Electronic Supplementary Material (ESI) for RSC Advances.


# Highly functionalized pyrrolidine analogues: Stereoselective synthesis and caspase-dependent apoptotic activity

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## Supplementary data

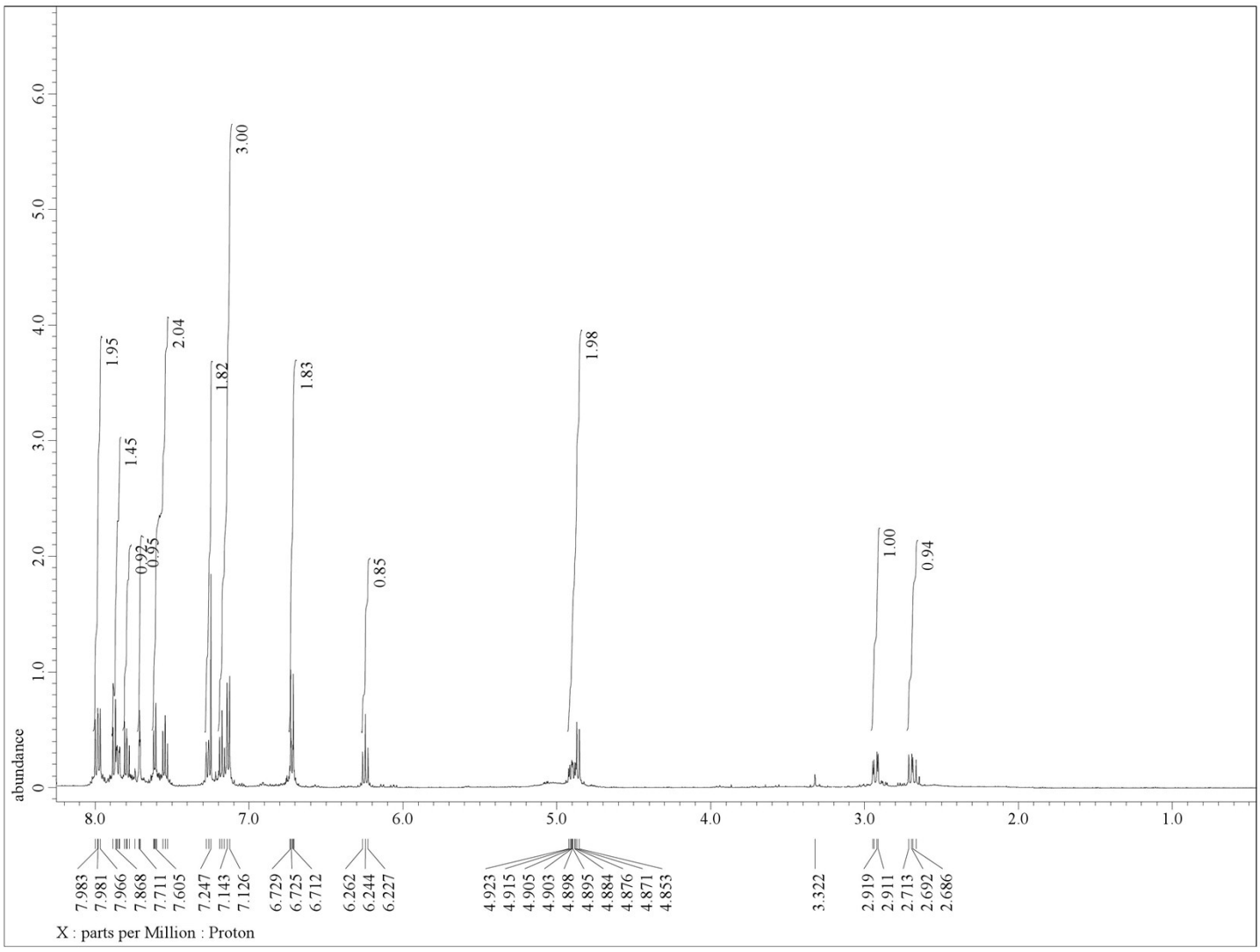



**Figure S1:** $^{1}$H NMR spectrum of **4f**

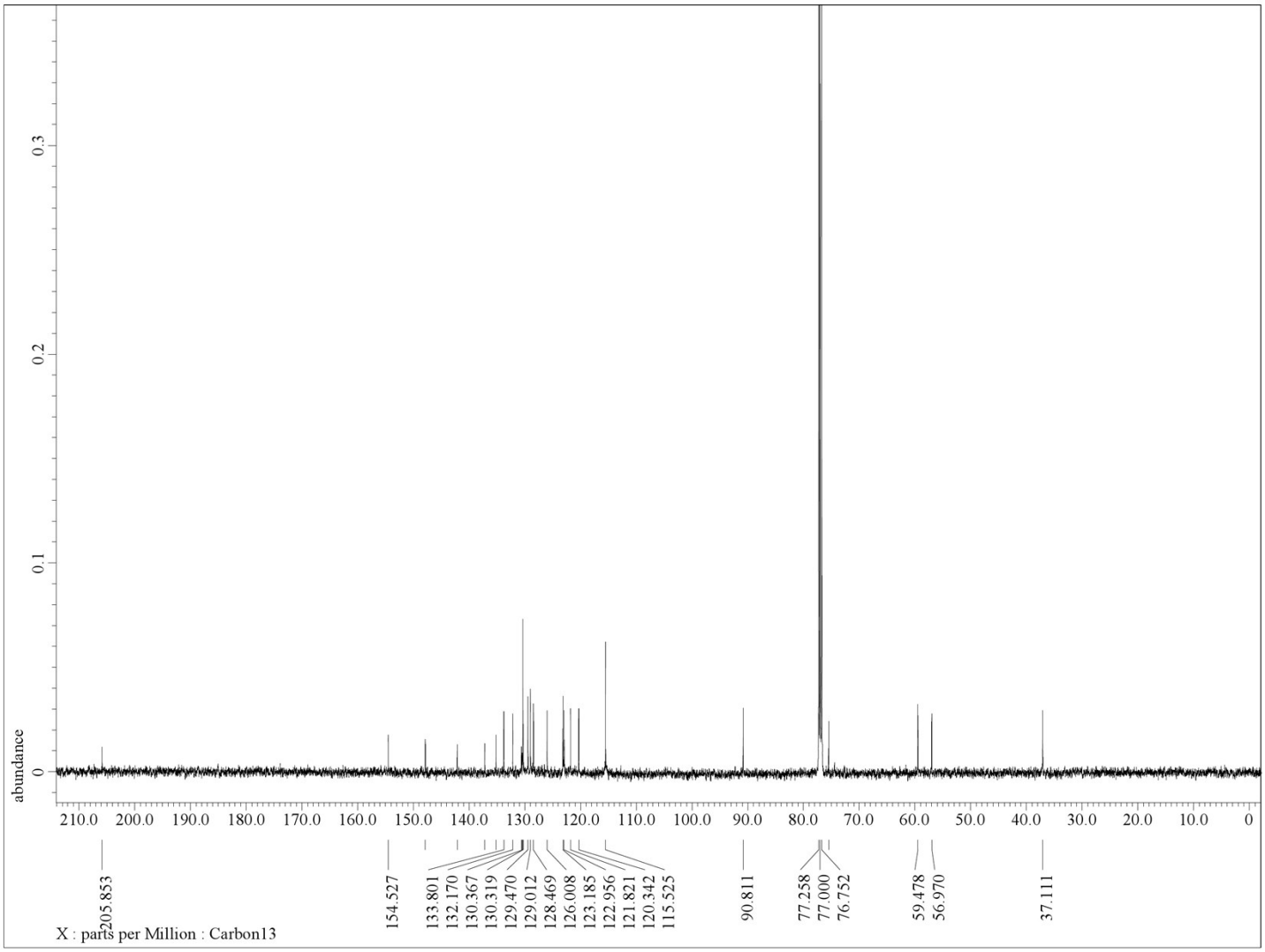



**Figure S2:** $^{13}C$ NMR spectrum of **4f**

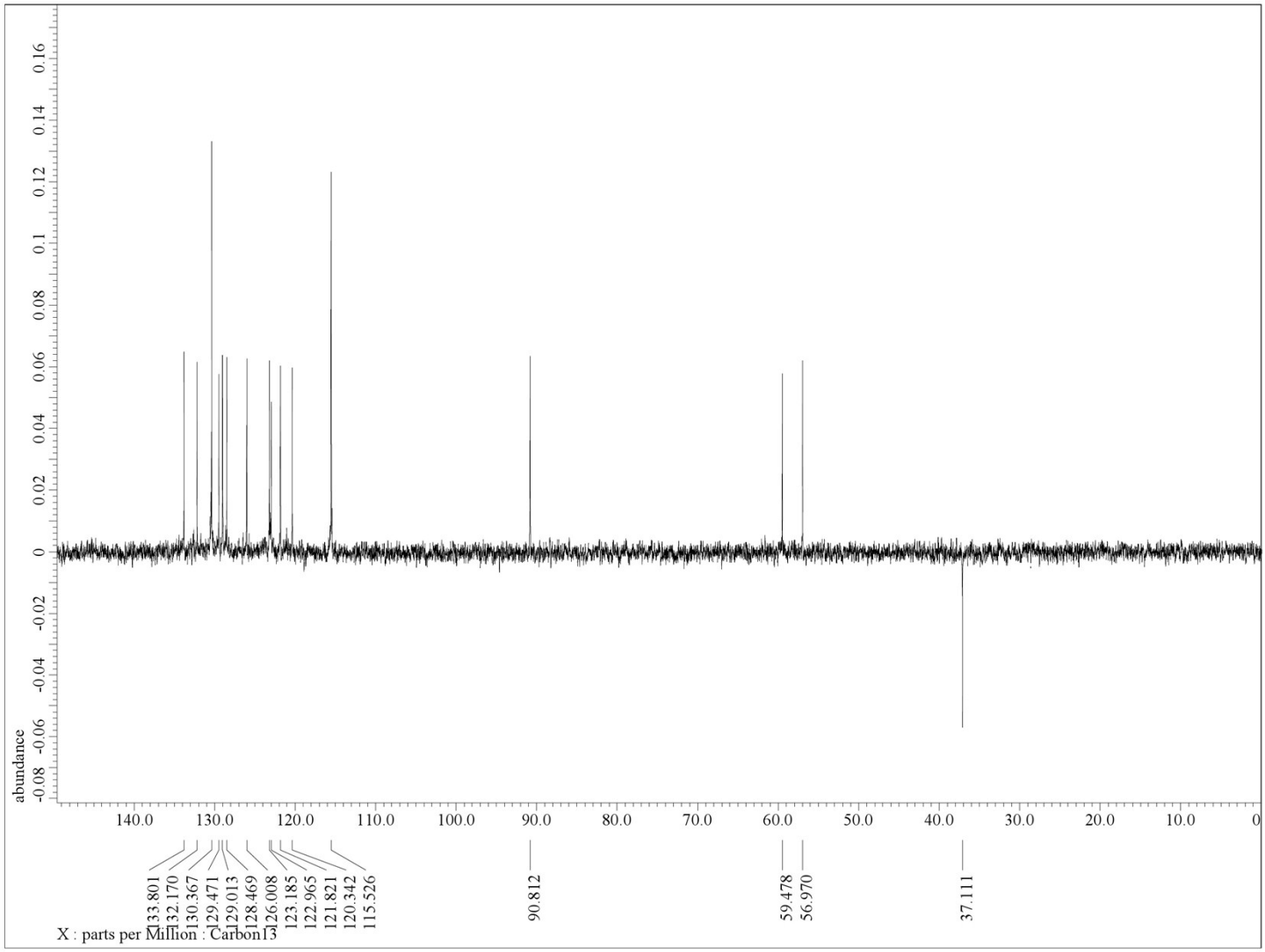



**Figure S3:** DEPT 135 NMR spectrum of **4f**

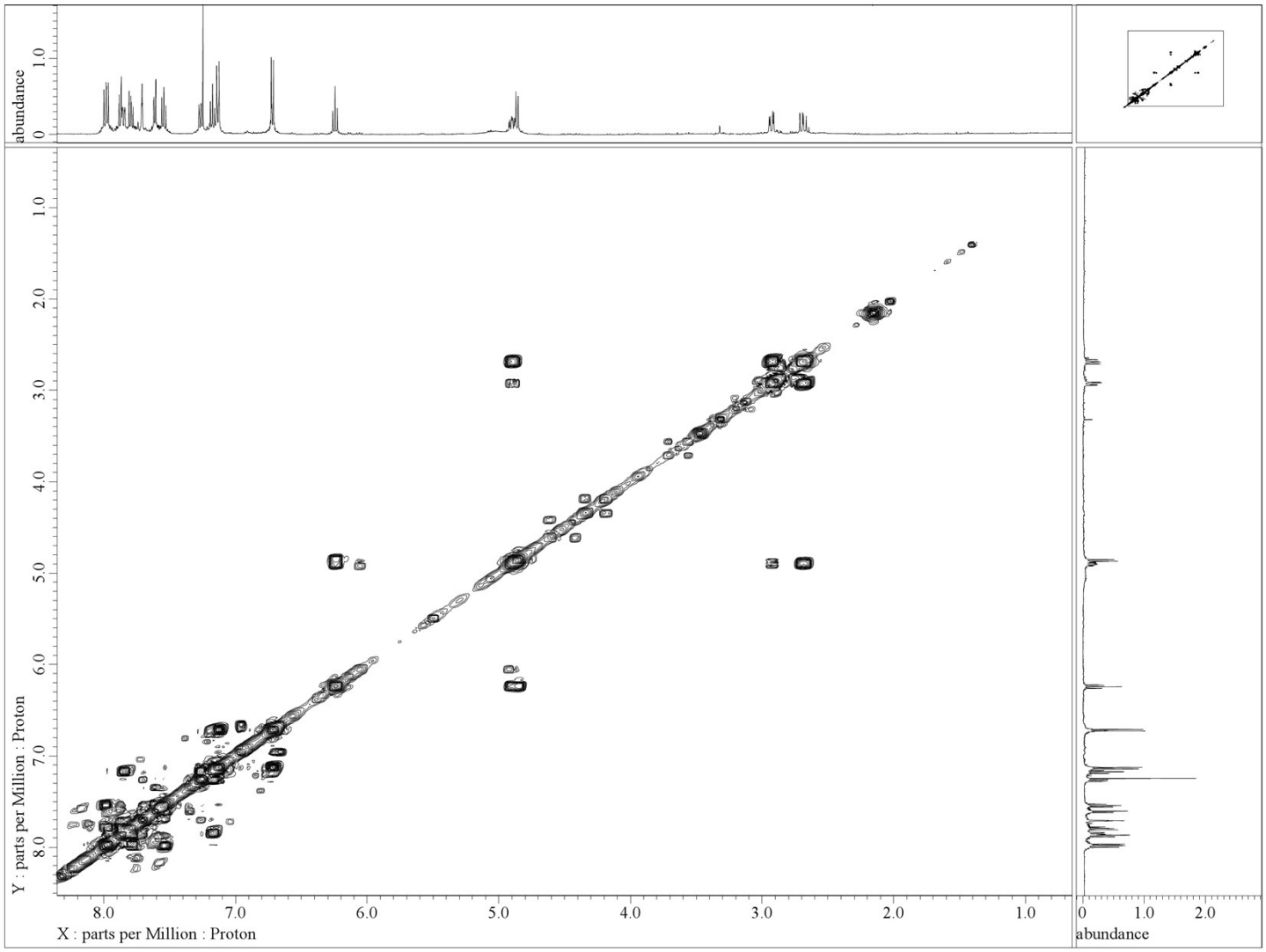



**Figure S4:** H, H-COSY spectrum of **4f**

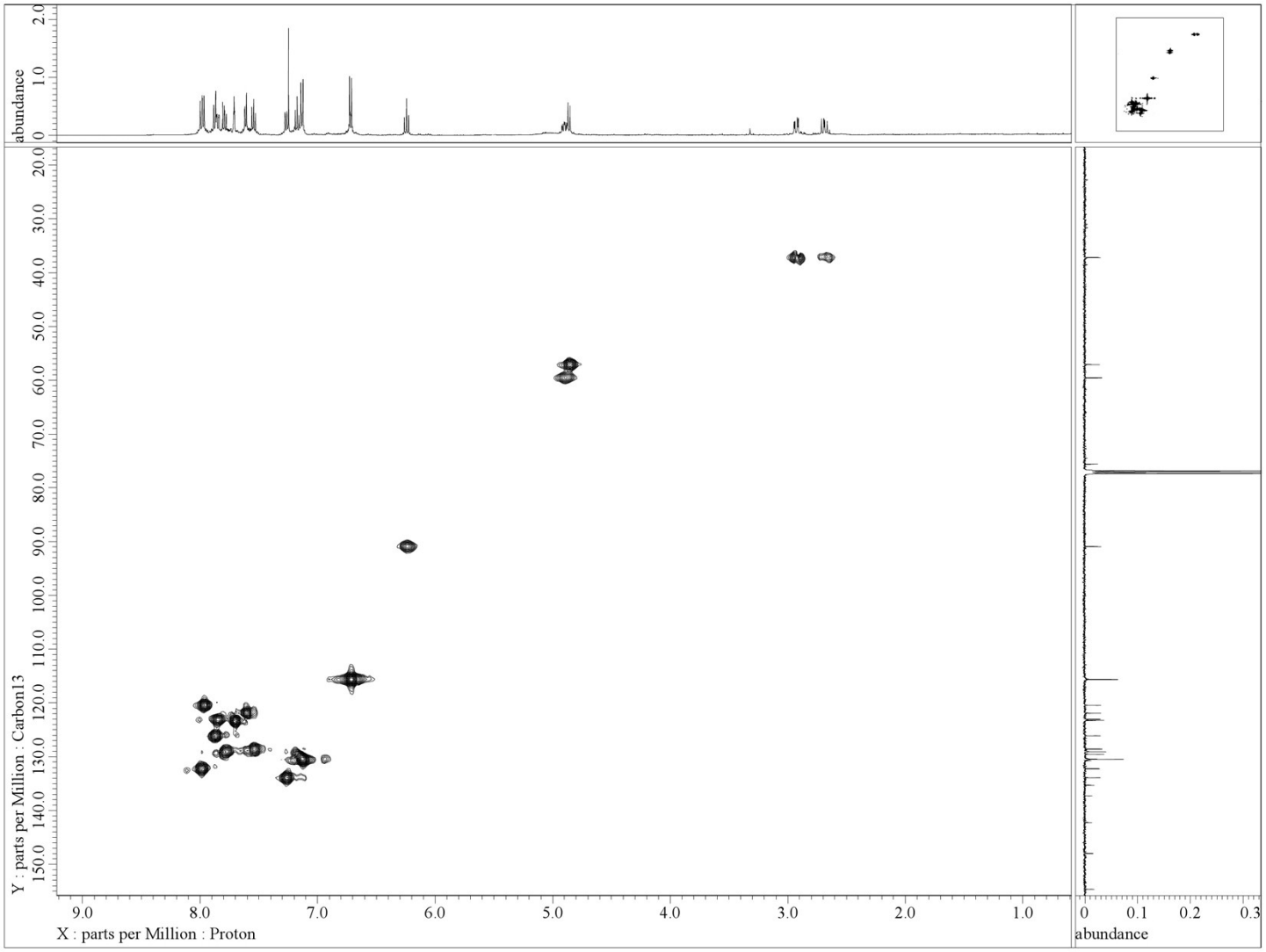



**Figure S5:** HMQC spectrum of **4f**

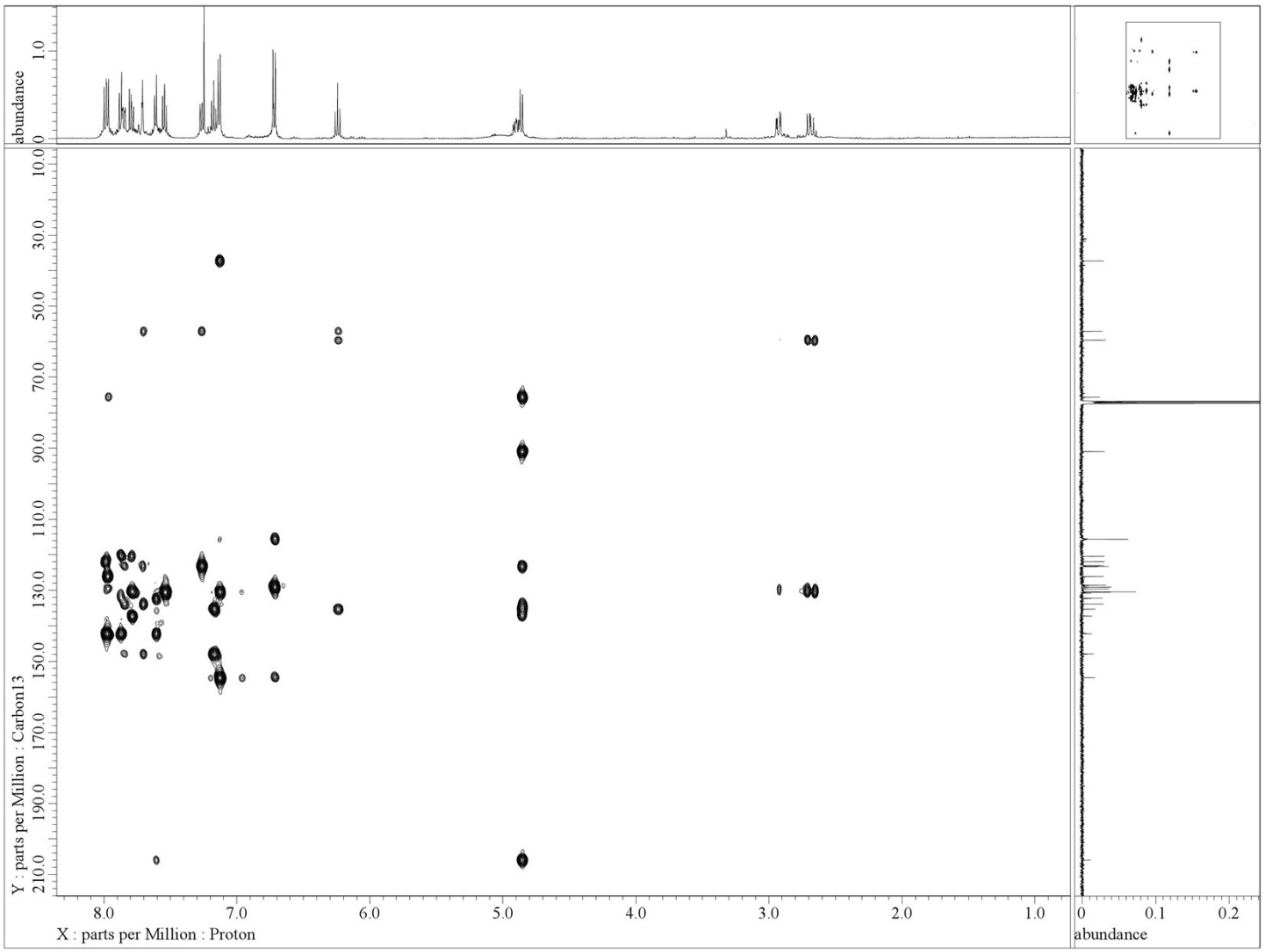



**Figure S6:** HMBC spectrum of **4f**

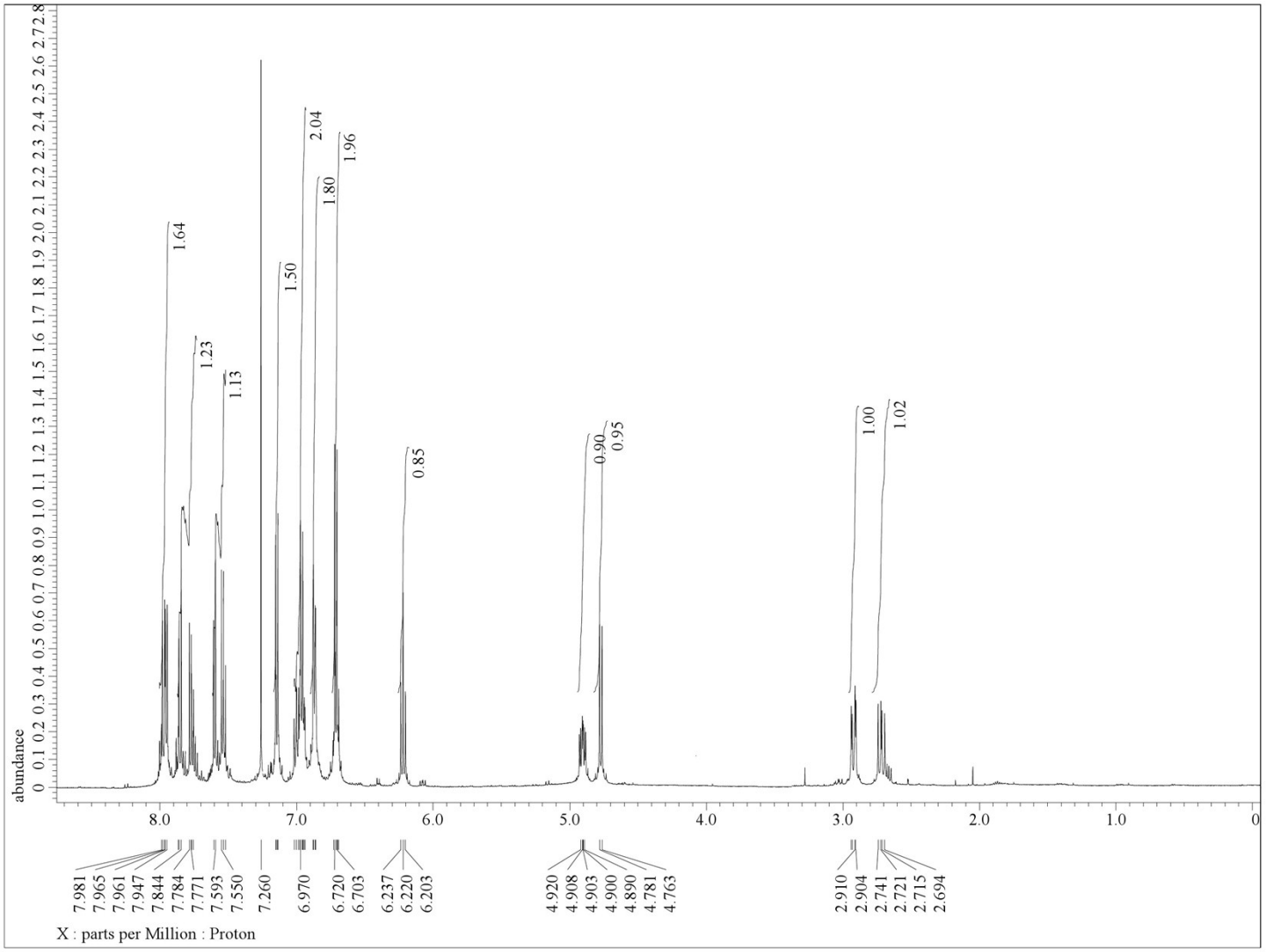



**Figure S7:** $^{1}$H NMR spectrum of **4a**

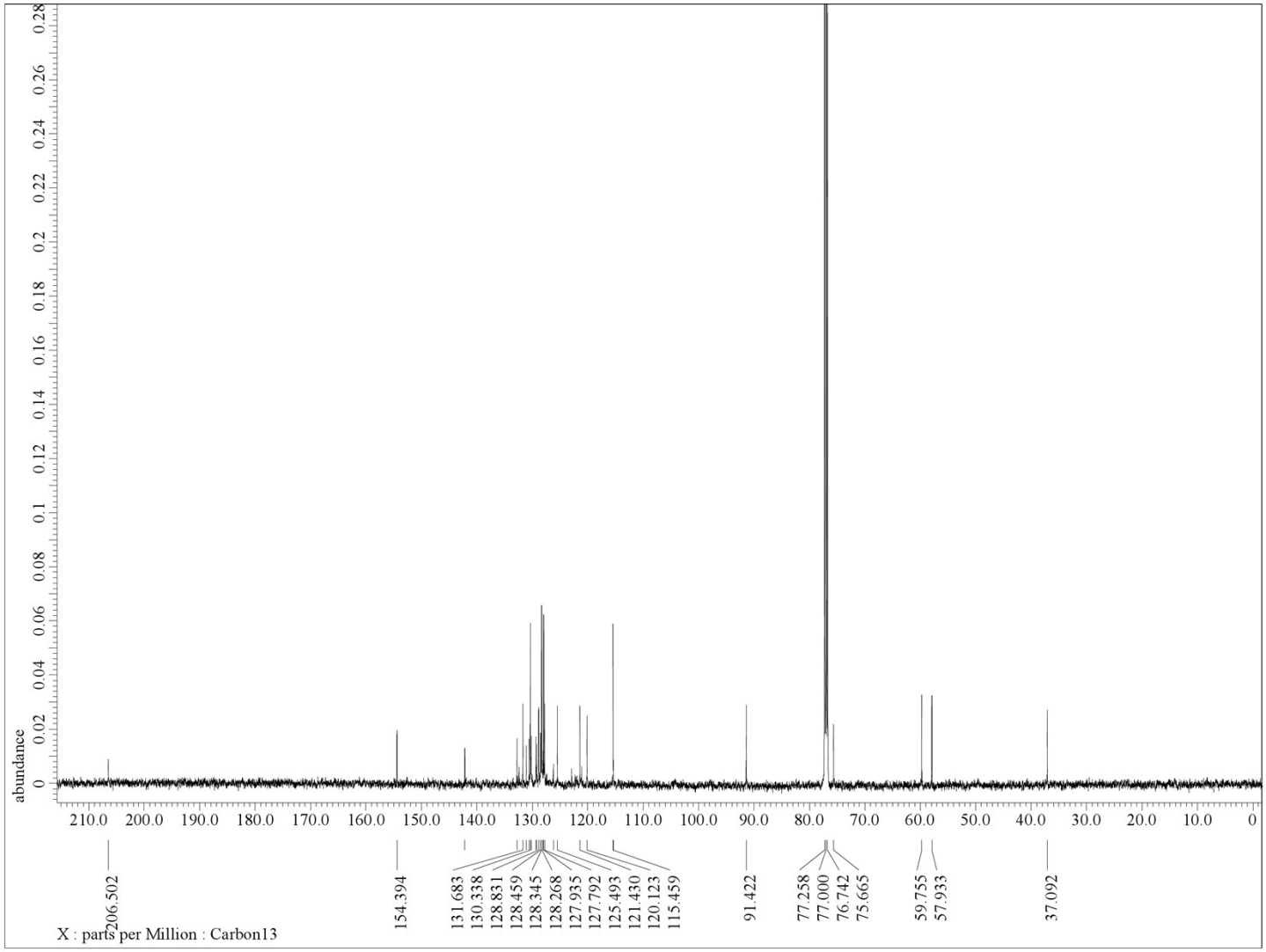



**Figure S8:** $^{13}$C NMR spectrum of **4a**

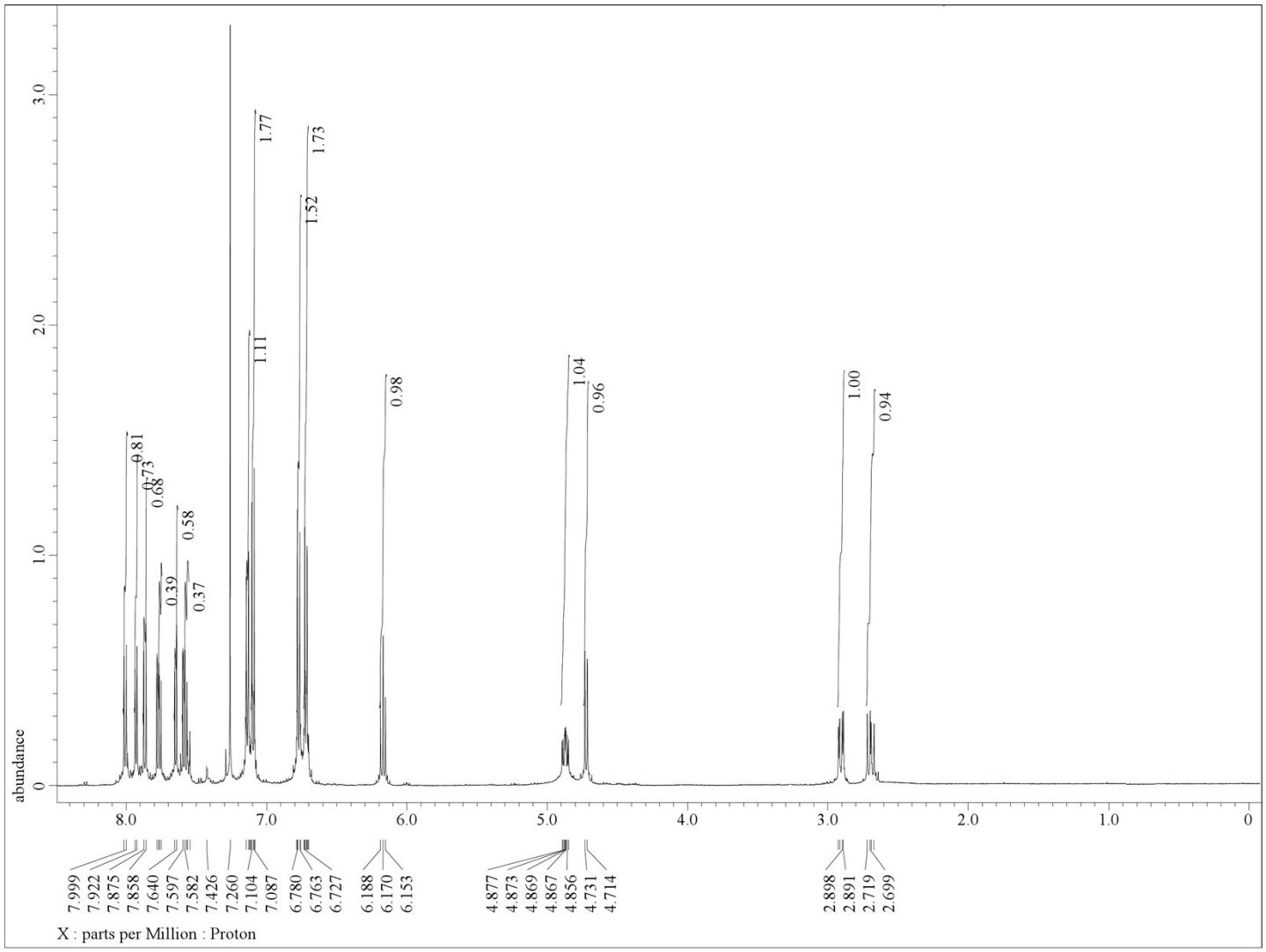



**Figure S9:** $^{1}$H NMR spectrum of **4b**

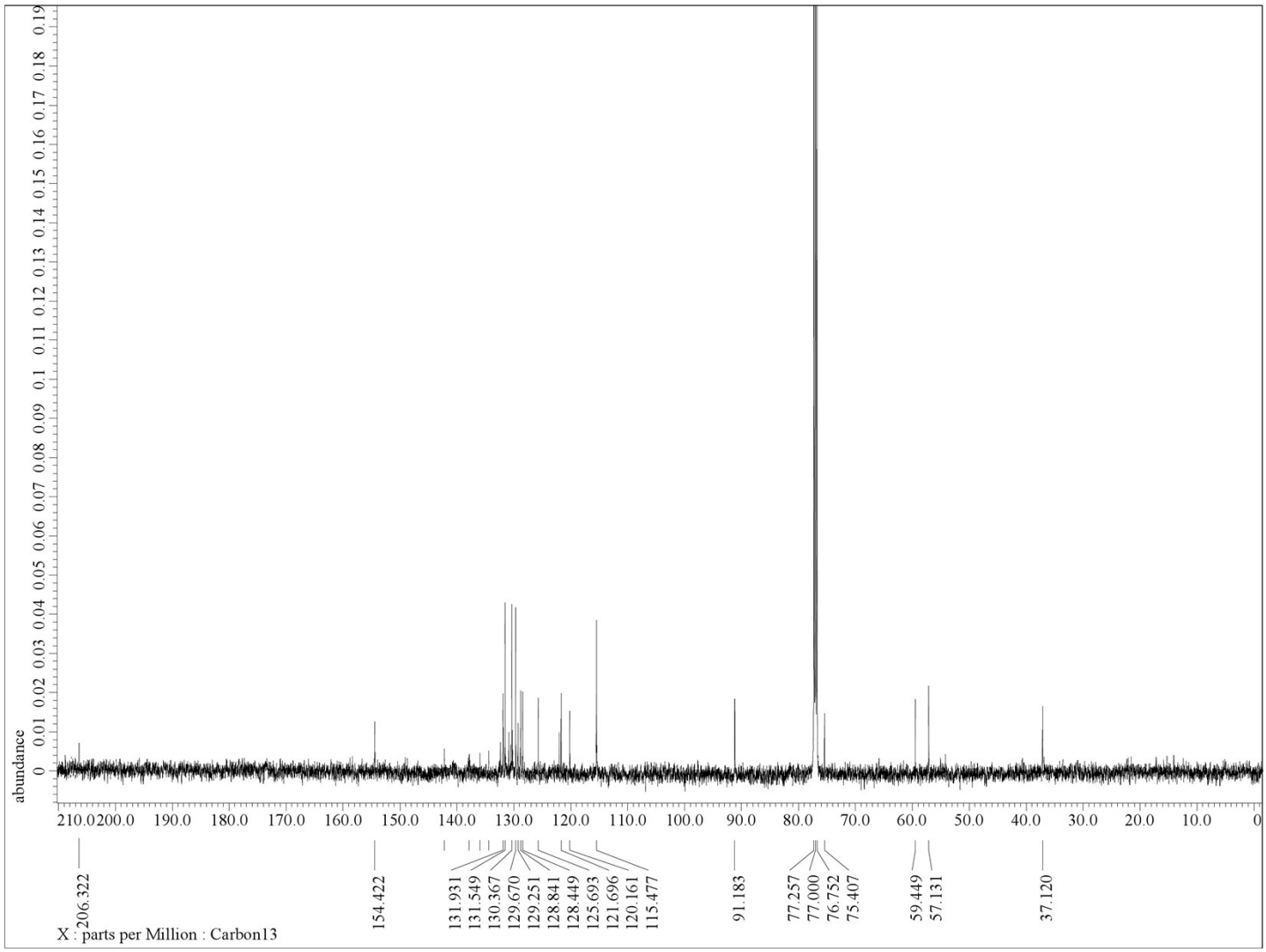



**Figure S10:** $^{13}$C NMR spectrum of **4b**

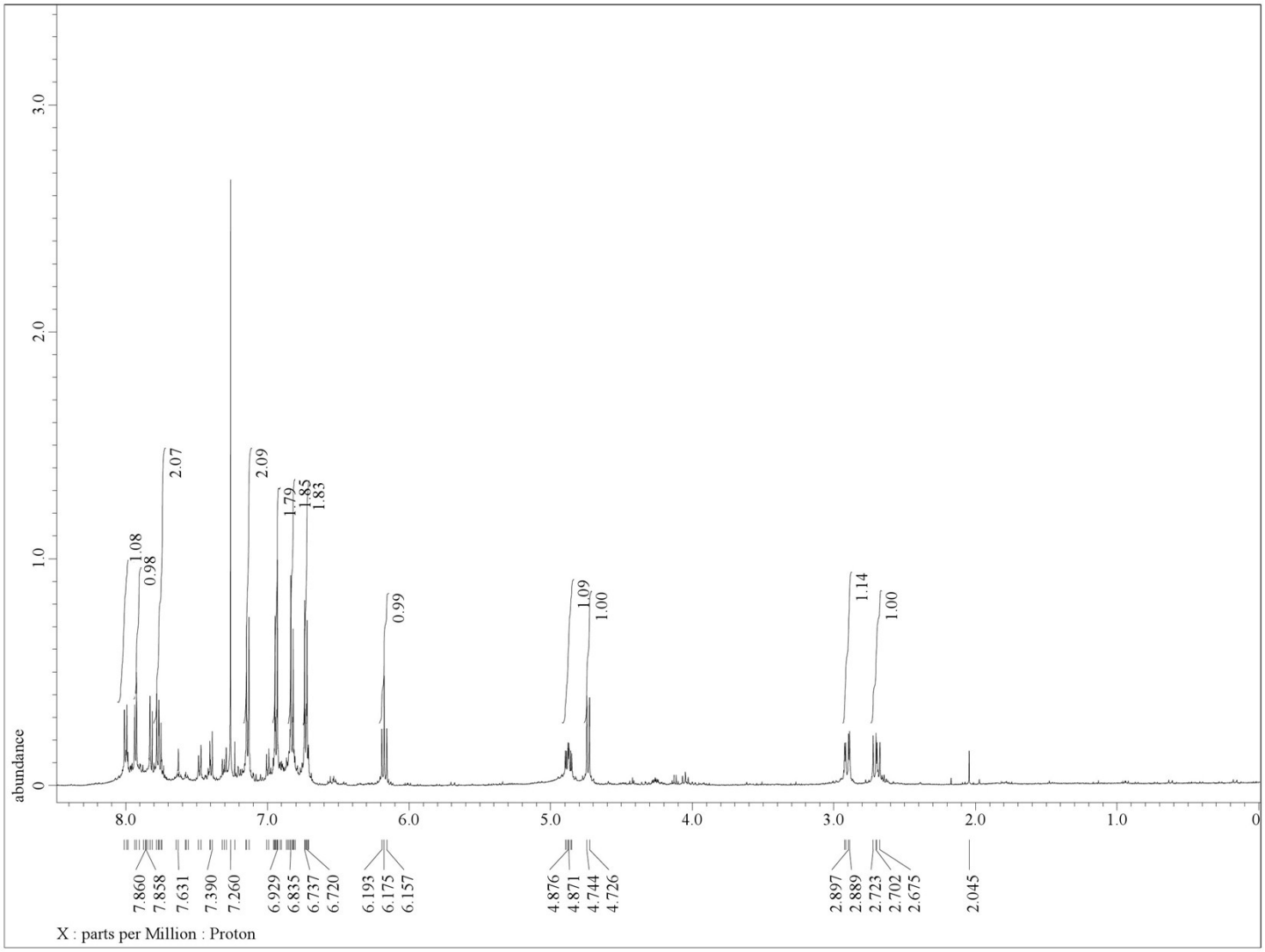



**Figure S11:** $^{1}$H NMR spectrum of **4c**

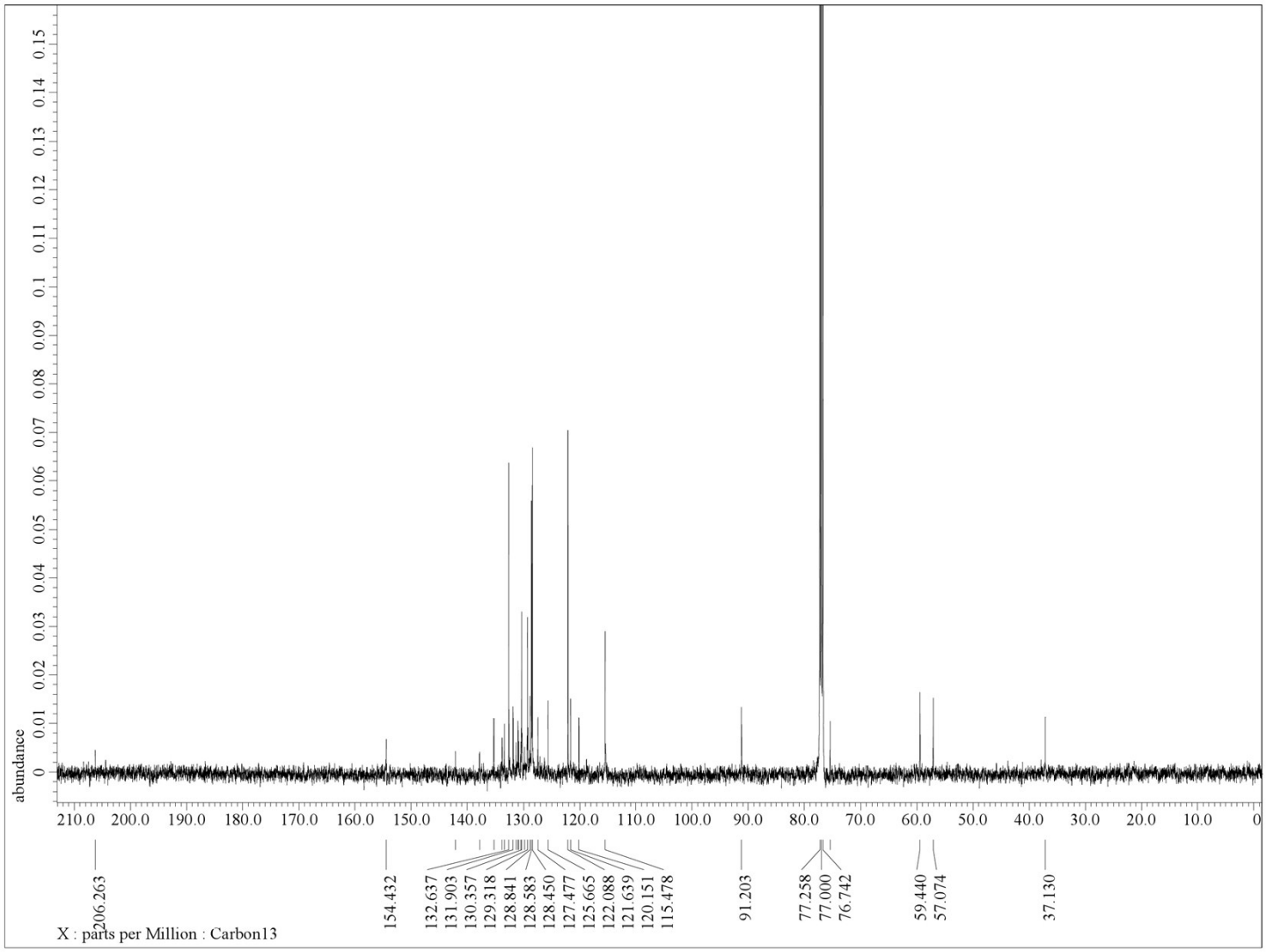



**Figure S12:** $^{13}$C NMR spectrum of **4c**

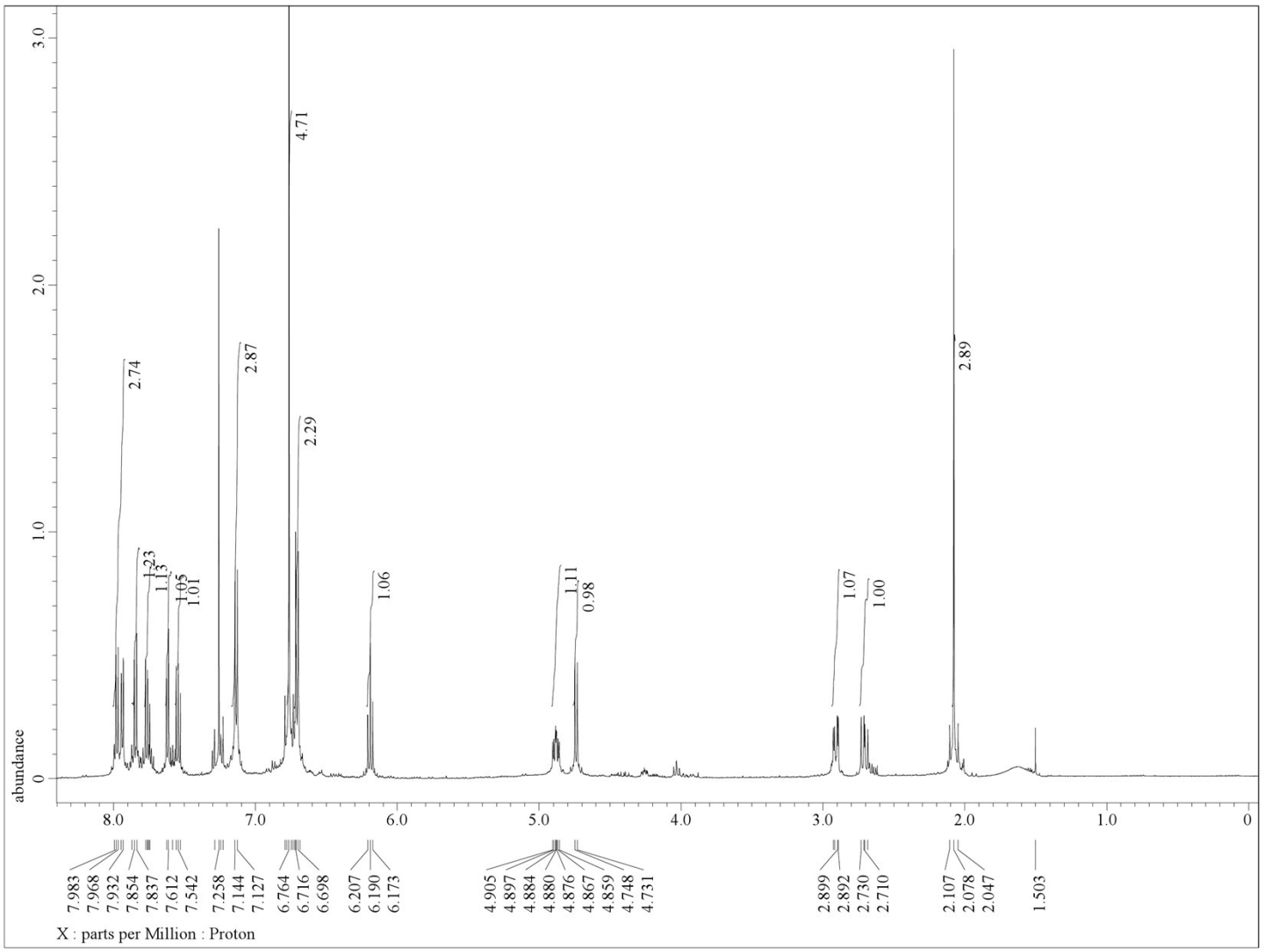



**Figure S13:** $^{1}$H NMR spectrum of **4d**

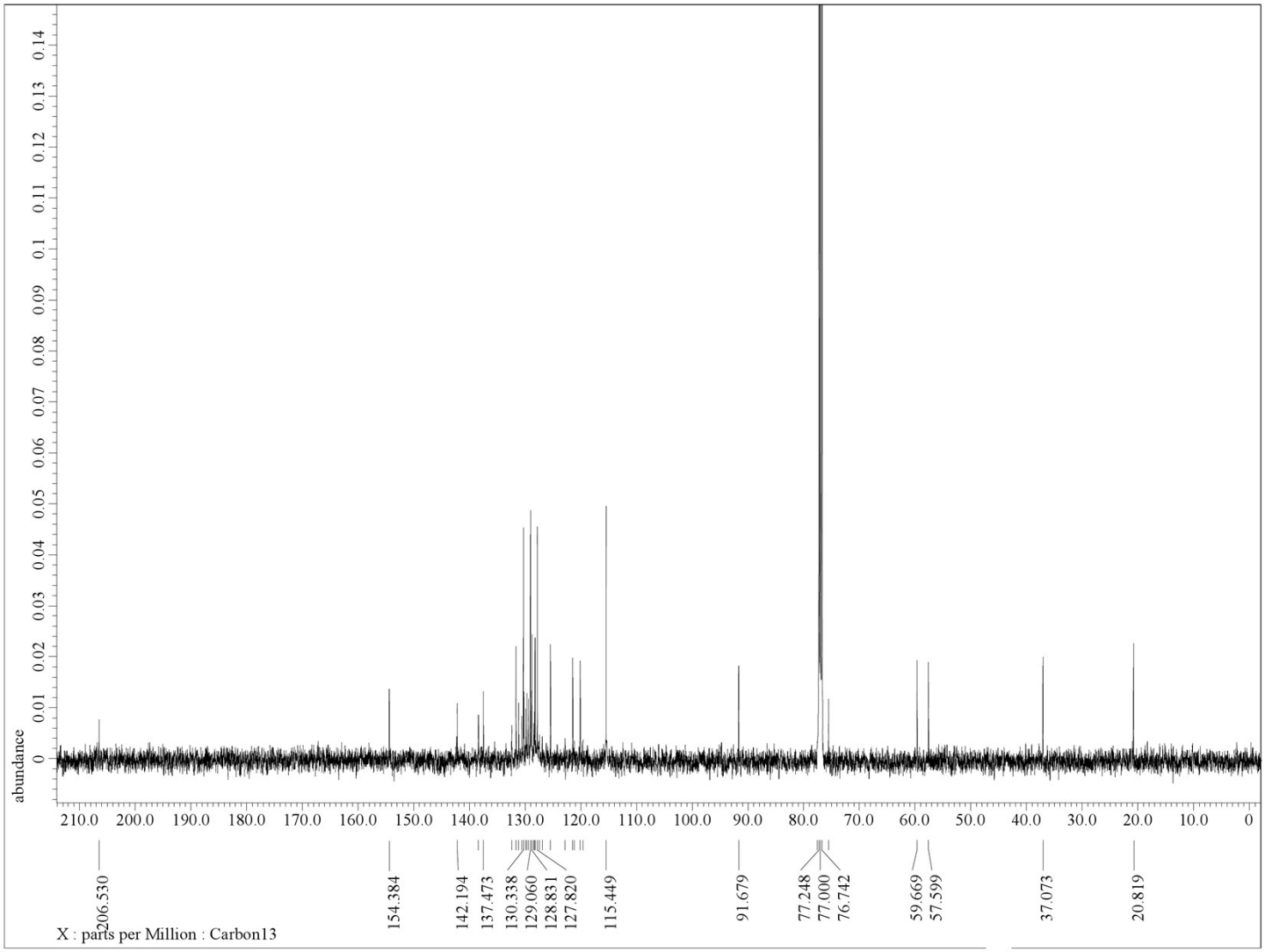



**Figure S14:** $^{13}$C NMR spectrum of **4d**

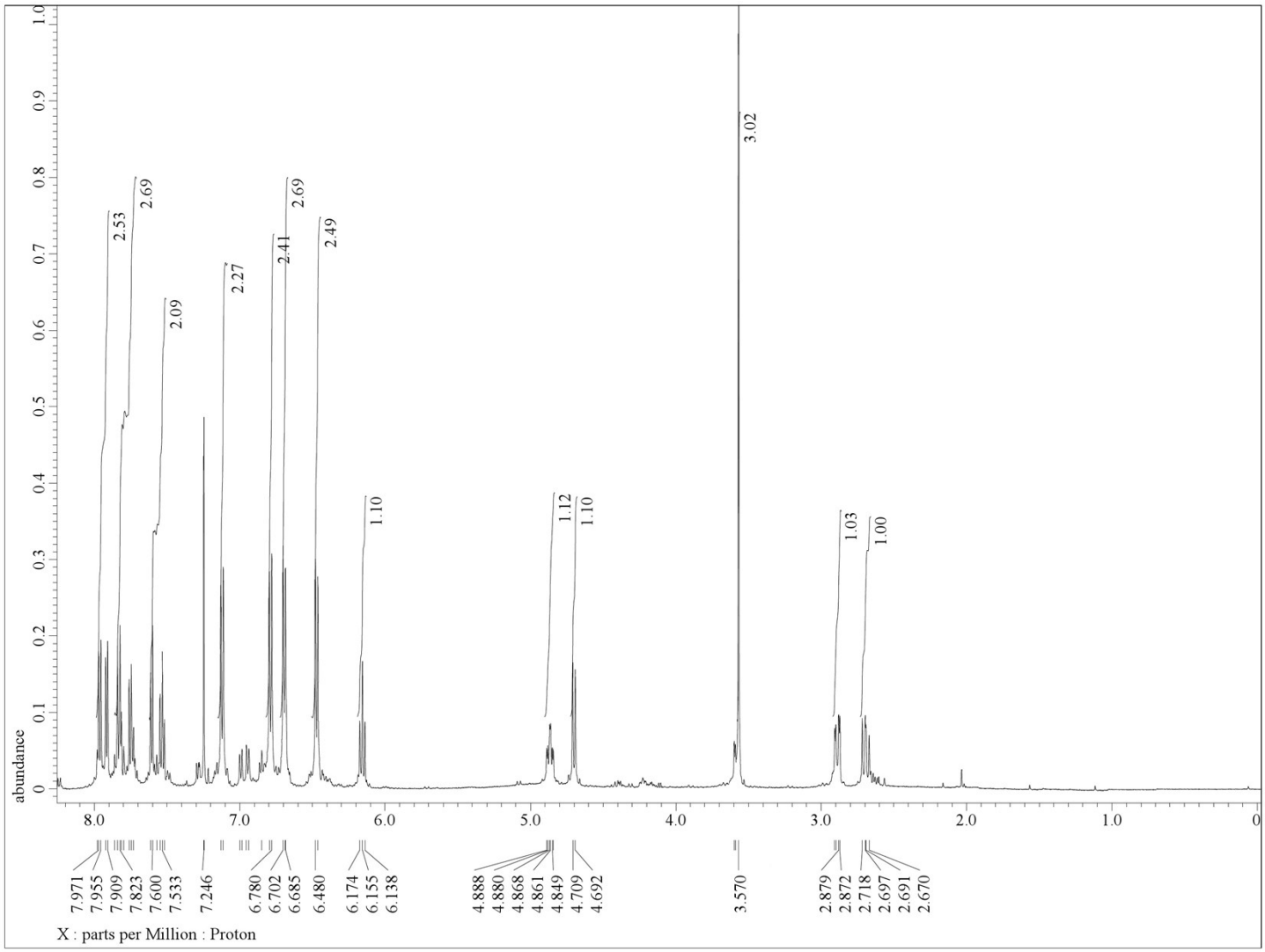



**Figure S15:** $^{1}$H NMR spectrum of **4e**

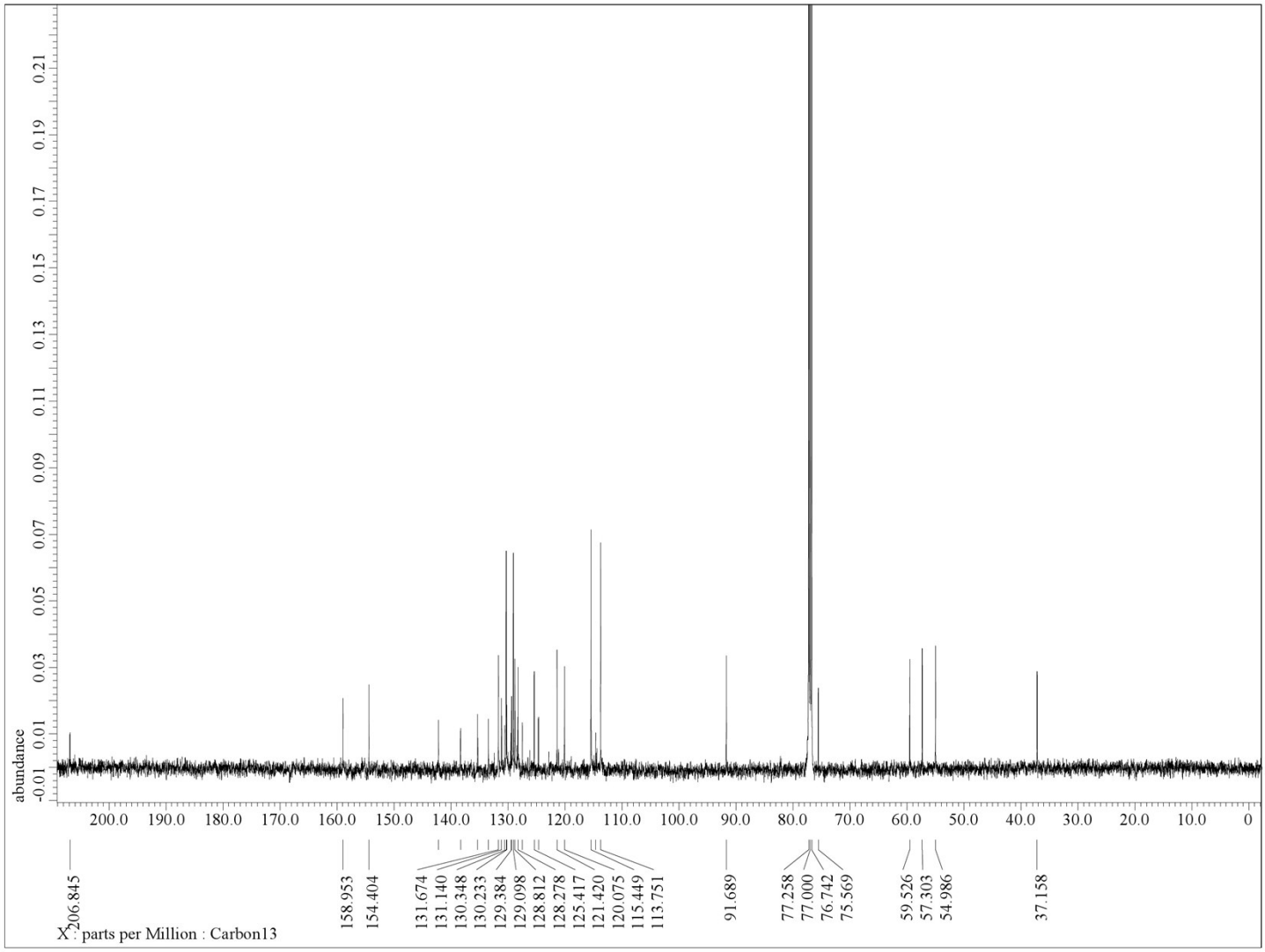



**Figure S16:** $^{13}$C NMR spectrum of **4e**

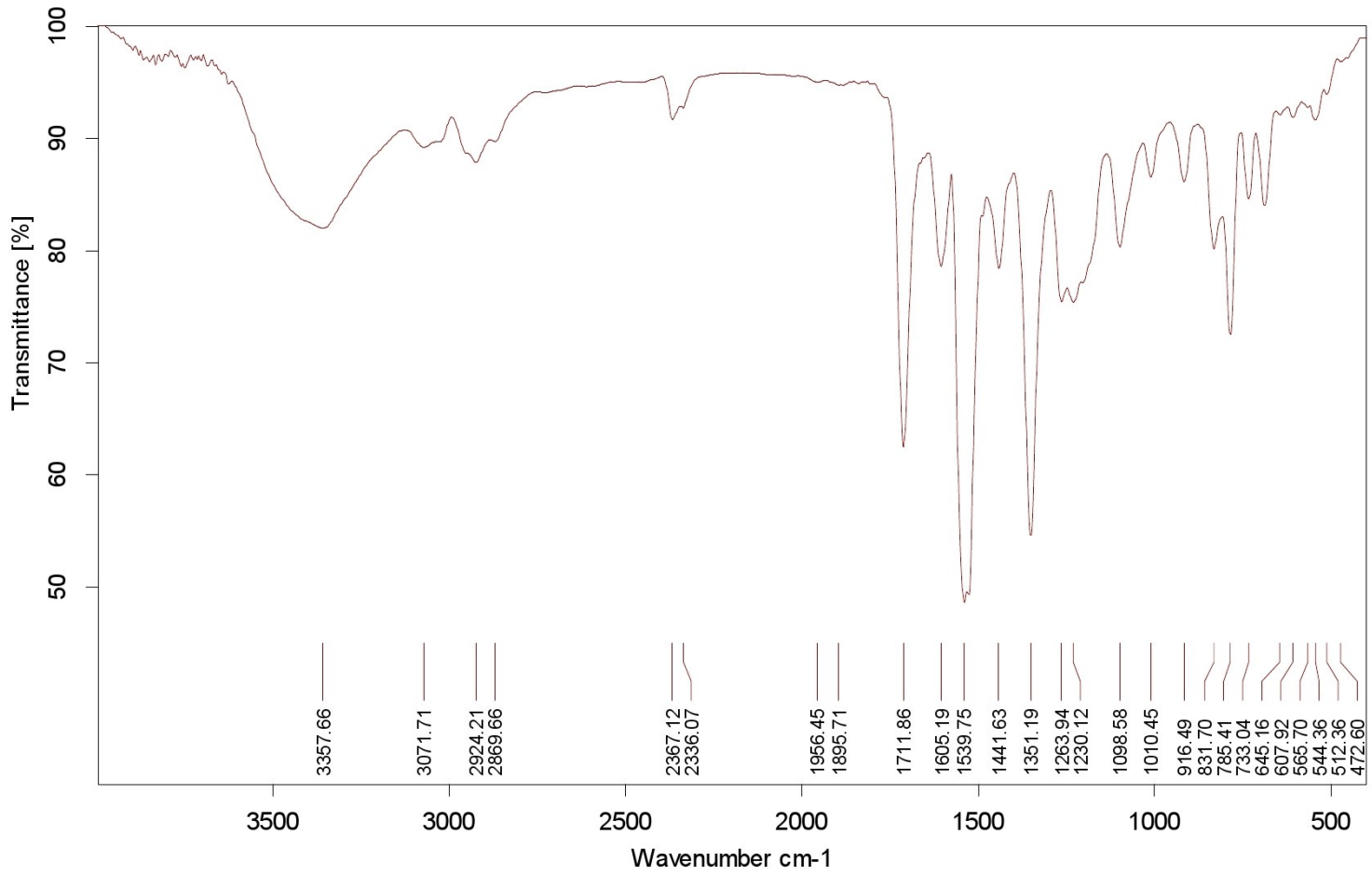



**Figure S17:** FT-IR spectrum of **4f**

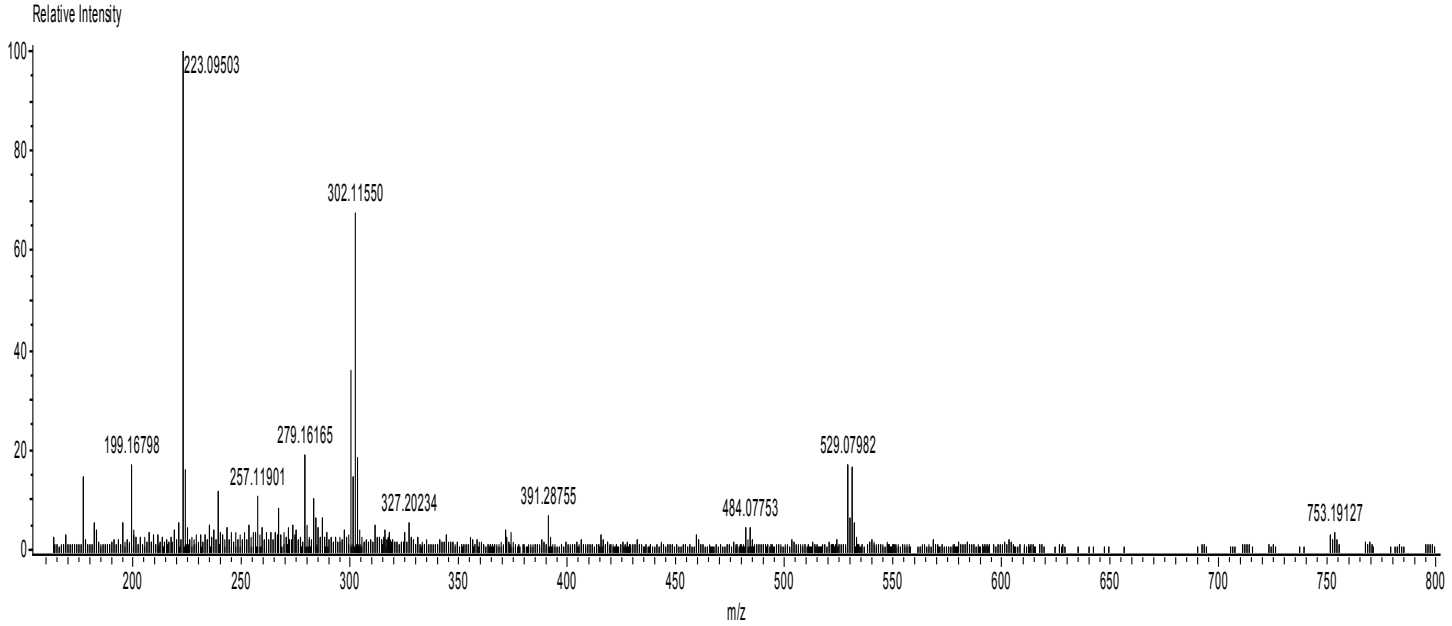



**Figure S18:** Mass spectrum of **4b**

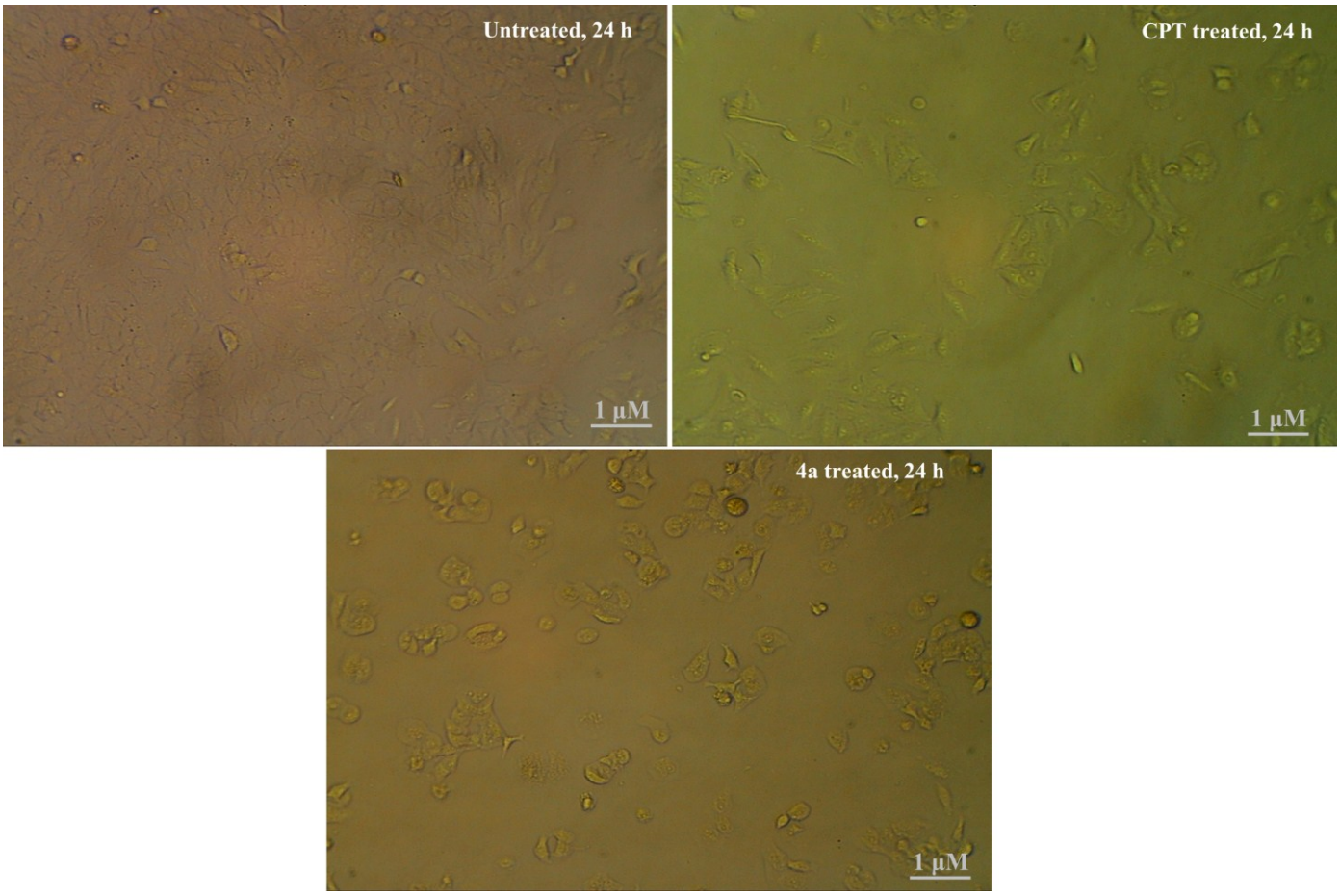



**Figure S19**: Comparison of the normal microscopic images of Jurkat cells following the treatment of CPT and compound **4a** with that of the cells of without any treatment. For the analysis, about $1 \times 10^6$ cells/well were plated in a six-well plate initially for a period of 12 h and following the period, the cells were treated with the required concentrations of CPT and 4a and further incubated for a 24 h period. Following the period, the cell culture medium was removed, washed with distilled water, and fresh medium was added. By looking through the microscope, the cellular images were taken.

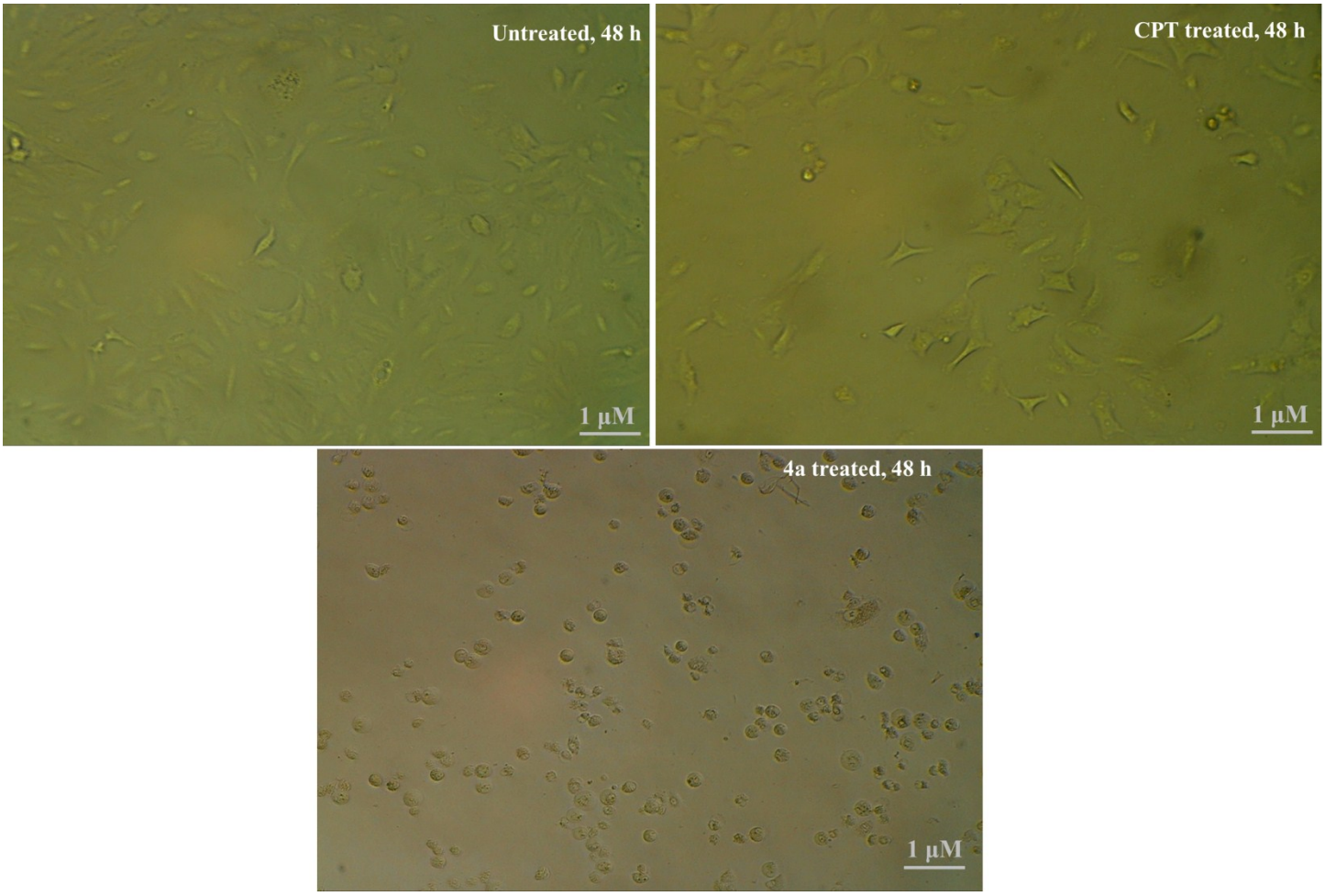
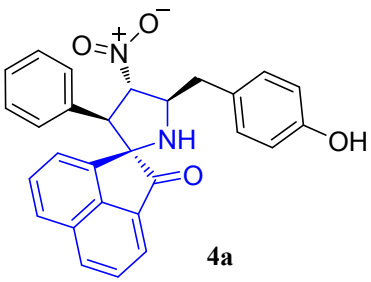
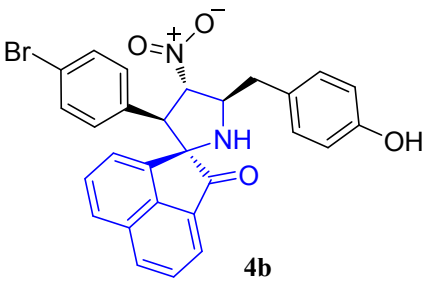



**Figure S20**: Comparison of the normal microscopic images of Jurkat cells following the treatment of CPT and compound **4a** with that of the cells of without any treatment. For the analysis, about $1 \times 10^6$ cells/well were plated in a six-well plate initially for a period of 12 h and following the period, the cells were treated with the required concentrations of CPT and 4a and further incubated for a 48 h period. Following the period, the cell culture medium was removed, washed with distilled water, and fresh medium was added. By looking through the microscope, the cellular images were taken.



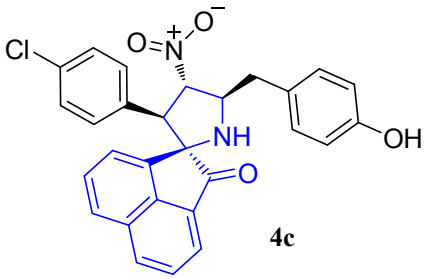

**4a**

CLogP: 4.4401



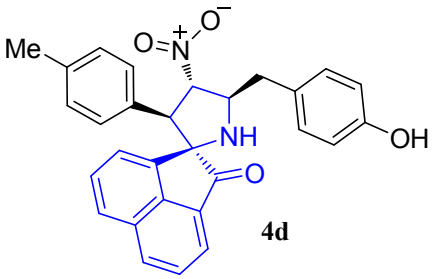

**4b**

CLogP: 5.3031



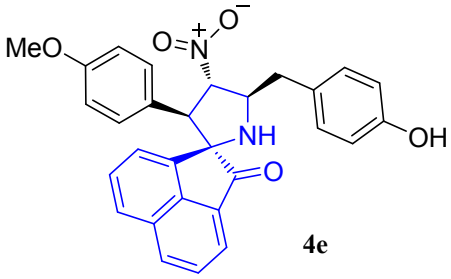

**4c**

CLogP: 5.1531



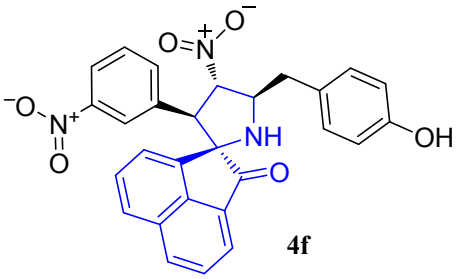

**4d**

CLogP: 3.16733




**4e**

CLogP: 4.3591




**4f**

CLogP: 4.1831

**Figure S21:**

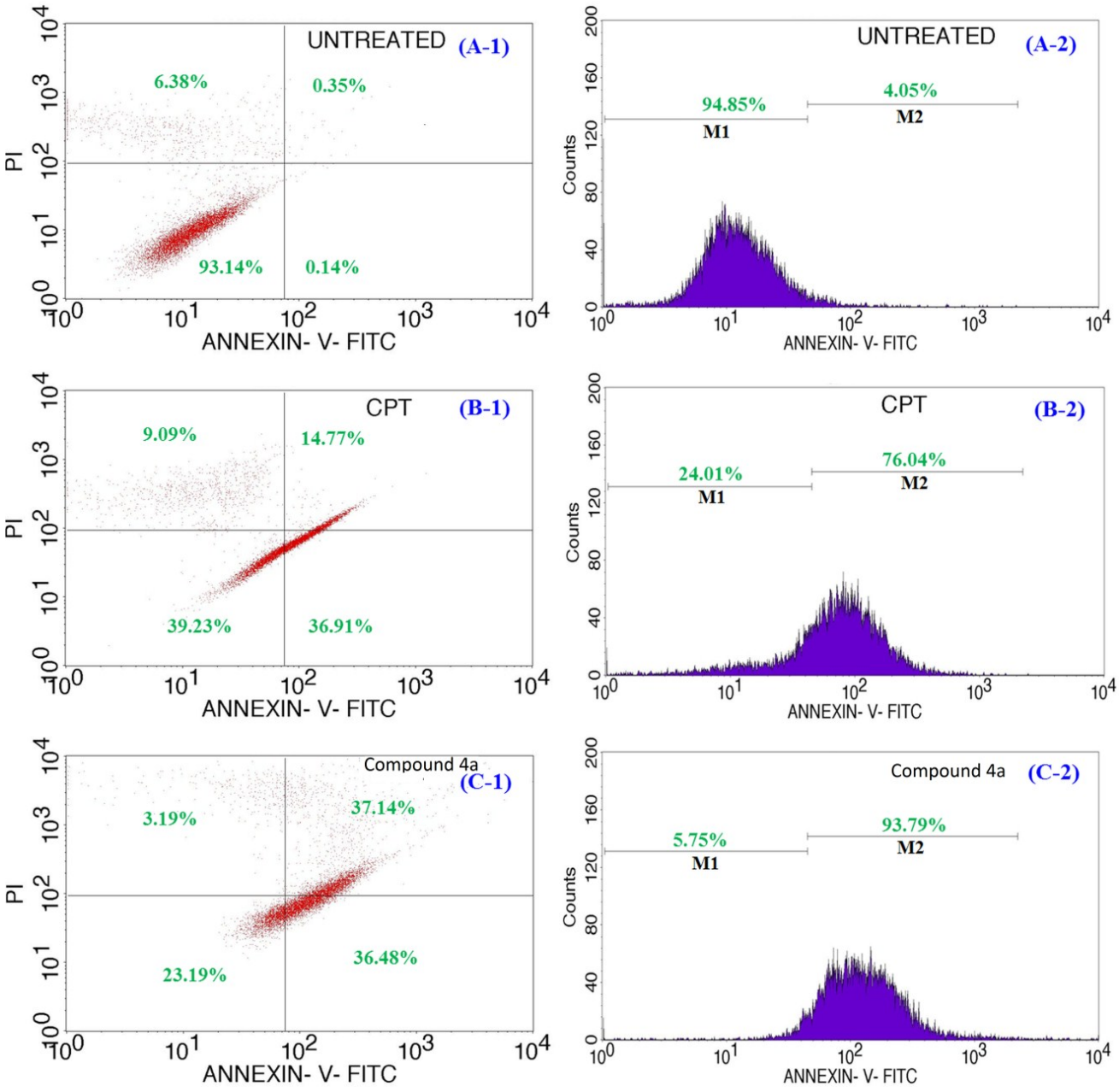



**Figure S22:** Apoptosis assay tested under 48 h incubation period for the Jurkat cells.

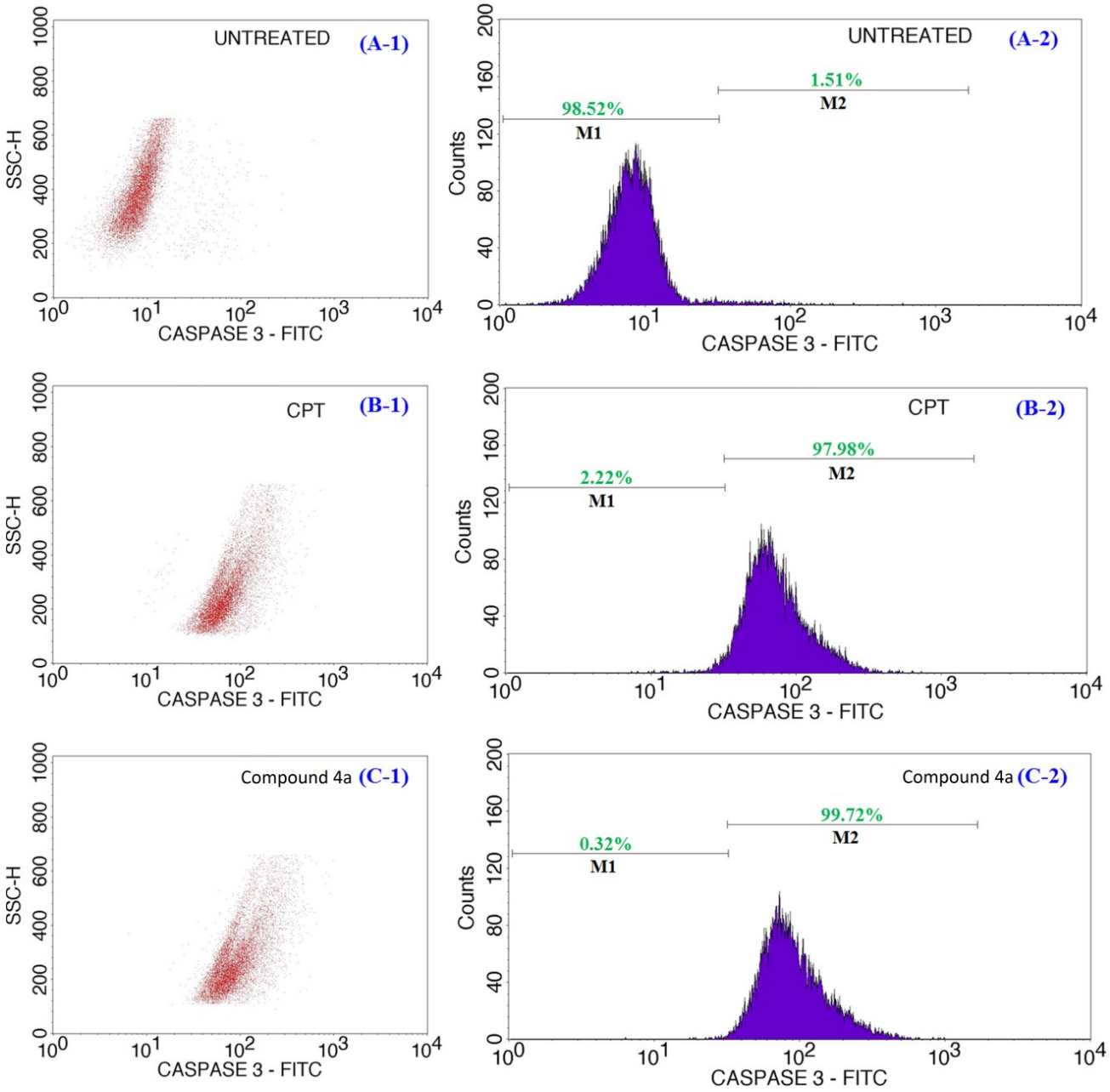



**Figure S23:** Caspase 3 activity assay when tested under a 48 h period for the Jurkat cells.