

Supplementary Information

Ruthenium/Yb(OTf)₃-Cocatalyzed Dehydrogenative Synthesis of 14-substituted-14-*H*-dibenzo[*a,j*]xanthenes from *β*-Naphthol and Alcohols

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General information

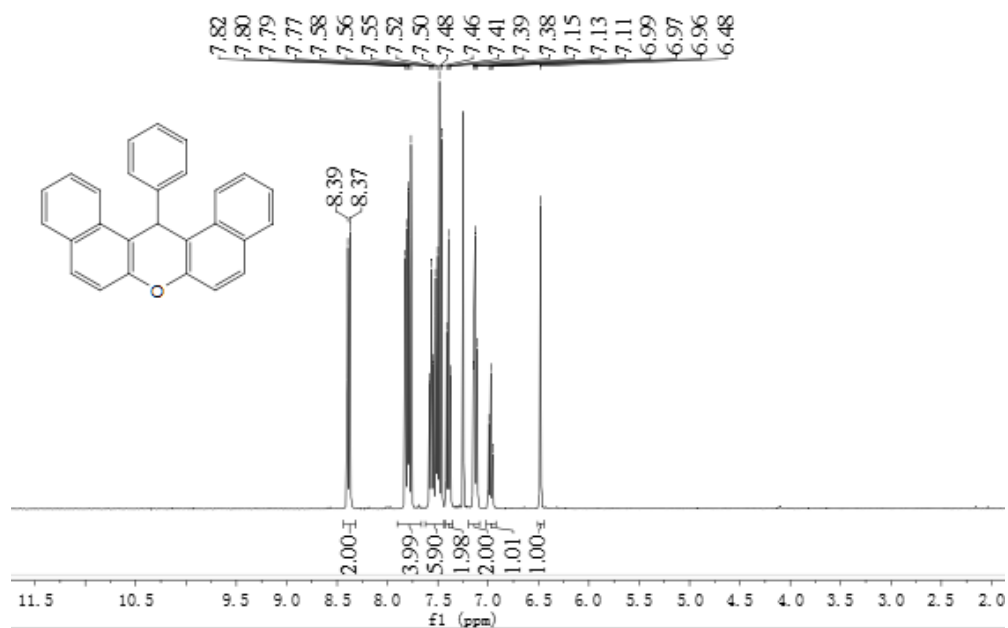
All the obtained products were characterized by melting points (m.p), $^1\text{H-NMR}$, $^{13}\text{C-NMR}$ infrared spectra (IR), the $^1\text{H-NMR}$ spectra of the known compounds were found to be identical with the ones reported in the literatures. Additionally, the new products were further determined by high resolution mass spectra (HR-MS). Melting points were measured on an Electrothermal SGW-X4 microscopy digital melting point apparatus and are uncorrected; IR spectra were recorded on a FTLA2000 spectrometer; $^1\text{H-NMR}$ and $^{13}\text{C-NMR}$ spectra were obtained on Bruker-400. Chemical shifts were reported in parts per million (ppm, δ) downfield from tetramethylsilane. Proton coupling patterns are described as singlet (s), doublet (d), triplet (t), multiplet (m); High-resolution mass spectra (HRMS) were recorded on a JEOL JMS-600 spectrometer. TLC was performed using commercially prepared 100-400 mesh silica gel plates (GF254), and visualization was effected at 254 nm; All the reagents were purchased from commercial sources (J&KChemic, TCI, Fluka, Acros, SCRC), and used without further purification.

Typical procedure for the synthesis of **3a**

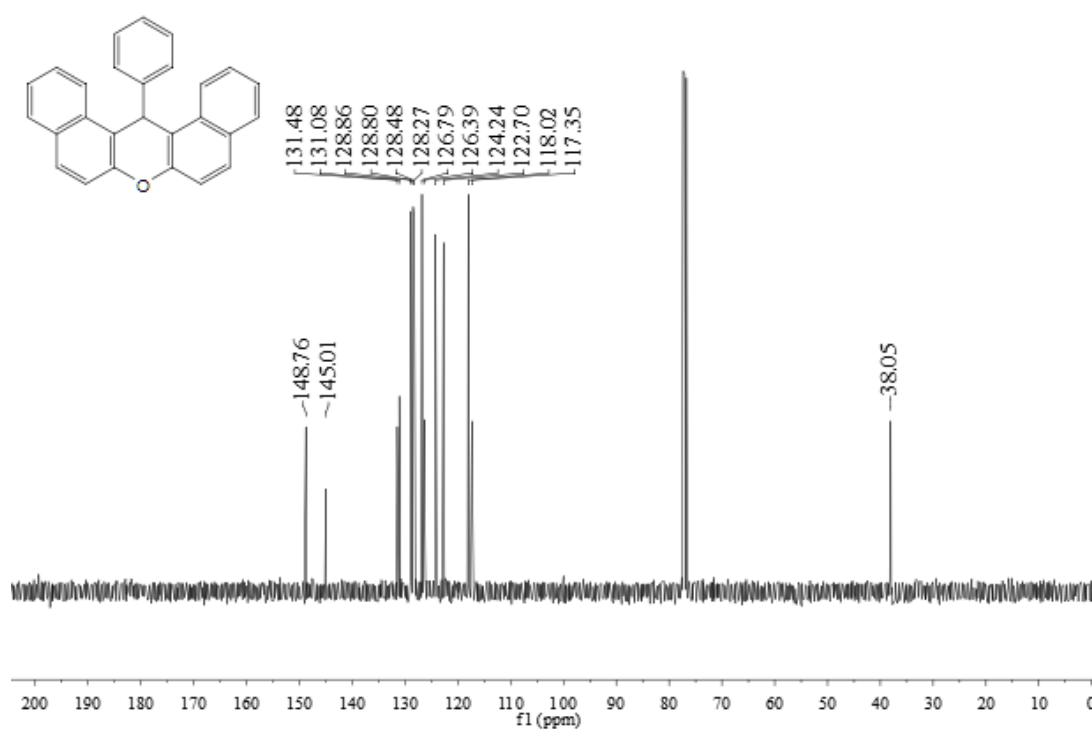
In a schlenk tube equipped with a magnetic stirrer bar, benzyl alcohol **1a** (1.5 mmol, 162.2 mg), β -naphthol **2a** (1 mmol, 144.2 mg), $[\text{P}^{\wedge}\text{O}]_2\text{Cl}_2\text{Ru}$ (Cat 5, 0.005 mmol, 3.8 mg) and $\text{Yb}(\text{OTf})_3$ (0.05 mmol, 31.0 mg) and toluene (1 mL) were introduced successively. The resulting mixture was stirred at 110 °C for 16 h without insert any gas protection. After cooling down to room temperature, the reaction solvent was removed under vacuum, the residue was directly purified by flash chromatography on silica gel eluting with petroleum ether : ethyl acetate (30 : 1) to give 14-phenyl-14-*H*-dibenzo[*a,j*]xanthene **3a** as a white solid (148 mg, 83%).

NMR spectra of the obtained compounds

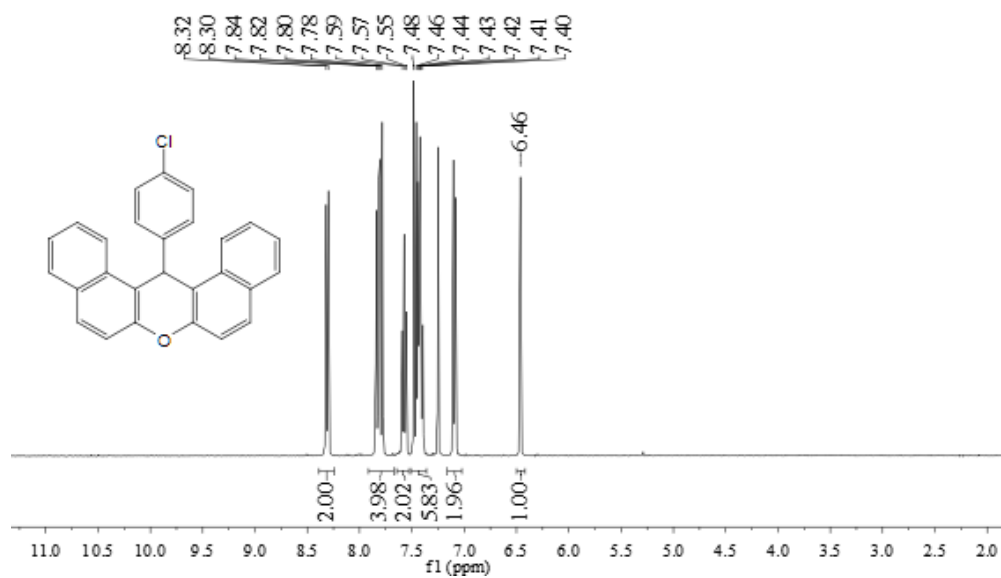
¹H-NMR of 3a



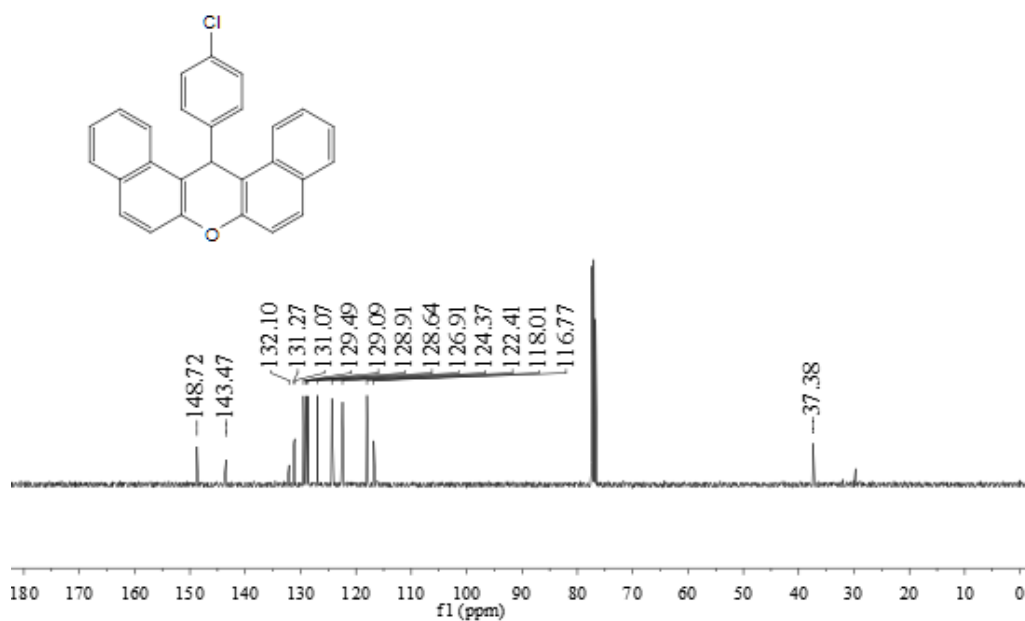
¹³C-NMR of 3a



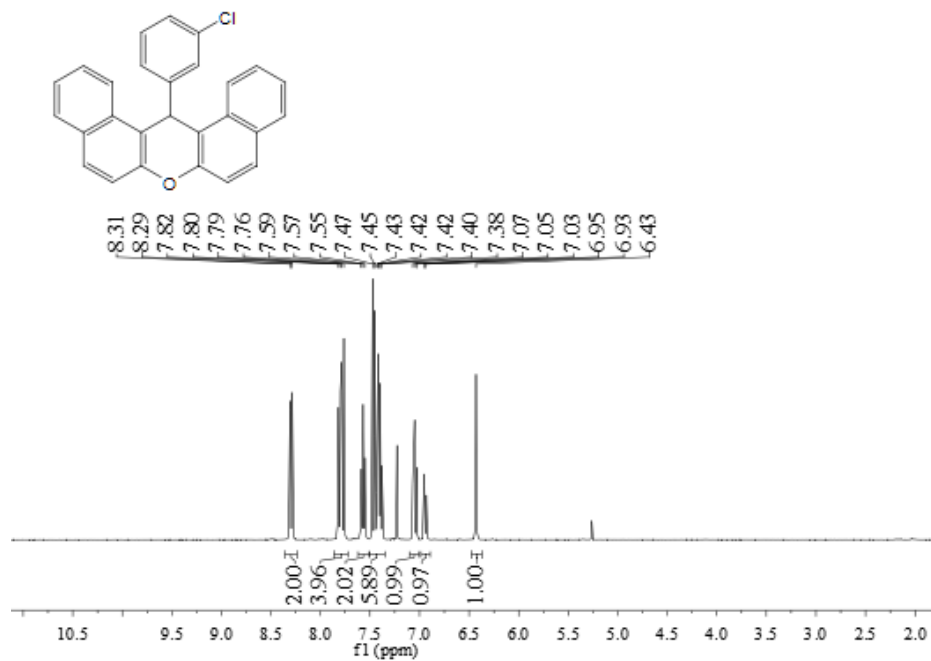
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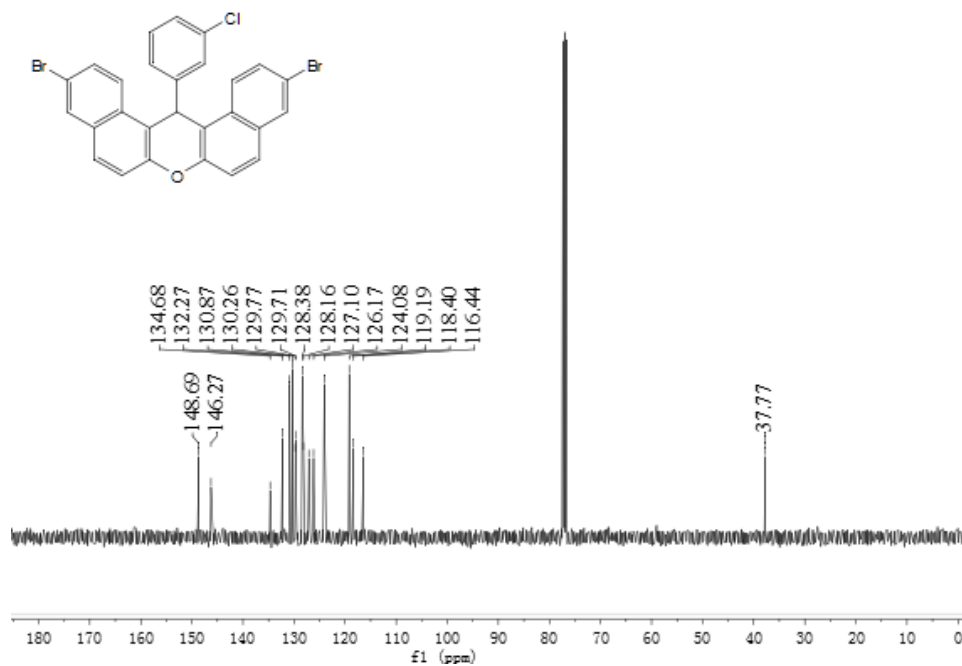
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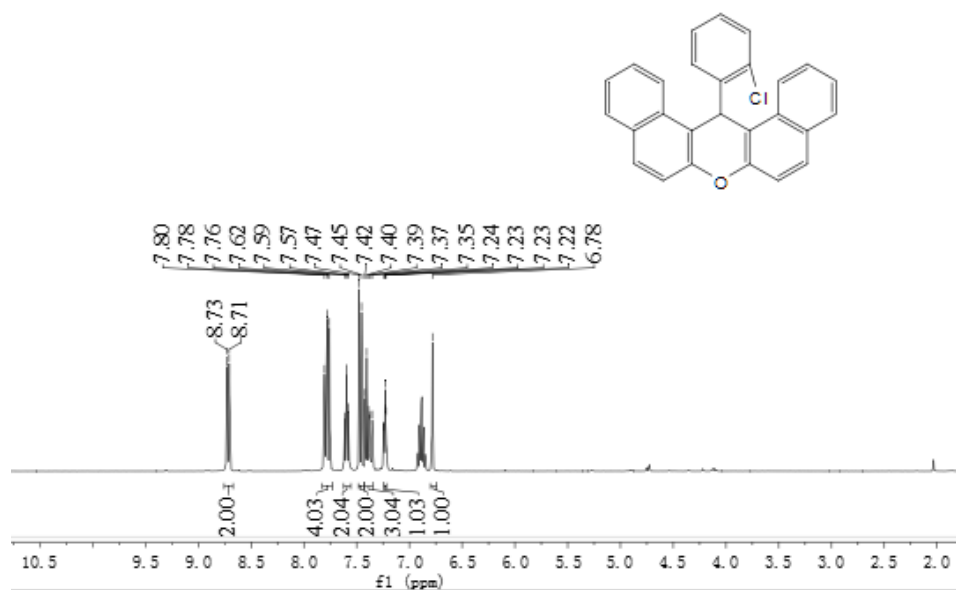
¹H-NMR of 3c



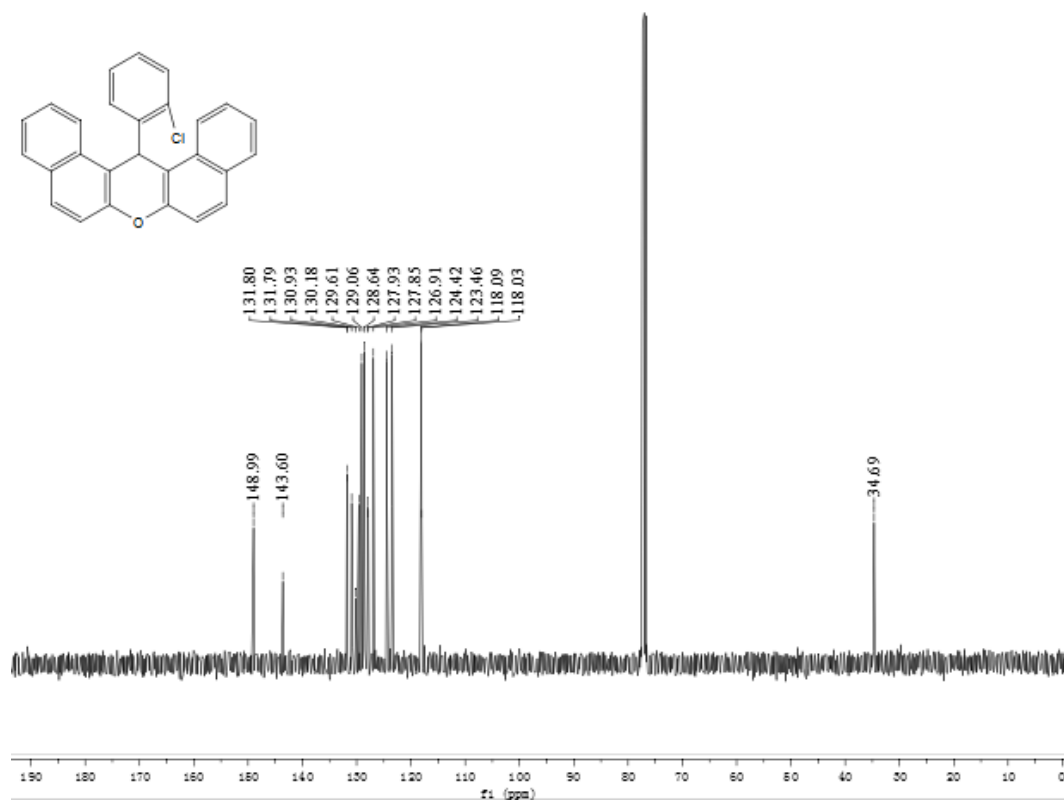
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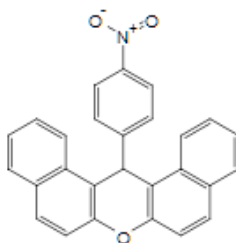
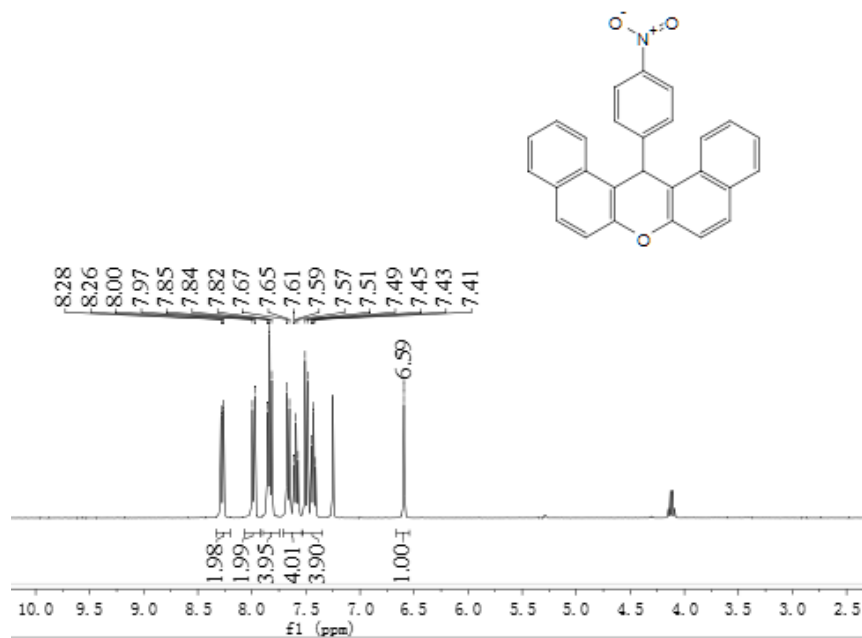
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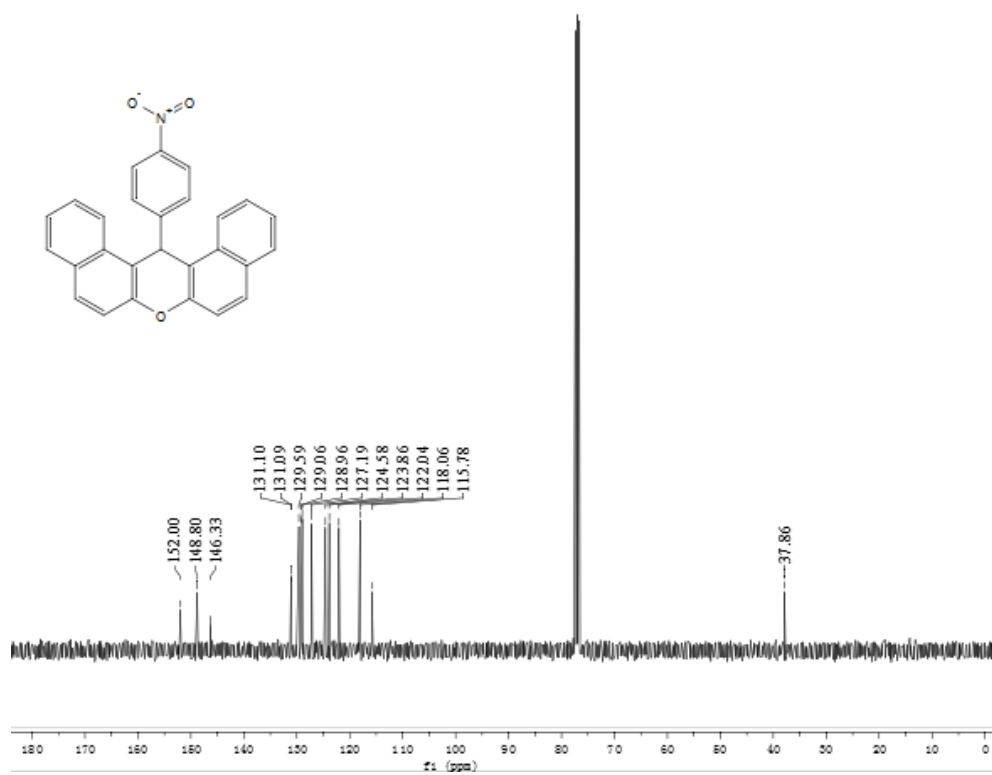
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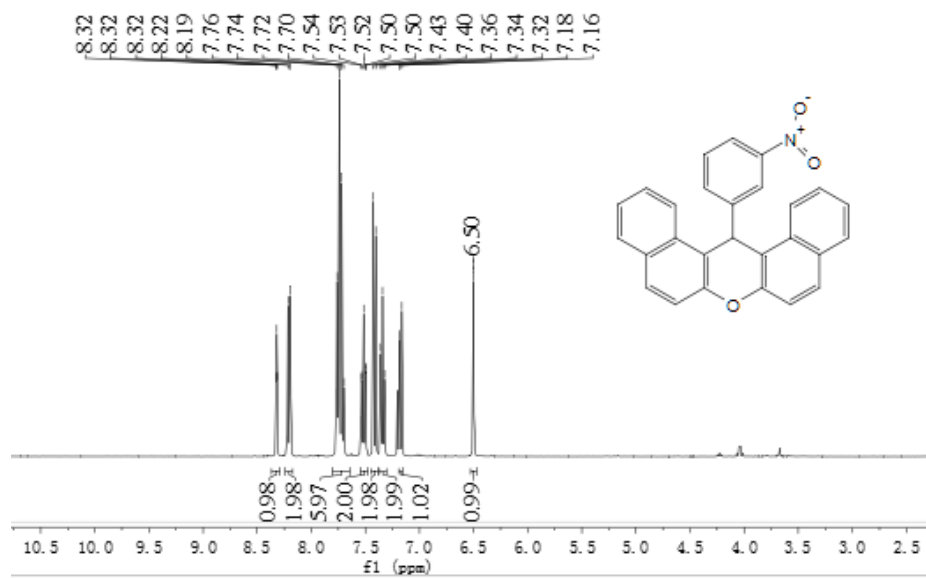
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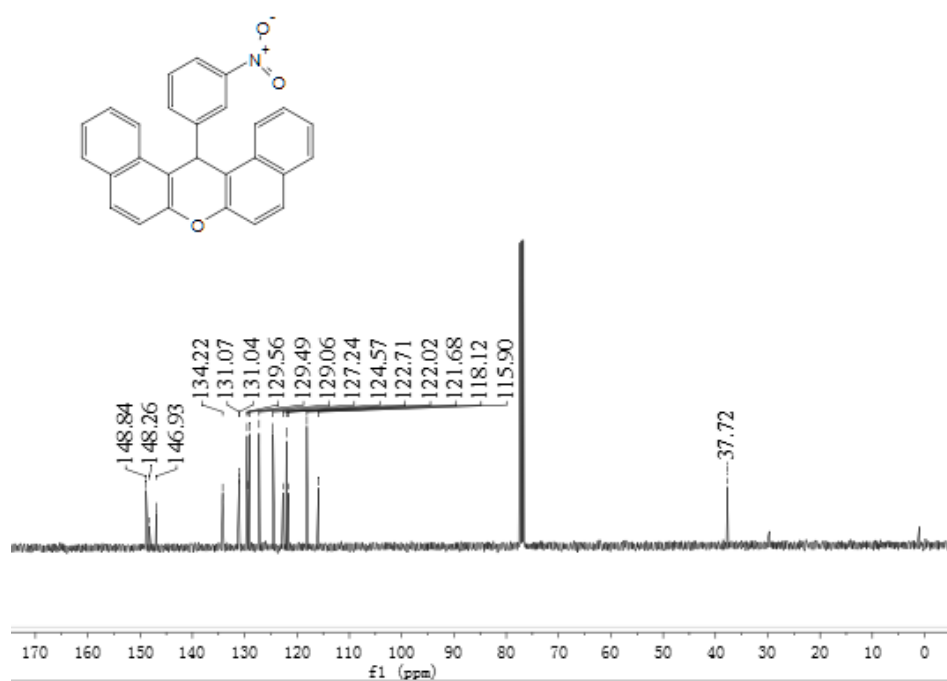
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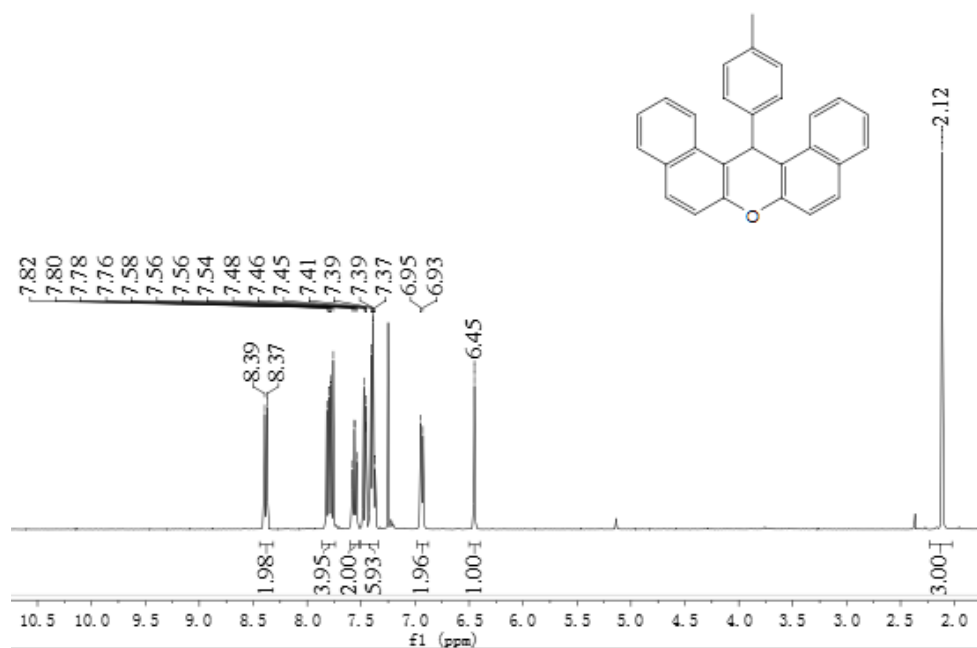
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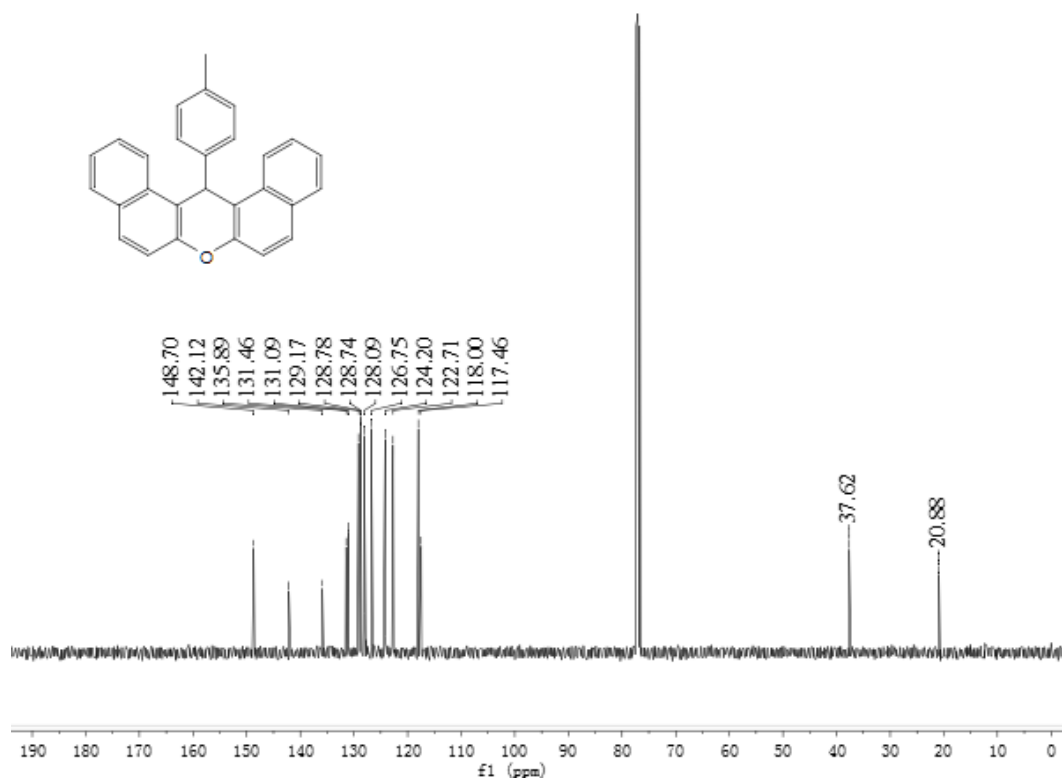
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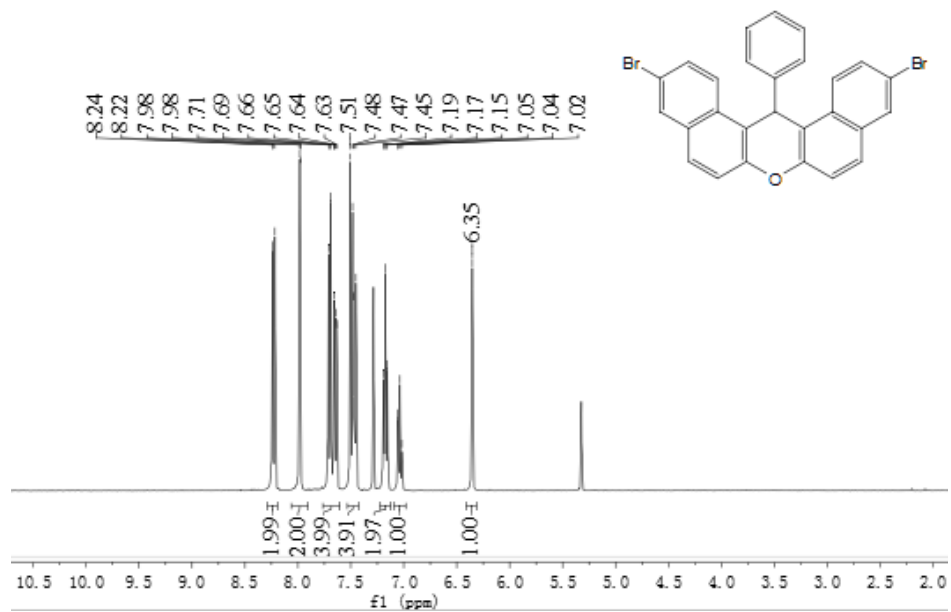
¹H-NMR of 3g



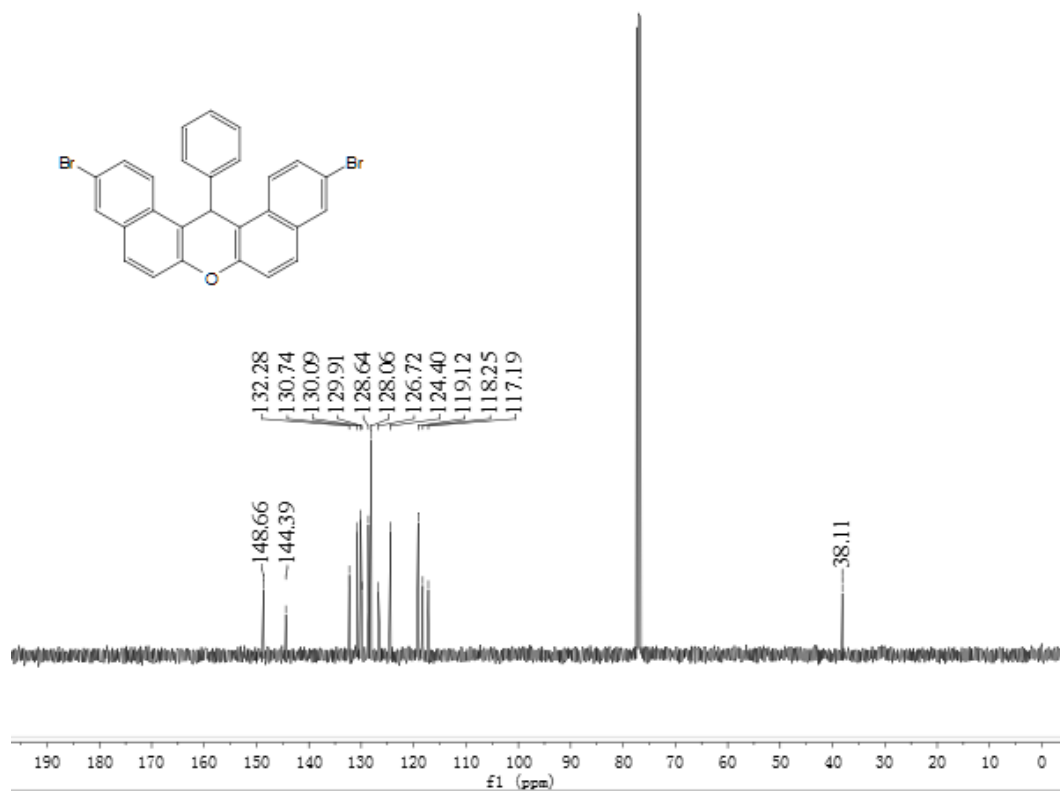
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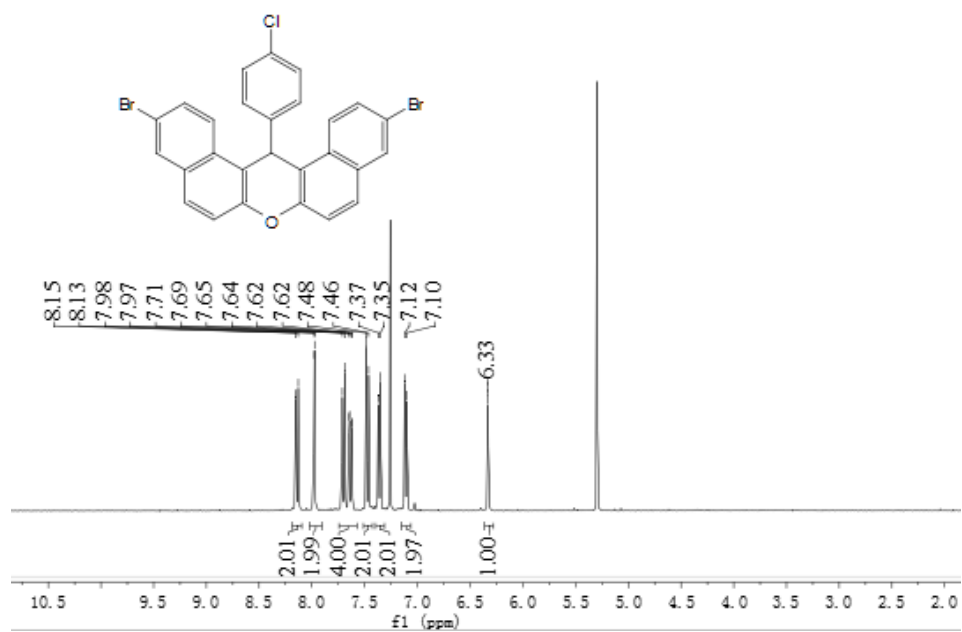
¹H-NMR of 3h



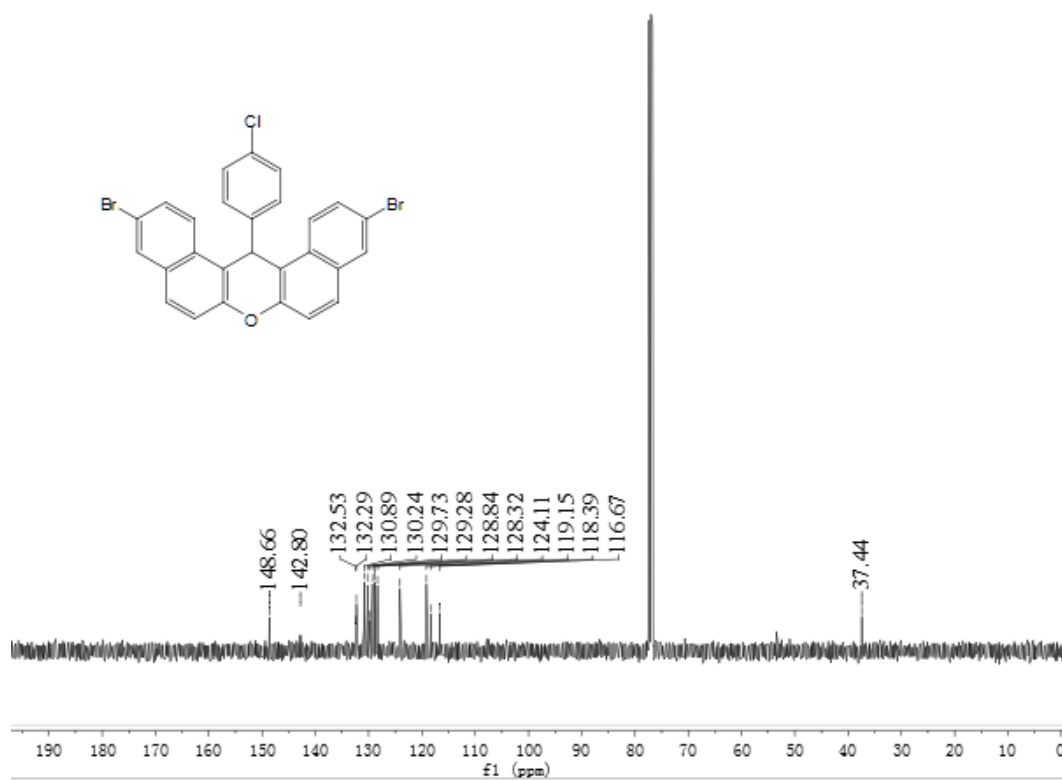
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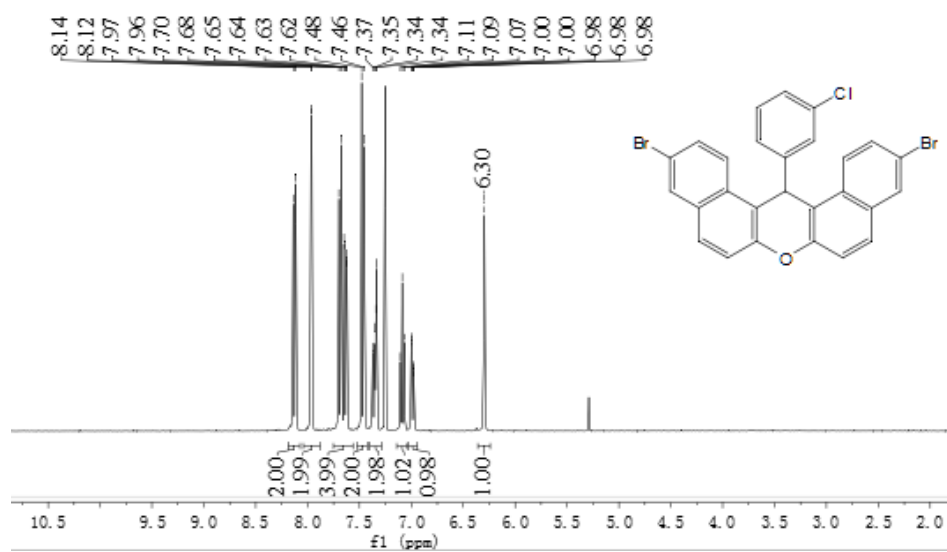
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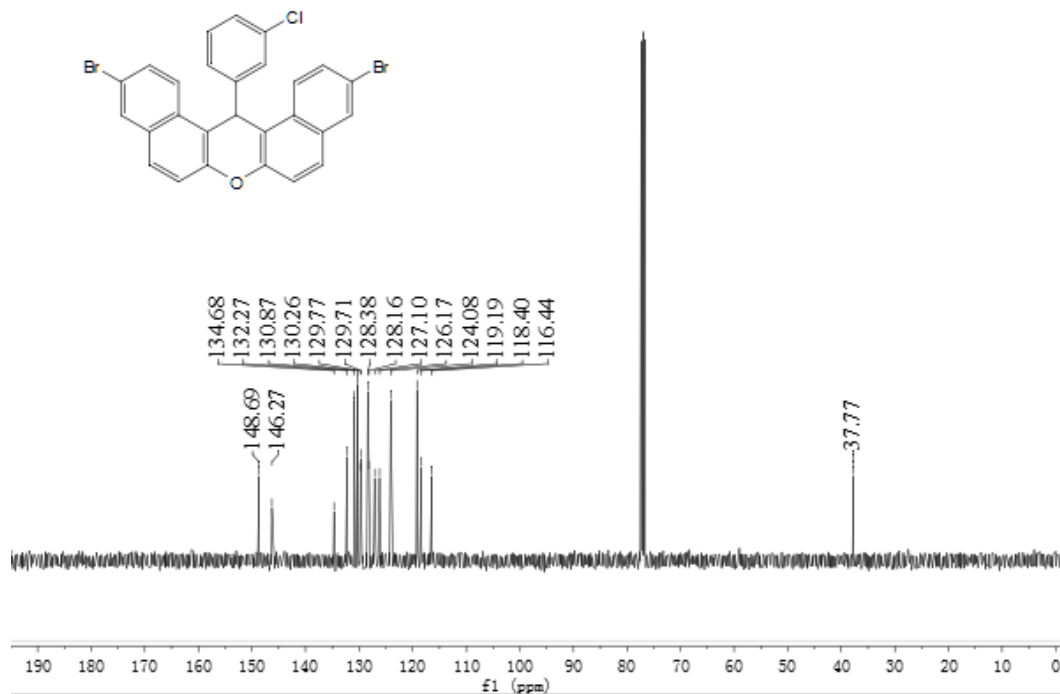
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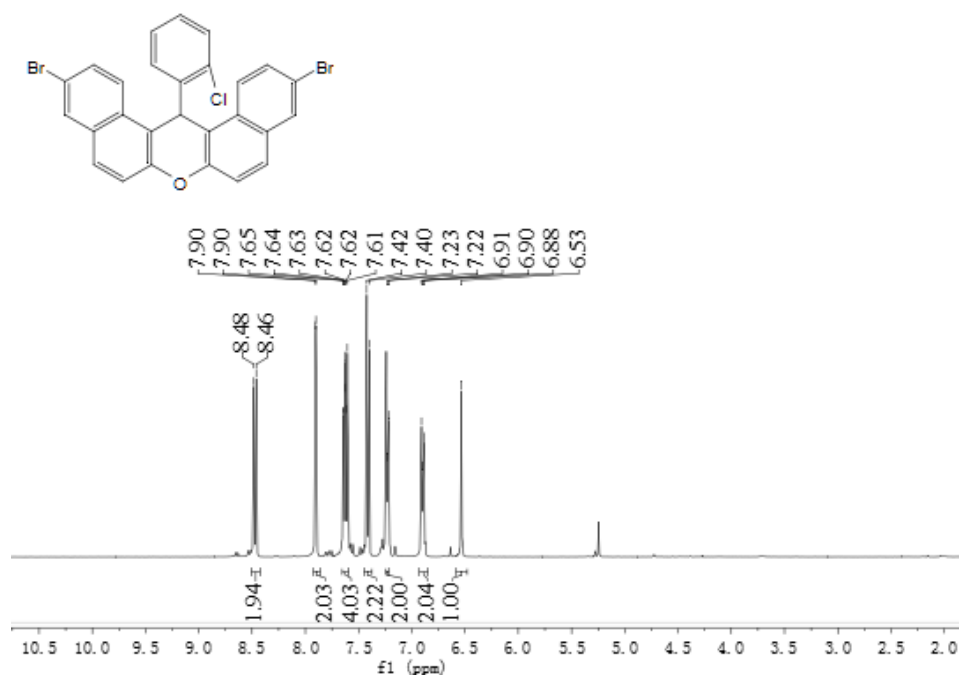
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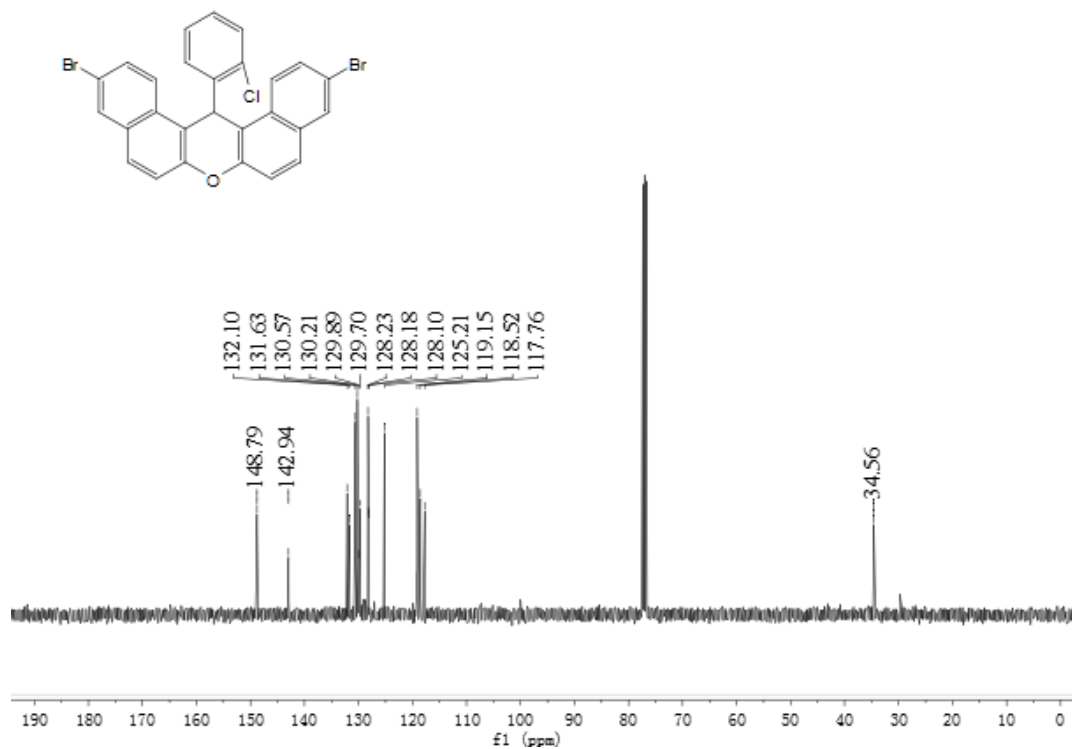
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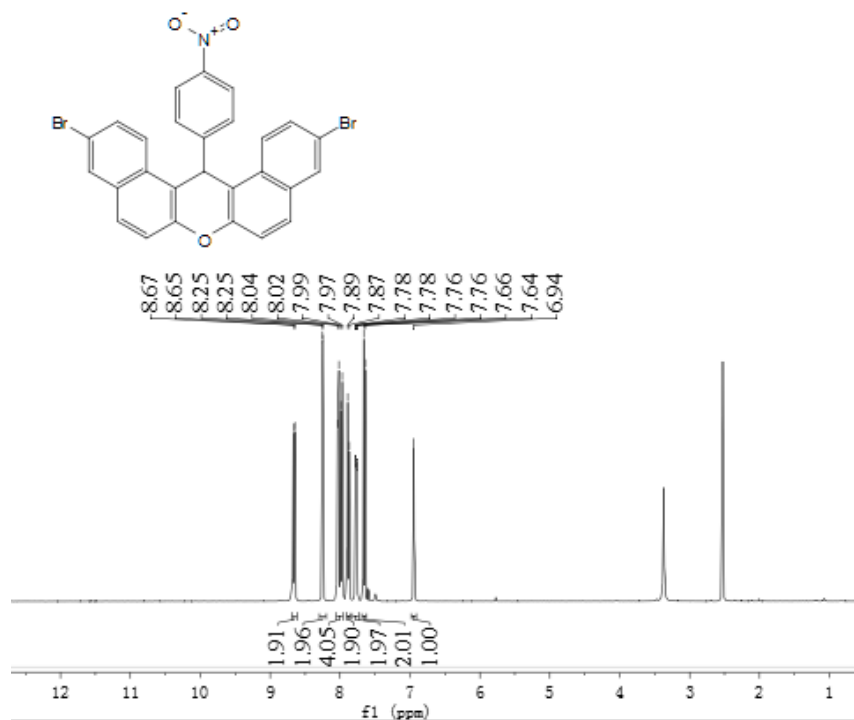
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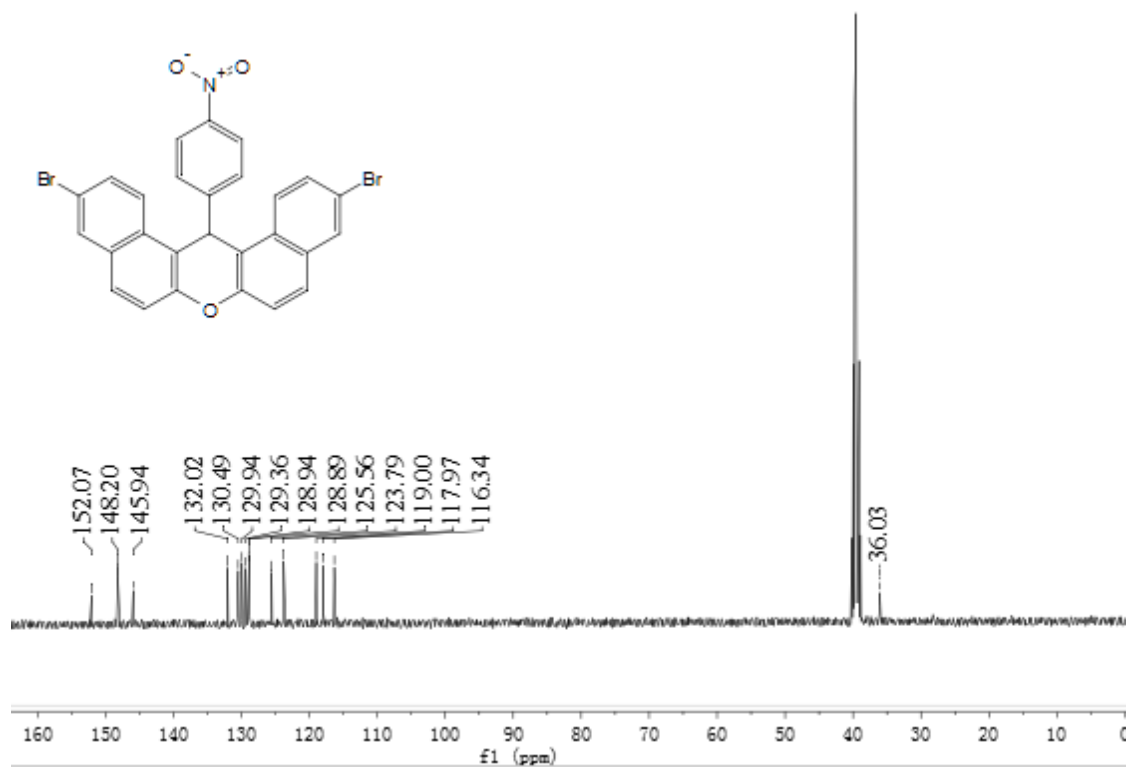
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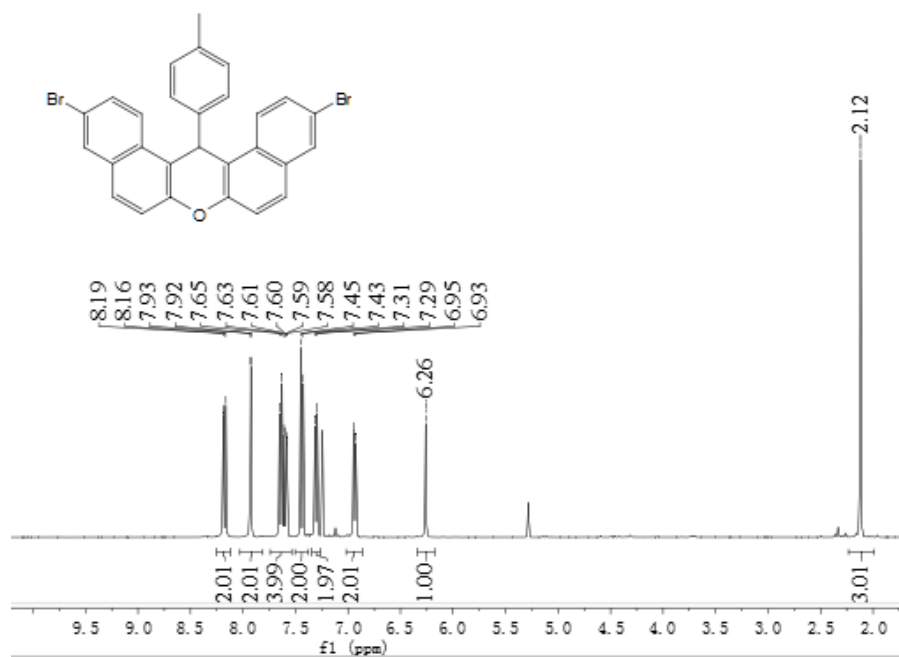
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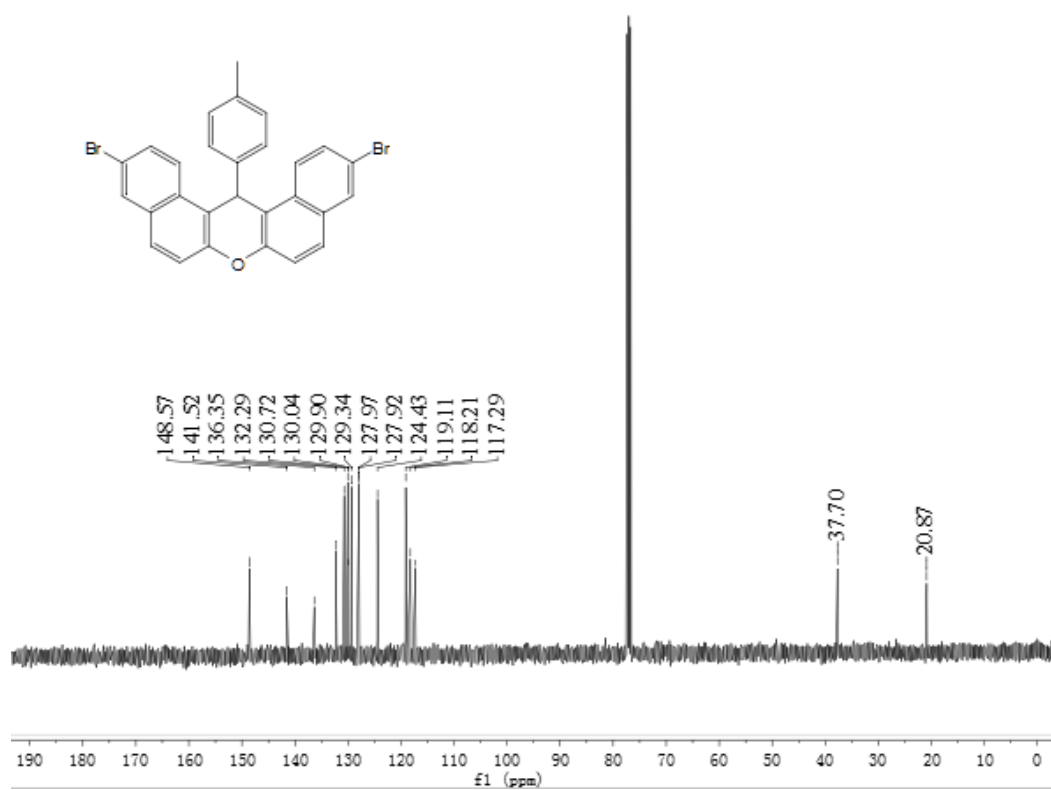
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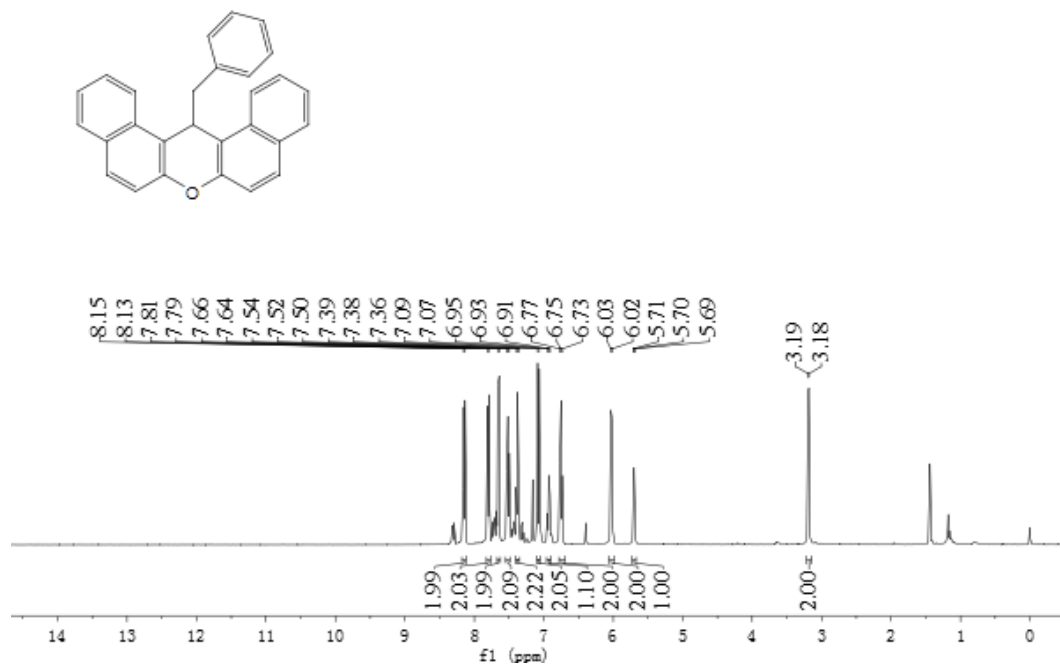
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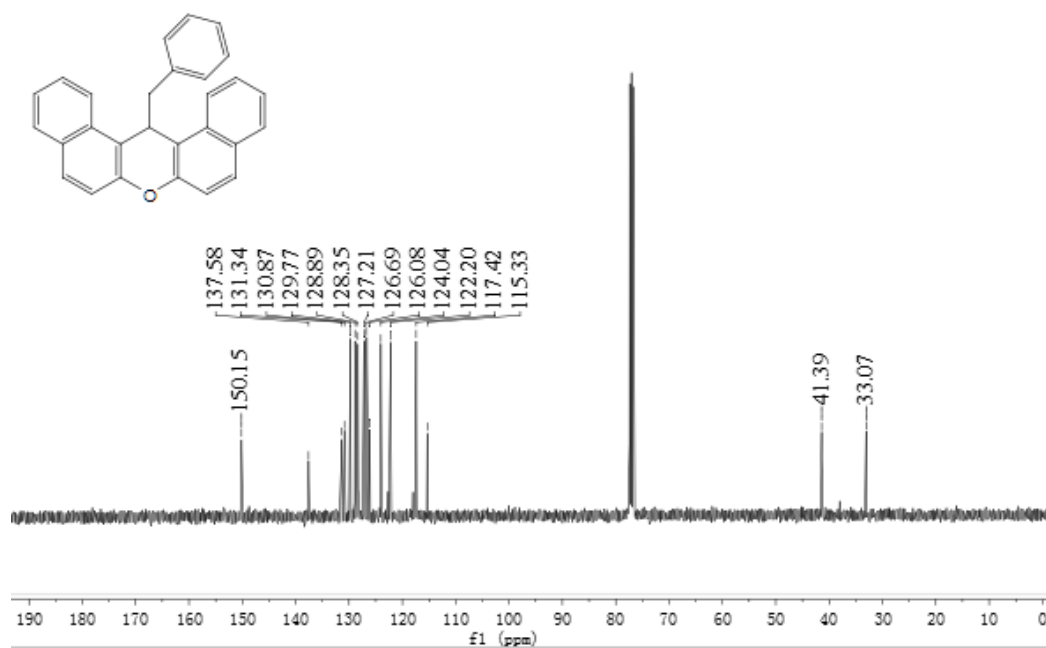
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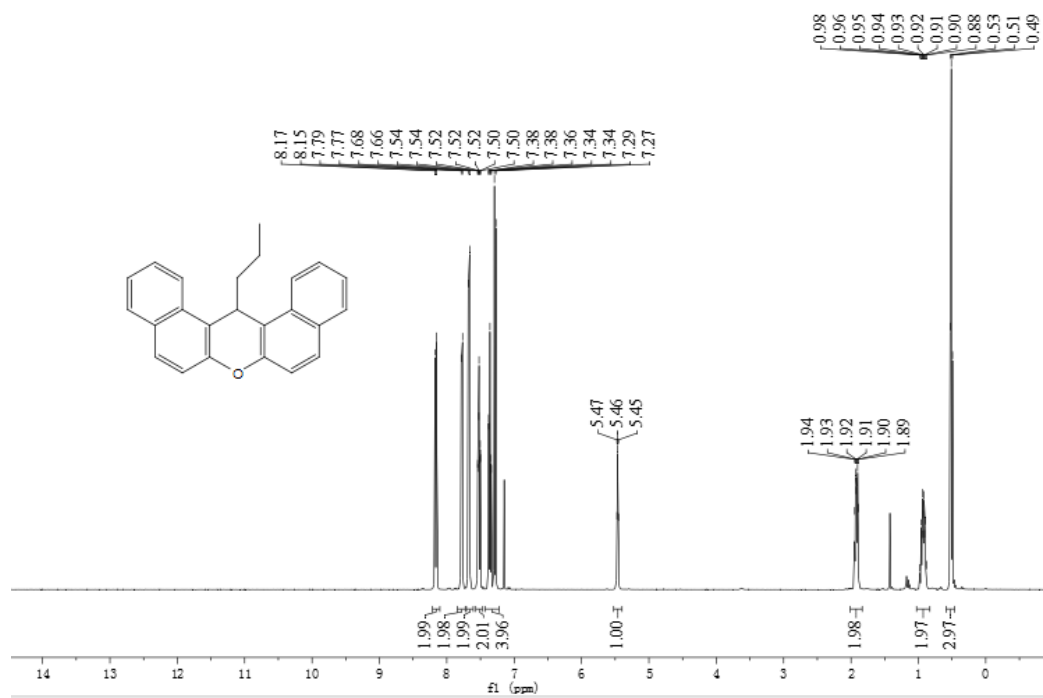
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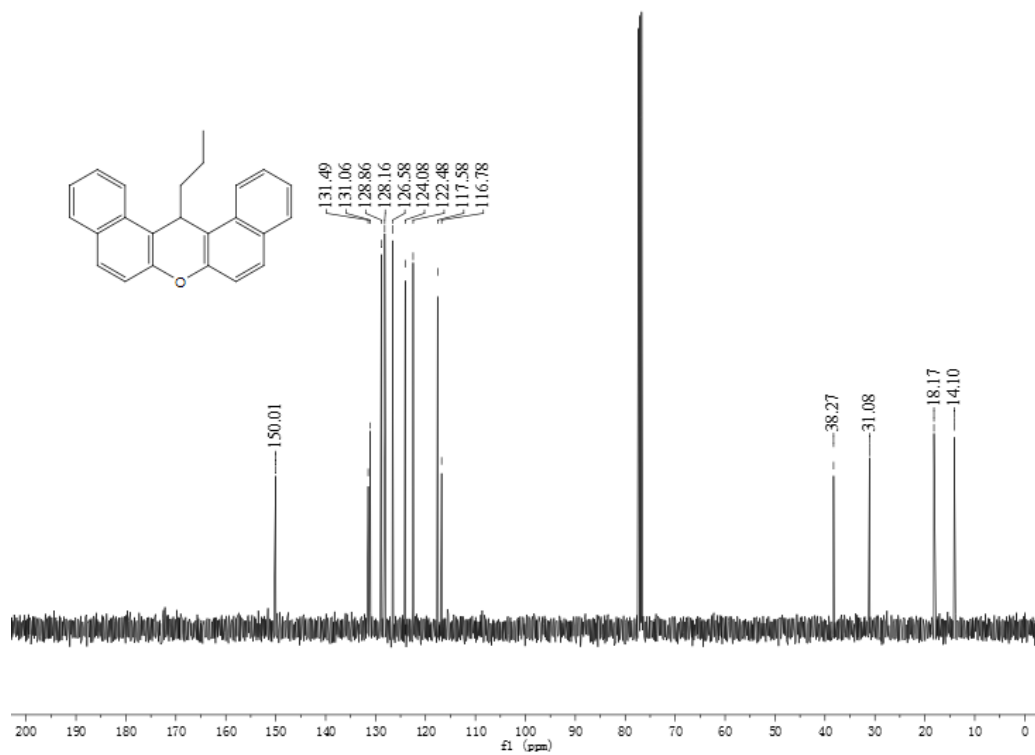
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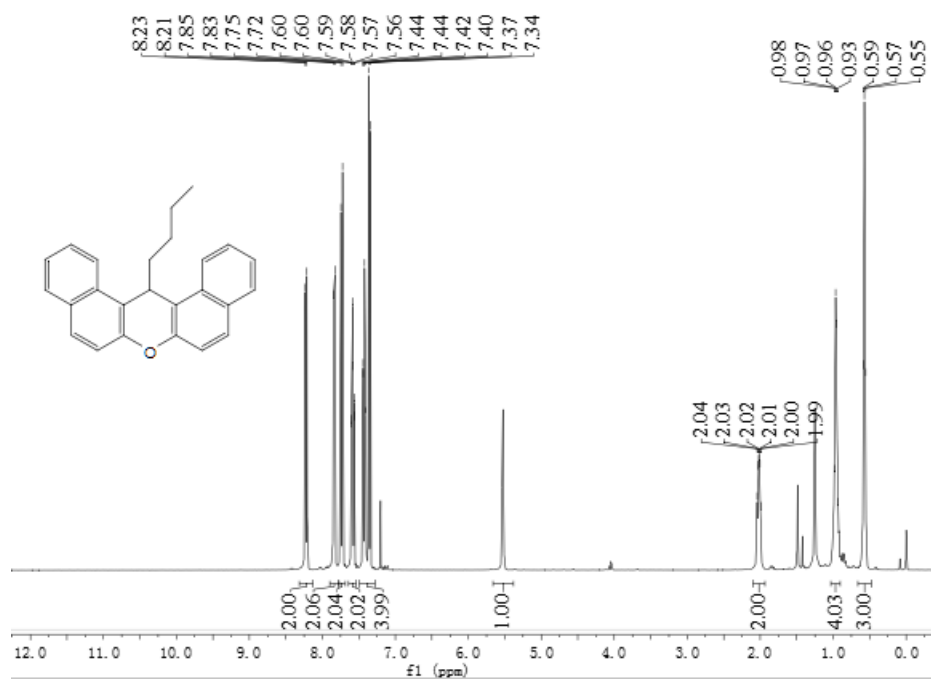
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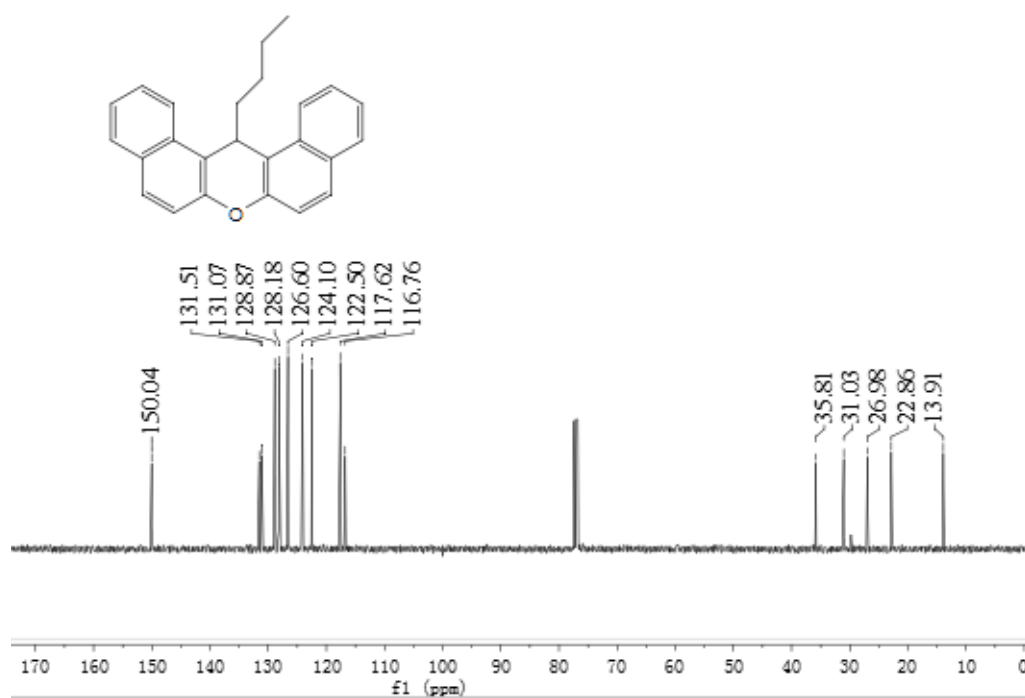
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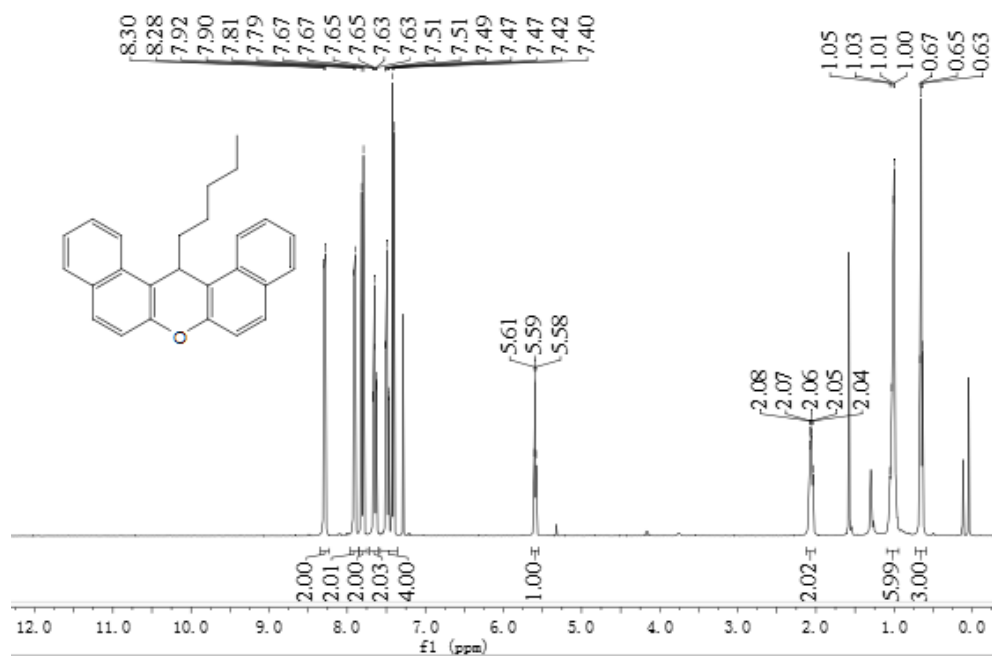
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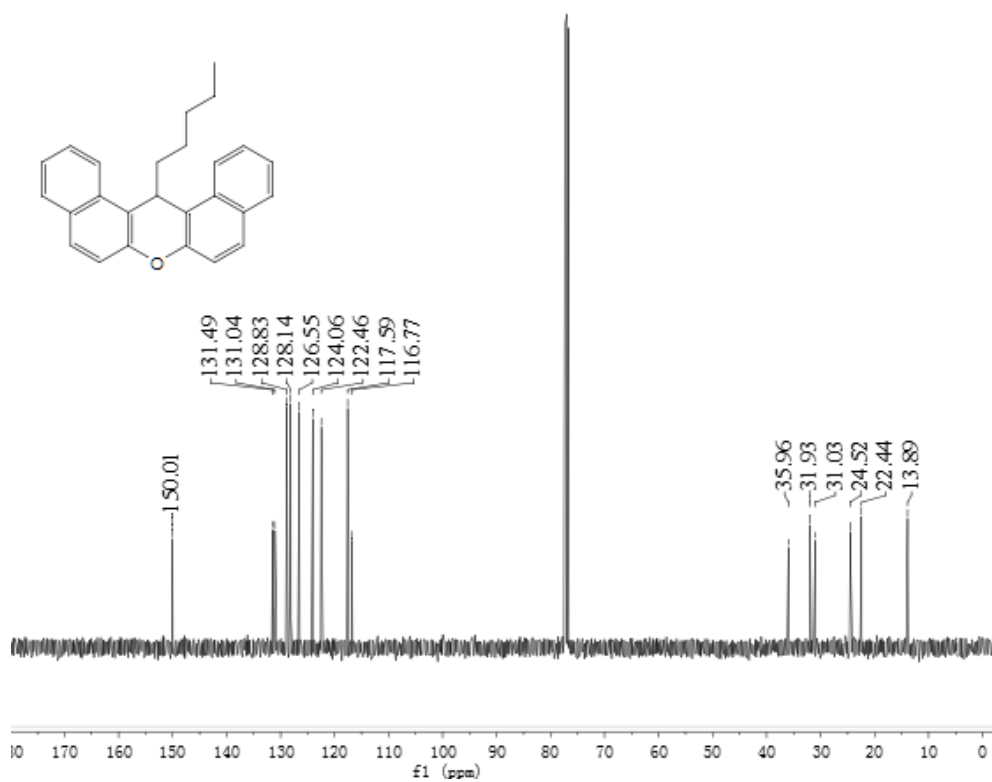
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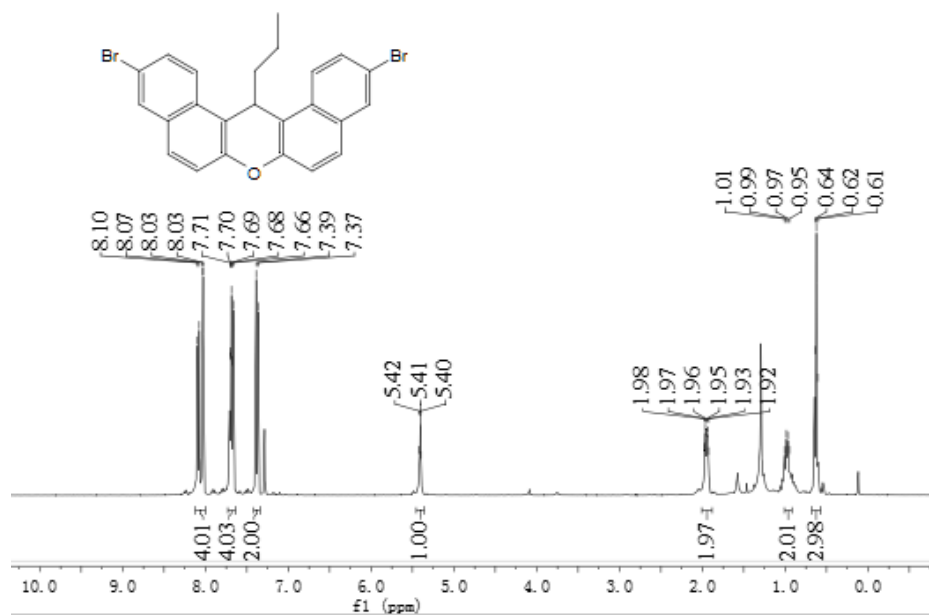
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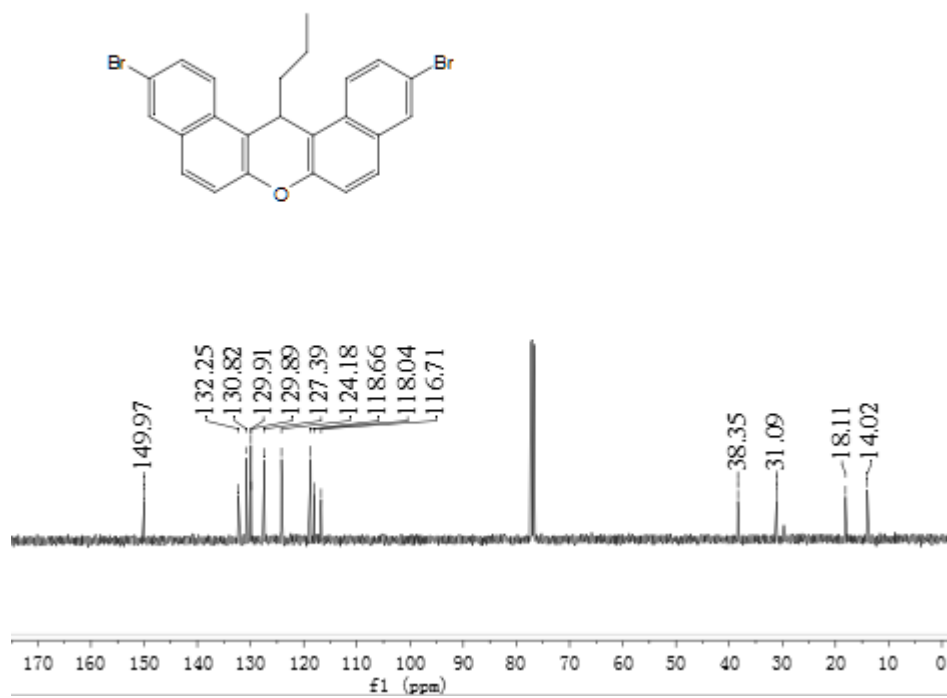
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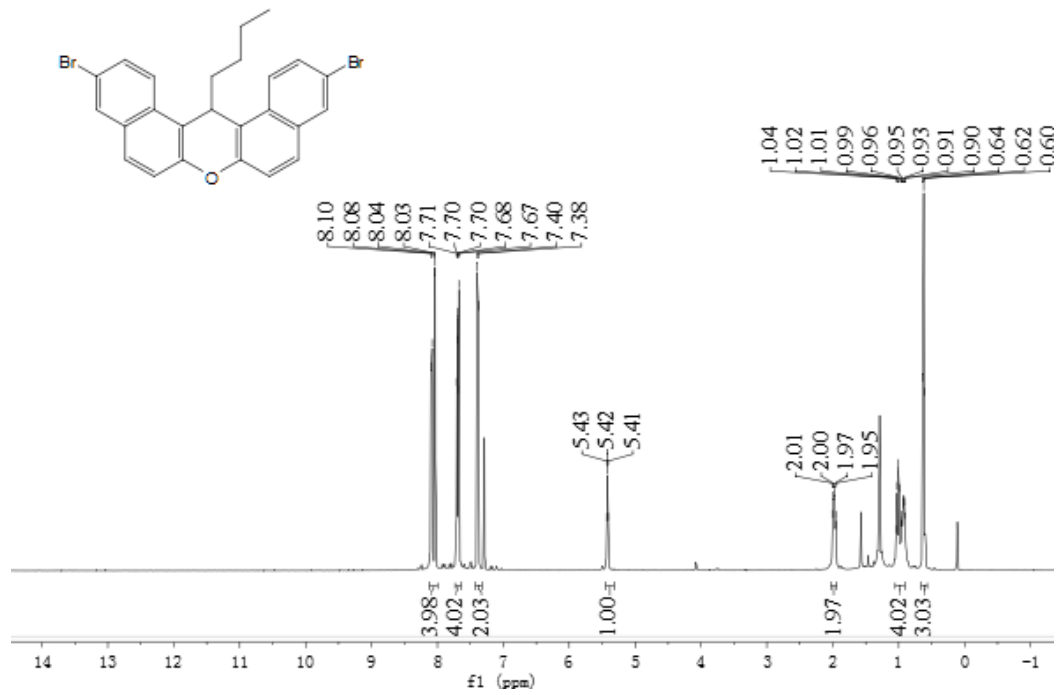
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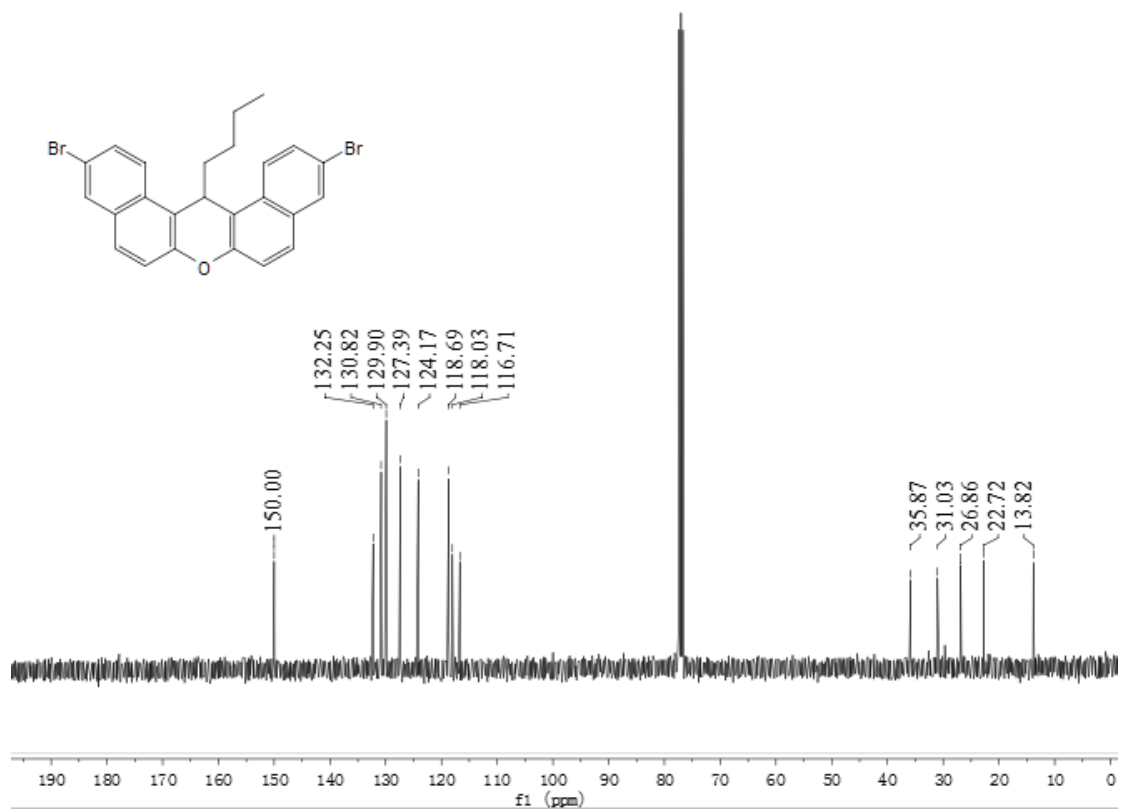
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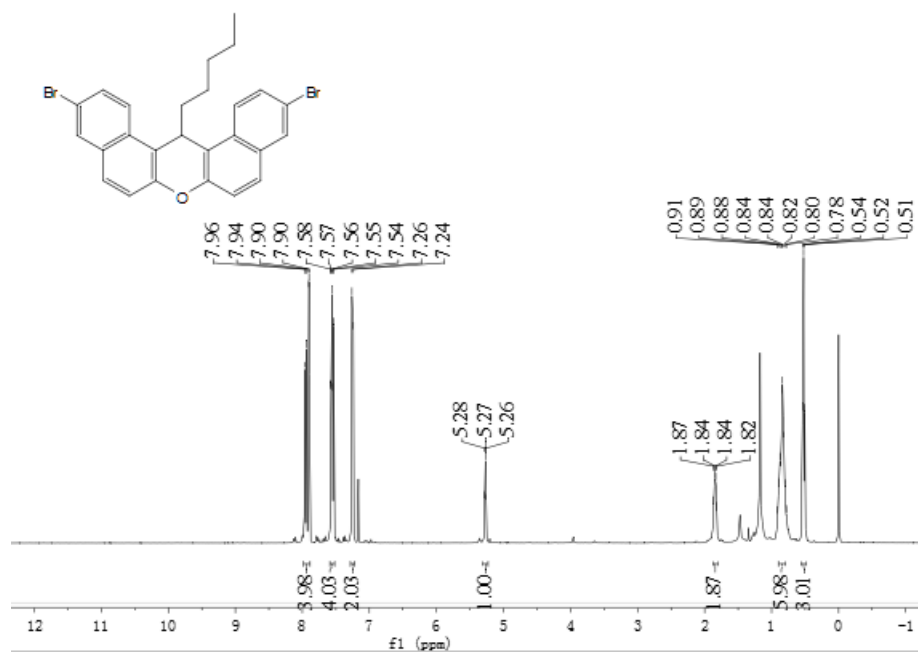
¹H-NMR of 3u



¹³C-NMR of 3u



¹H-NMR of 3v



¹³C-NMR of 3v

