Electronic Supporting Information

Investigation of a copper (I) biquinoline complex for application in dye-sensitized solar cells

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Preparation of the electrodes and DSSC assembly

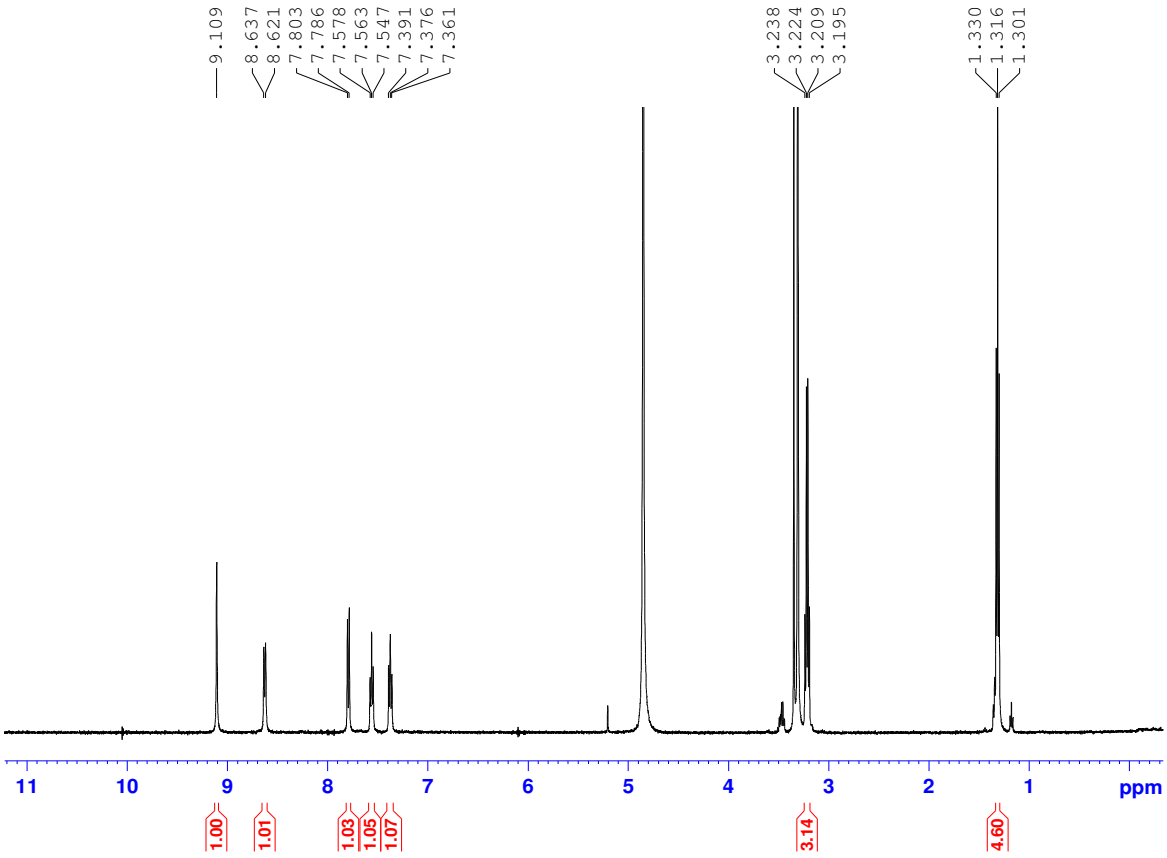
Prior to use, fluorine-doped tin oxide (FTO) glass (Hartford Glass, USA sheet resistance 13Ω/sq) was cleaned in a sonicator with heating, in 15 min cycles, in Decon 90 solution, Milli-Q water, isopropanol and ethanol. Unless otherwise stated, a TiO_2 blocking layer was deposited by spray pyrolysis from a 0.2 M solution of diisopropoxytitanium bis(acetylacentonate) in isopropanol onto the cleaned FTO glass before preparation of the TiO_2 film. The glass was heated to ~400 °C and the blocking layer solution was sprayed onto the surface using a hand-held atomiser. The films were deposited by spraying one short burst to the top, middle and bottom of the glass every 10 s for 2.5 min. After cooling, a layer of colloidal TiO_2 paste (Dyesol, DSL 18NR-T, average nanoparticle size 20 nm) was then deposited onto the surface using the doctor blade method. One layer was applied and the film was dried on a hot plate at ~100 °C for 5 min, before a second layer was applied in the same manner. The film was dried again on a hot plate at ~100 °C for 5 min then sintered in an oven at 500 °C for 30 min.

For the counter electrode, two holes were drilled within a $1cm^2$ area of the FTO plate, which was then cleaned following the regime described previously. Platinum was deposited by pipetting a couple of drops of 5 mM hexachloroplatinate solution in isopropanol on the glass, followed by heating at 390 °C for 15 min. Alternatively, the counter electrodes were platinized using an Agar Sputter Coater.

The electrodes were sealed together using Surlyn plastic (Solaronix), with heating to ~100 °C on a hot plate while applying pressure with a hand press. The electrolyte was introduced into the cell through the drilled holes in the counter electrode and the holes were sealed using Surlyn and a glass cover slip. The electrolyte used was a solution of 0.03 M I_2, 0.6 M 1-propyl-3-methylimidazolium iodide, 0.1 M guanidine thiocyanate and 0.5 M *tert*-butyl pyridine in a mixture of MeCN and valeronitrile (85:15) unless otherwise stated.

NMR Spectra

^{1}H NMR (CD_3OD)



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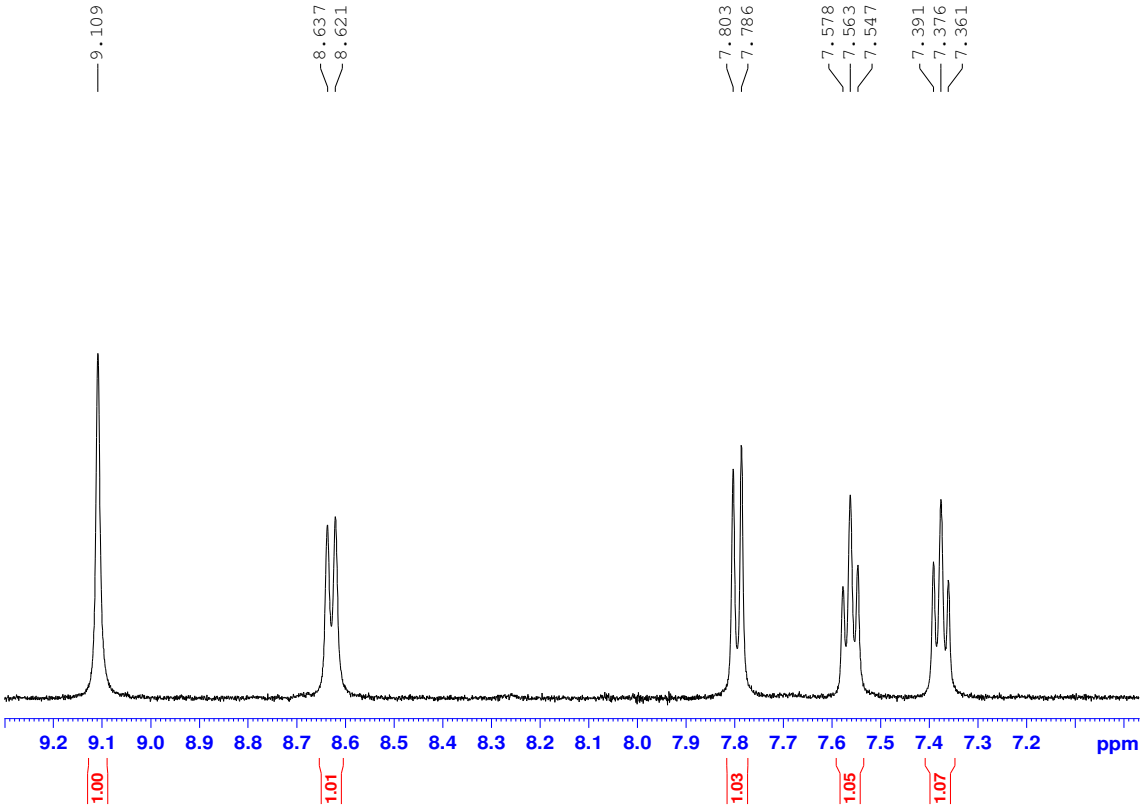
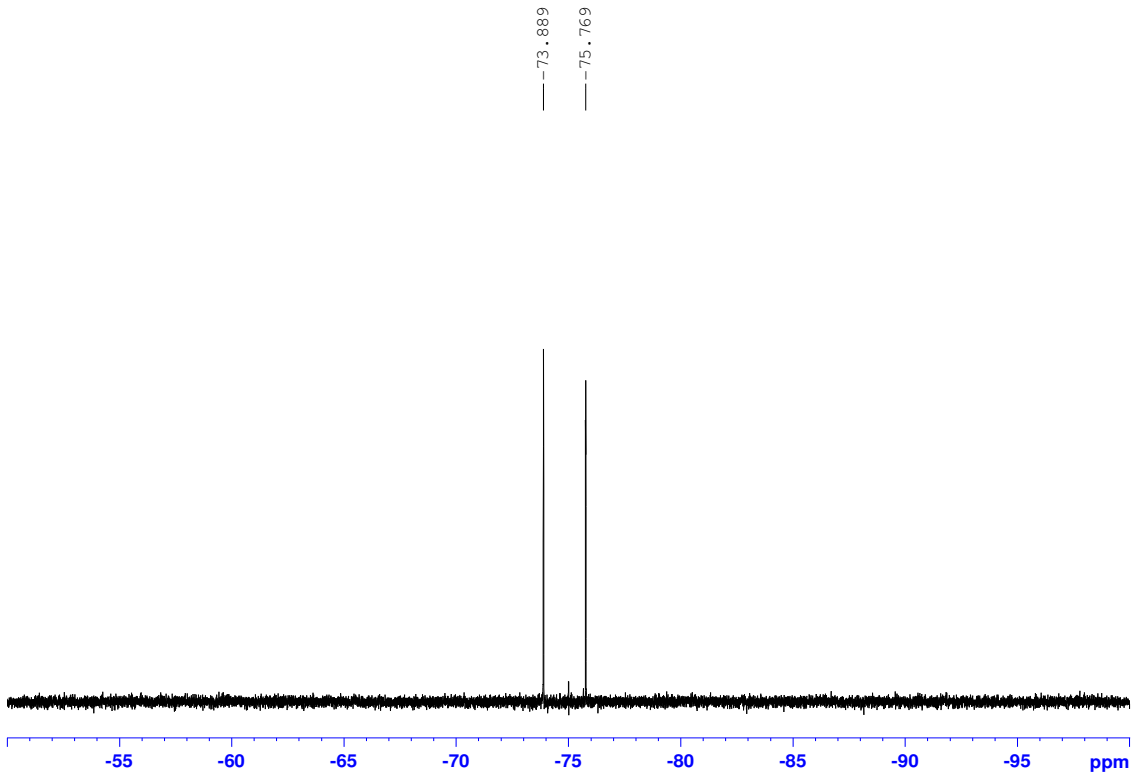
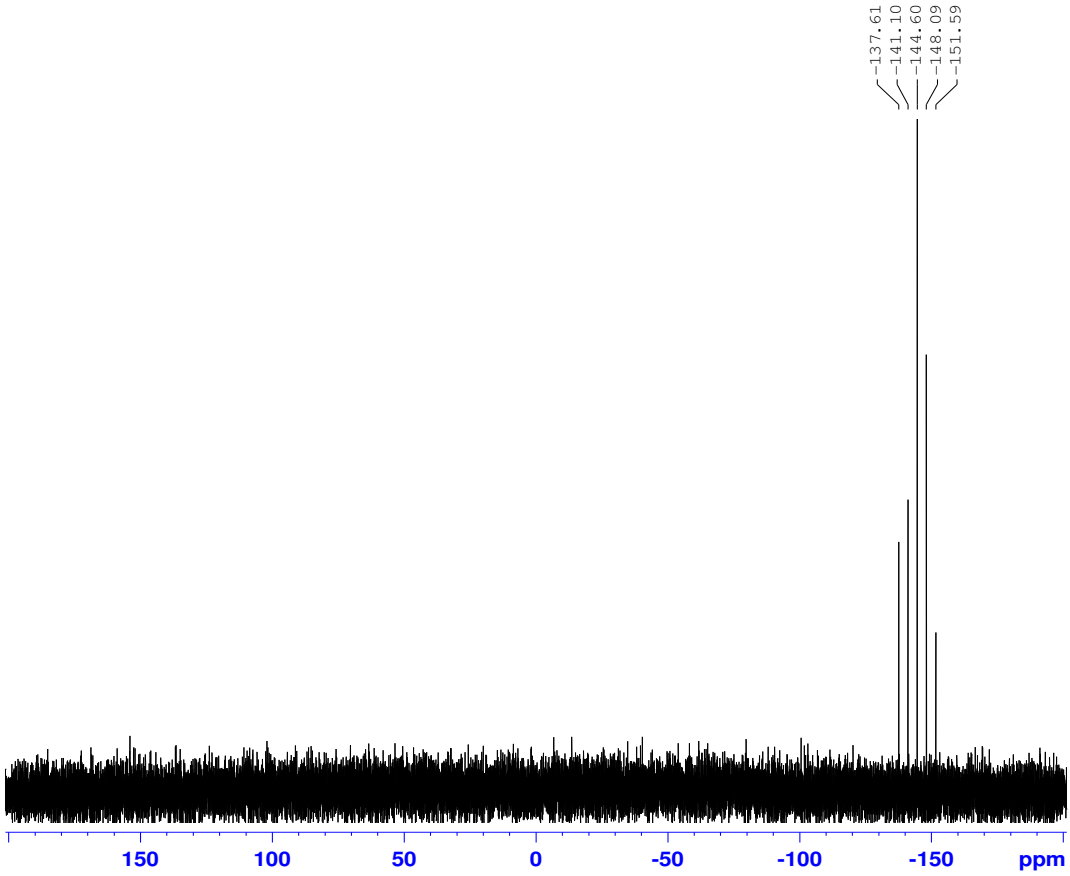


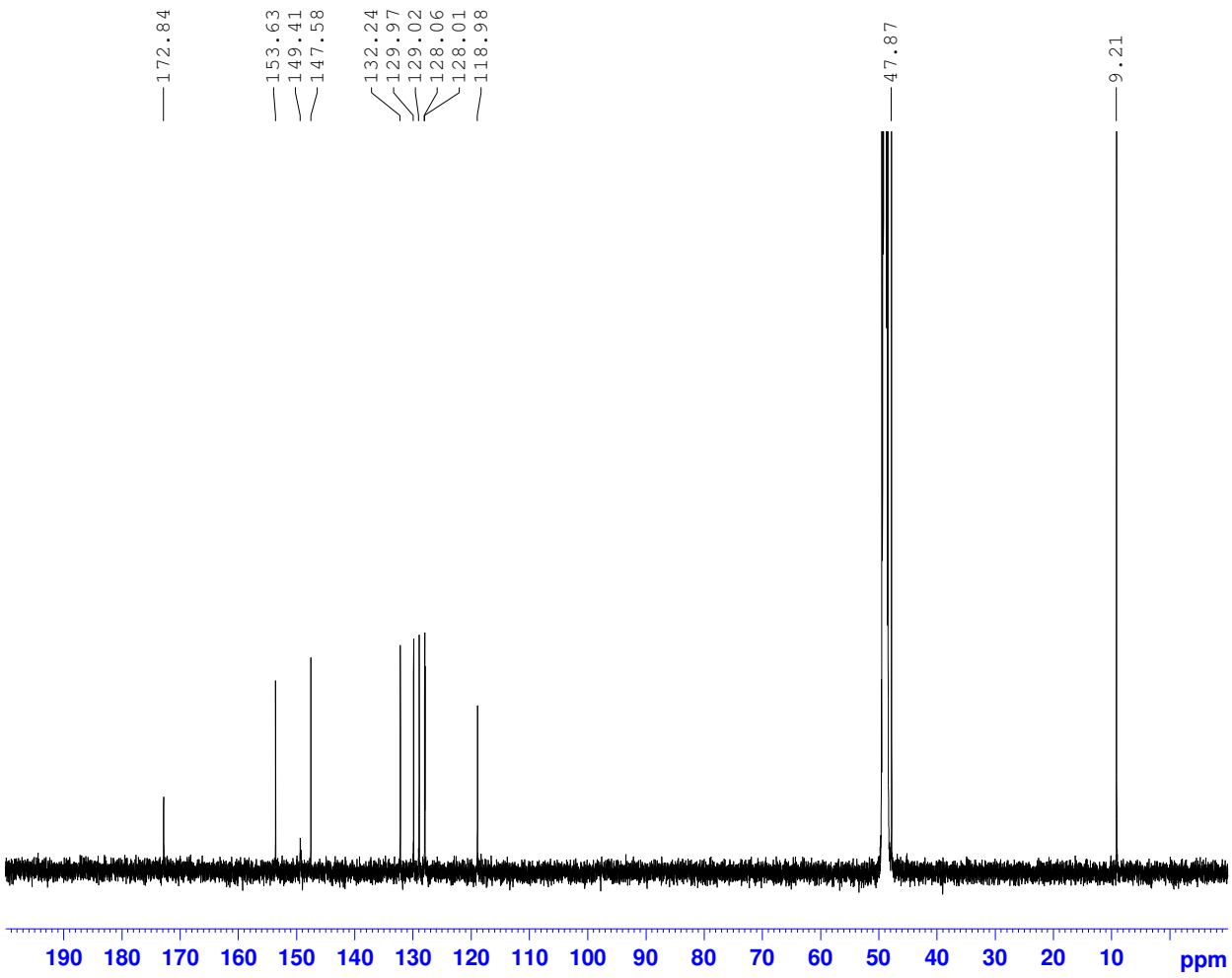
^{19}F NMR (CD_3OD)



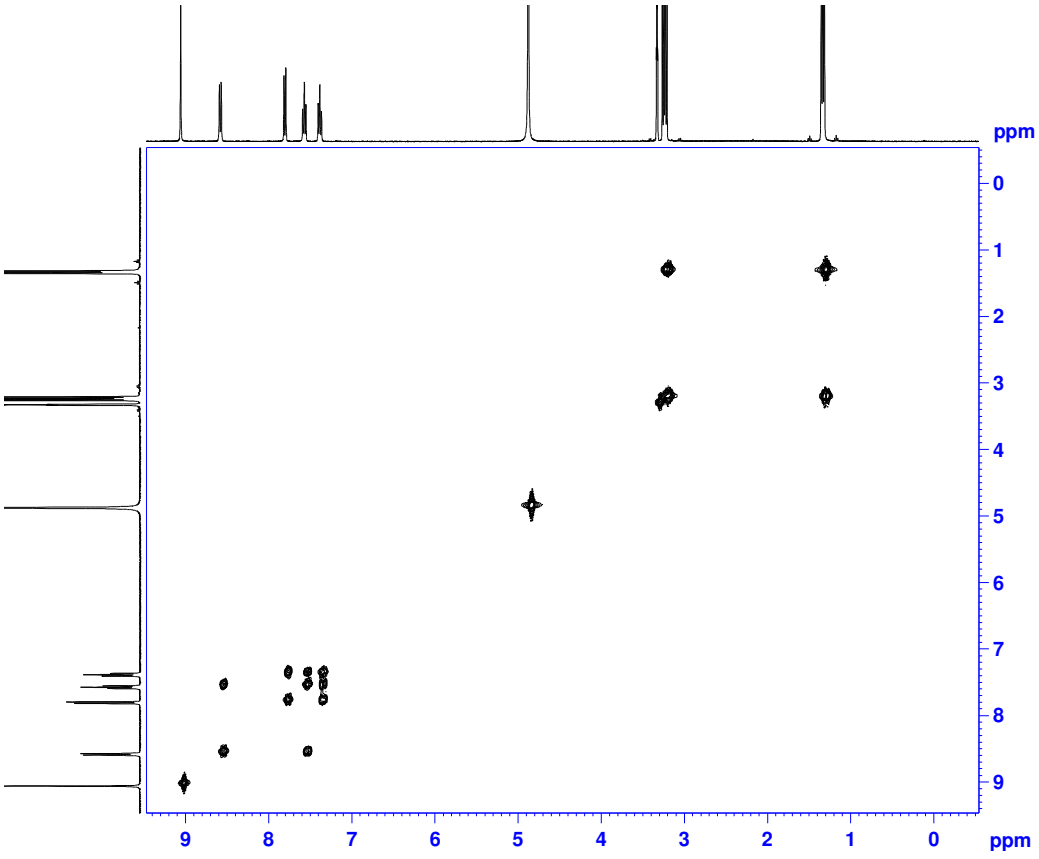
^{31}P NMR (CD_3OD)

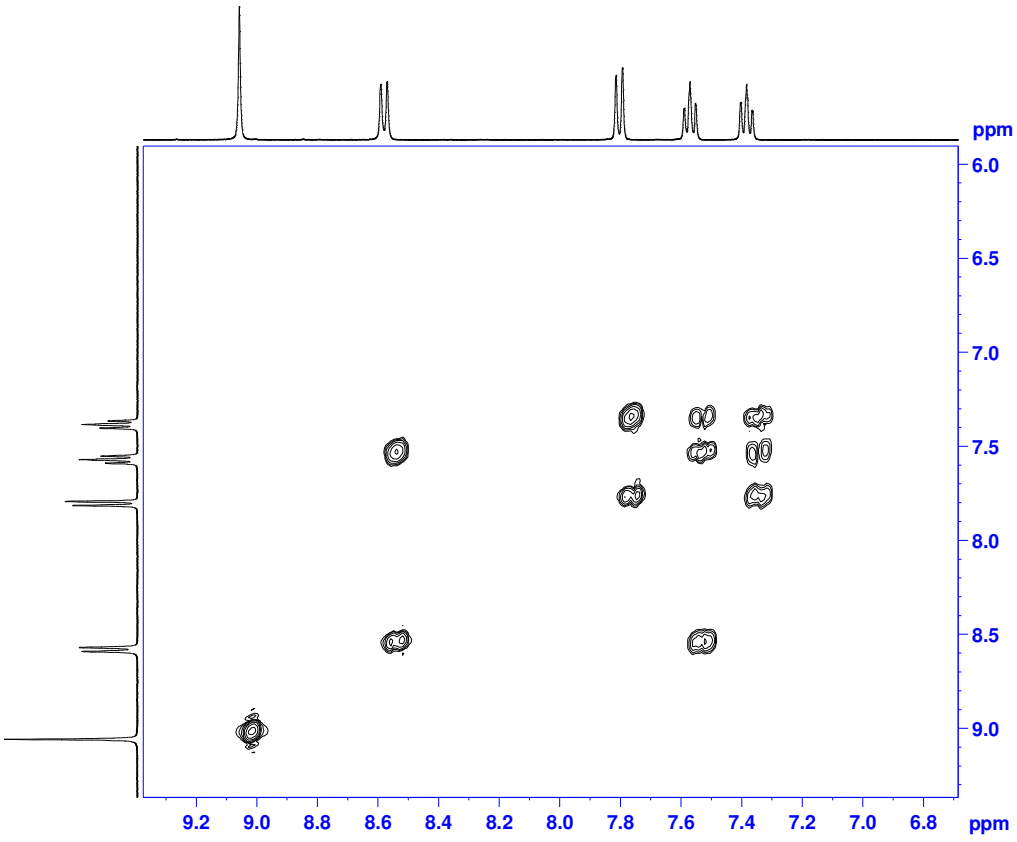


^{13}C NMR (CD_3OD)

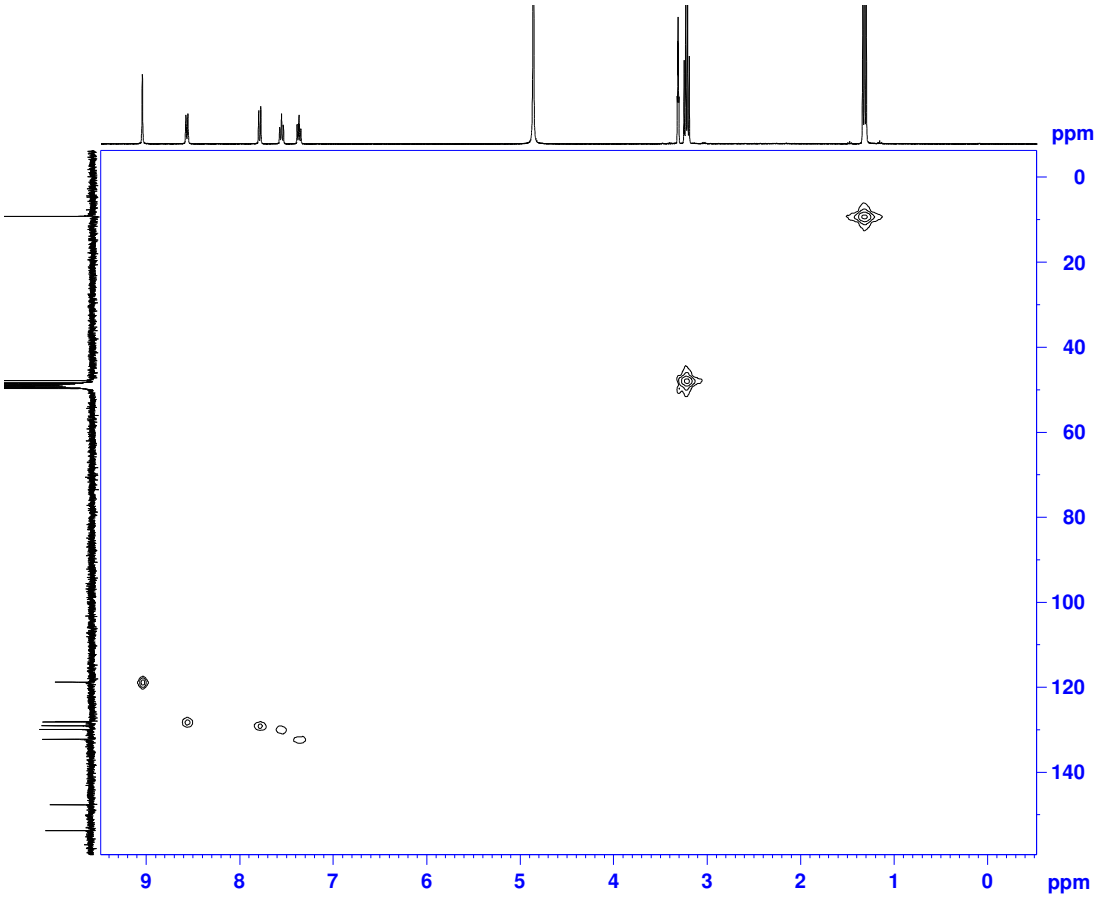


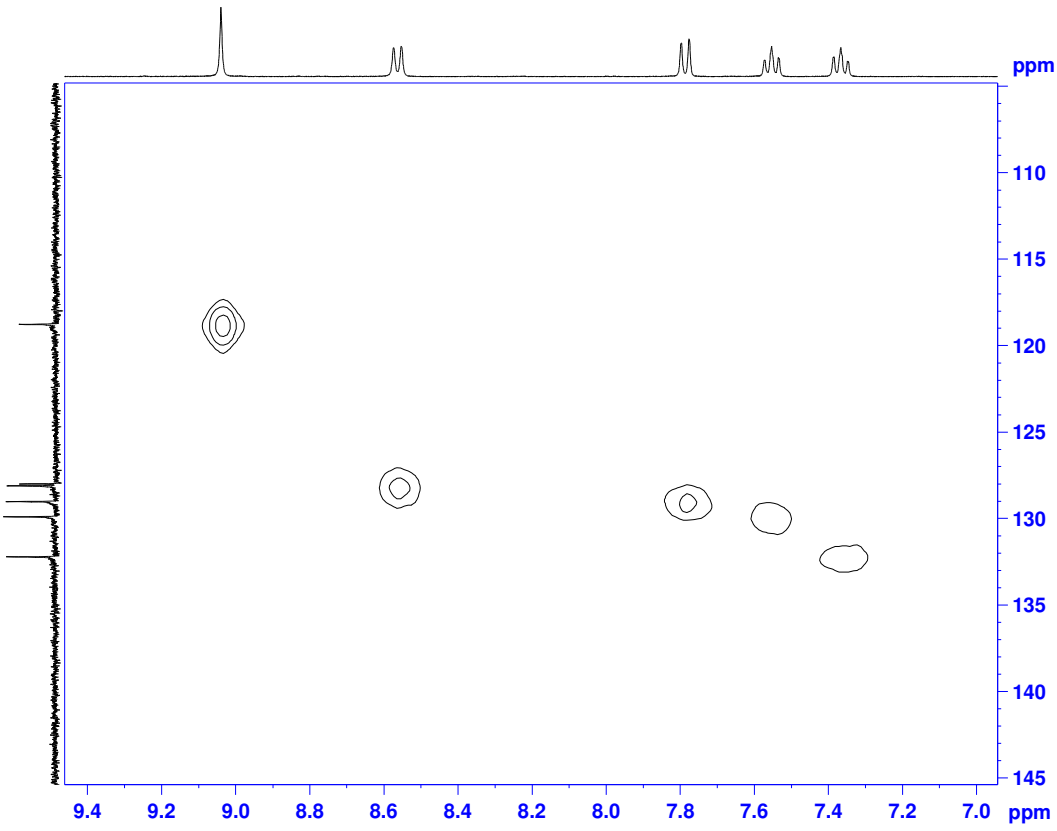
COSY (CD_3OD)





HMQC (CD_3OD)





HMBC (CD_3OD)