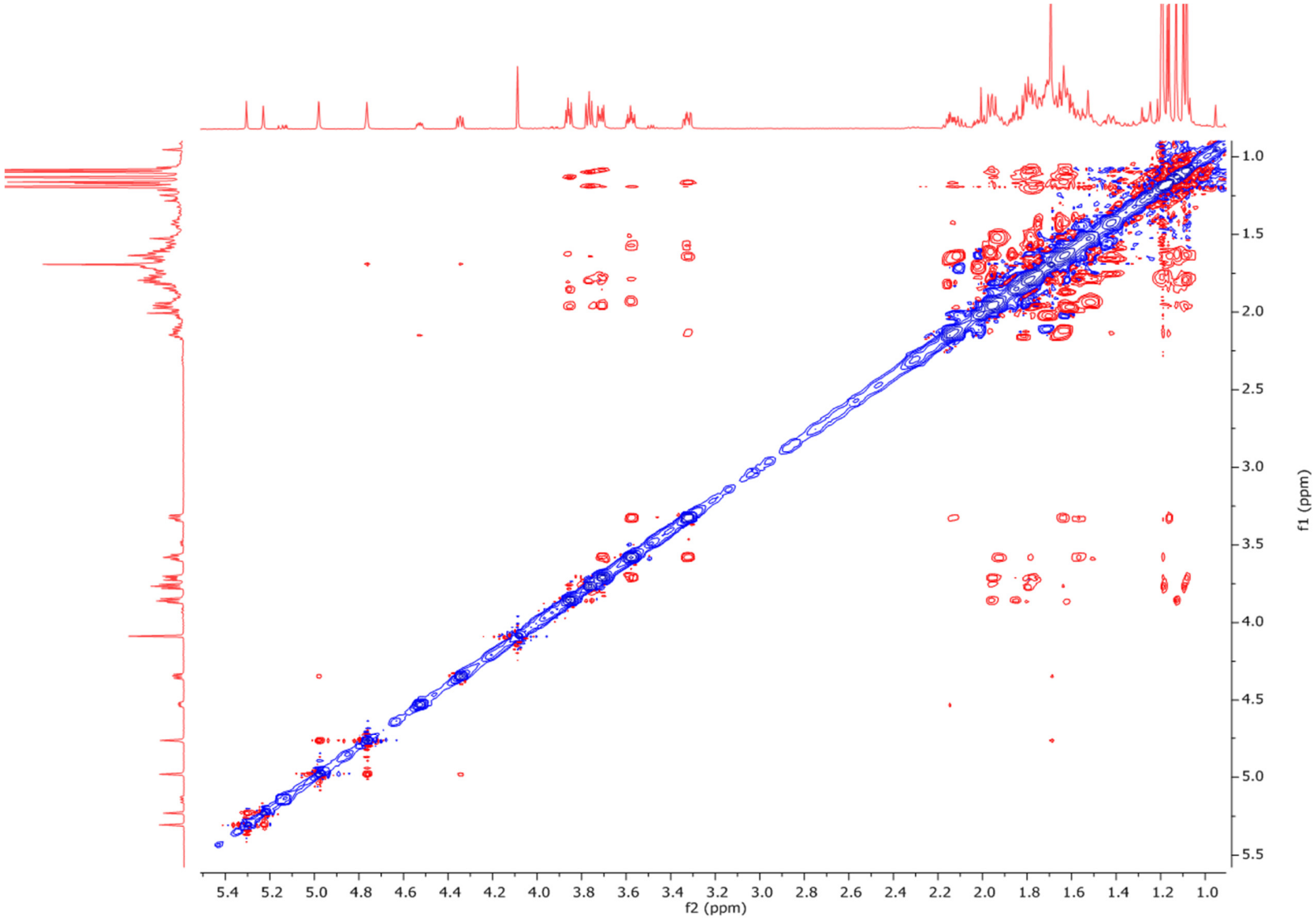



**Figure S30**. ROESY NMR spectrum (600MHz, $CDCl_3$, 303K) of compounds **5** and **6**

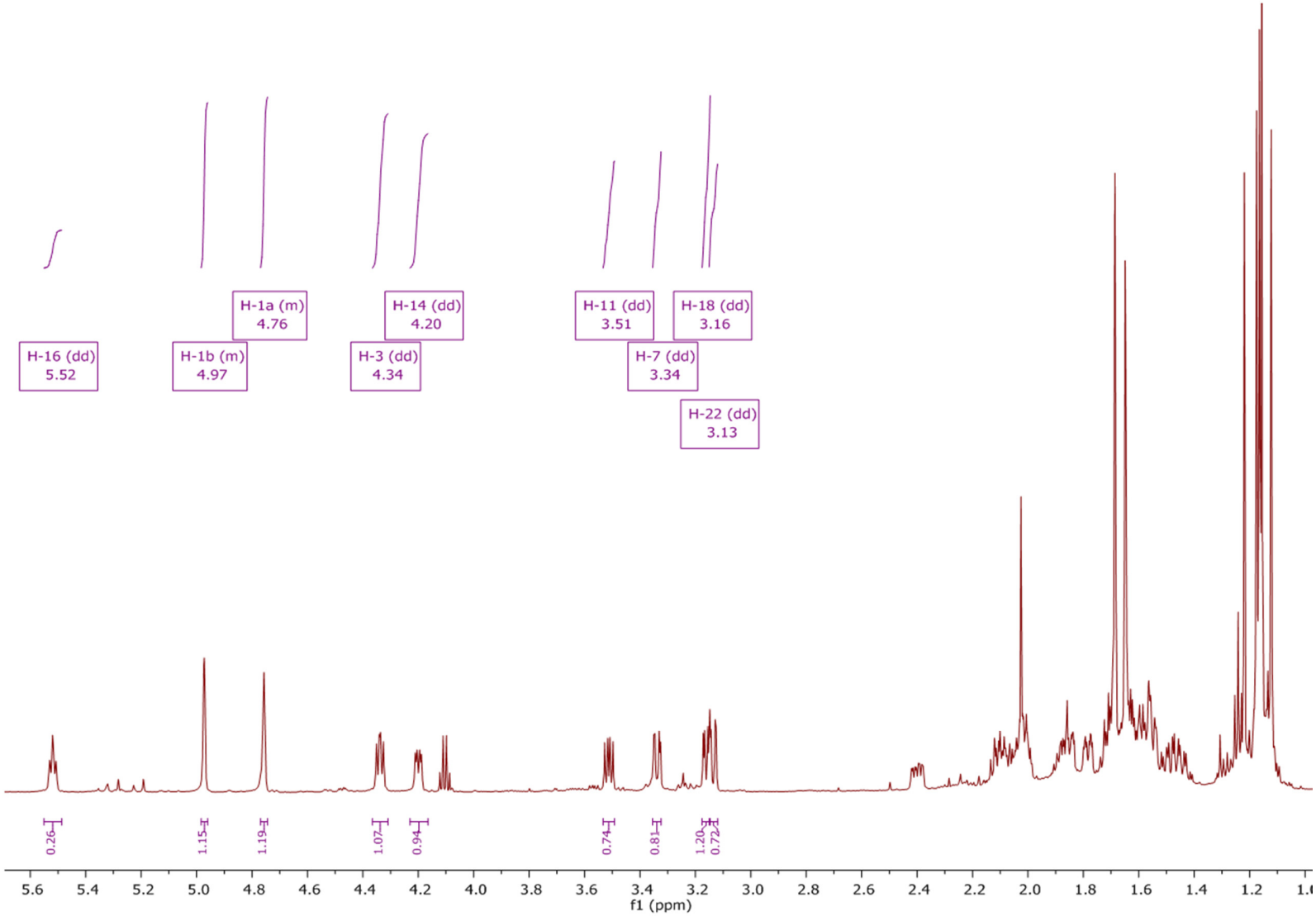



**Figure S31**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **7**

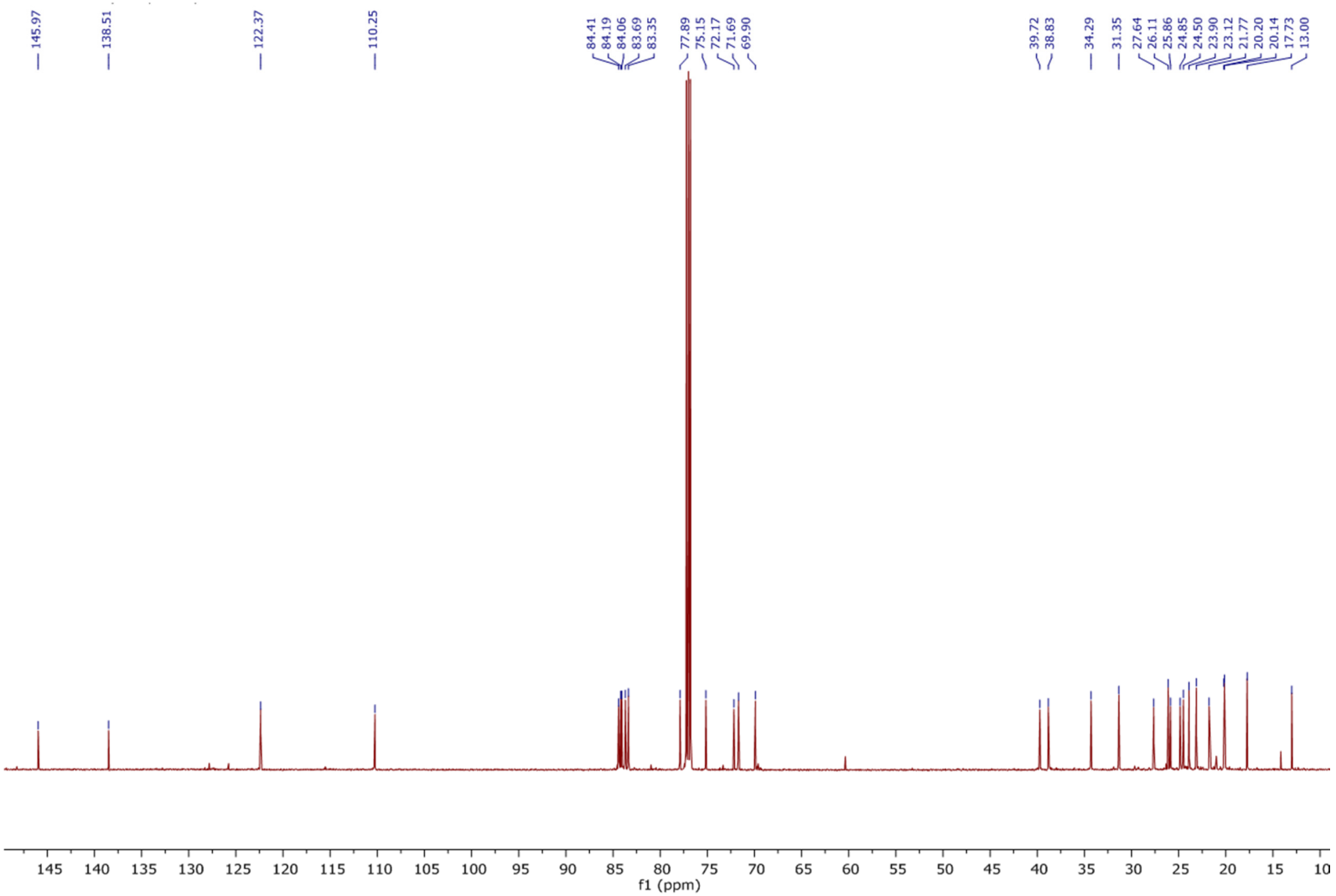



**Figure S32**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compound **7**

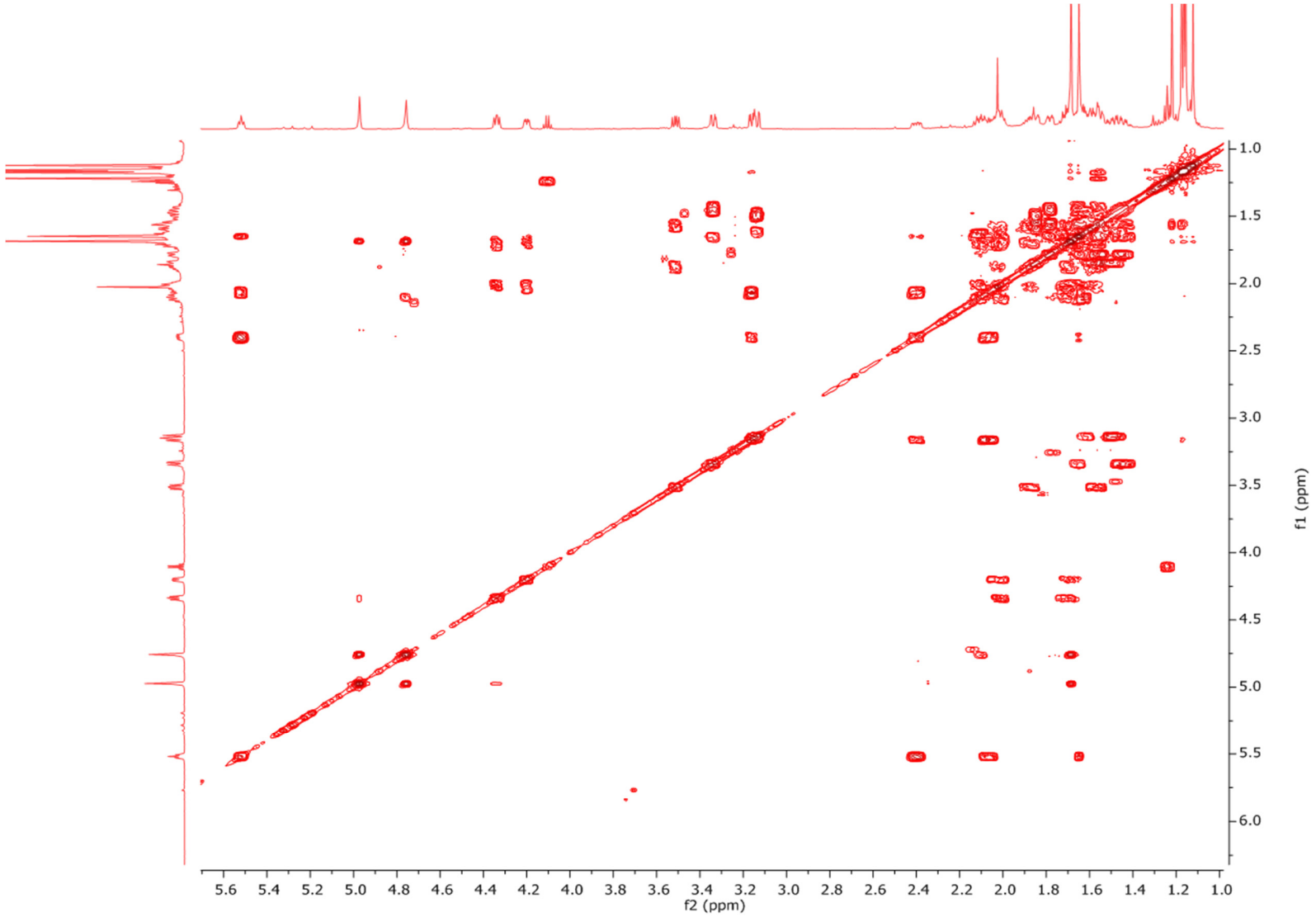



**Figure S33**. $^{1}H$-$^{1}H$ COSY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **7**

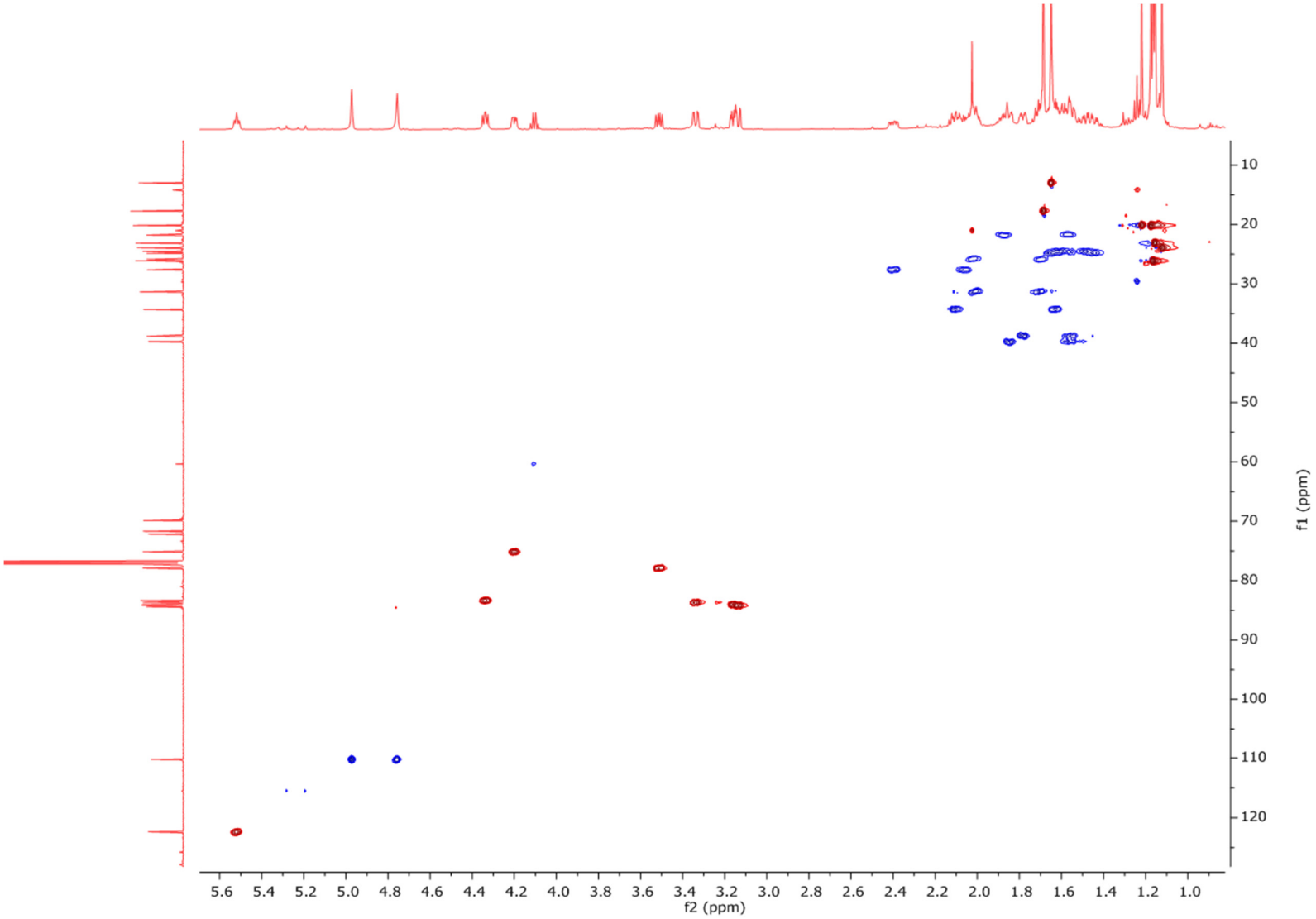



**Figure S34**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **7**

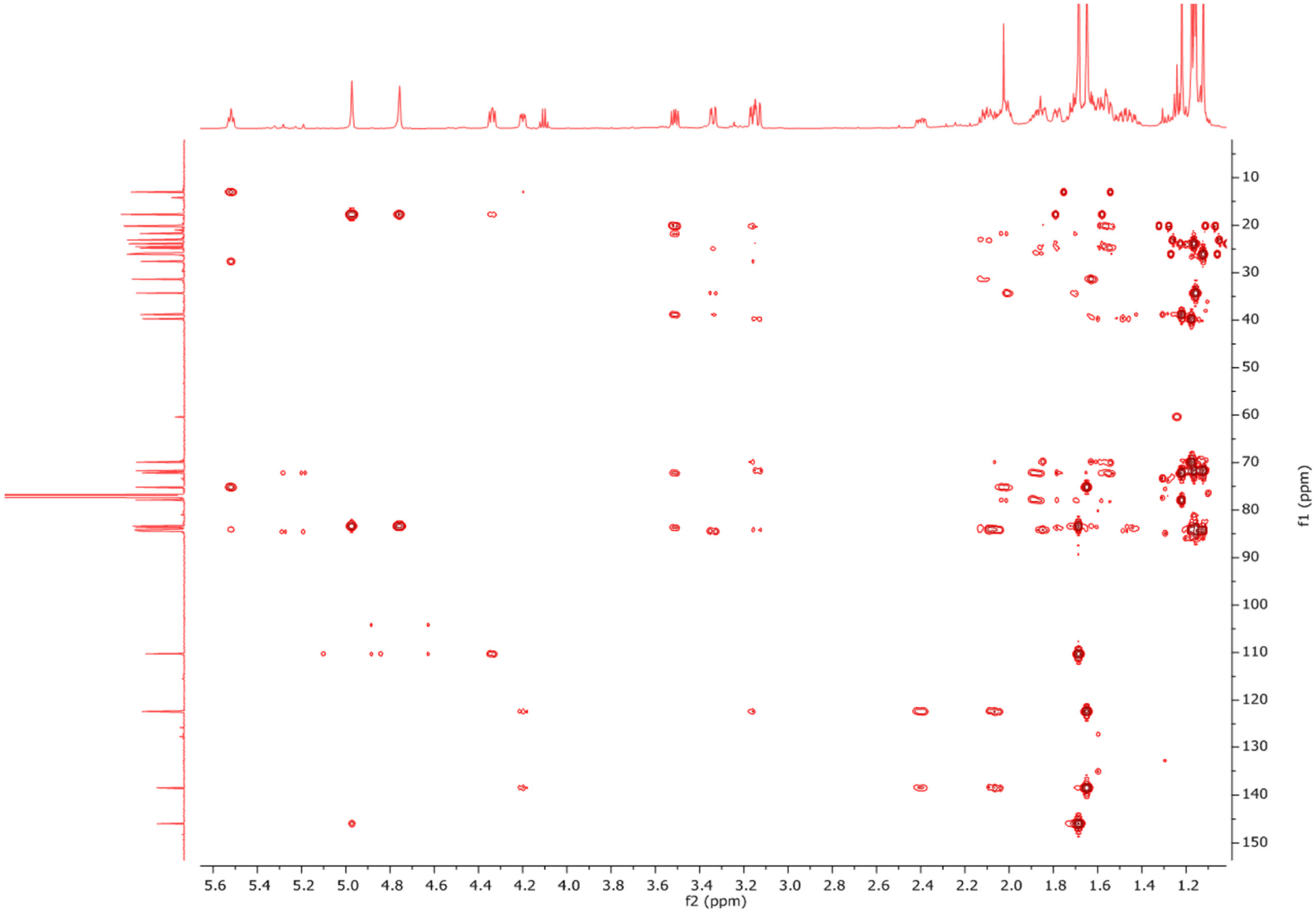



**Figure S35**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **7**

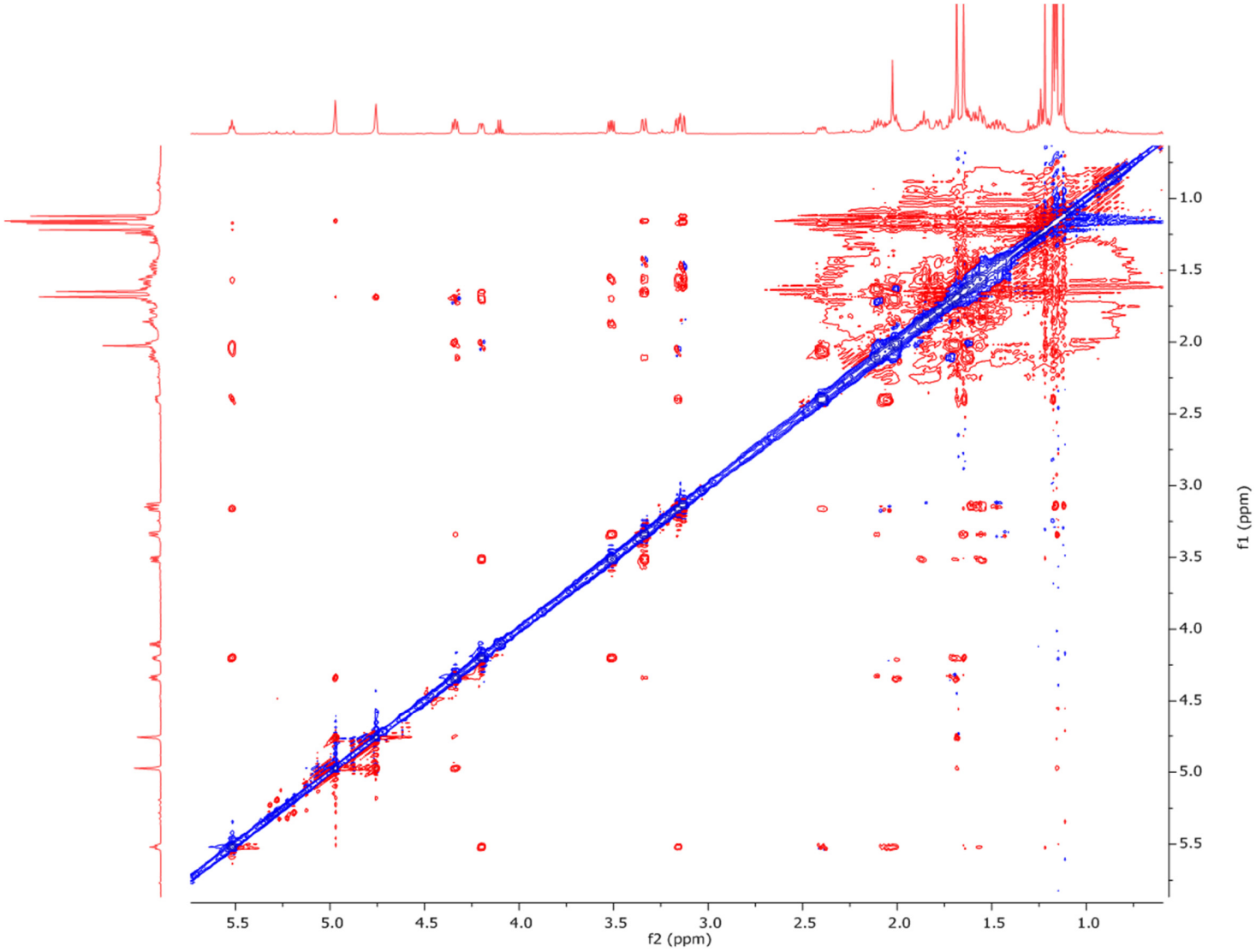



**Figure S36**. ROESY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **7**

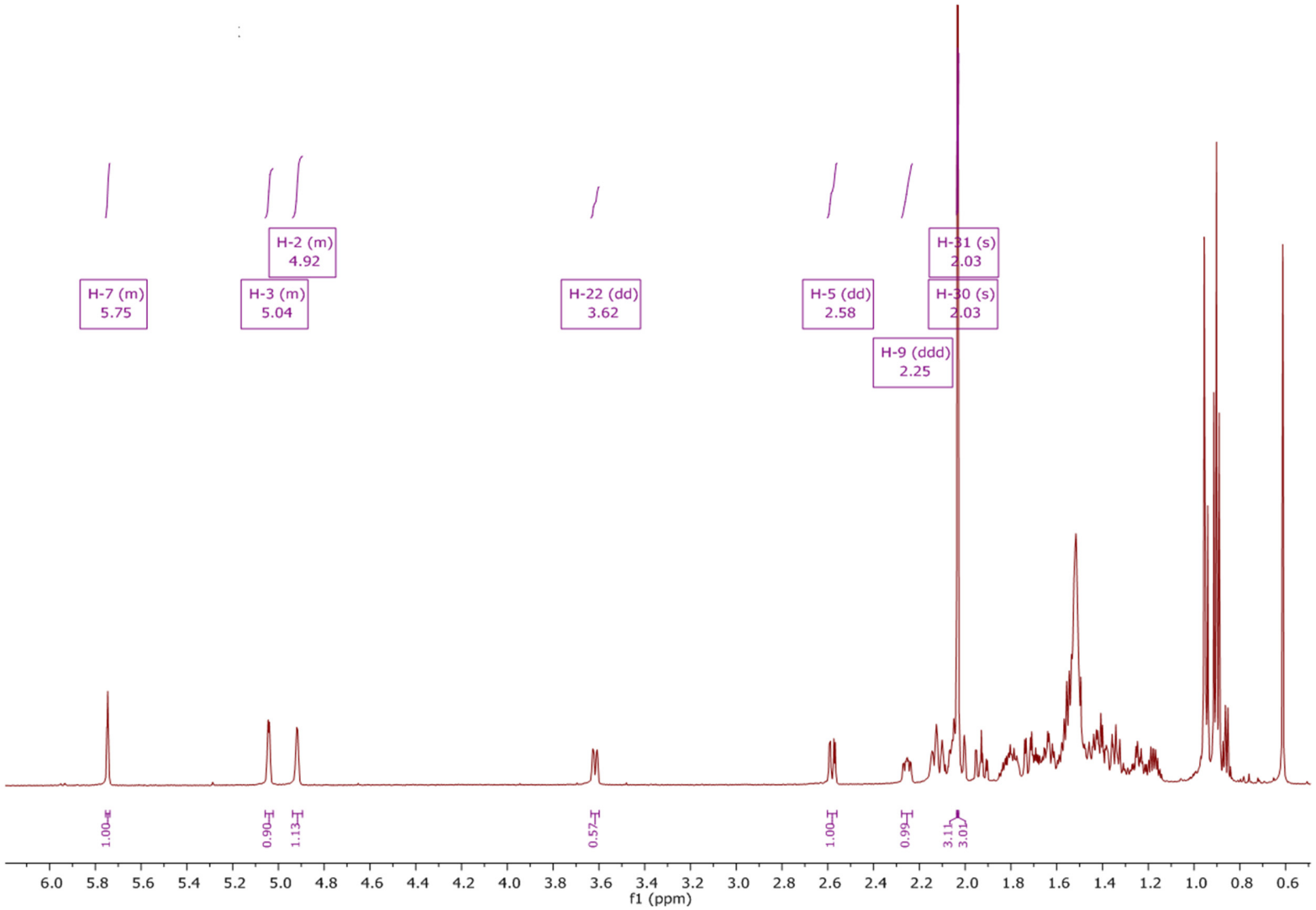



**Figure S37**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **8**

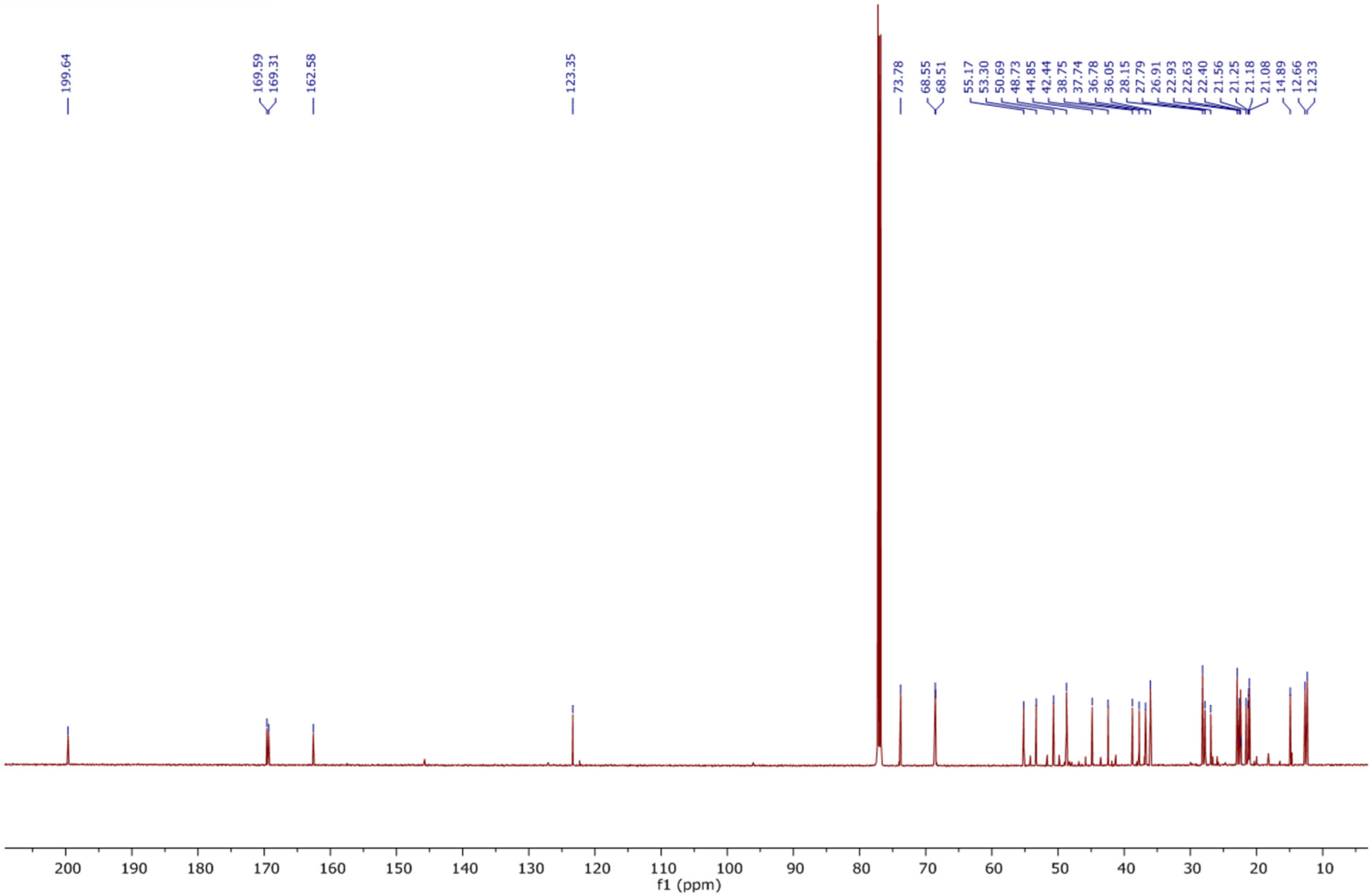



**Figure S38**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compound **8**

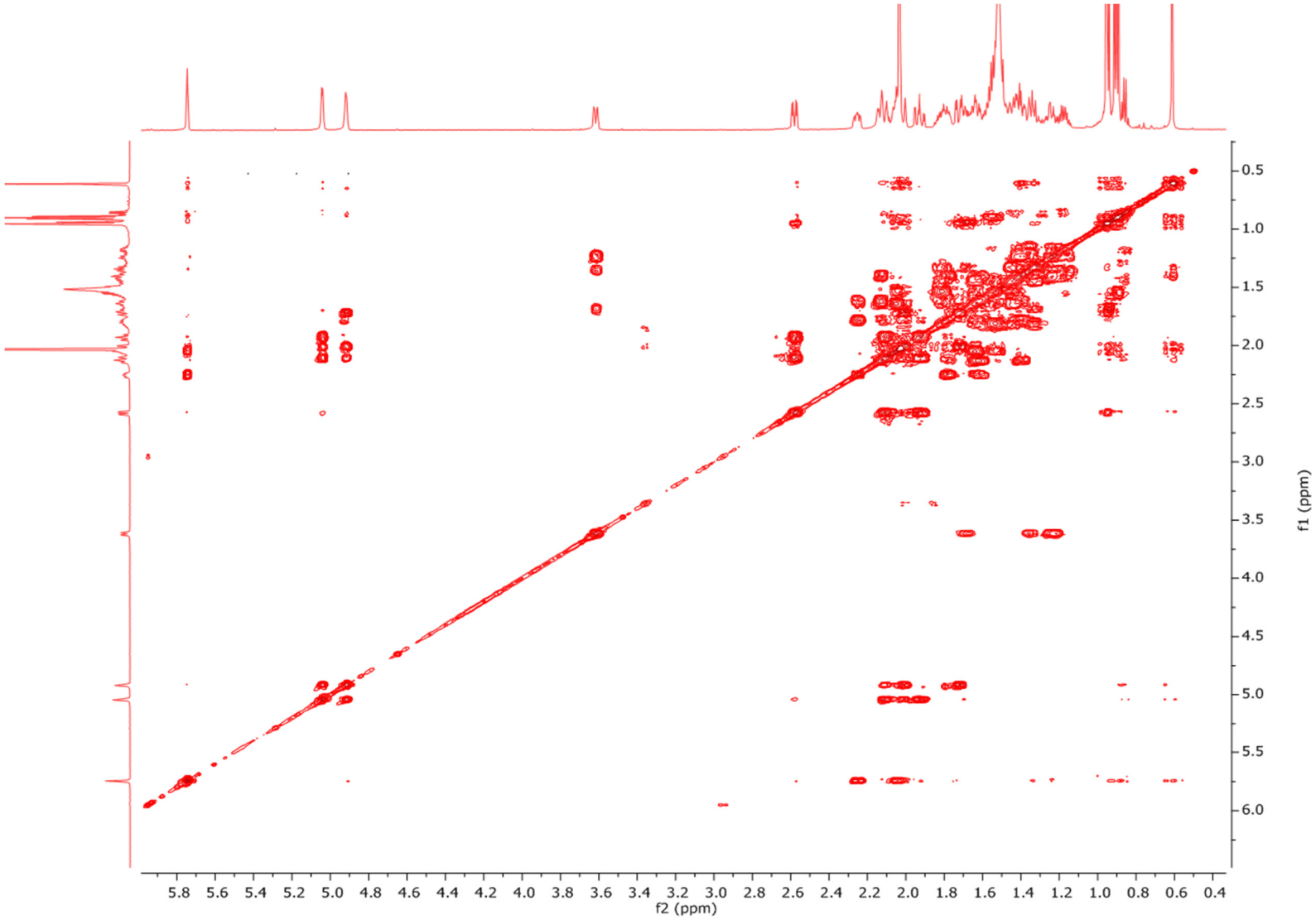



**Figure S39**. $^{1}H$-$^{1}H$ COSY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **8**

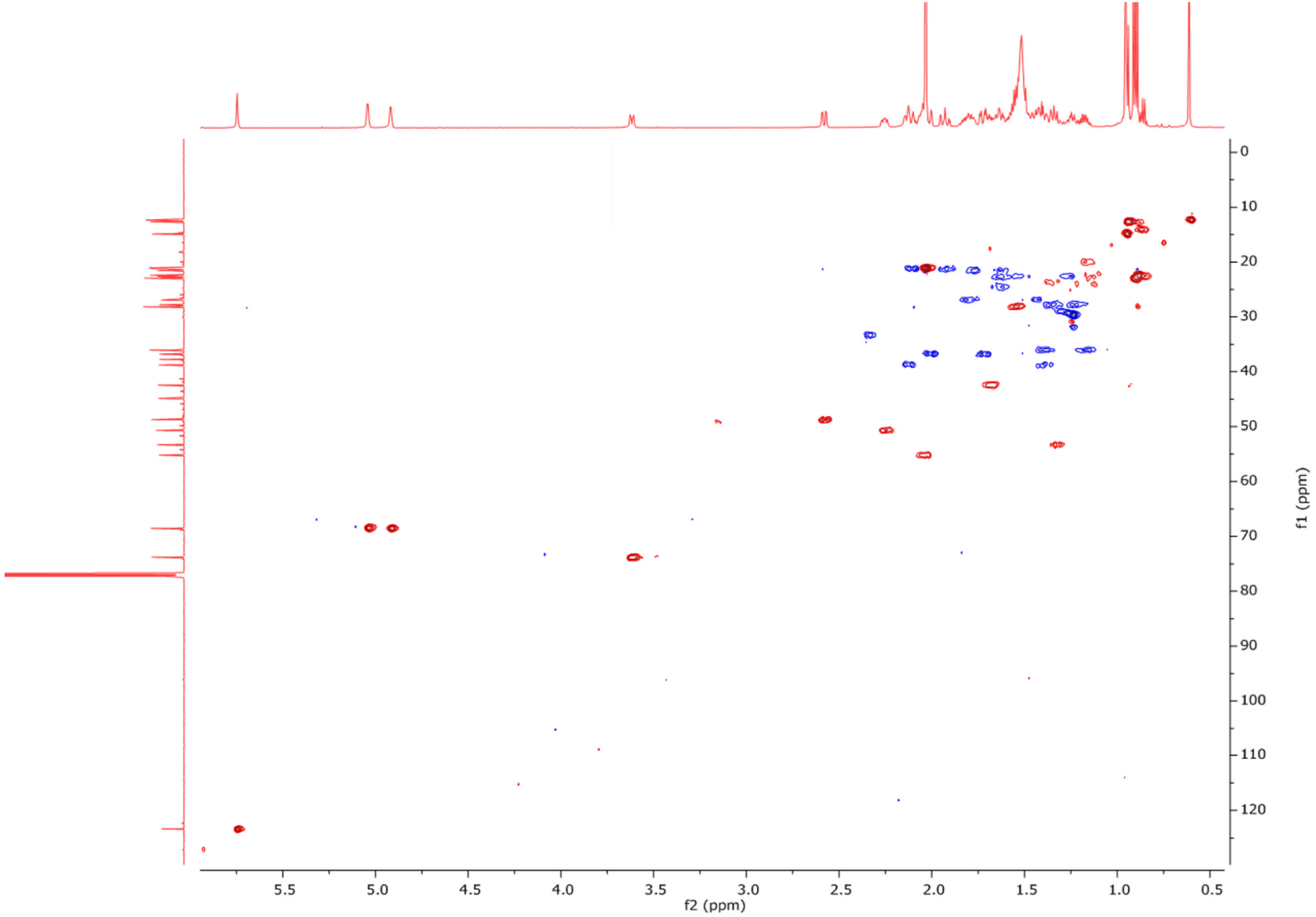



**Figure S40**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **8**

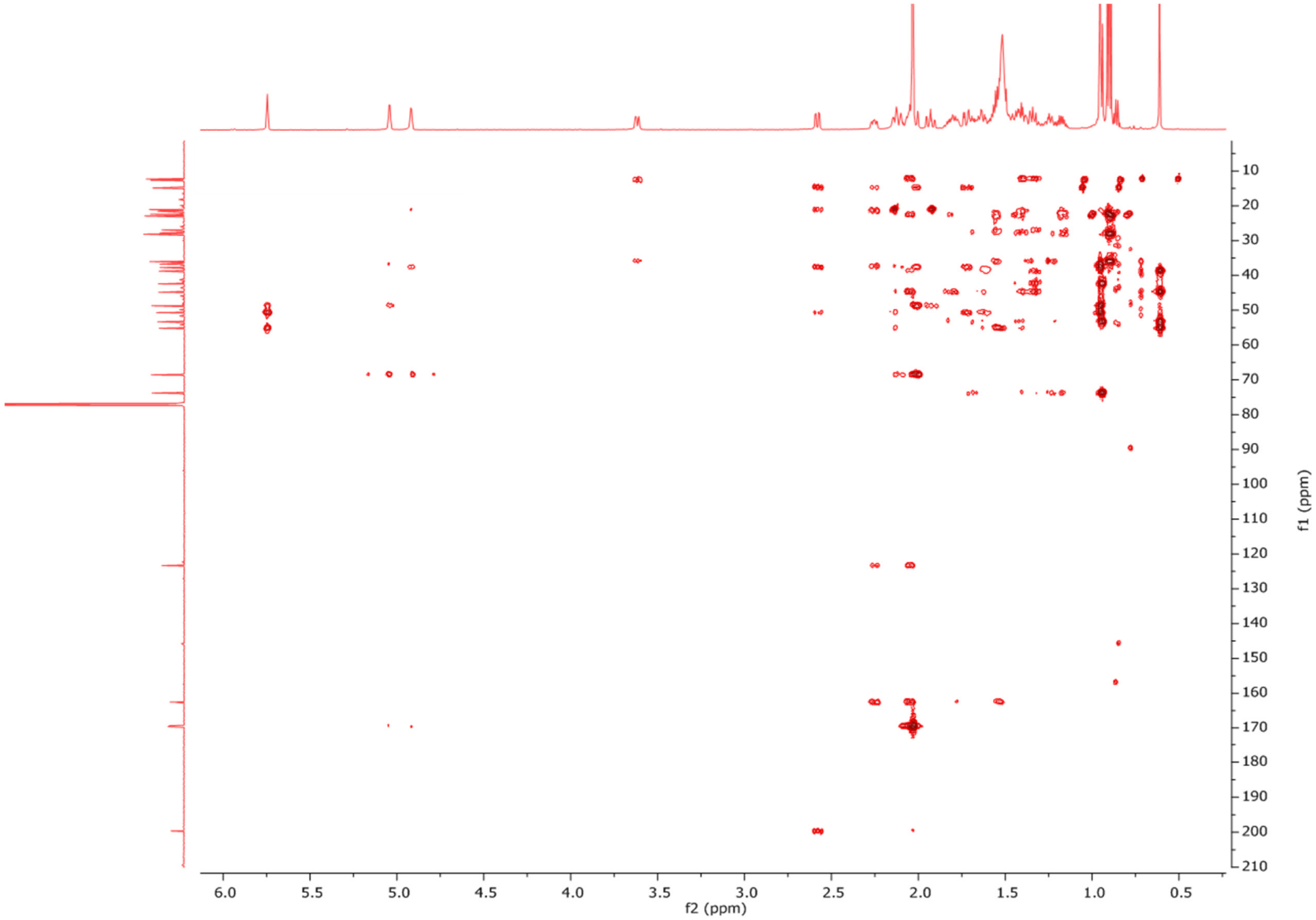



**Figure S41**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **8**

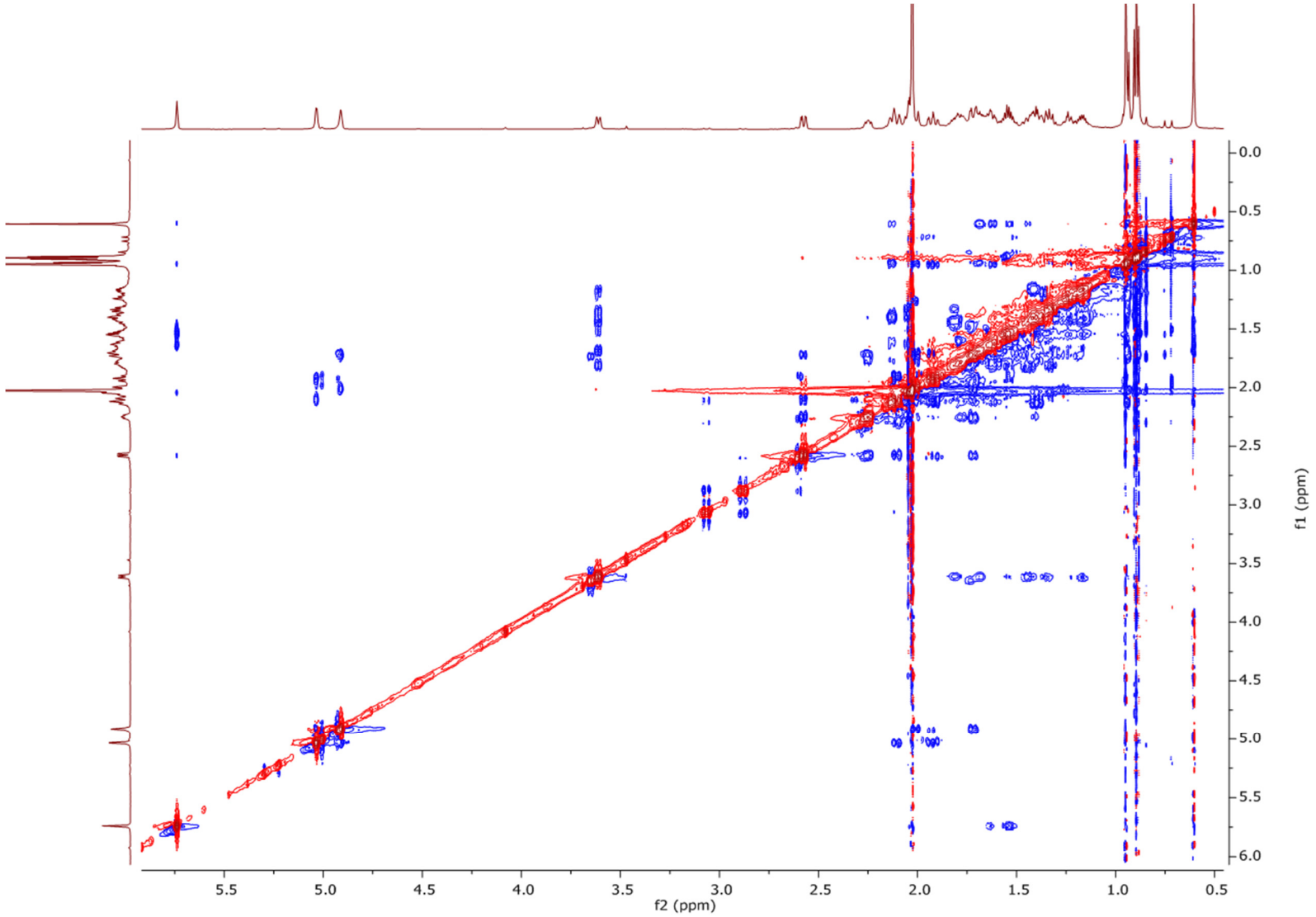



**Figure S42**. NOESY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **8**

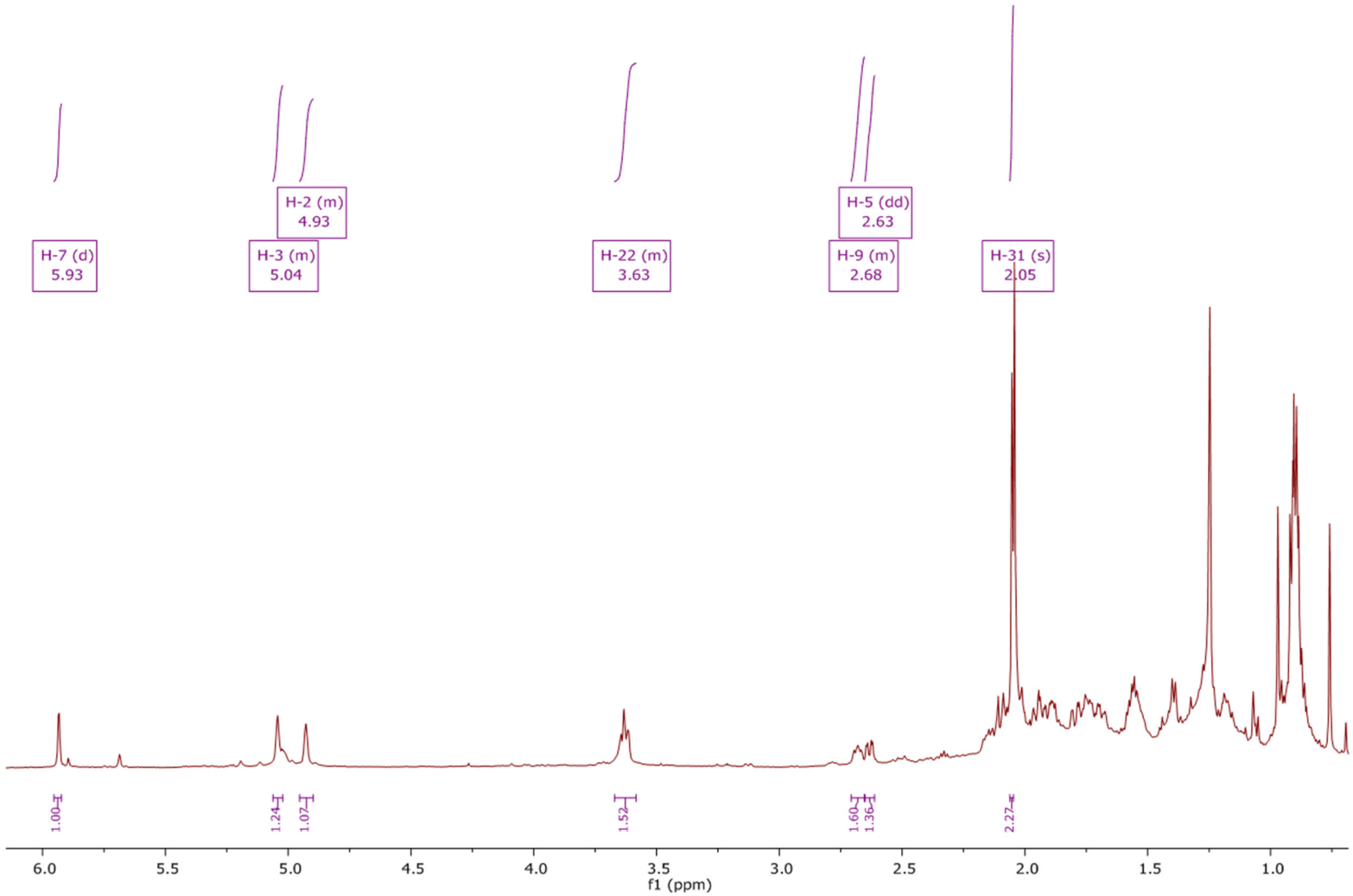



**Figure S43**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **9**

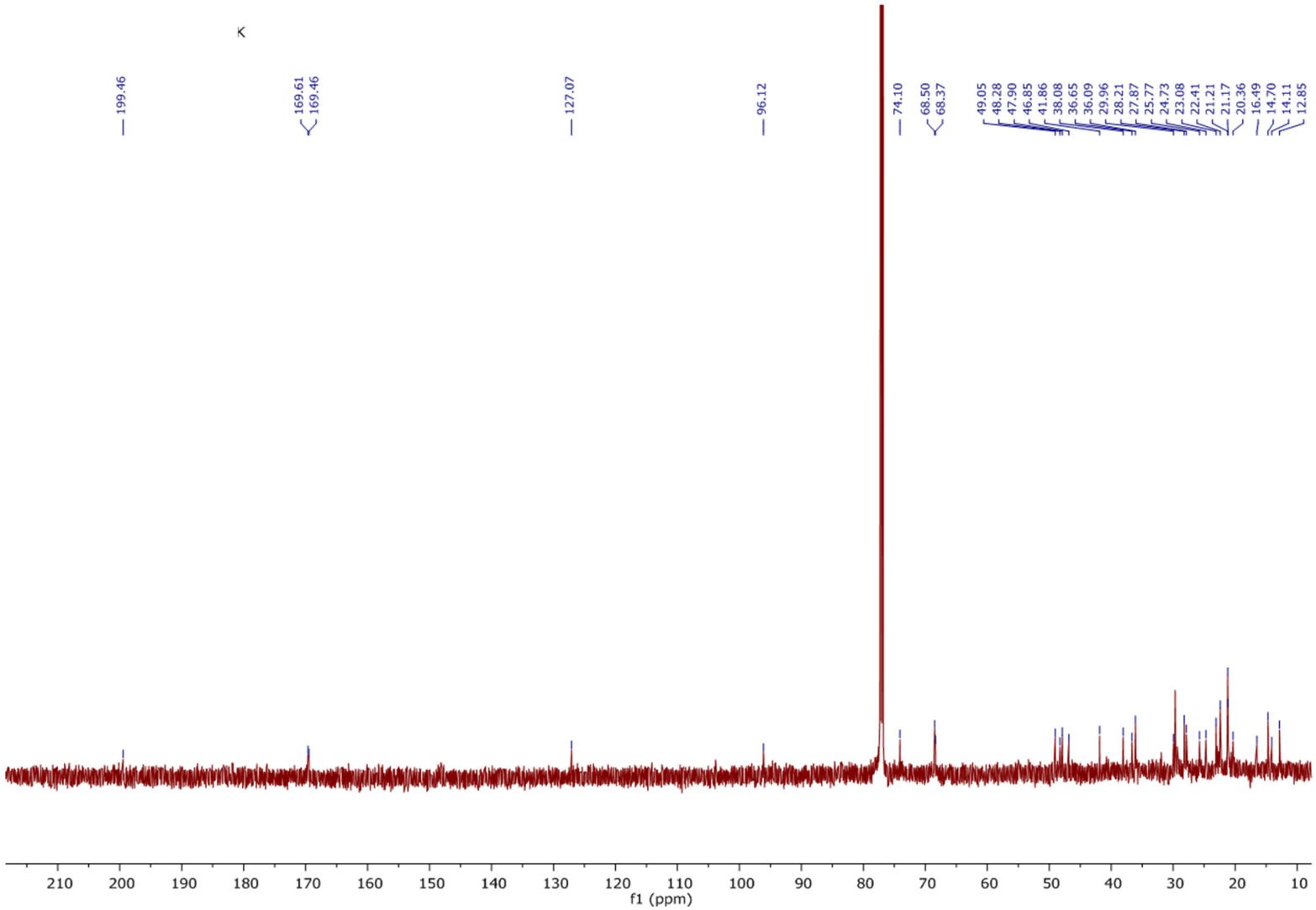



**Figure S44**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compound **9**

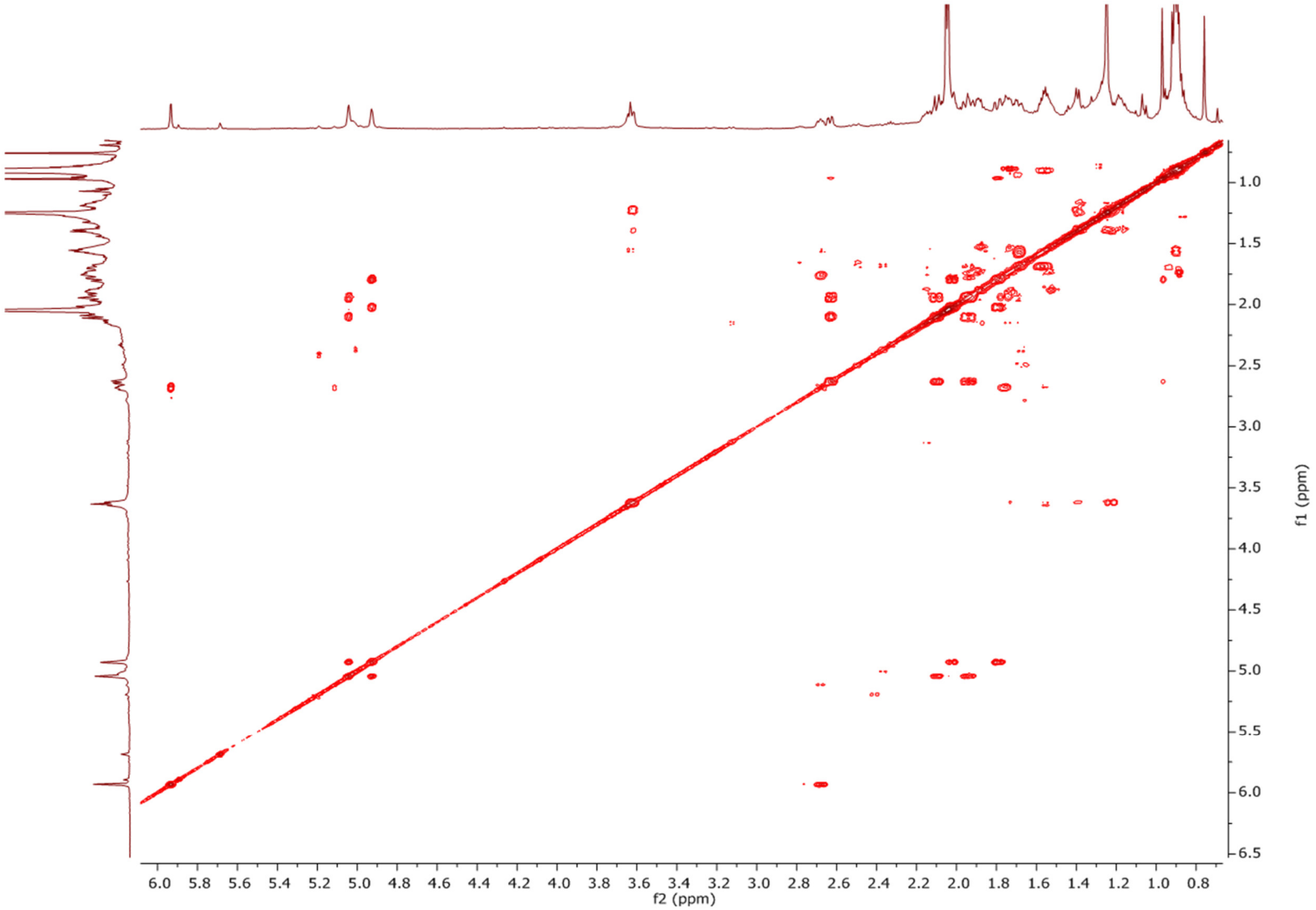



**Figure S45**. $^{1}H$-$^{1}H$ COSY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **9**

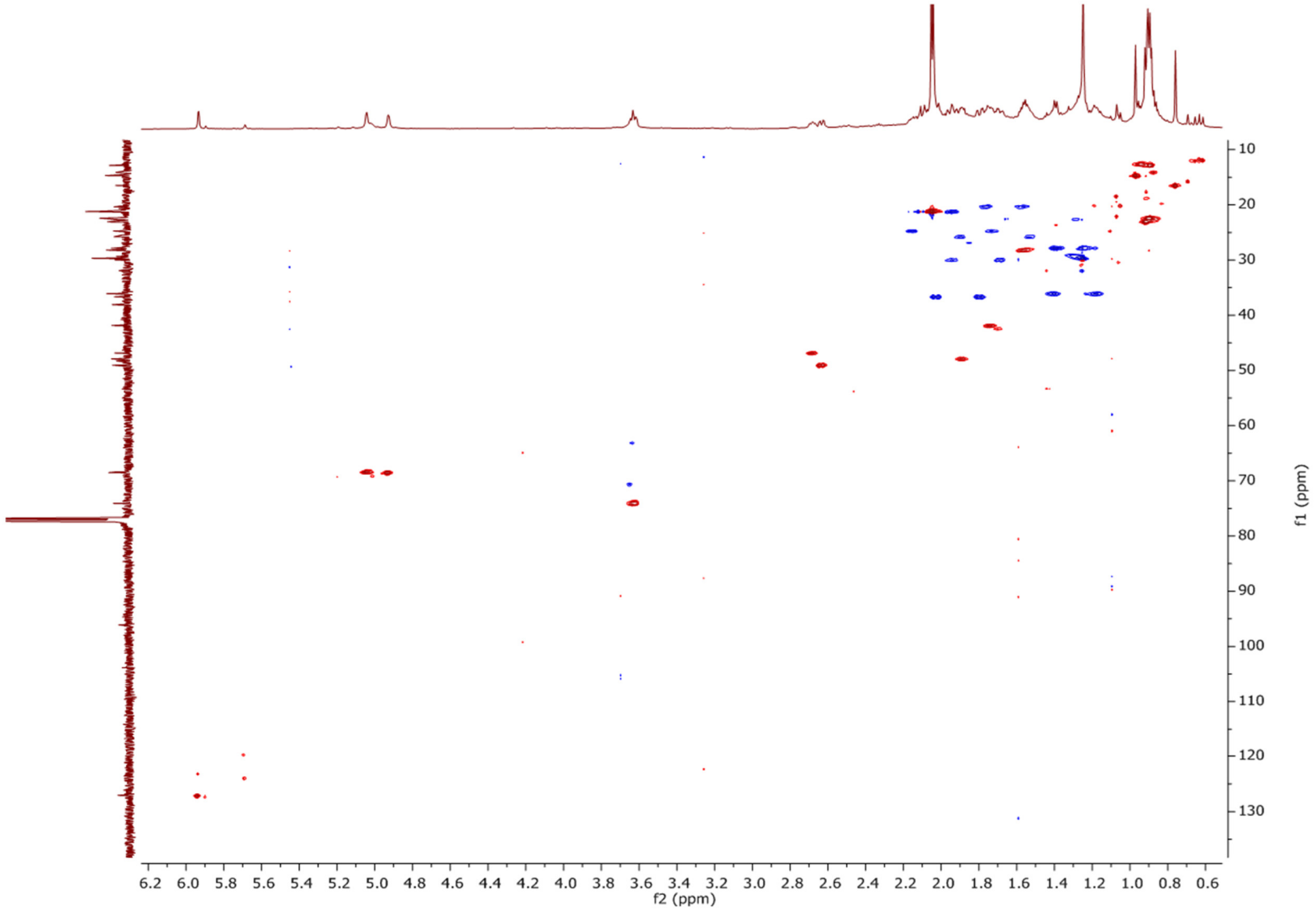



**Figure S46**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **9**

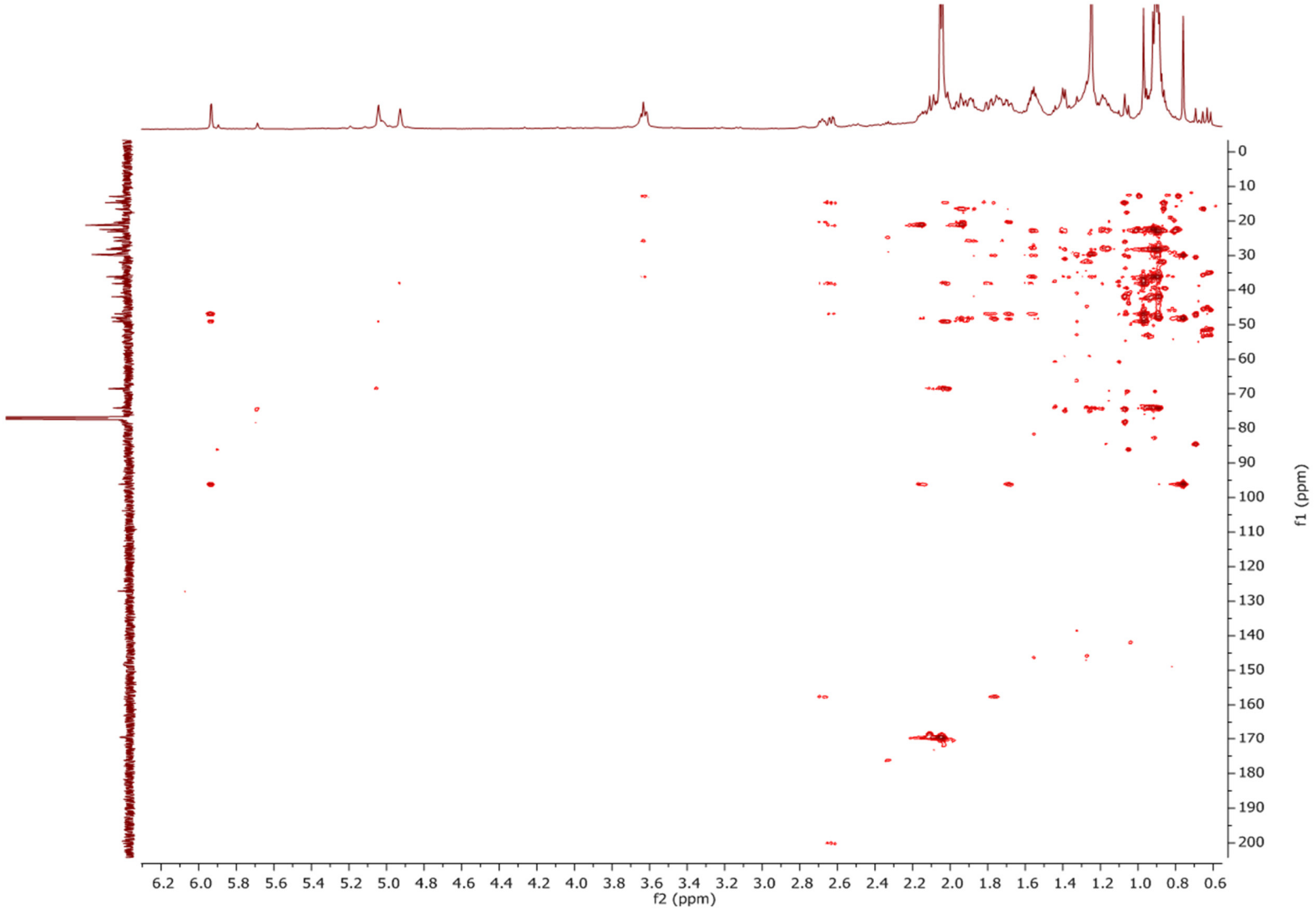



**Figure S47**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **9**

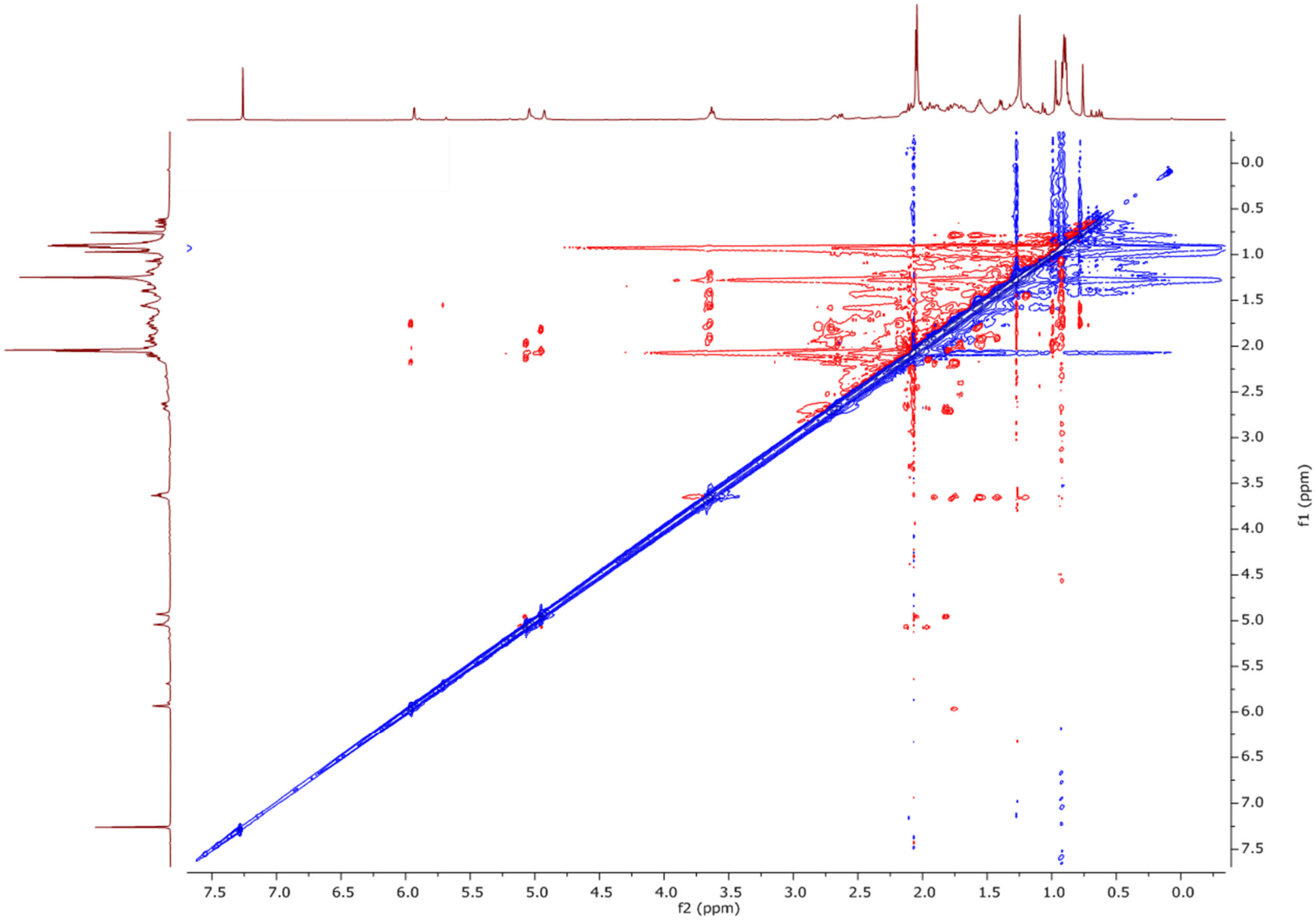



**Figure S48**. ROESY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **9**

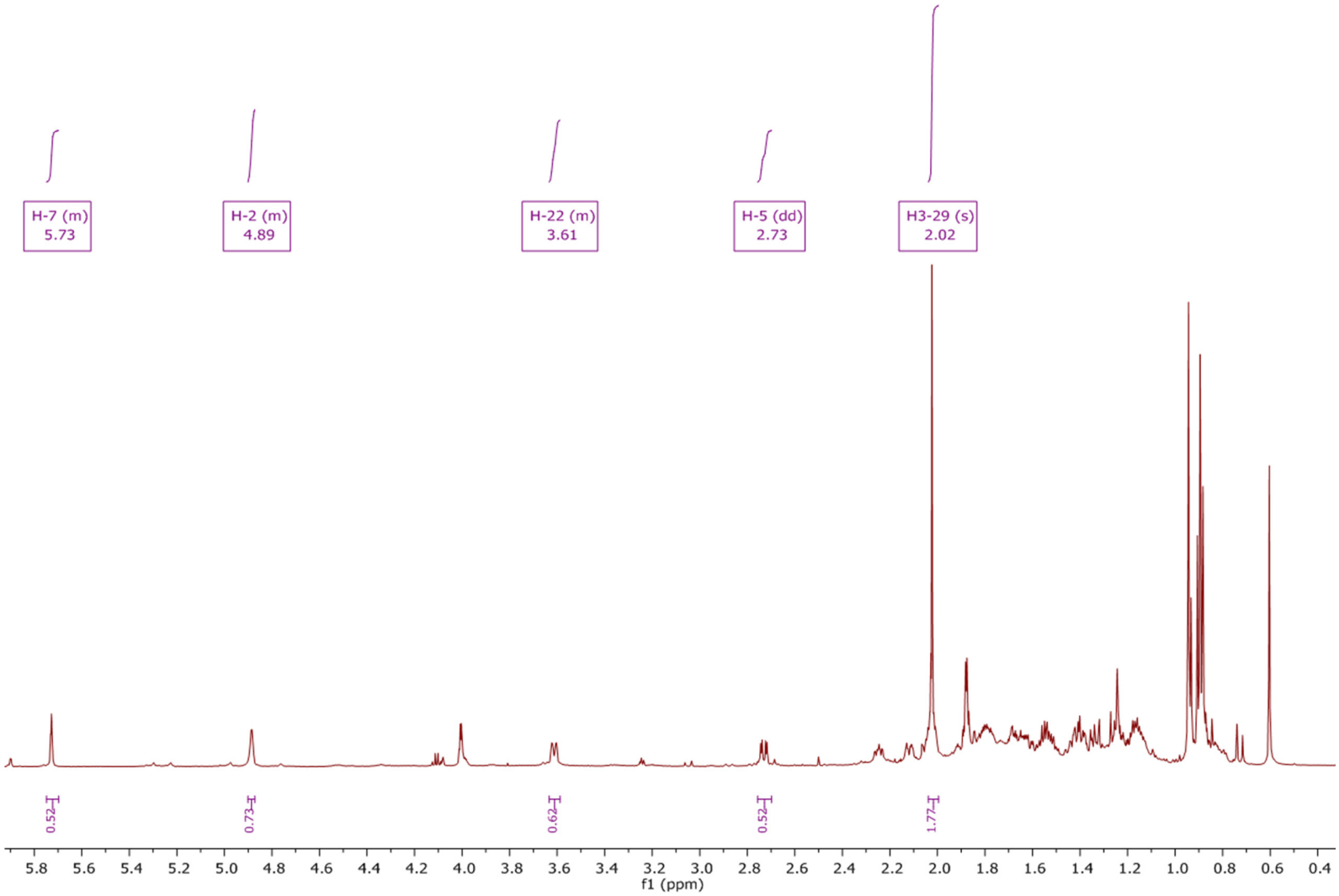



**Figure S49**. $^{1}$H-NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **10**

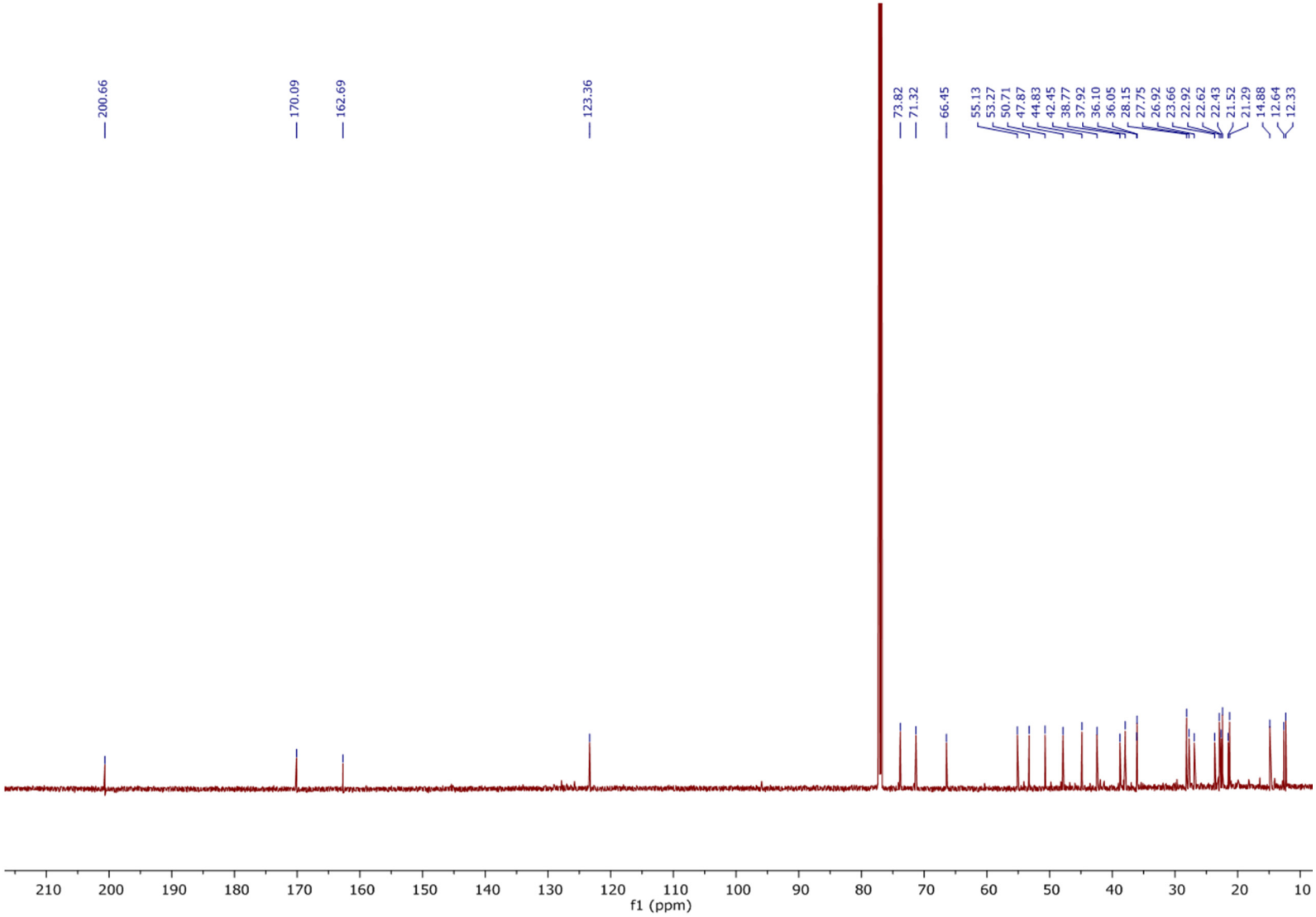



**Figure S50**. $^{13}$C-NMR spectrum (150MHz, $CDCl_3$, 303K) of compound **10**

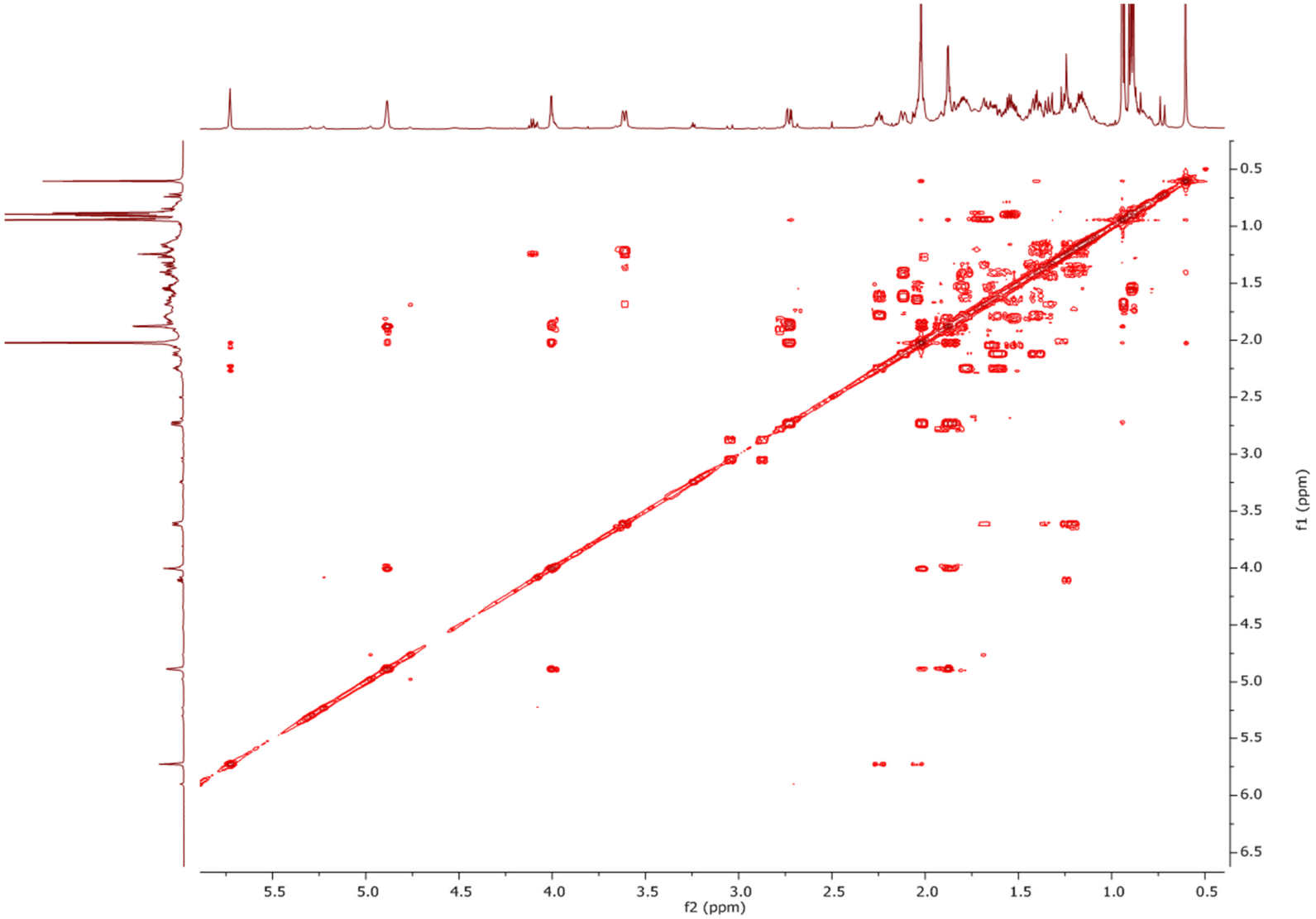



**Figure S51**. $^{1}H$-$^{1}H$ COSY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **10**

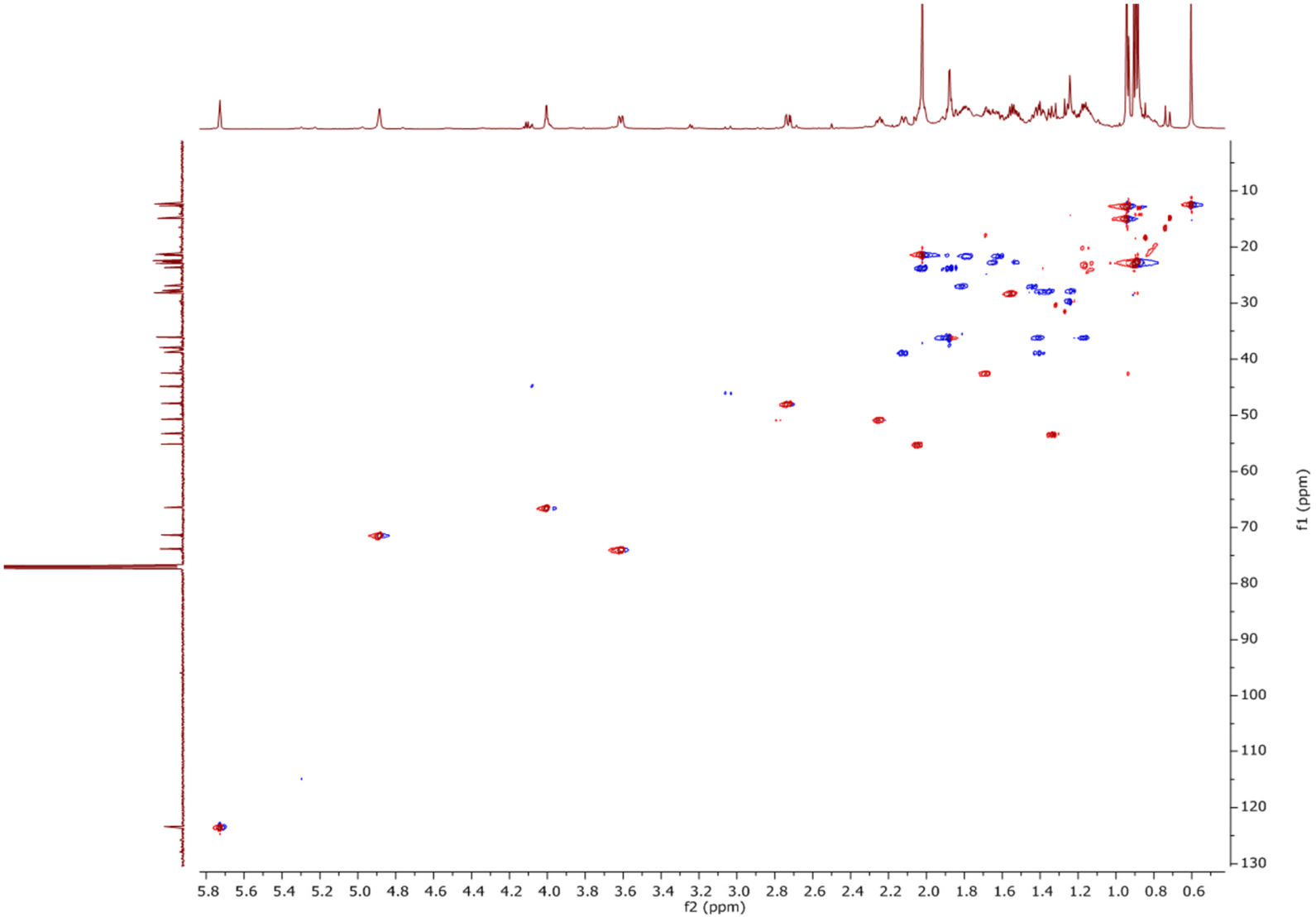



**Figure S52**. HSQC-DEPT NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **10**

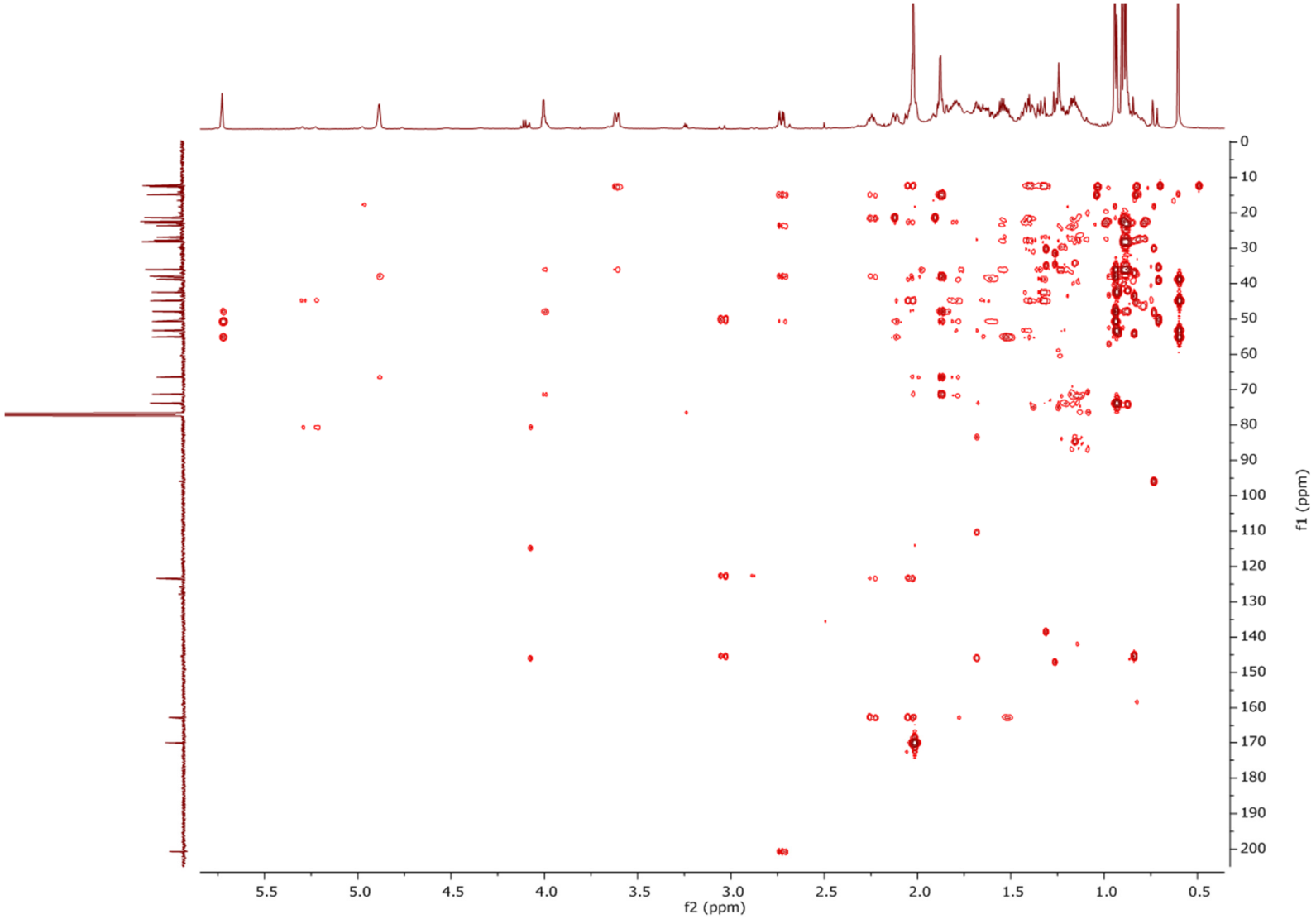



**Figure S53**. HMBC NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **10**

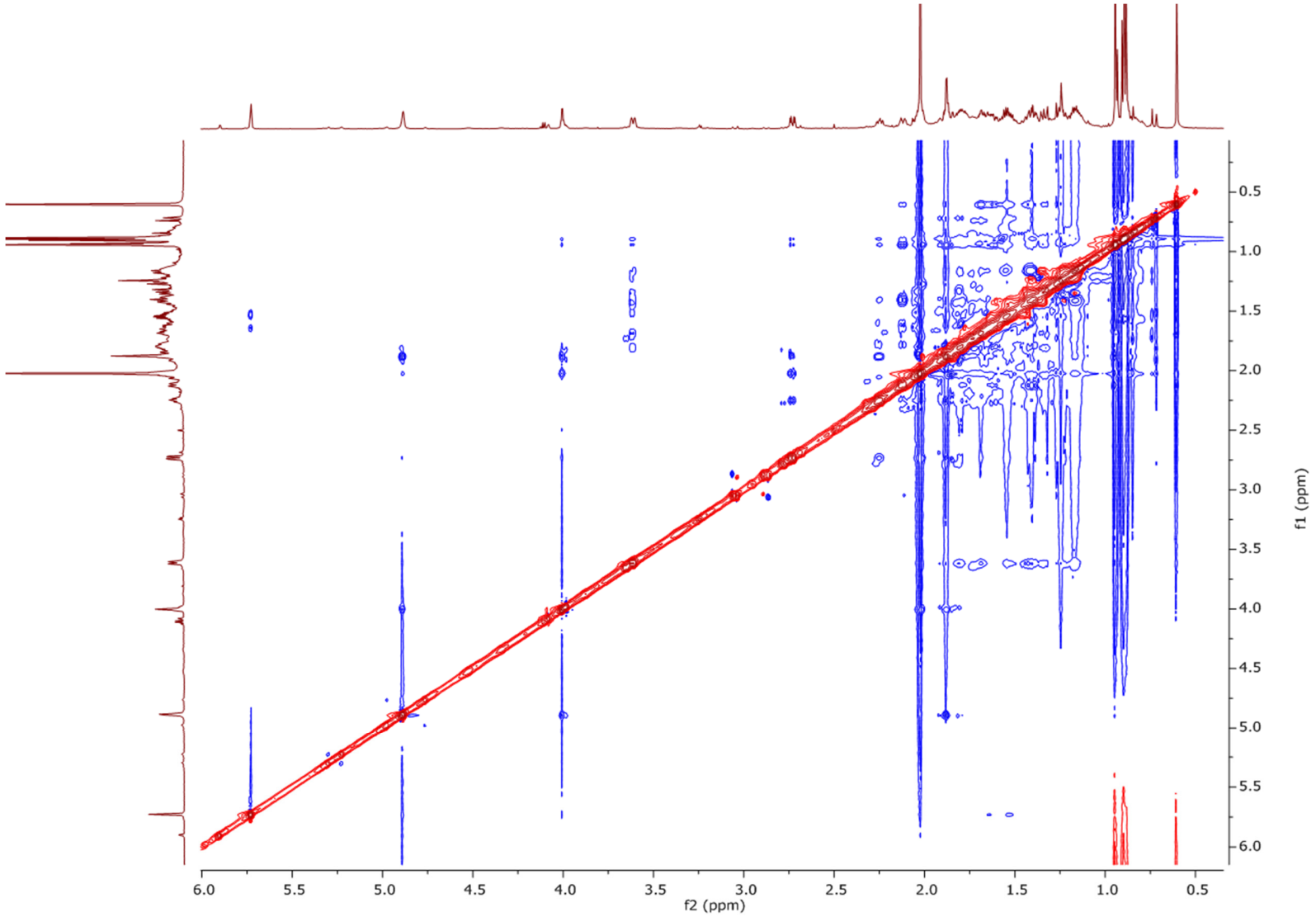



**Figure S54**. ROESY NMR spectrum (600MHz, $CDCl_3$, 303K) of compound **10**

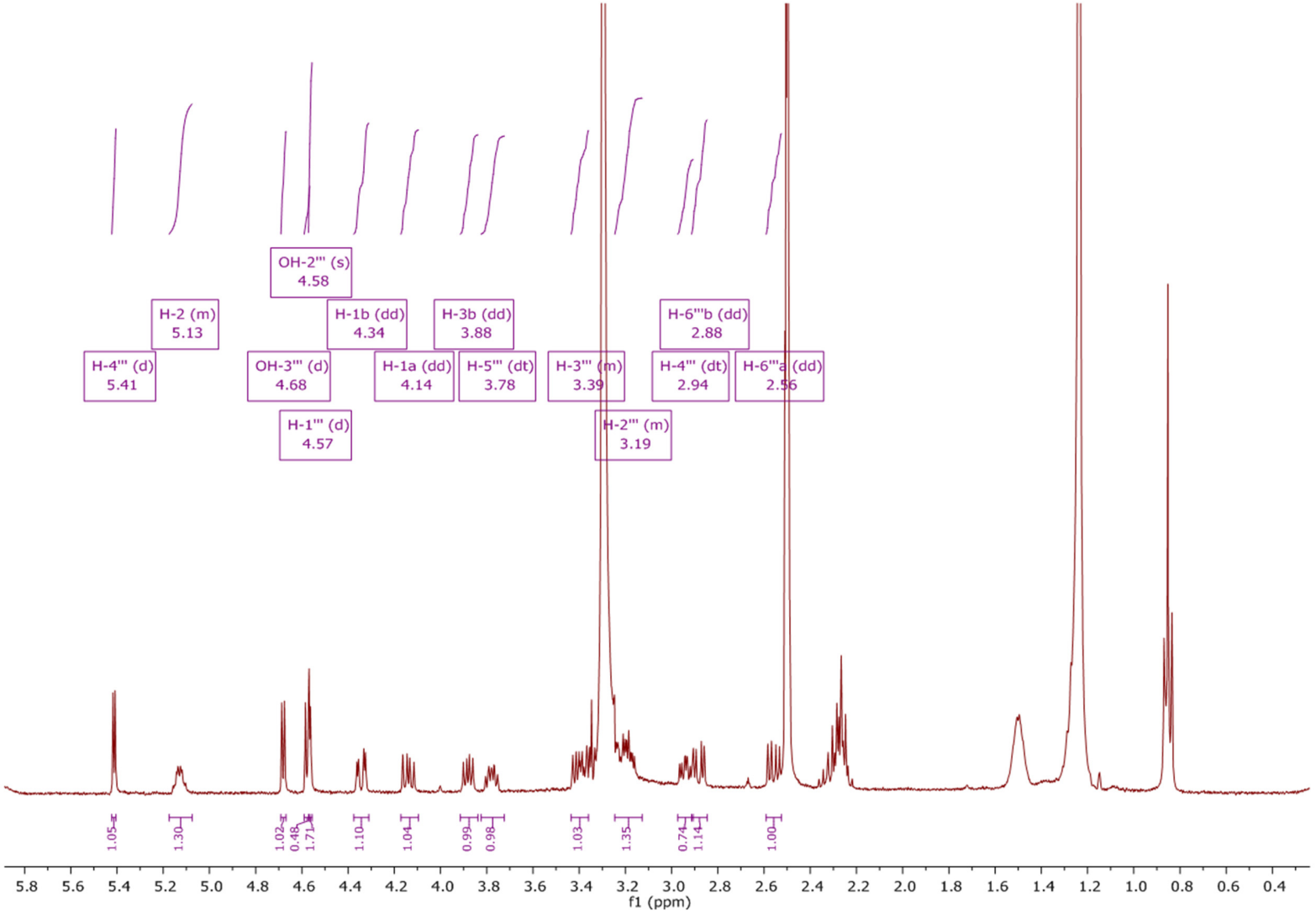



**Figure S55**. $^{1}$H-NMR spectrum (600MHz, DMSO-$d_6$, 303K) of compound **11**

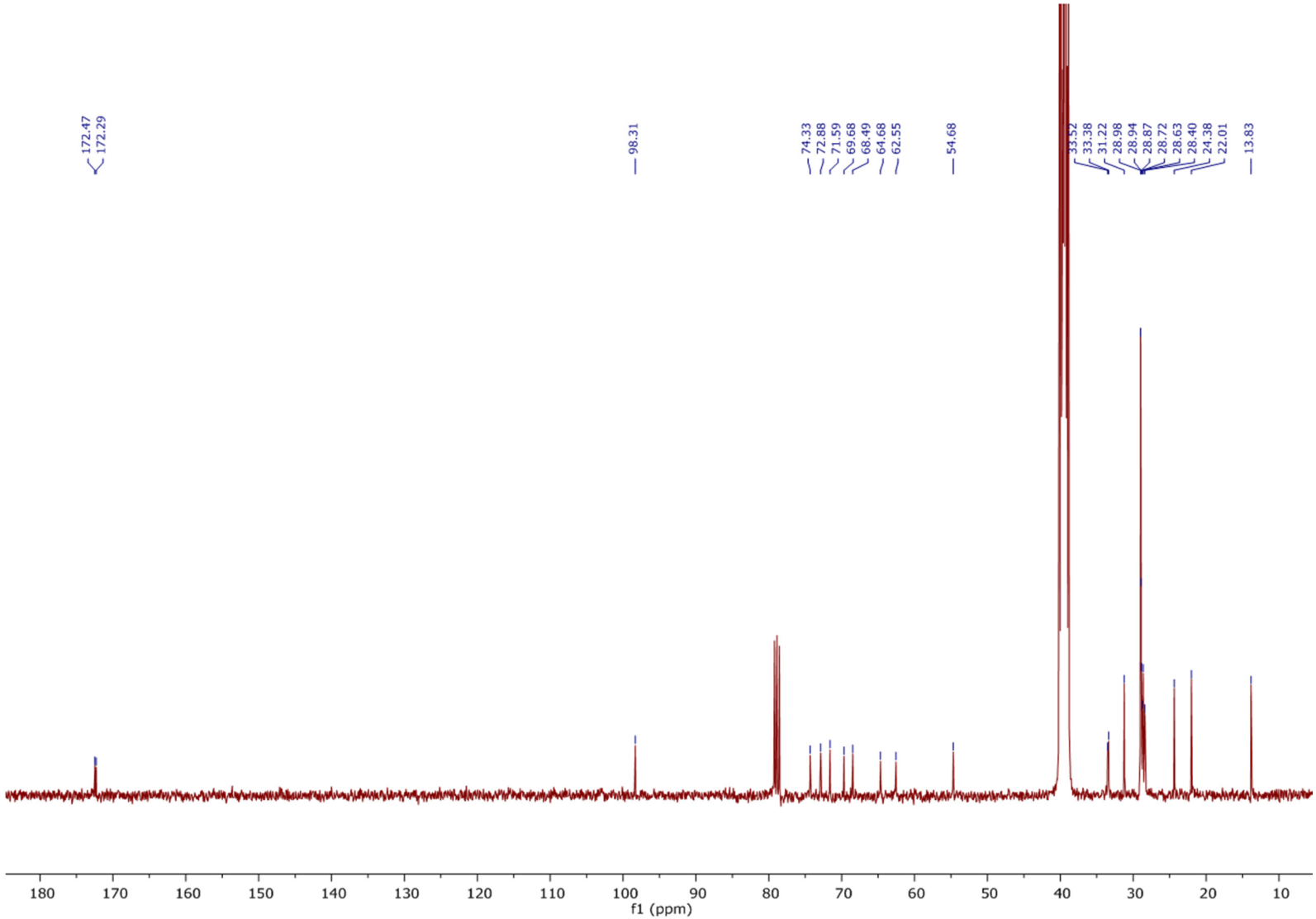



**Figure S56**. $^{13}$C-NMR spectrum (150MHz, DMSO-$d_6$, 303K) of compound **11**

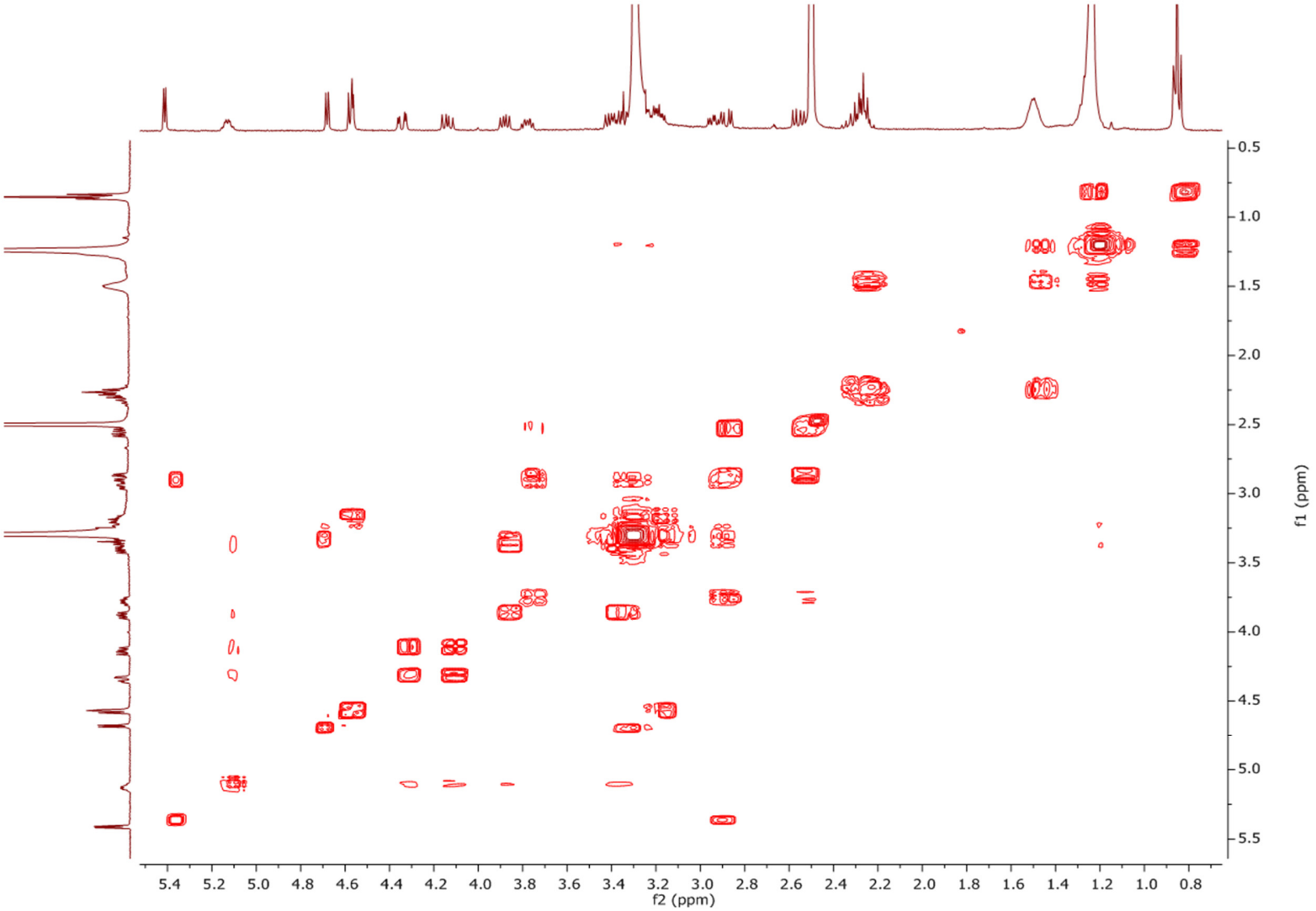



**Figure S57**. $^{1}$H-$^{1}$H COSY NMR spectrum (600MHz, DMSO-d$_6$, 303K) of compound **11**

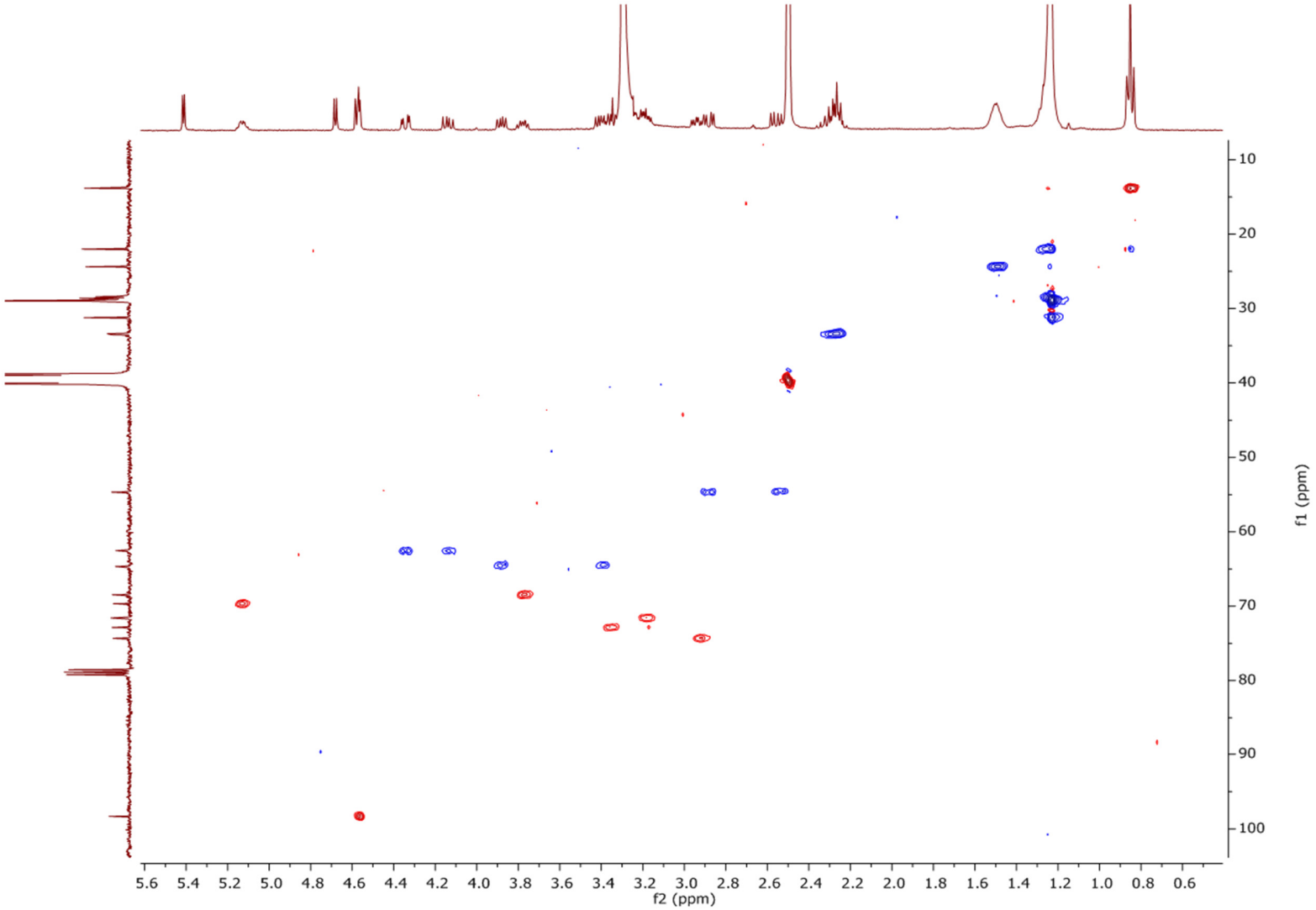



**Figure S58**. HSQC-DEPT NMR spectrum (600MHz, DMSO-$d_6$, 303K) of compound **11**

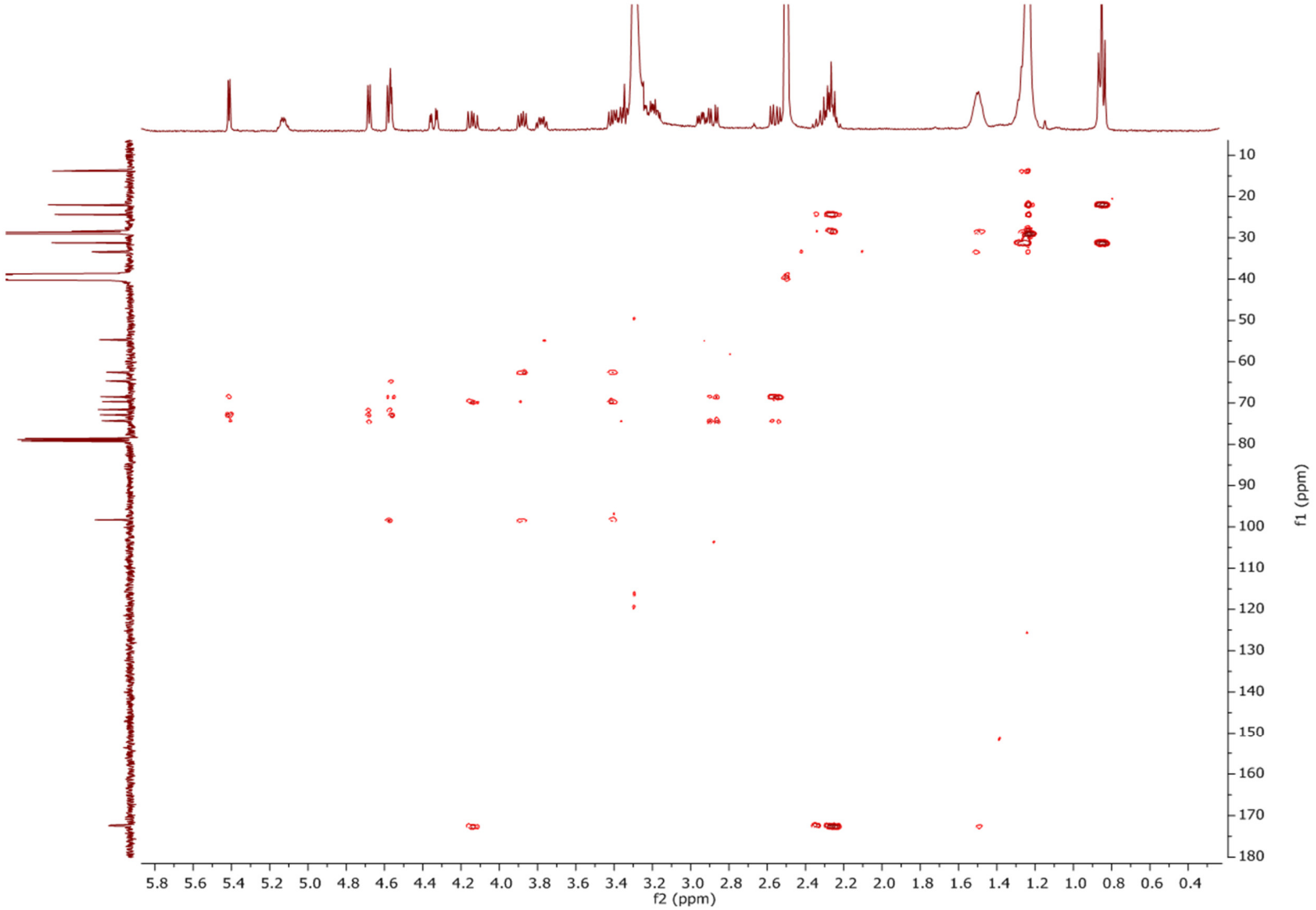



**Figure S59**. HMBC NMR spectrum (600MHz, DMSO-$d_6$, 303K) of compound **11**

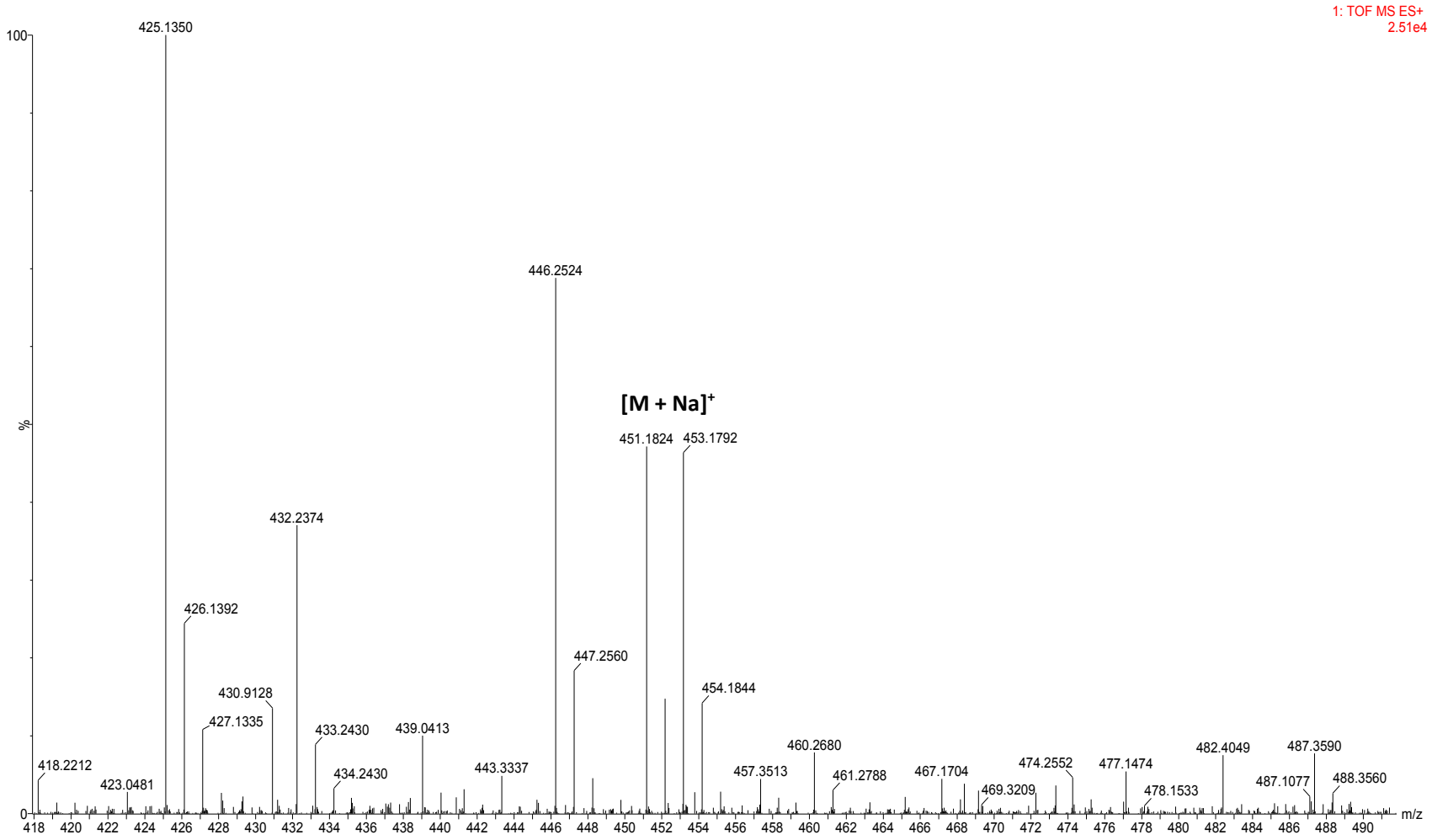



**Figure S60**. HR-ESI-MS spectrum of compound **1**

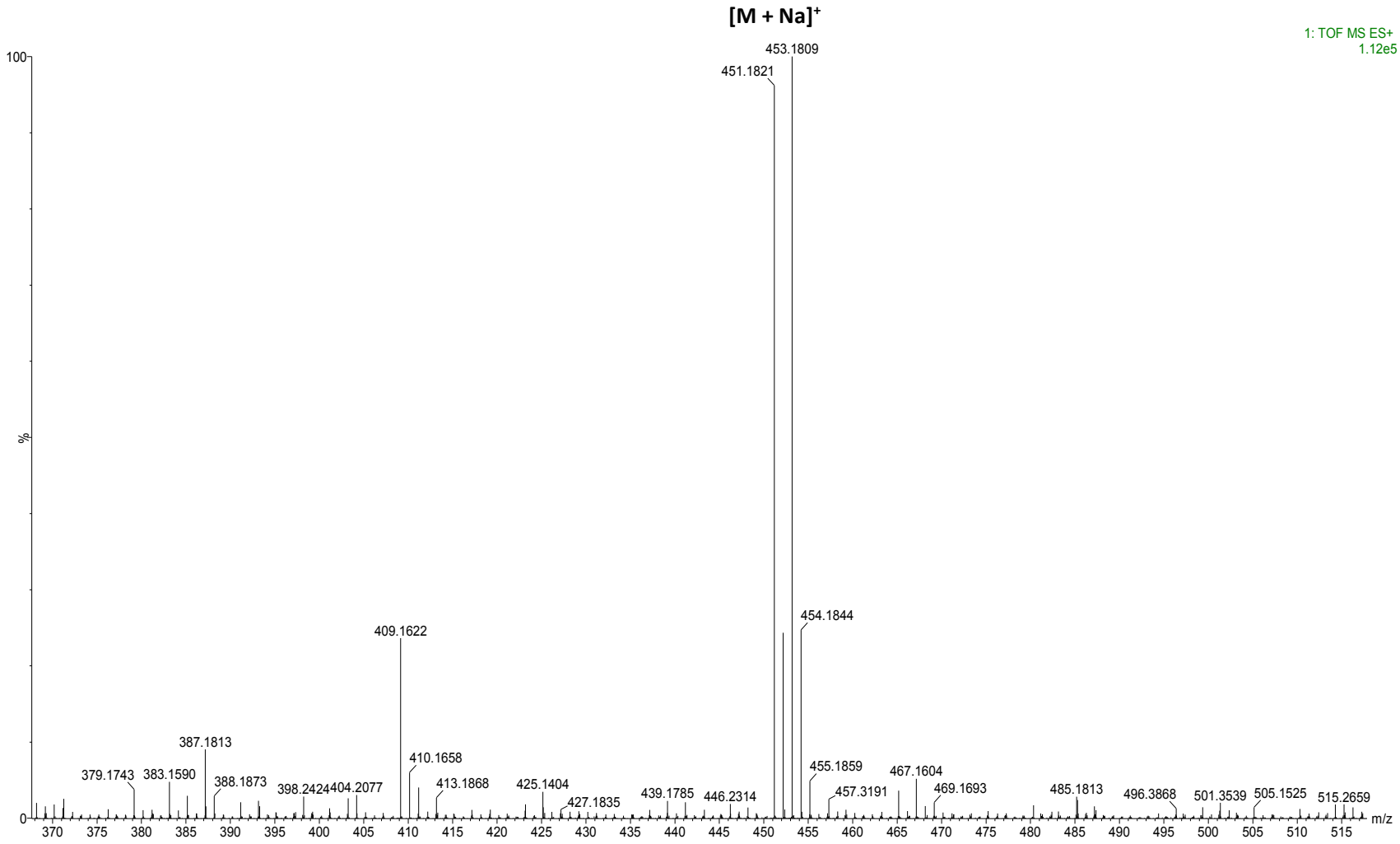



**Figure S61**. HR-ESI-MS spectrum of compound **2**

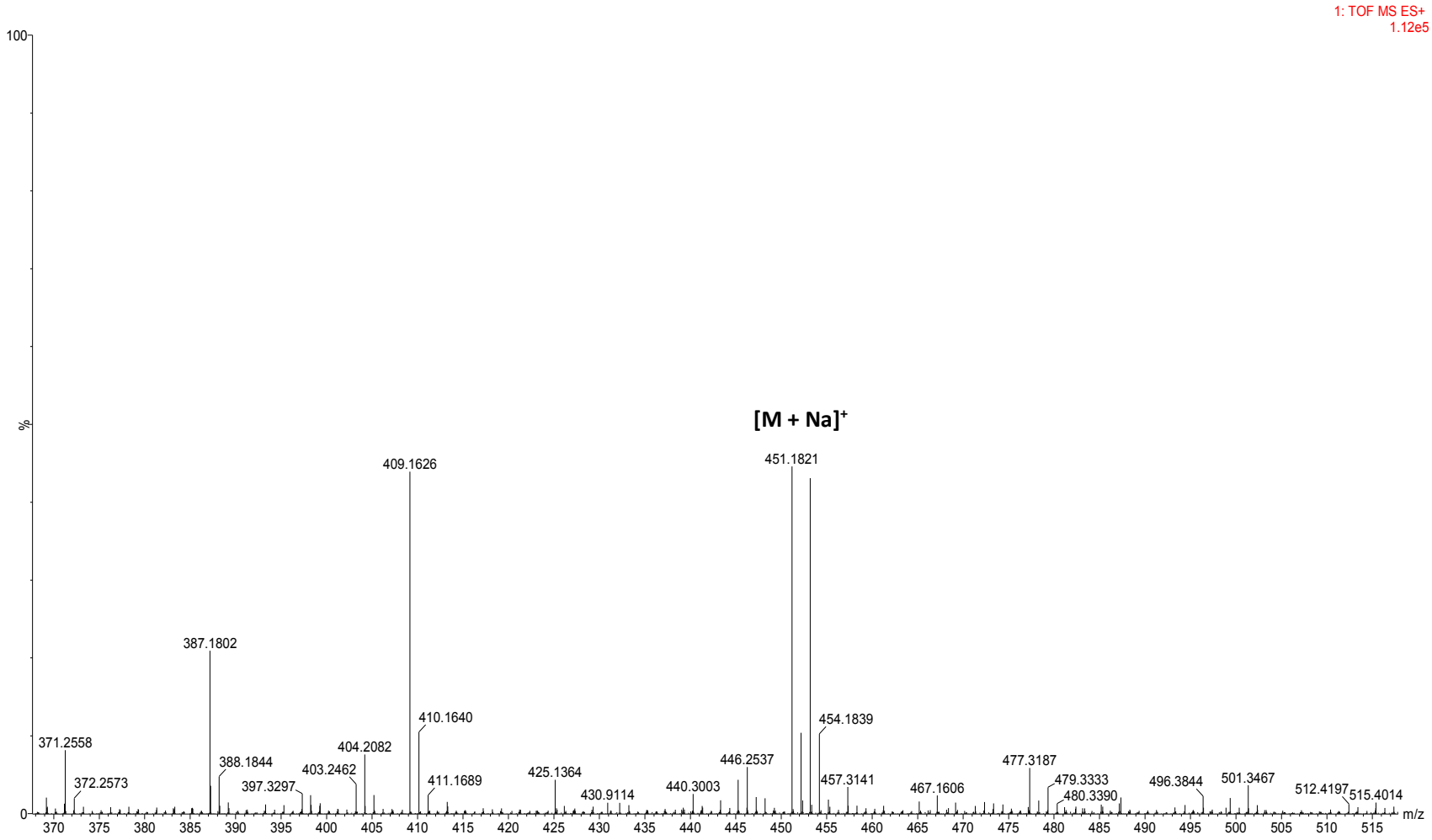



**Figure S62**. HR-ESI-MS spectrum of compound **3**

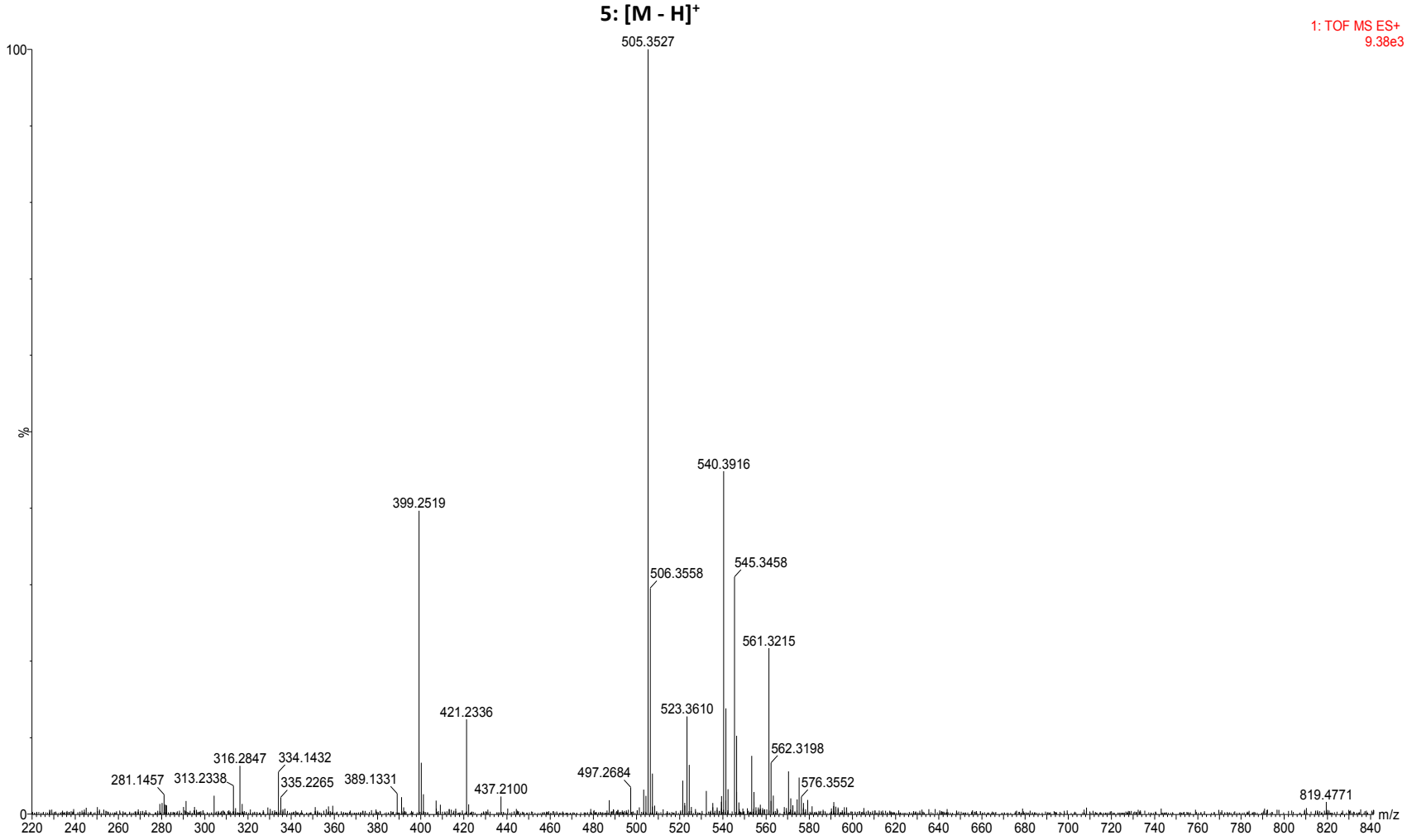



**Figure S63**. HR-ESI-MS spectrum of compound **5**

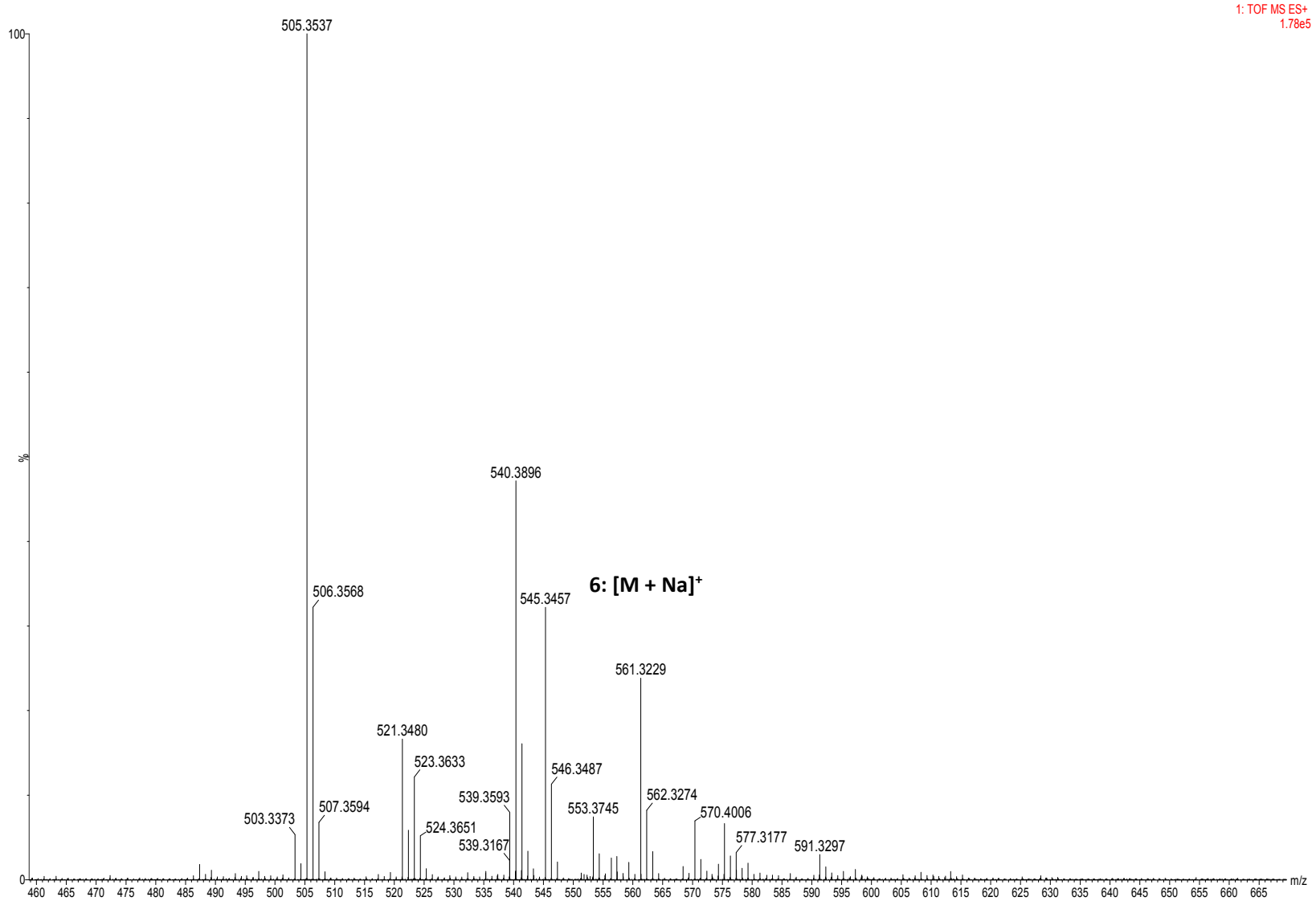



**Figure S64**. HR-ESI-MS spectrum of compound **6**

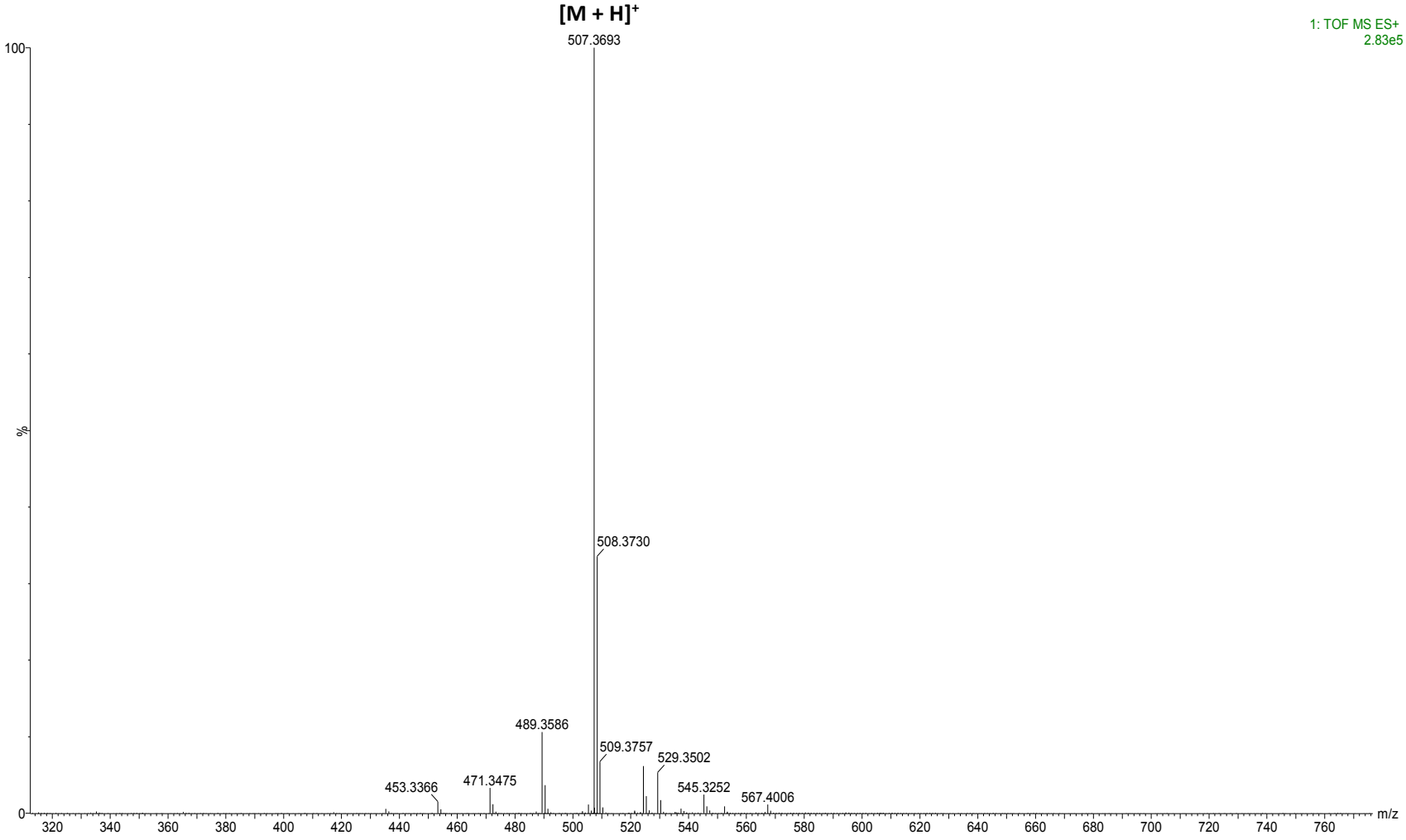



**Figure S65**. HR-ESI-MS spectrum of compound **7**

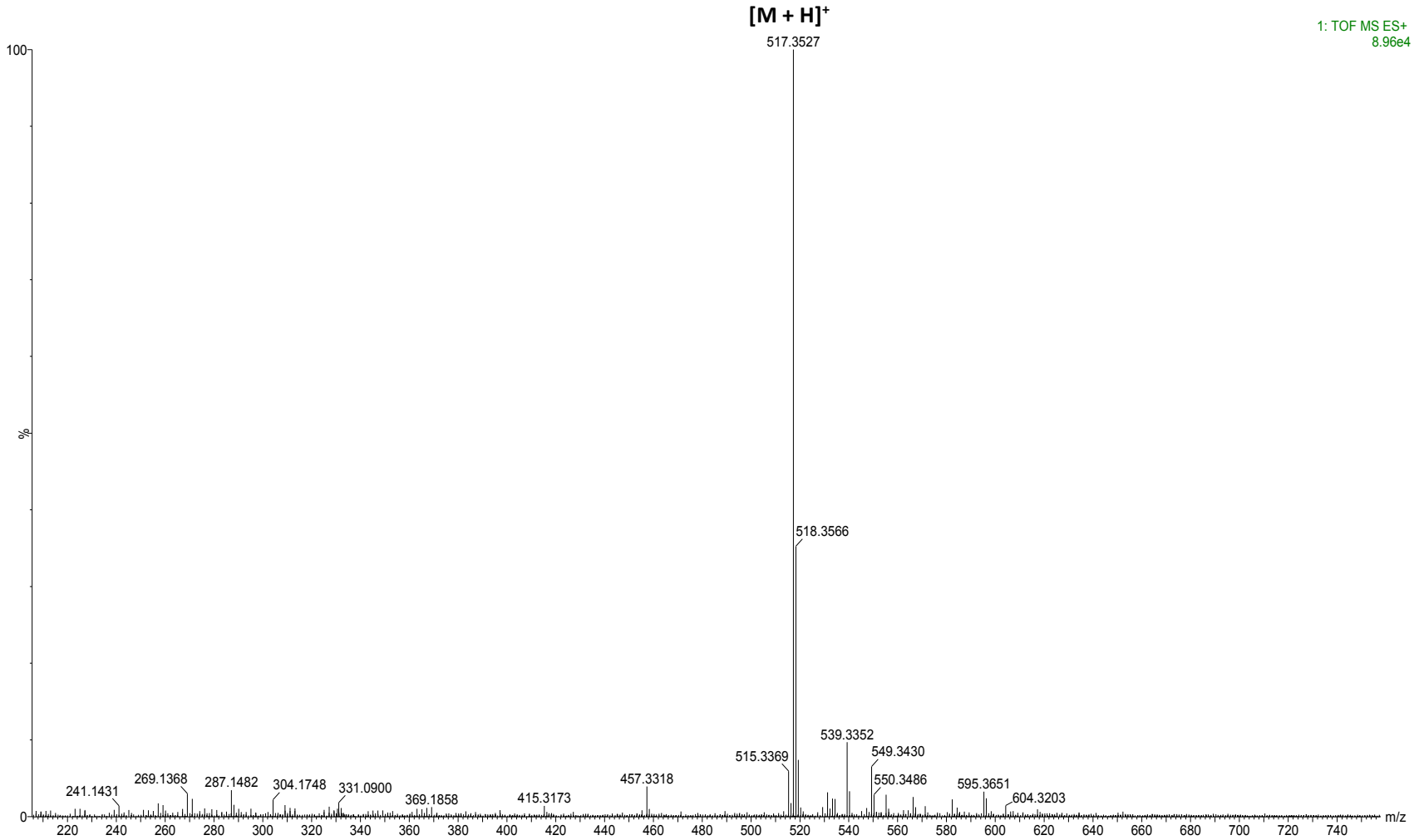



**Figure S66**. HR-ESI-MS spectrum of compound **8**

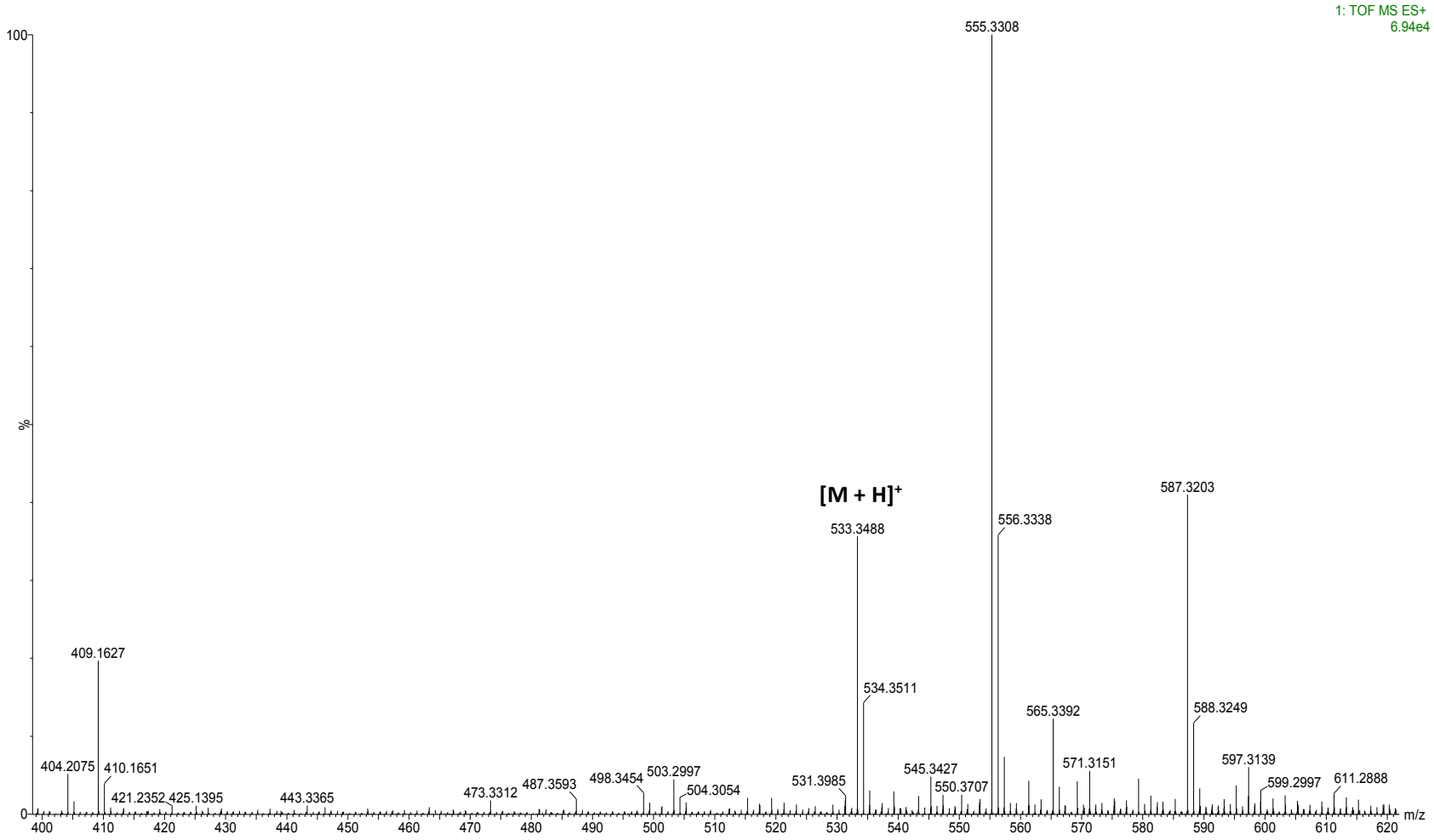



**Figure S67**. HR-ESI-MS spectrum of compound **9**

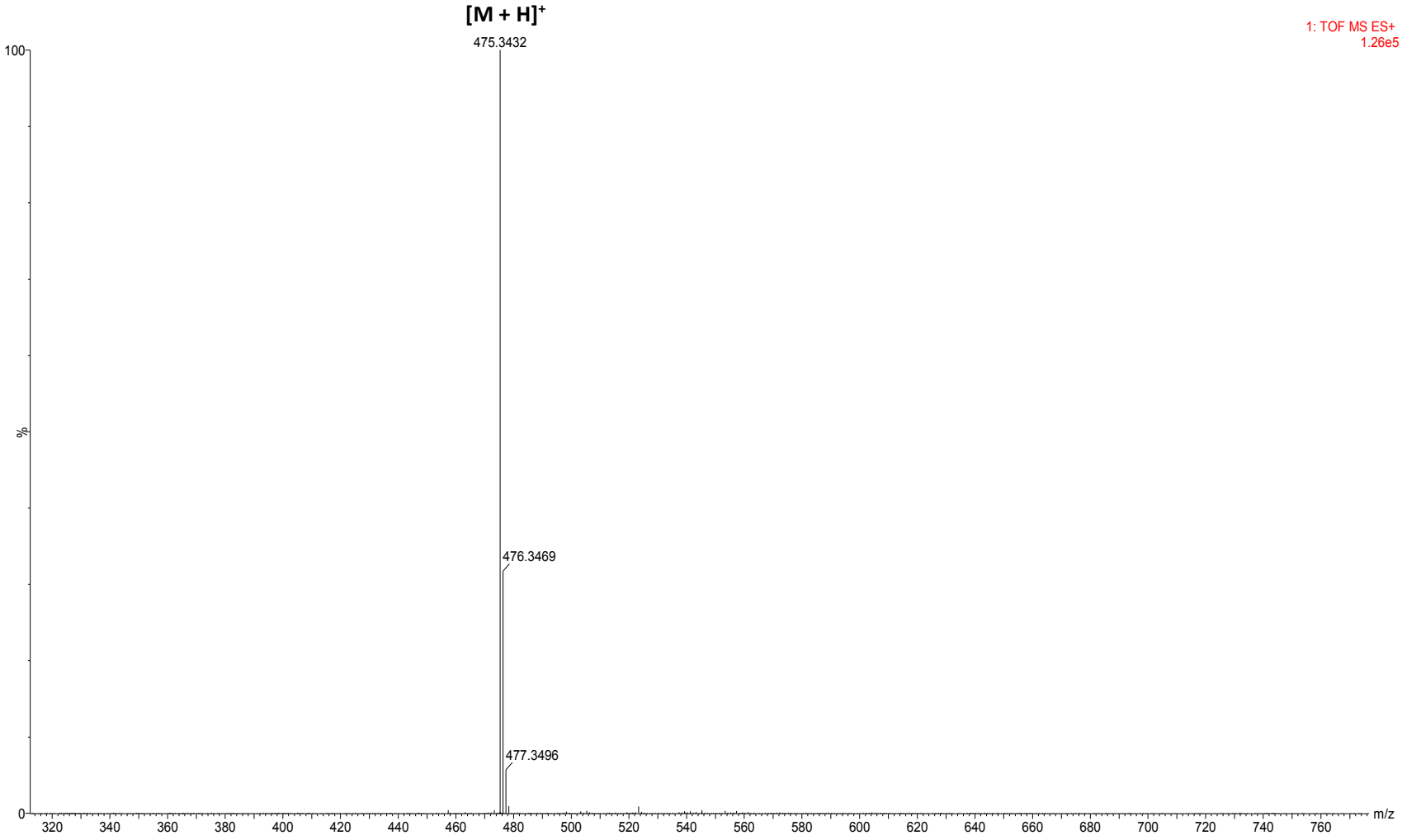



**Figure S68**. HR-ESI-MS spectrum of compound **10**

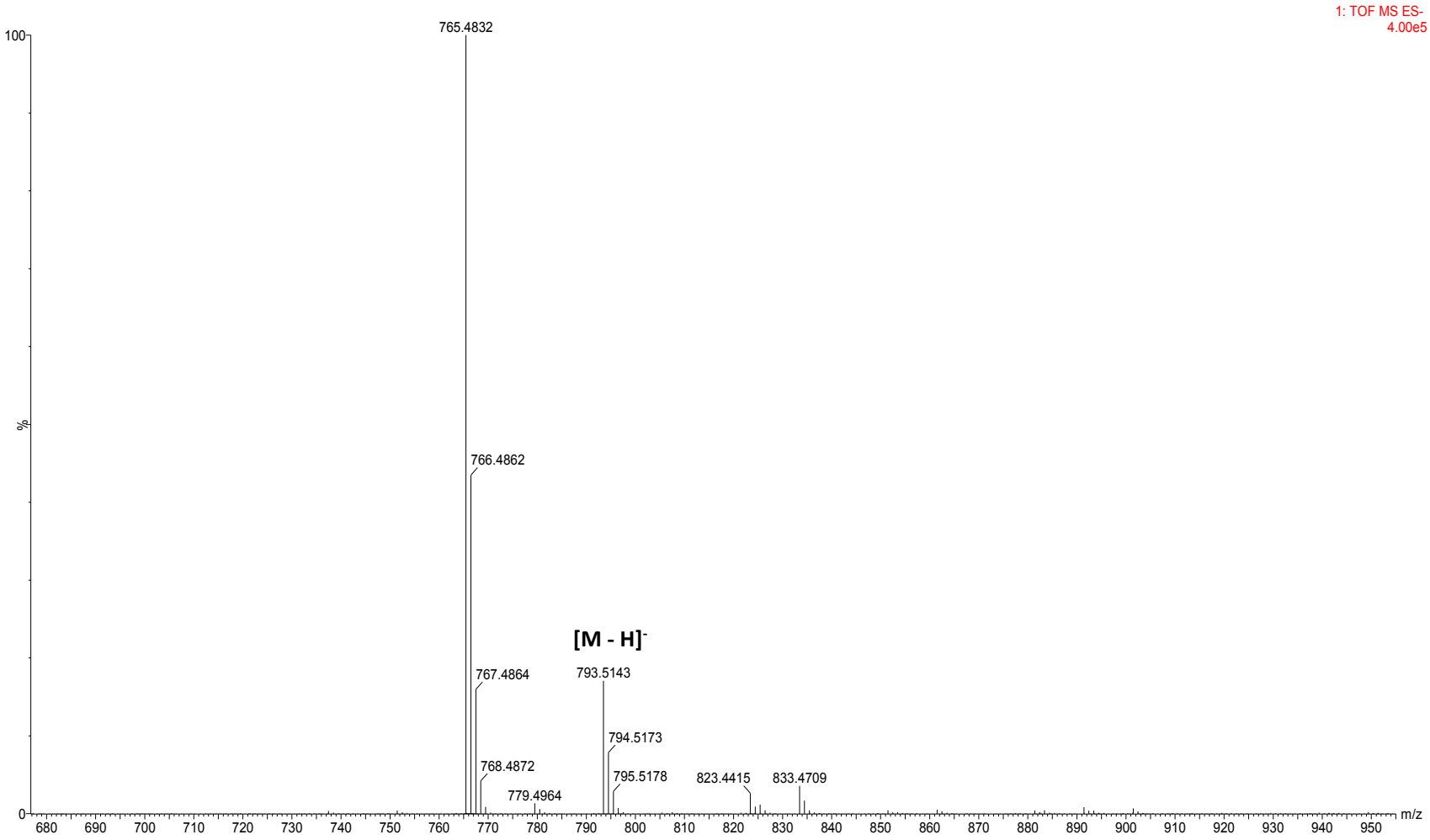



**Figure S69**. HR-ESI-MS spectrum of compound **11**

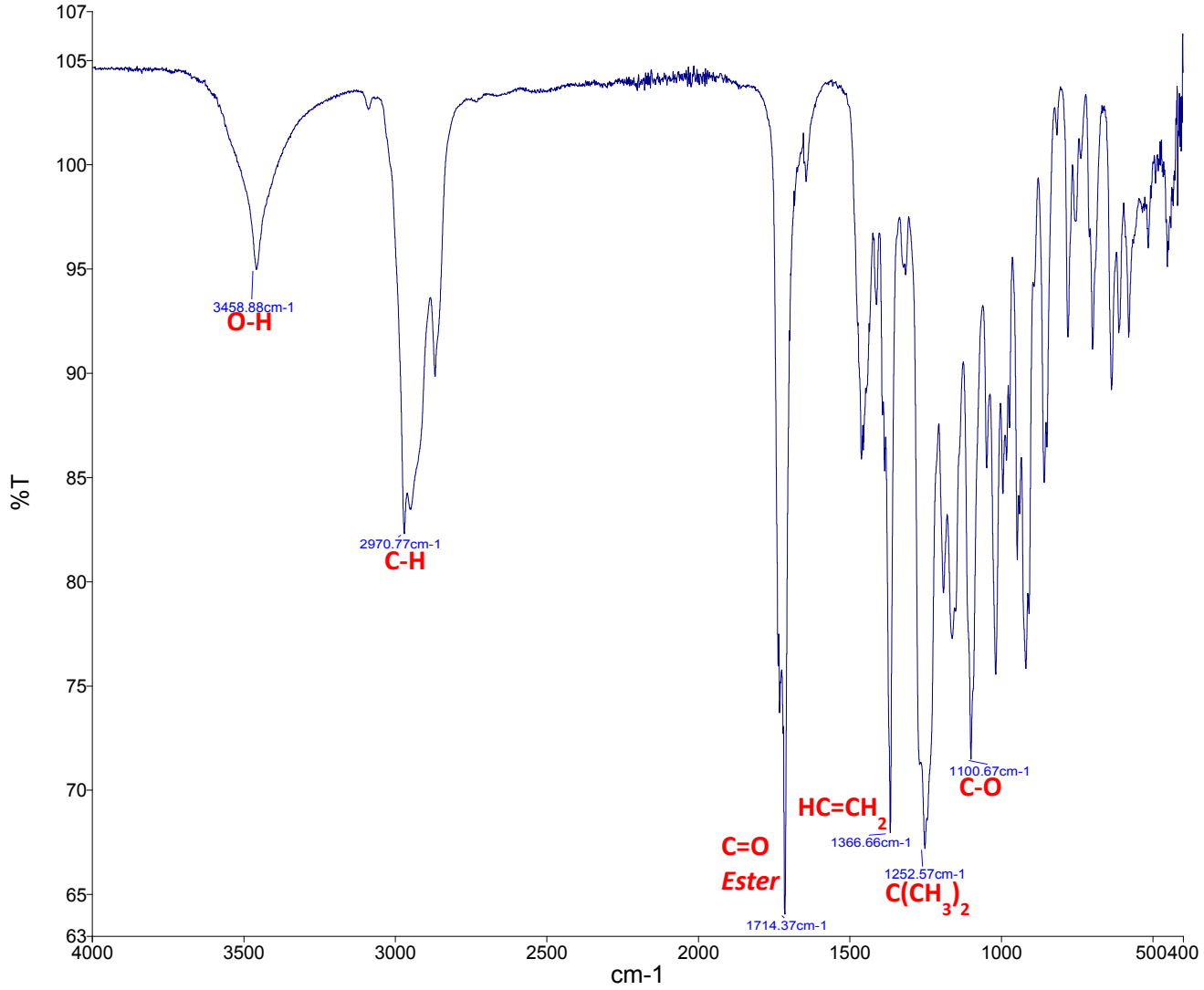



**Figure S70**. IR spectrum of compound **1**

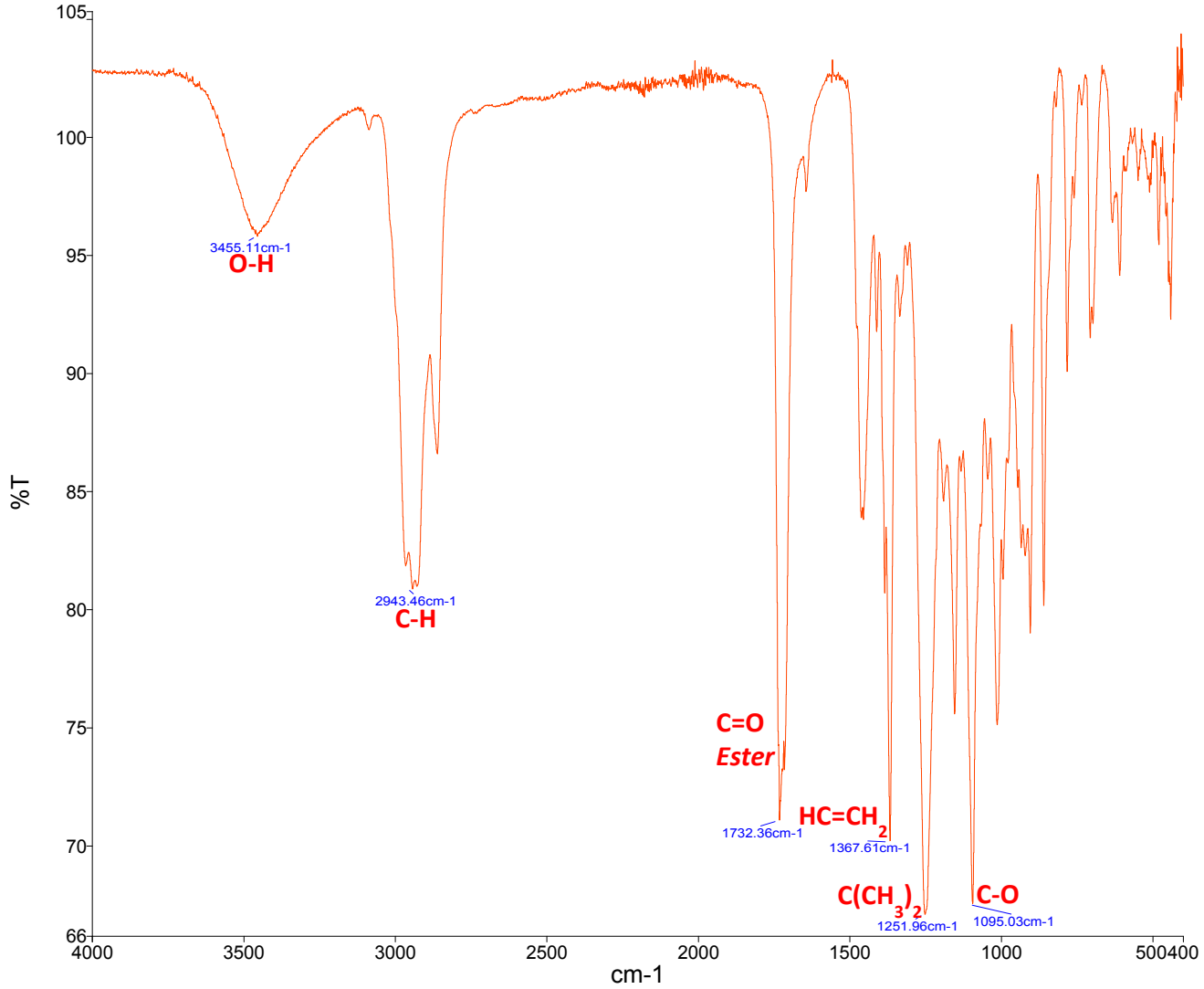



**Figure S71**. IR spectrum of compound **2**

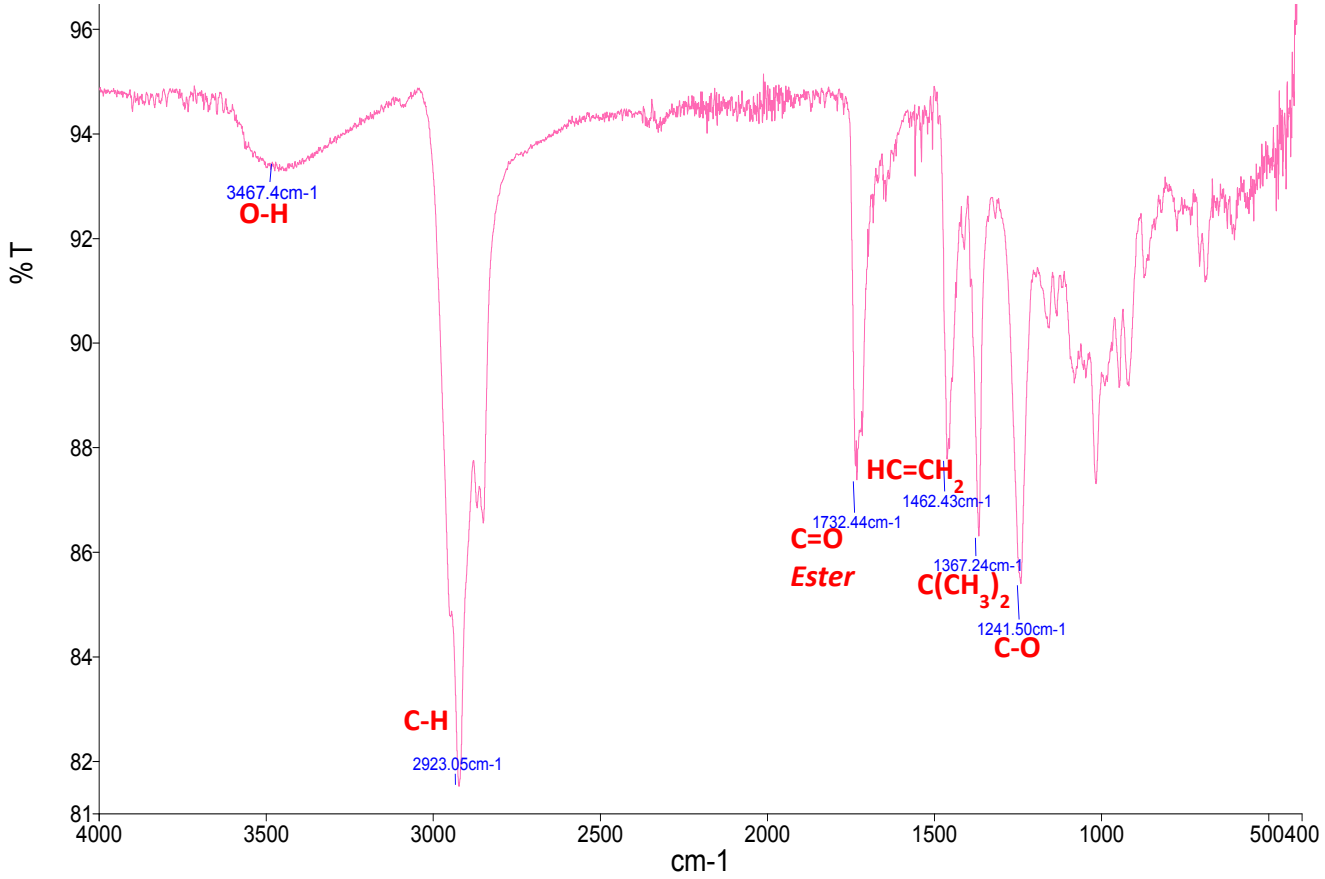



**Figure S72**. IR spectrum of compound **3**

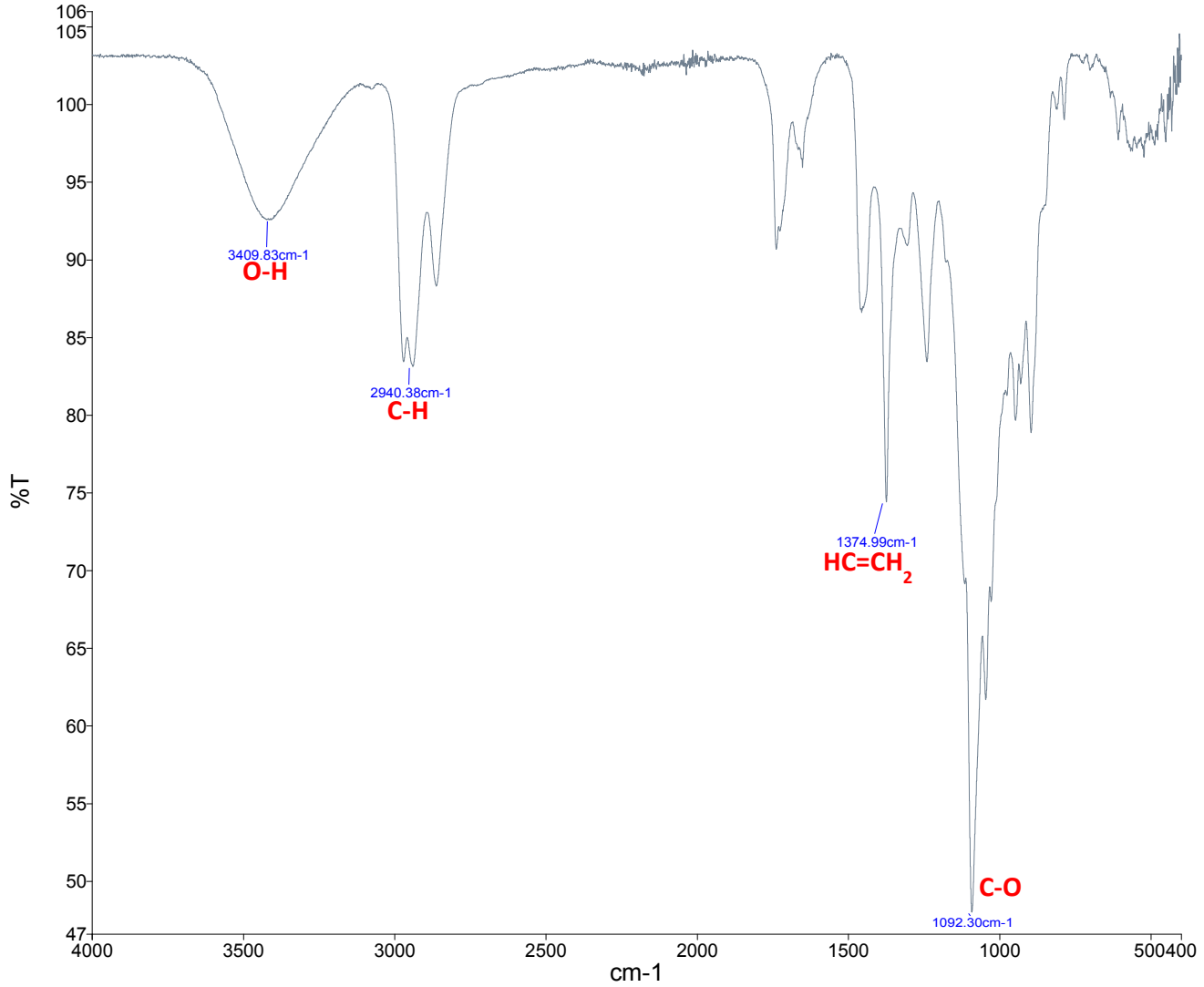



**Figure S73**. IR spectrum of compound **7**

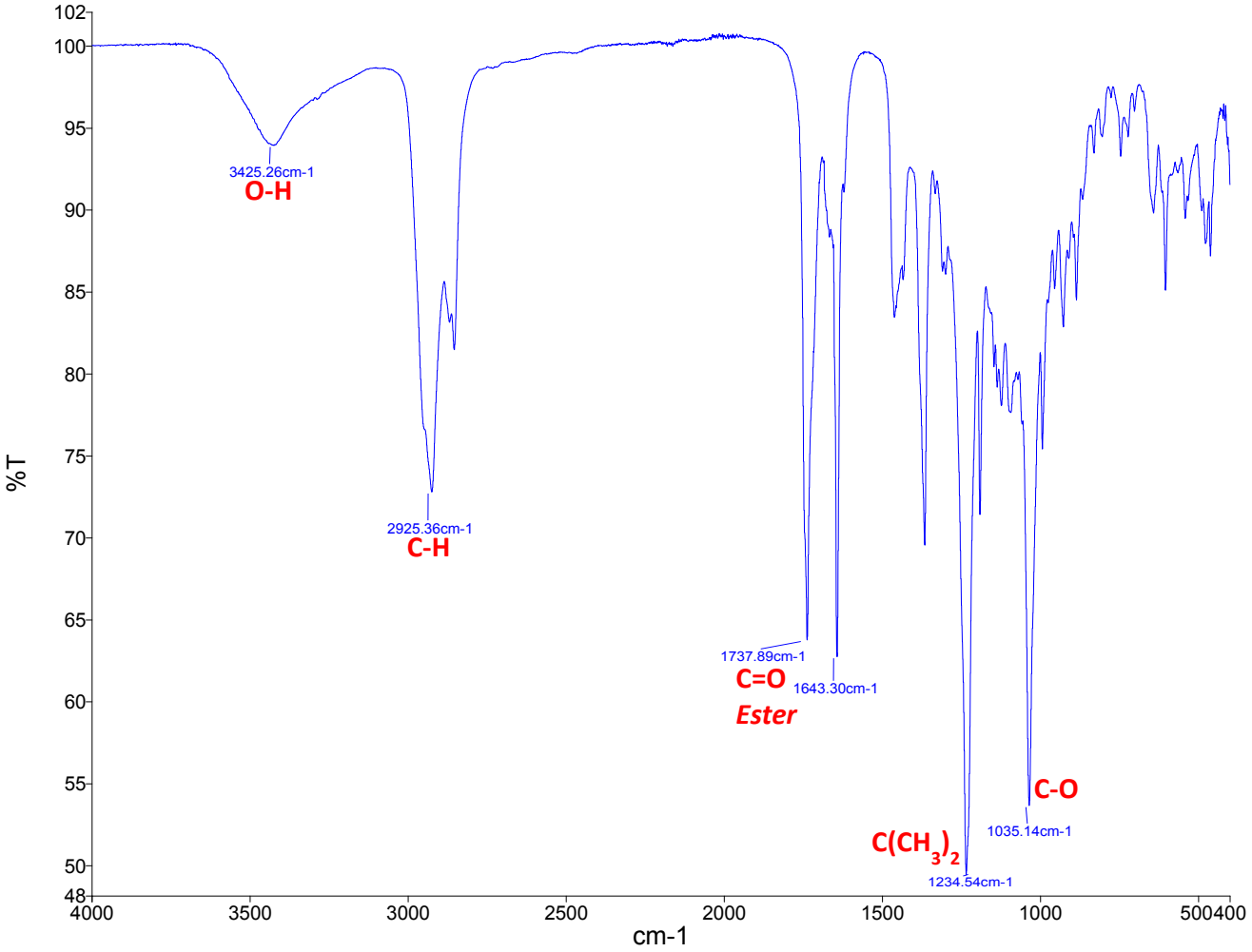



**Figure S74**. IR spectrum of compound **8**

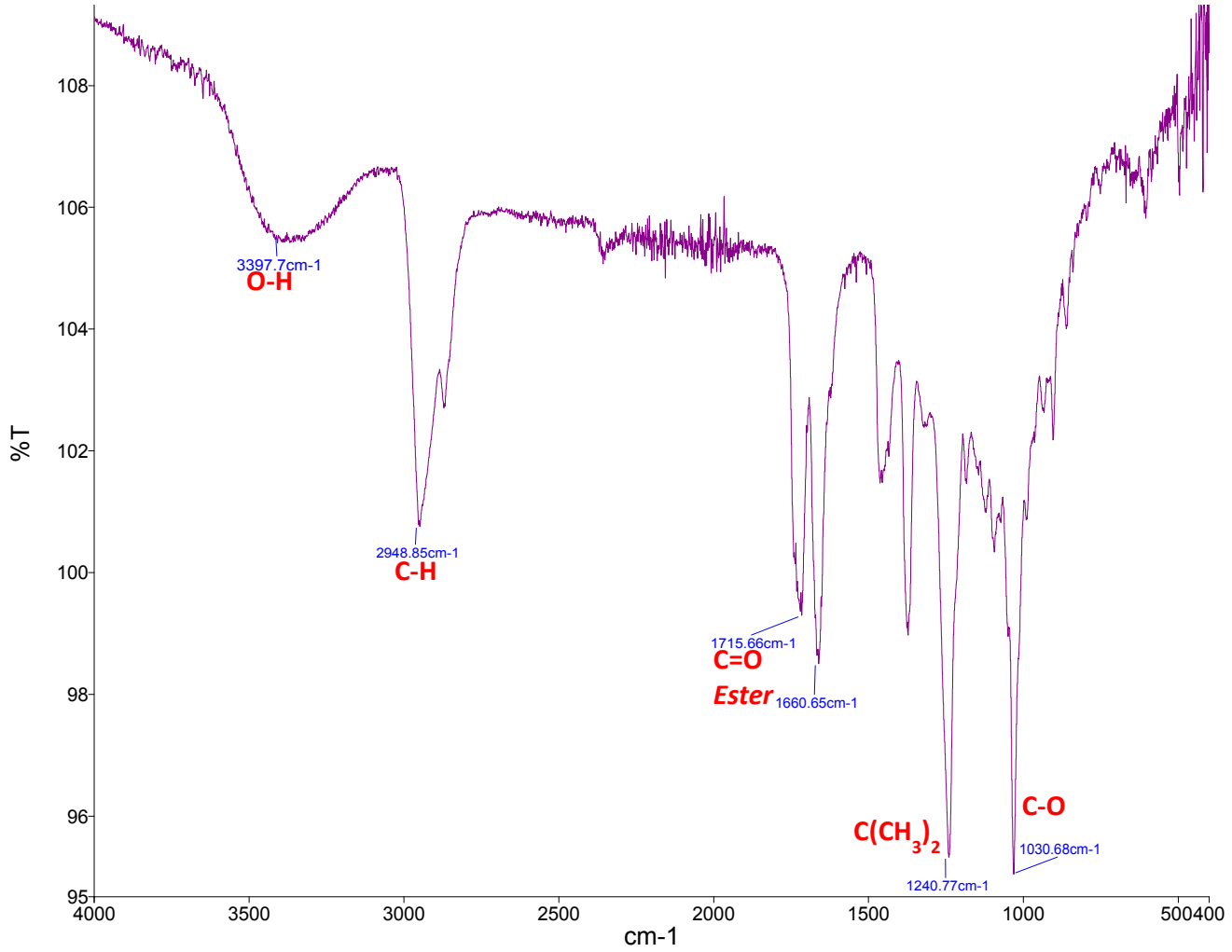



**Figure S75**. IR spectrum of compound **10**

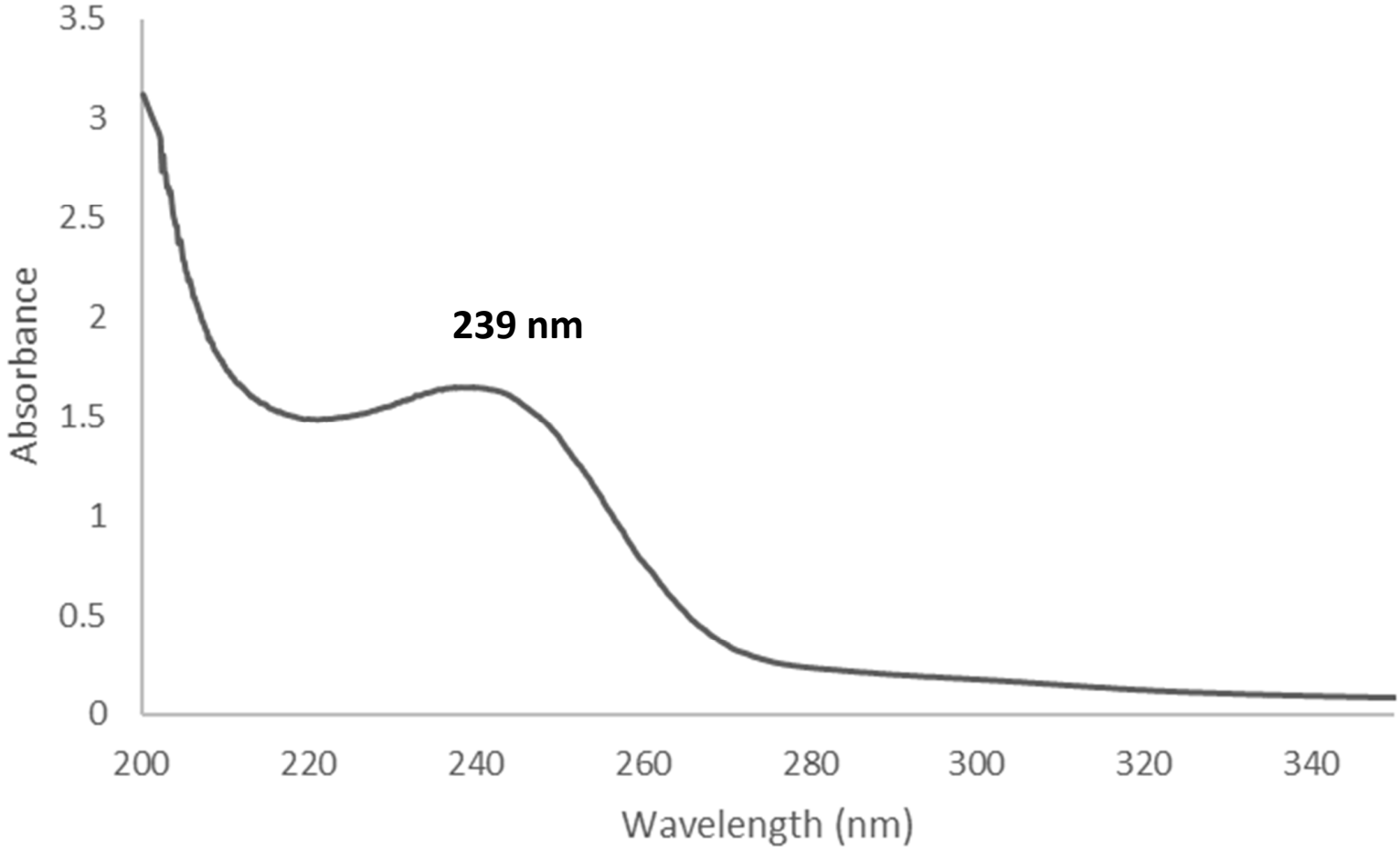



**Figure S76**. UV spectrum of compound **8**

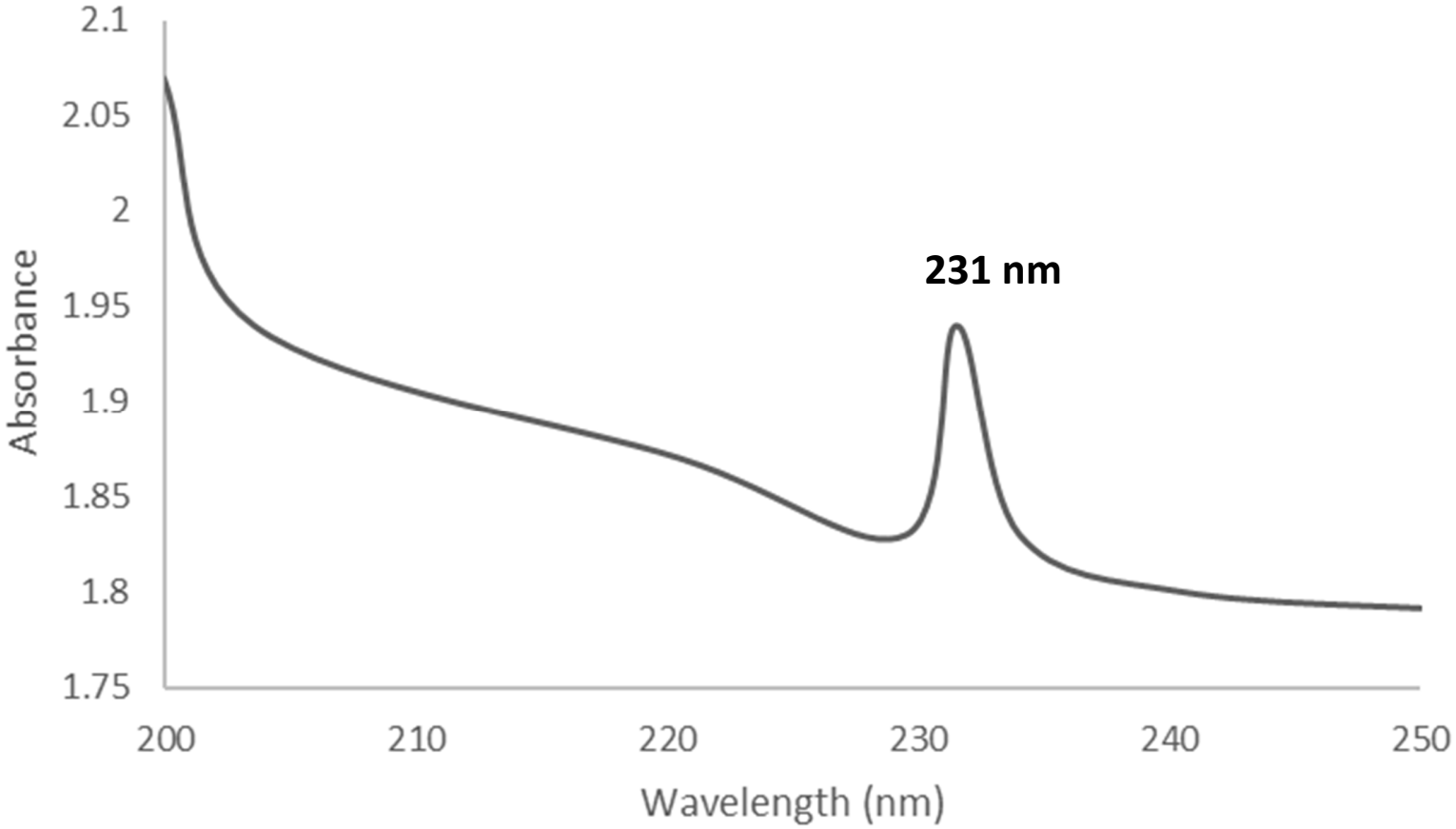



**Figure S77**. UV spectrum of compound **10**

**Table S1**. Cytotoxicity assay data for compounds **1** - **10**

| | MDA-MB-231 | | | HeLa | | |
|---|---|---|---|---|---|---|
| **Compound** | **$IC_{50}$ (μM)** | **SEM** | **$R^2$** | **$IC_{50}$ (μM)** | **SEM** | **$R^2$** |
| **1** | 26.3 | 1 | 0.9952 | 30.2 | 1.2 | 0.9309 |
| **2** | 53.7 | 1.2 | 0.8924 | 9.3 | 1.3 | 0.9215 |
| **3** | 58.5 | 1.3 | 0.9756 | 42 | 1.2 | 0.9346 |
| **4** | 44.4 | 1.1 | 0.9812 | 21.1 | 1.1 | 0.9584 |
| **5 + 6** | 13.5 | 1.1 | 0.9883 | 46.4 | 1.1 | 0.9822 |
| **7** | 8.8 | 5.6 | 0.9913 | 133.8 | 1.1 | 0.9716 |
| **8** | 27.6 | 1.1 | 0.9748 | 25.6 | 1.2 | 0.9304 |
| **9** | 15.8 | 1.1 | 0.9907 | 48.2 | 3.3 | 0.9732 |
| **10** | 21.6 | 1.1 | 0.9797 | 43.5 | 1.2 | 0.9213 |