Supporting Information

Ru(II)-Catalyzed Cascade Decarbonylative Annulation and Dehydrogenative Alkenylation Reactions: Synthesis of Phthalides

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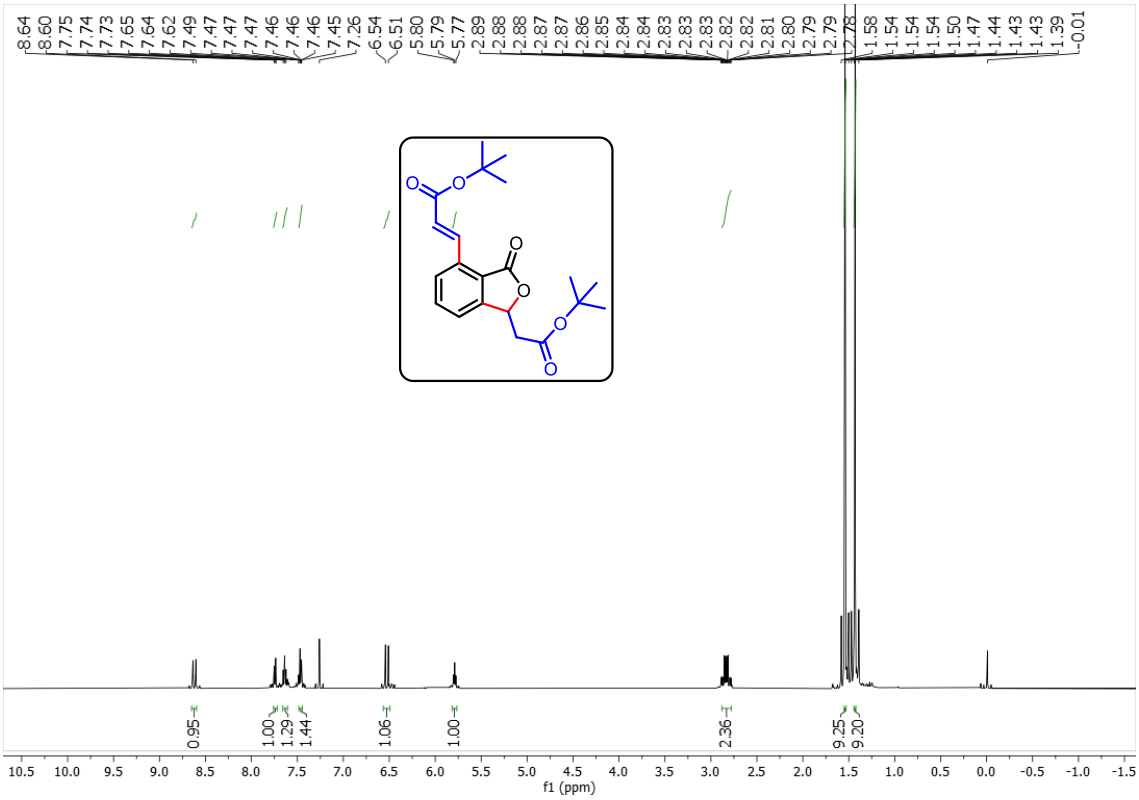
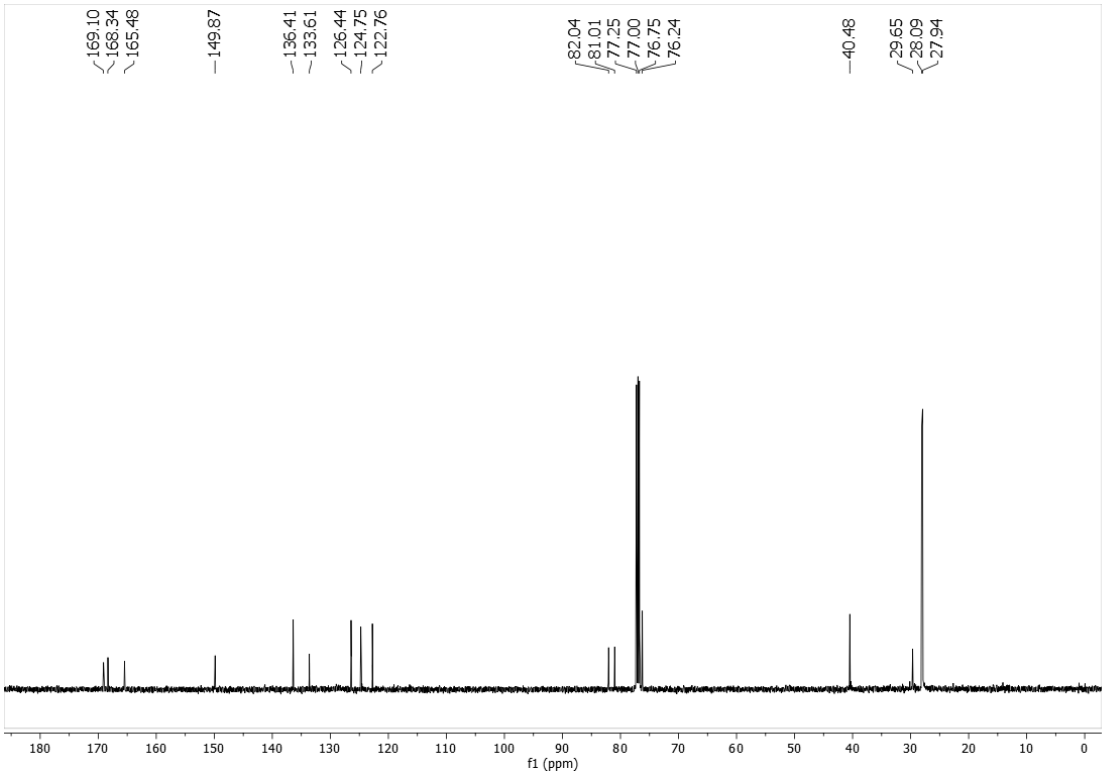
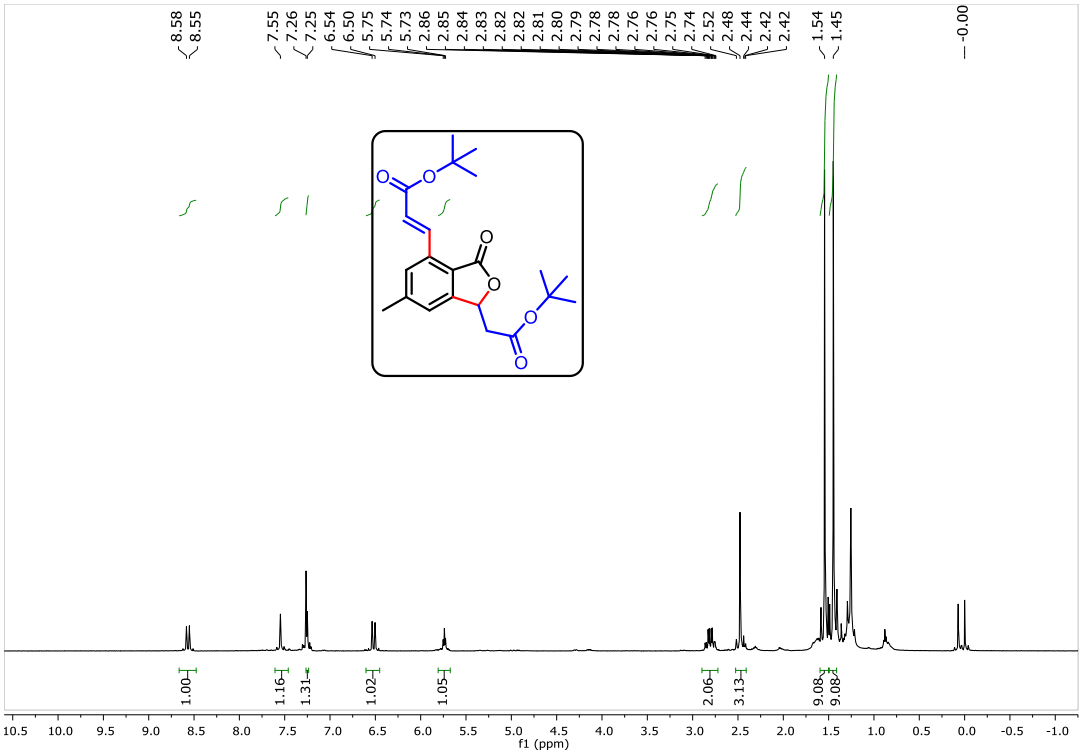
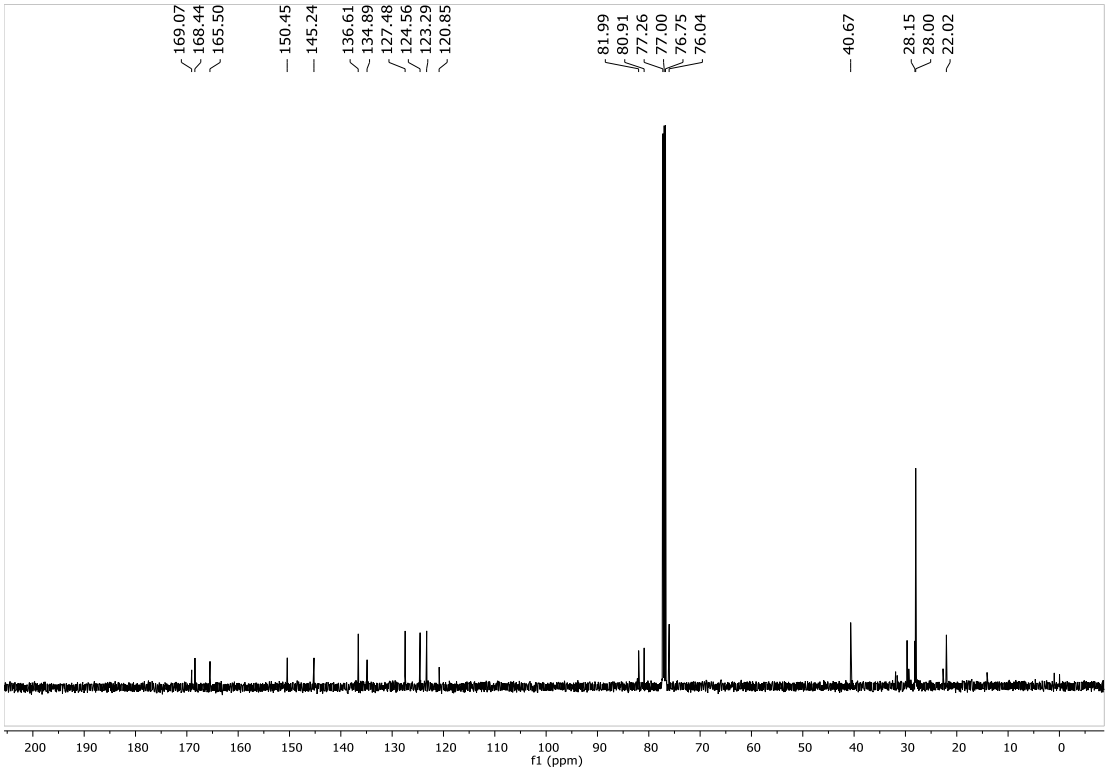
^{1}H and ^{13}C of Compound 3aa (500 & 125 MHz, $CDCl_3$):



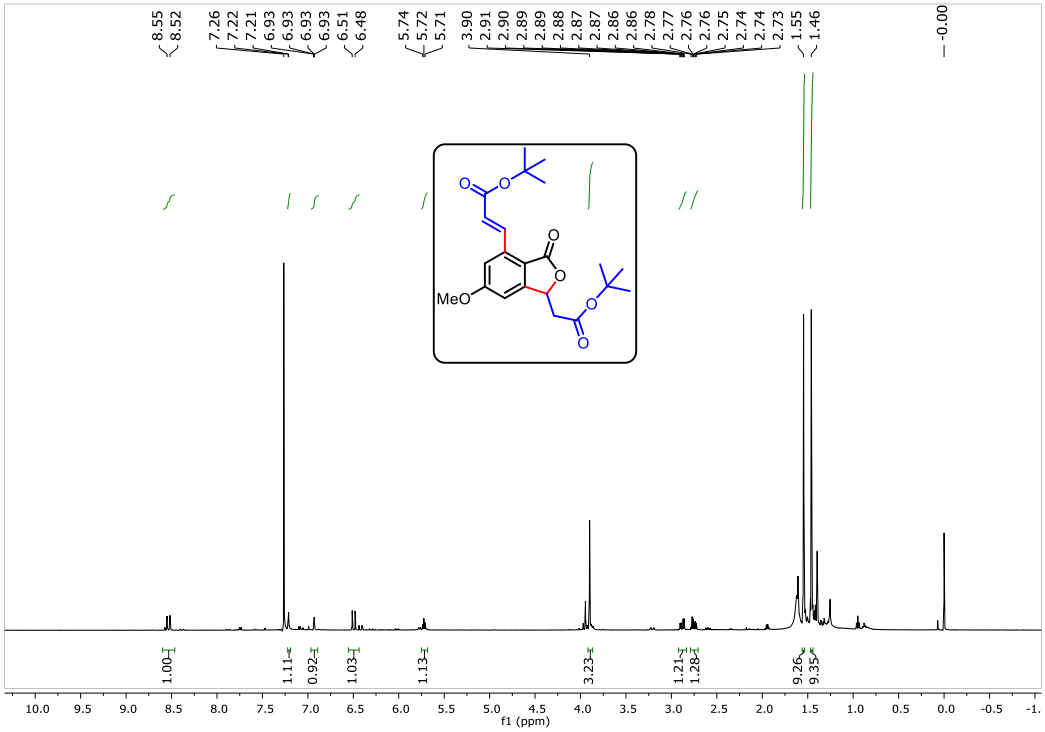


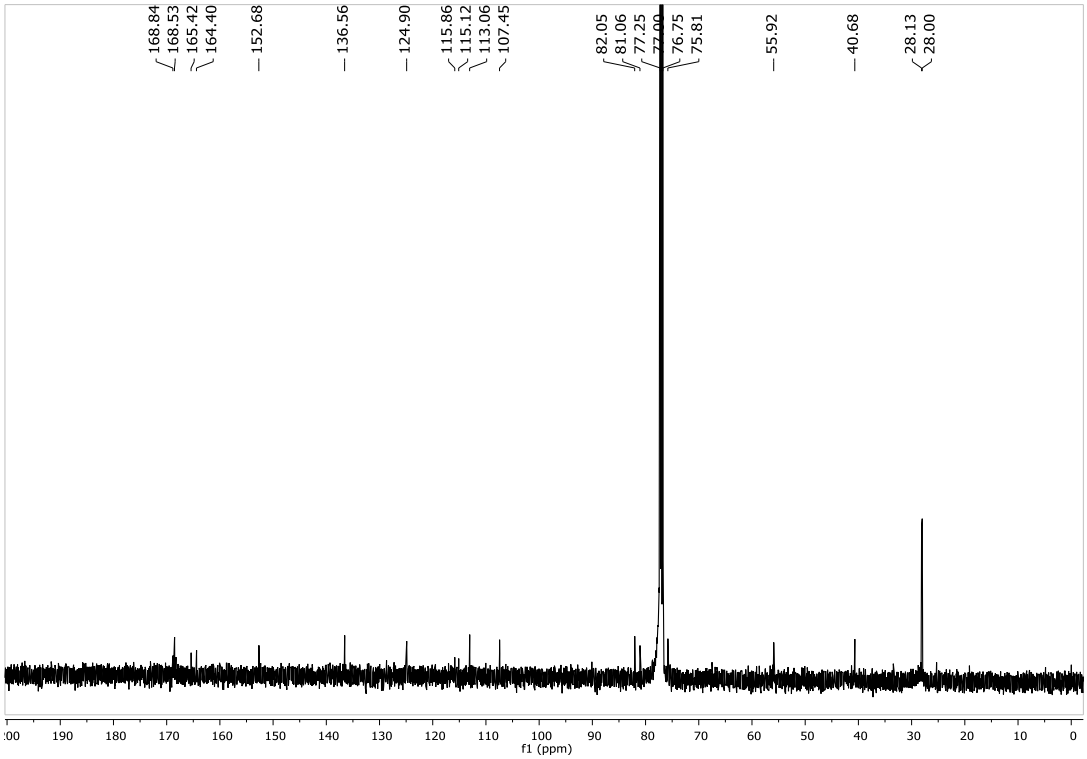
^{1}H and ^{13}C of Compound 3ba (500 & 125 MHz, $CDCl_3$):





^{1}H and ^{13}C of Compound 3ca (500 & 125 MHz, $CDCl_3$):





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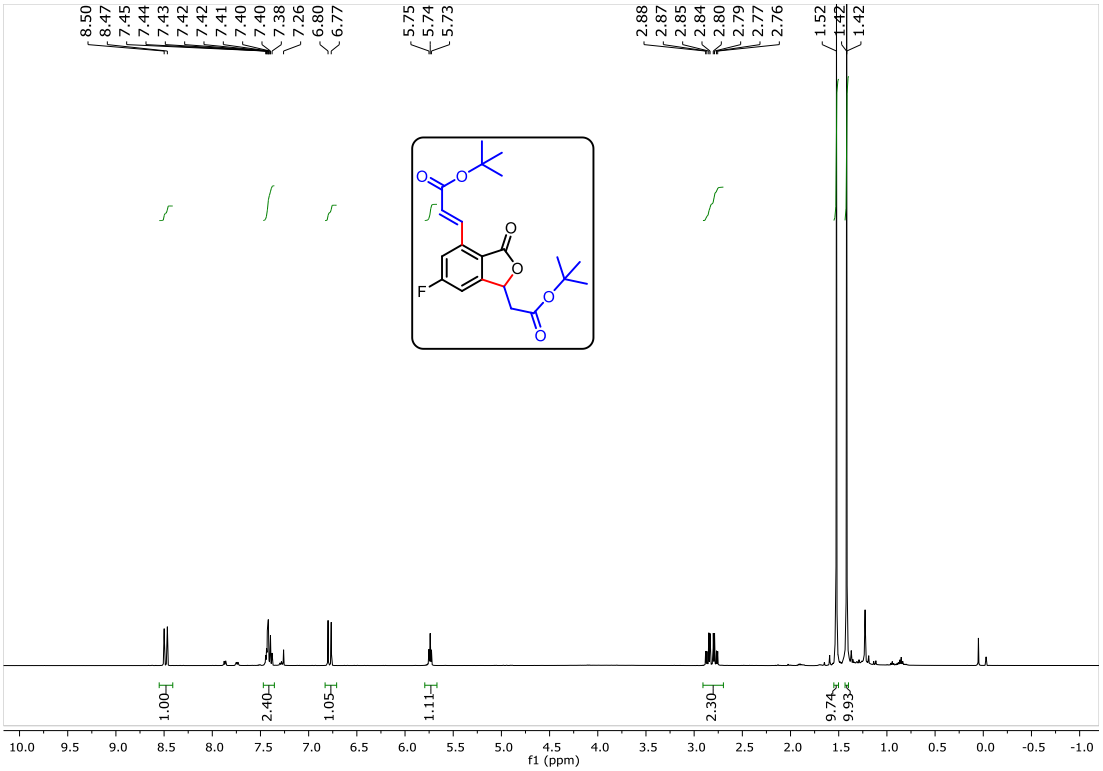
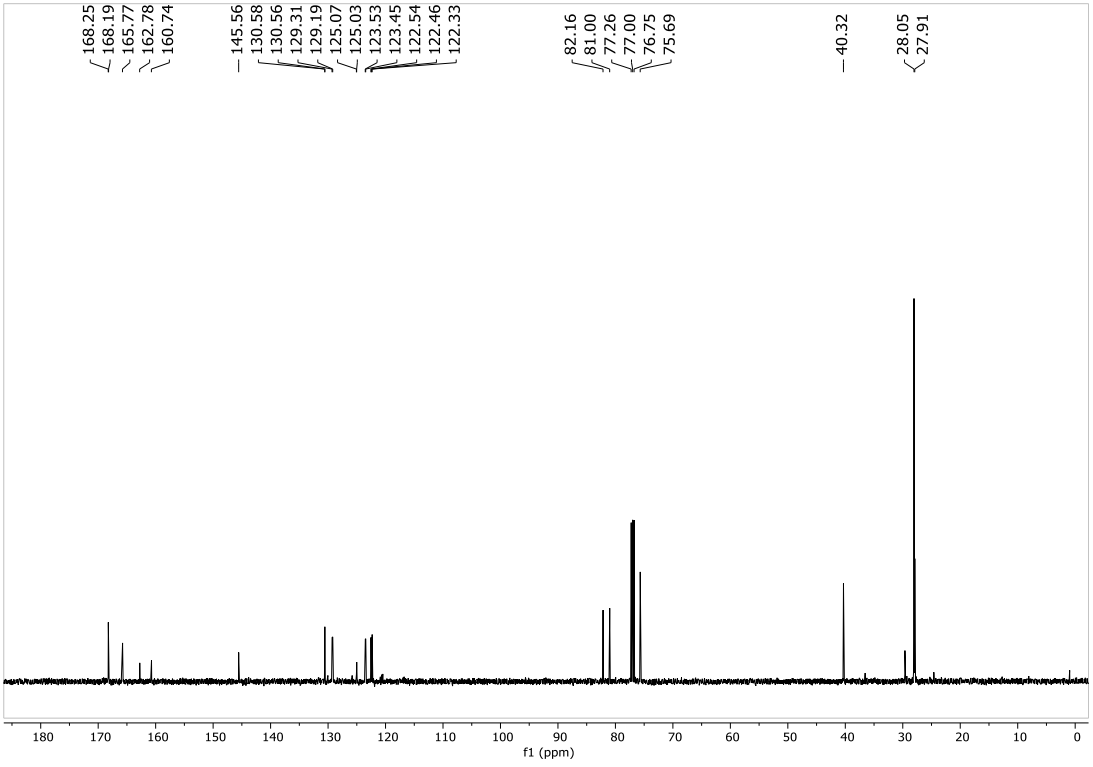
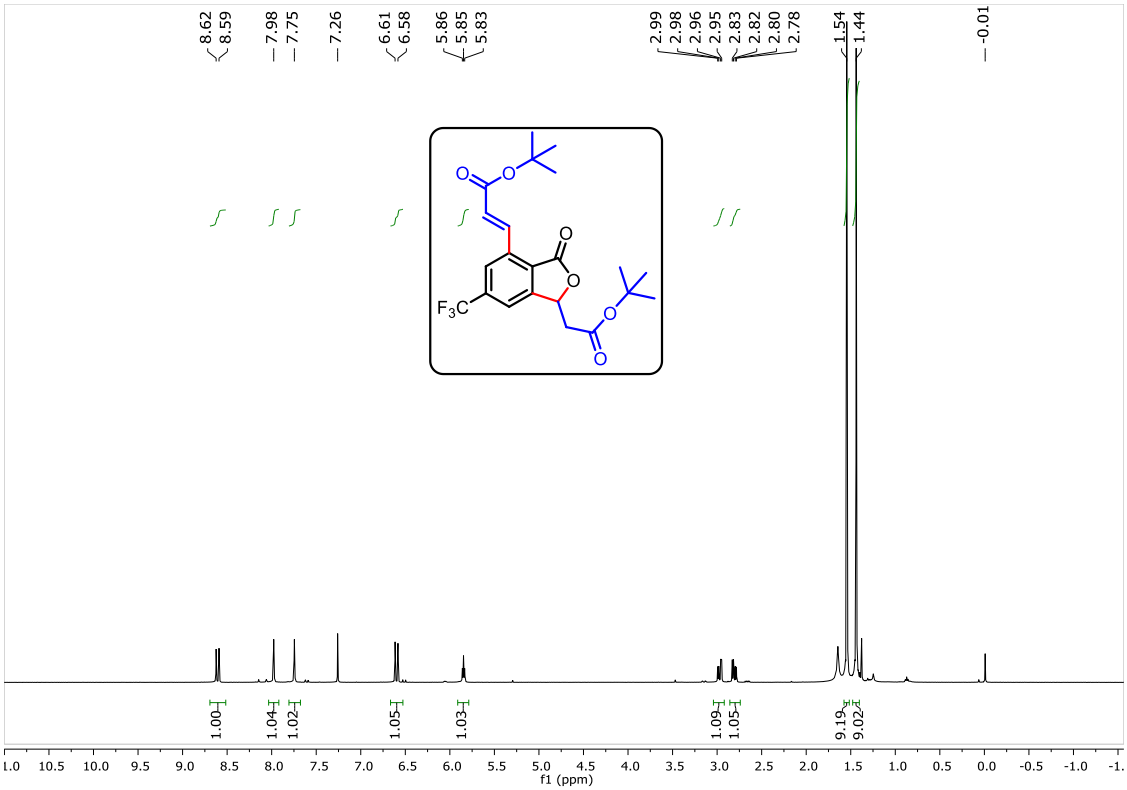
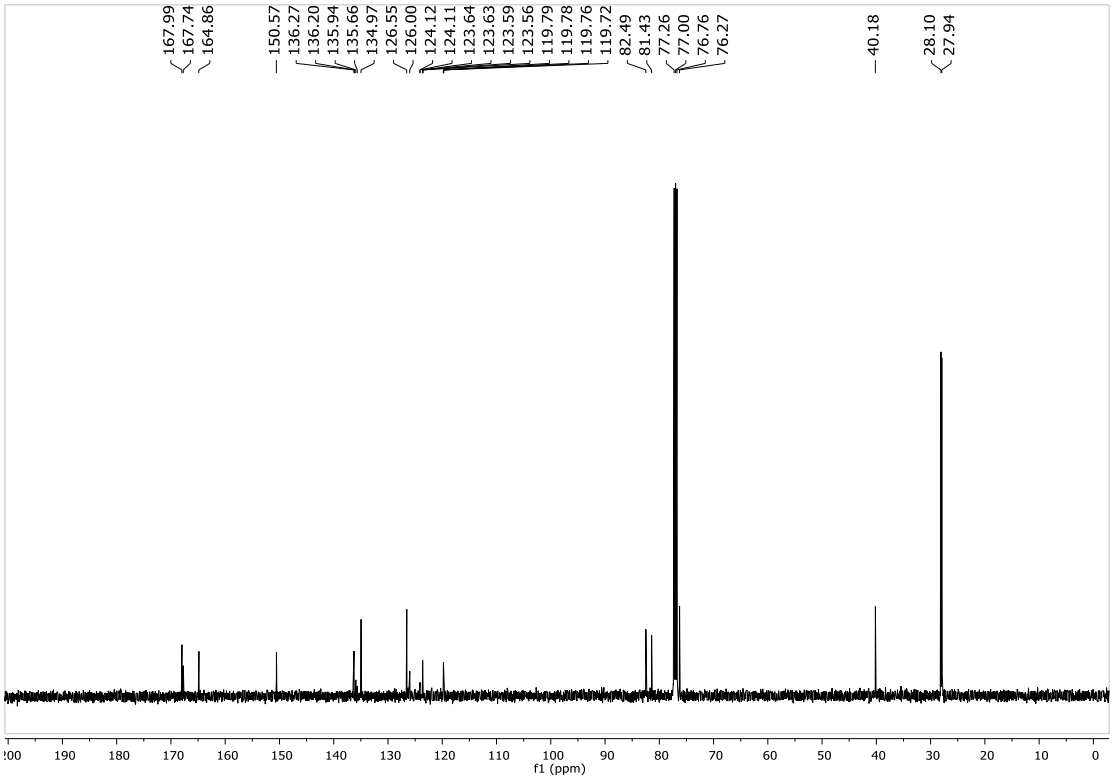


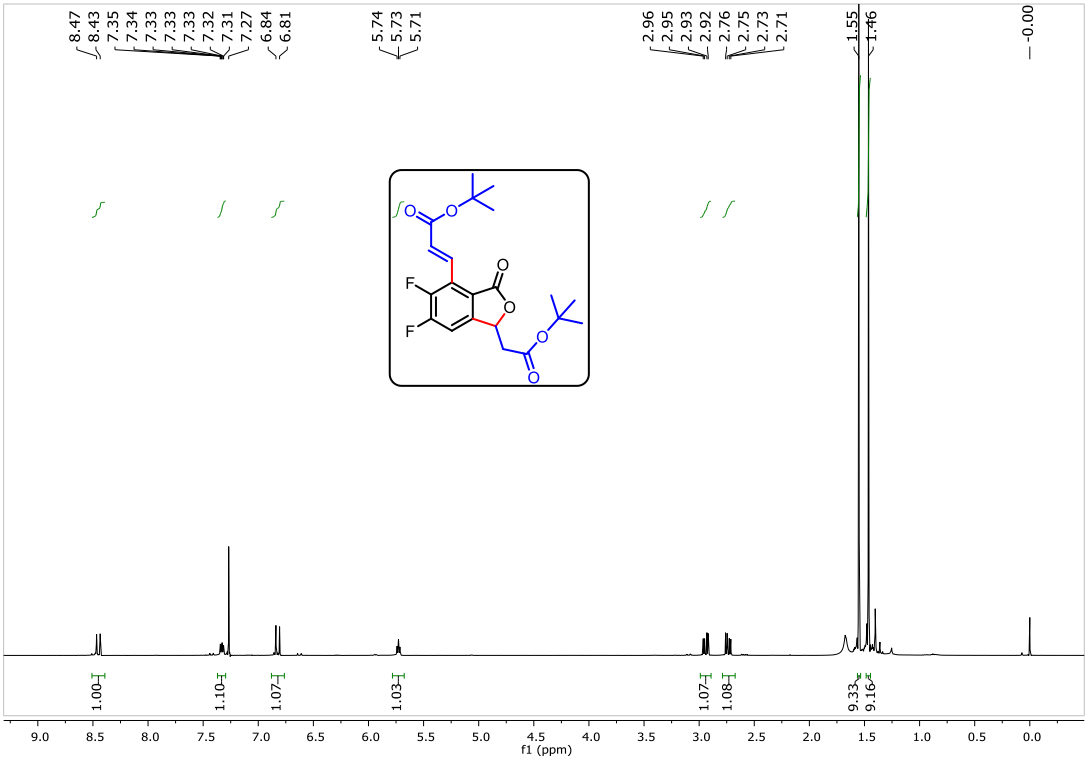


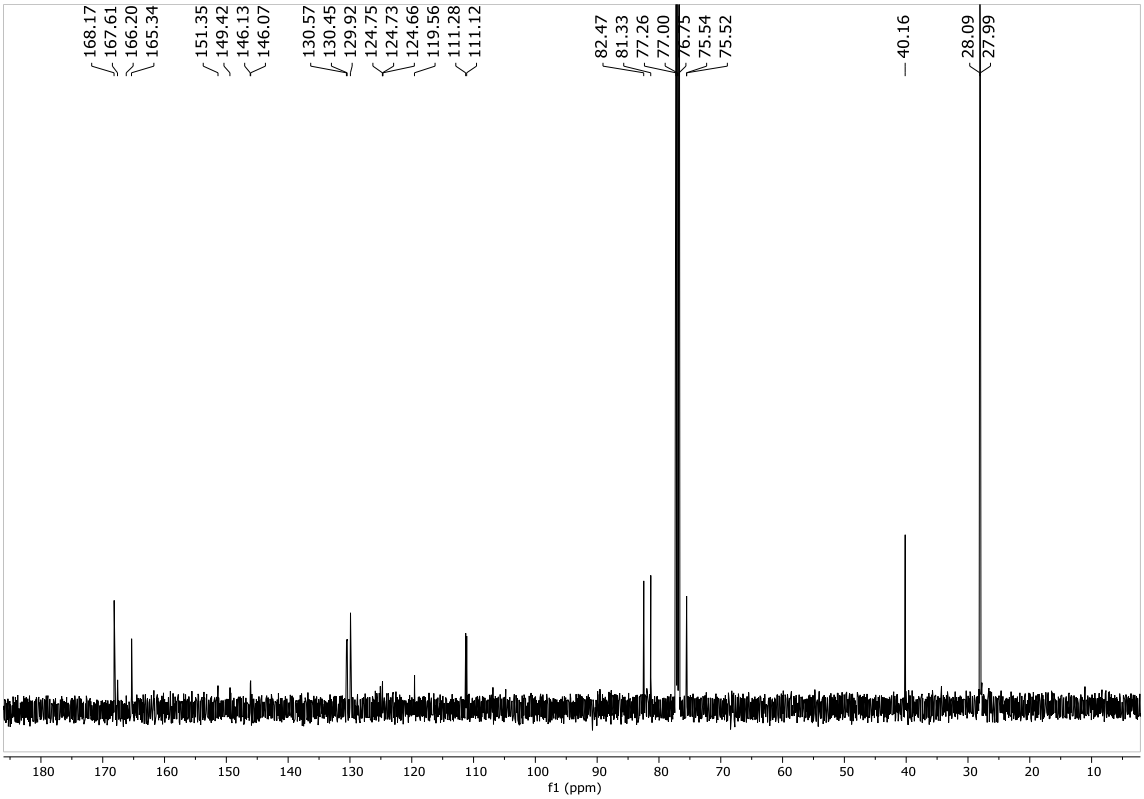
^{1}H and ^{13}C of Compound 3ea (500 & 125 MHz, $CDCl_3$):



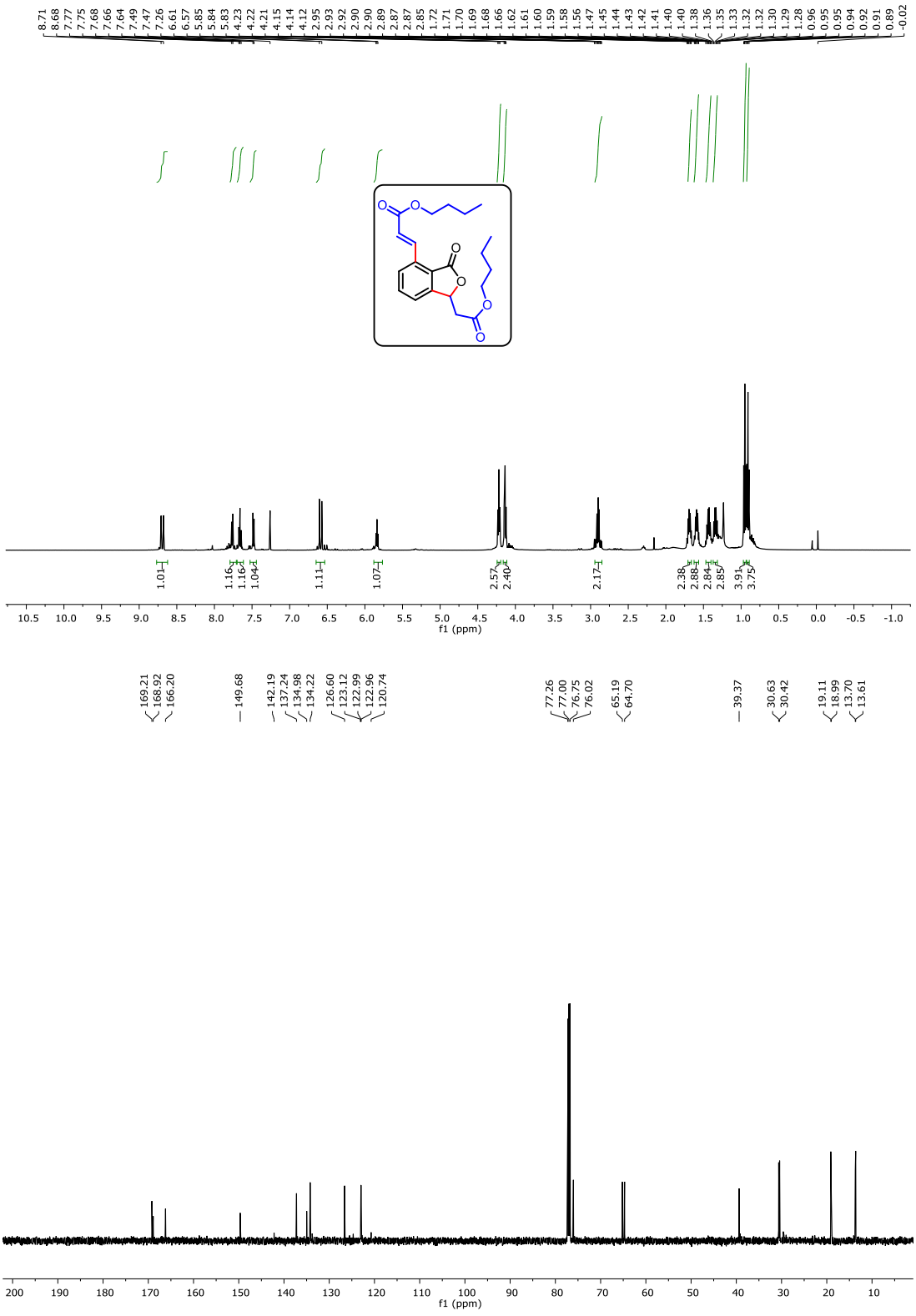


^{1}H and ^{13}C of Compound 3fa (500 & 125 MHz, $CDCl_3$):

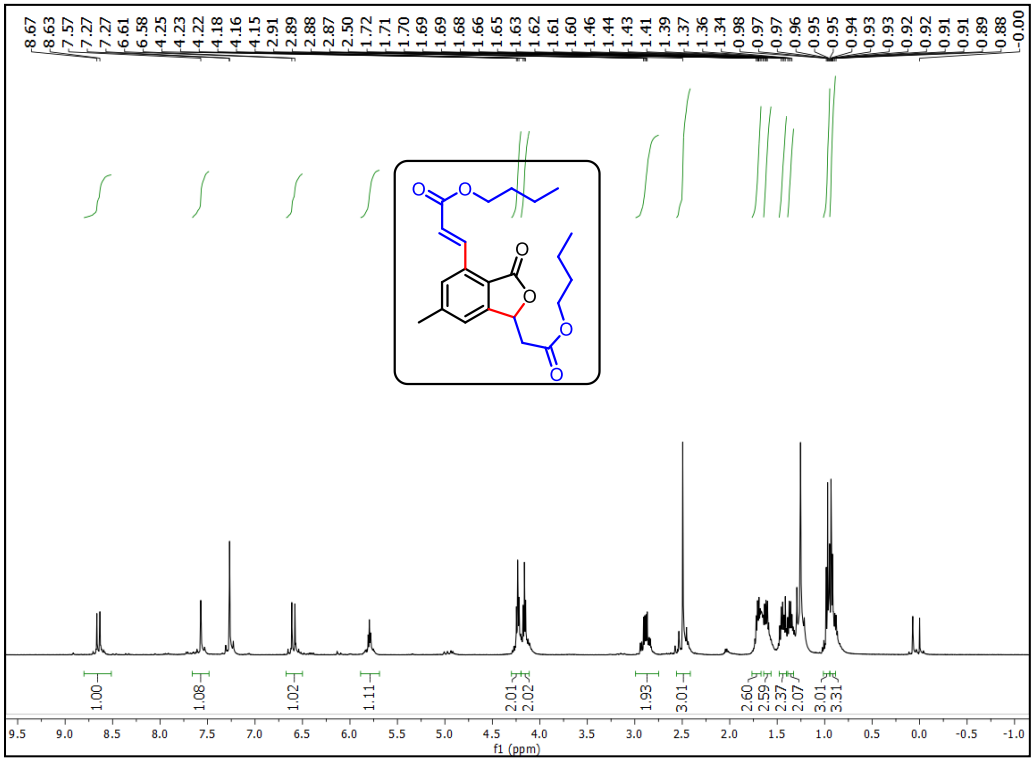


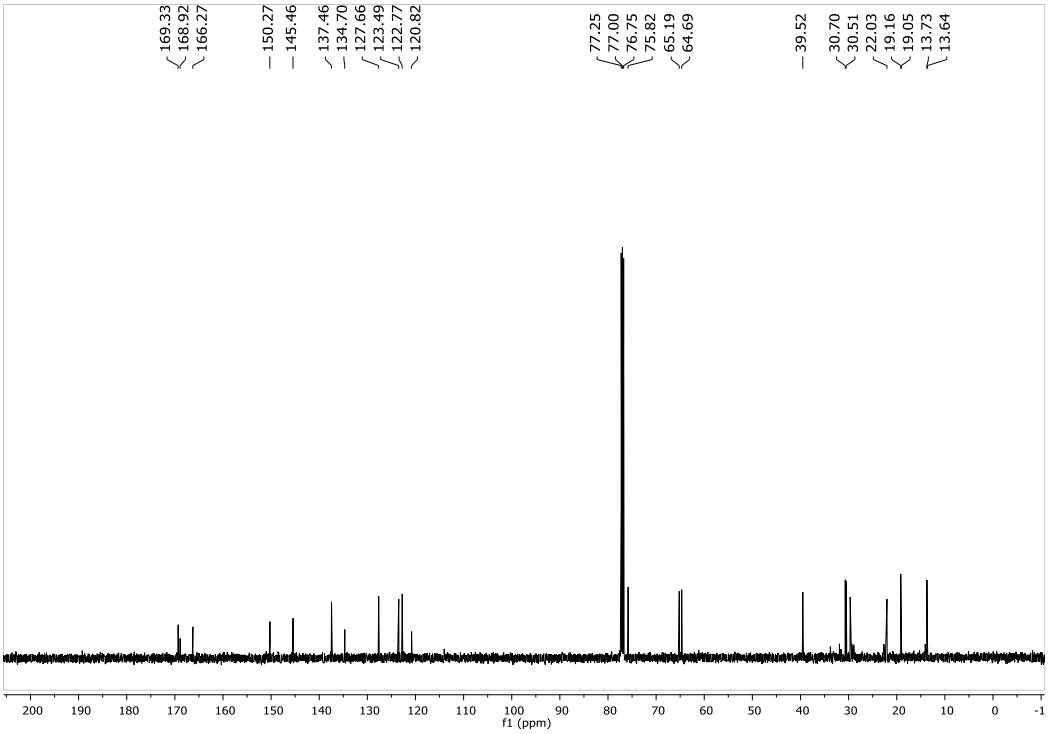


^{1}H and ^{13}C of Compound 3ab (500 & 125 MHz, $CDCl_3$):

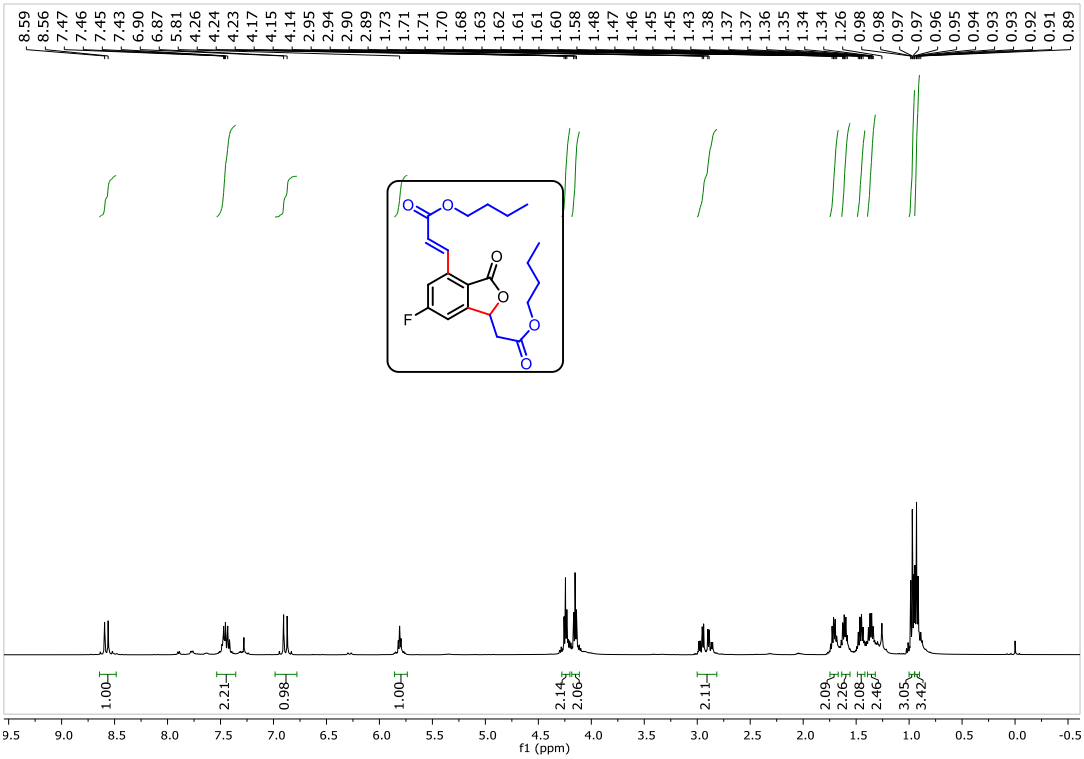


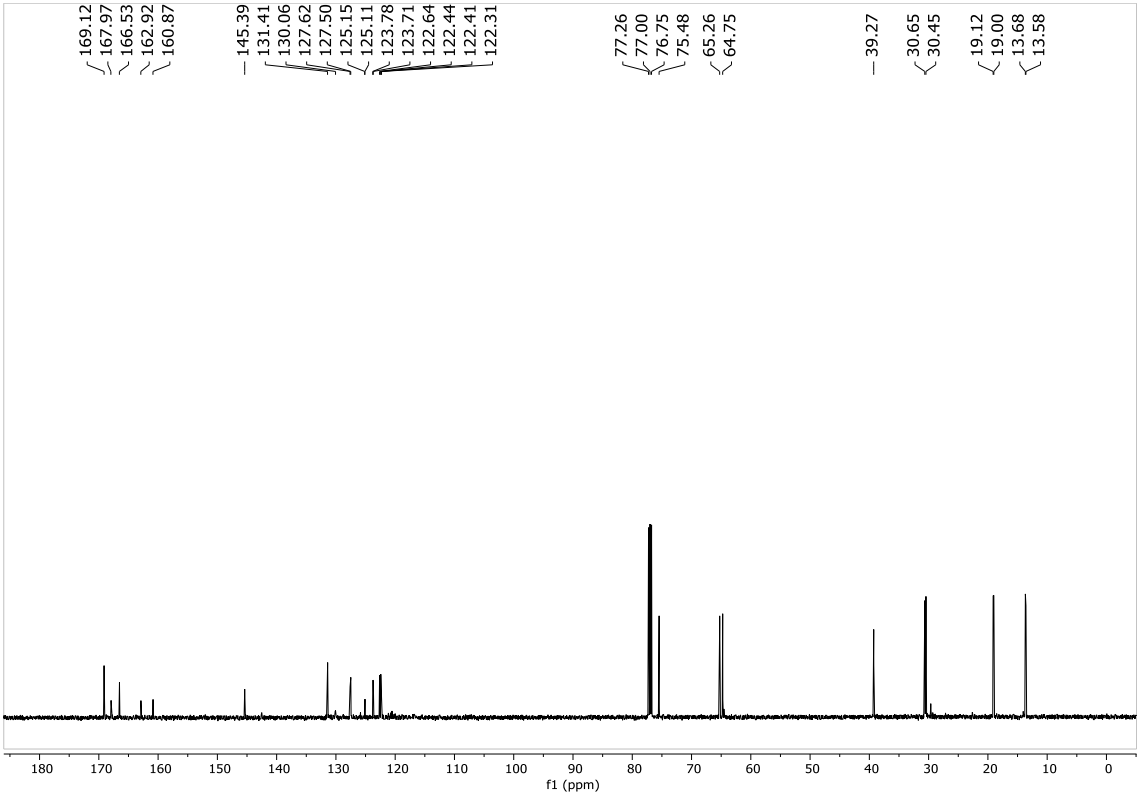
^{1}H and ^{13}C of Compound 3bb (500 & 125 MHz, $CDCl_3$):



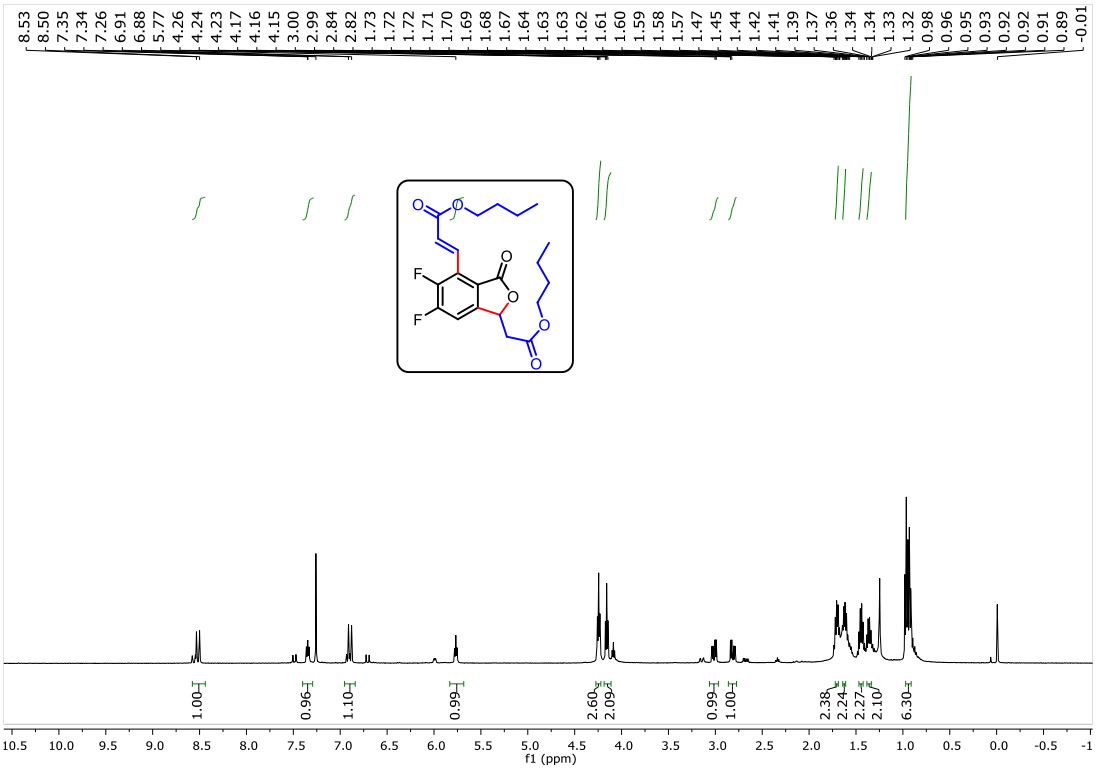


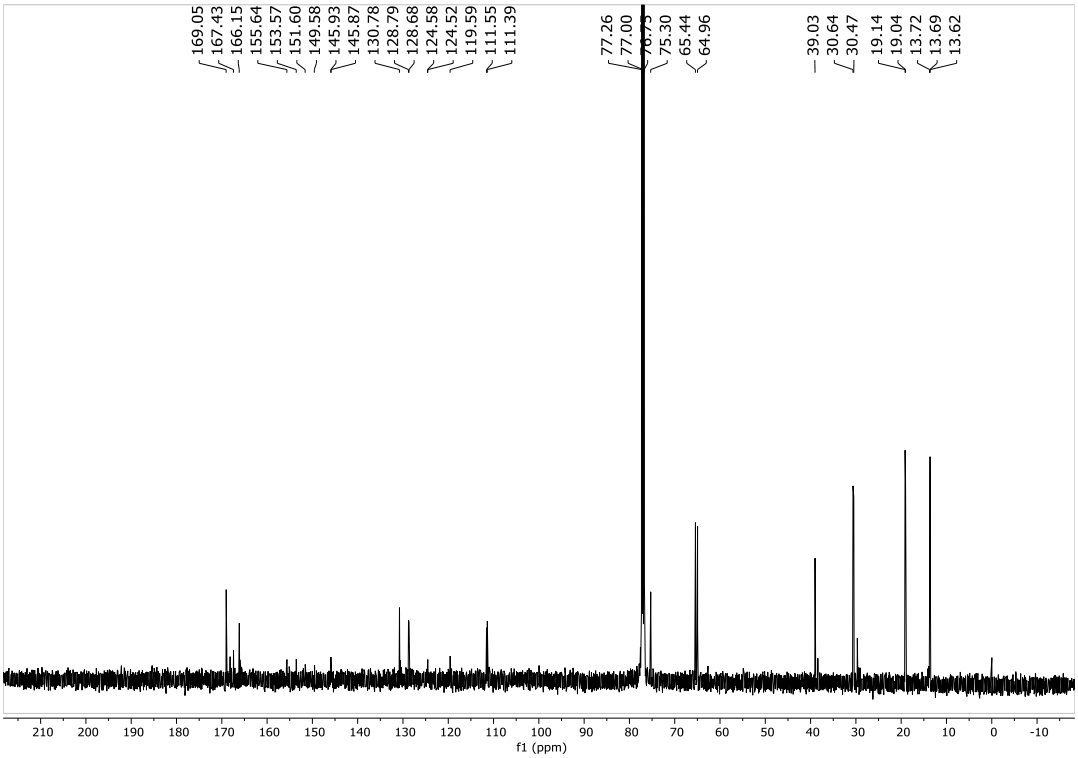
^{1}H and ^{13}C of Compound 3db (500 & 125 MHz, $CDCl_3$):



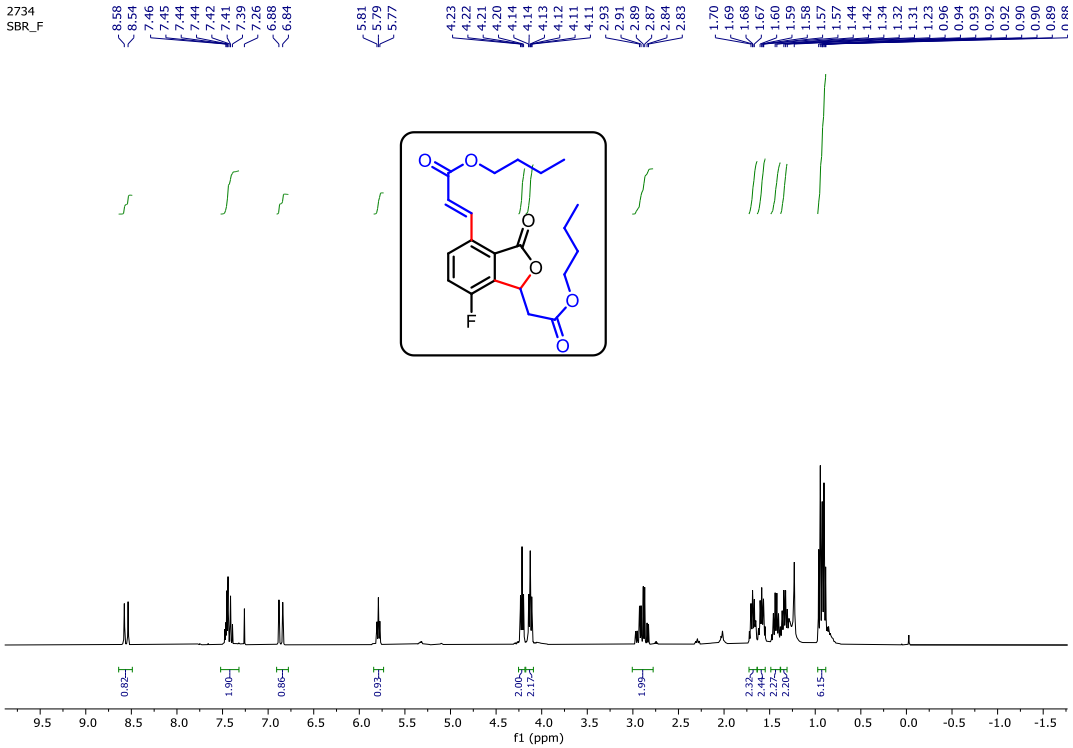


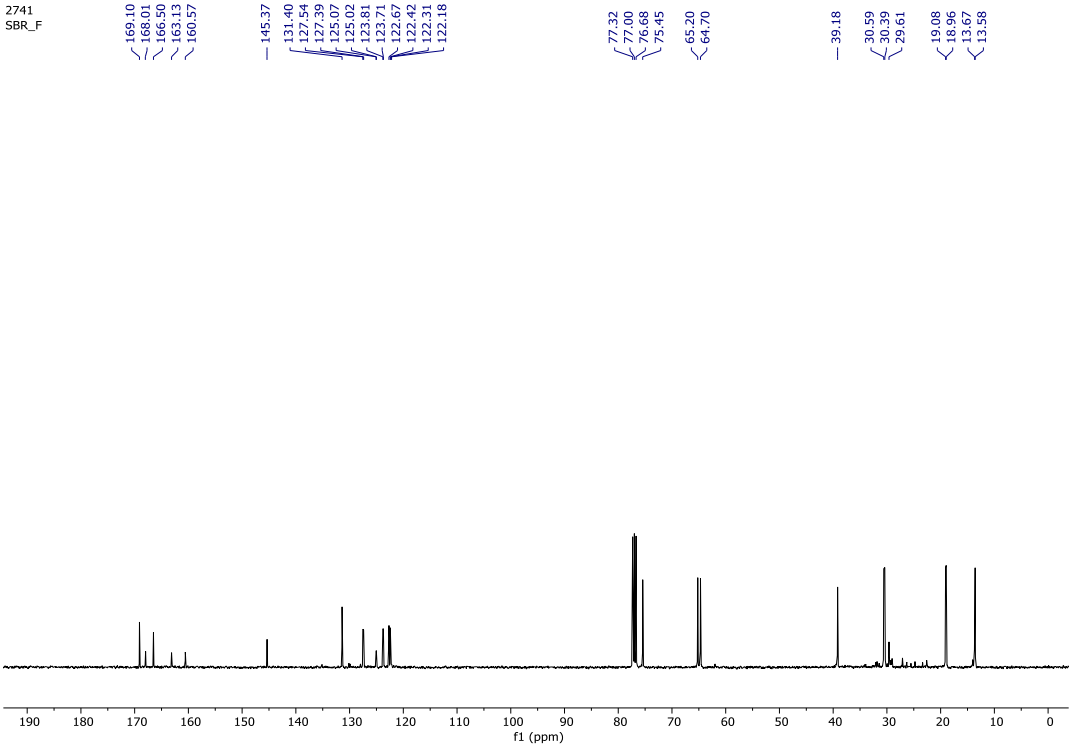
^{1}H and ^{13}C of Compound 3fb (500 & 125 MHz, $CDCl_3$):



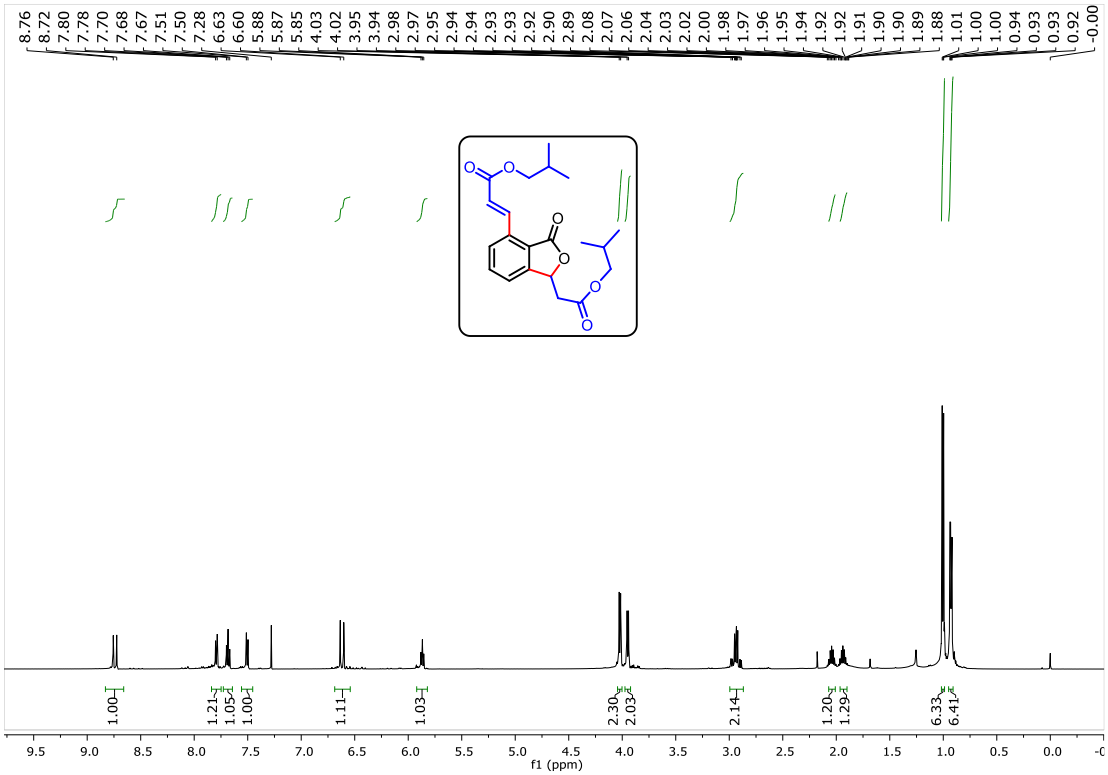


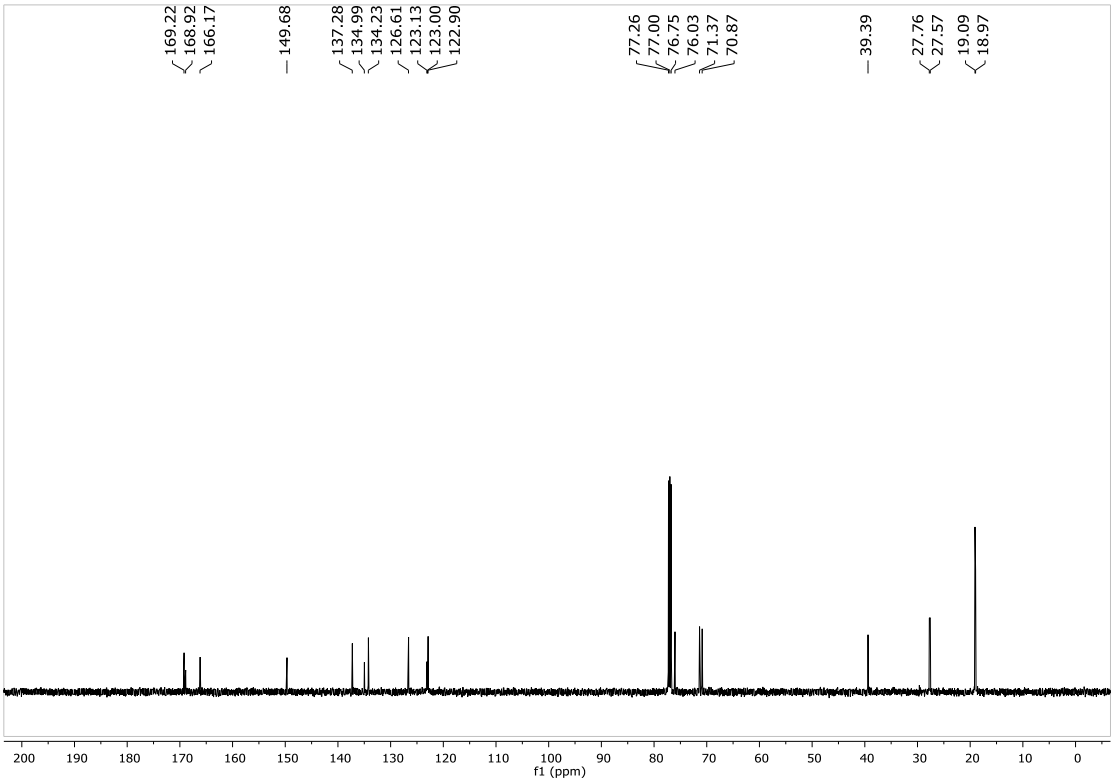
^{1}H and ^{13}C of Compound 3gb (400 & 100 MHz, $CDCl_3$):



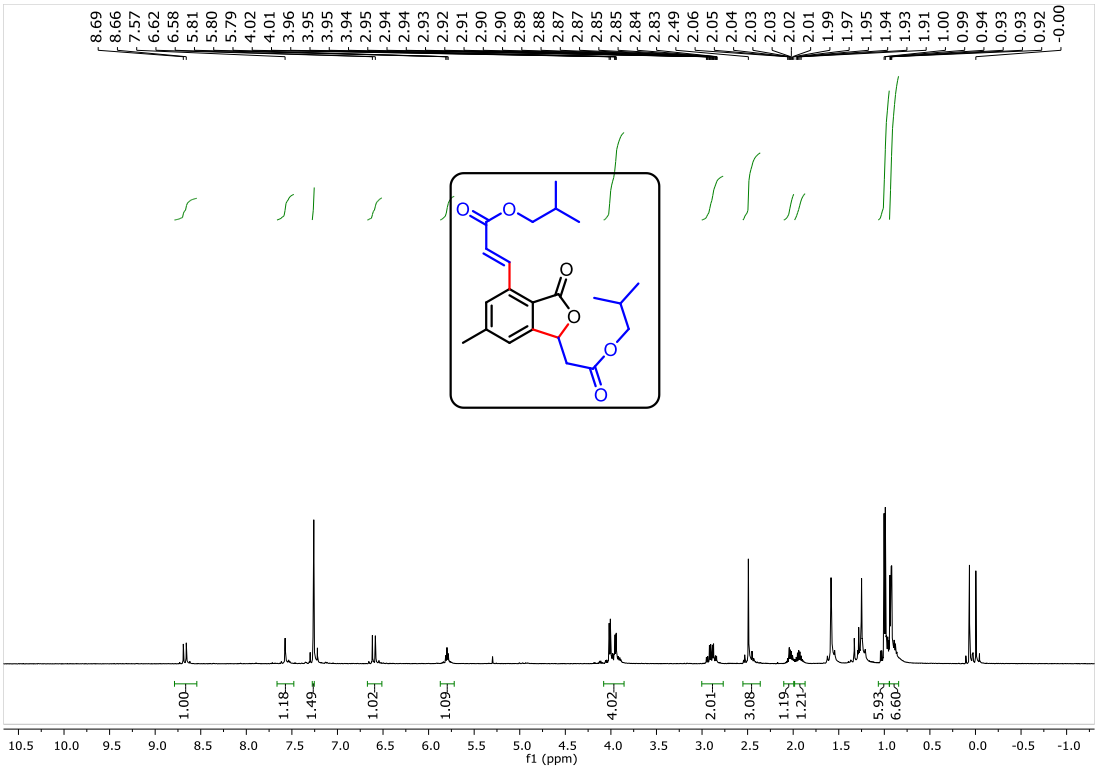


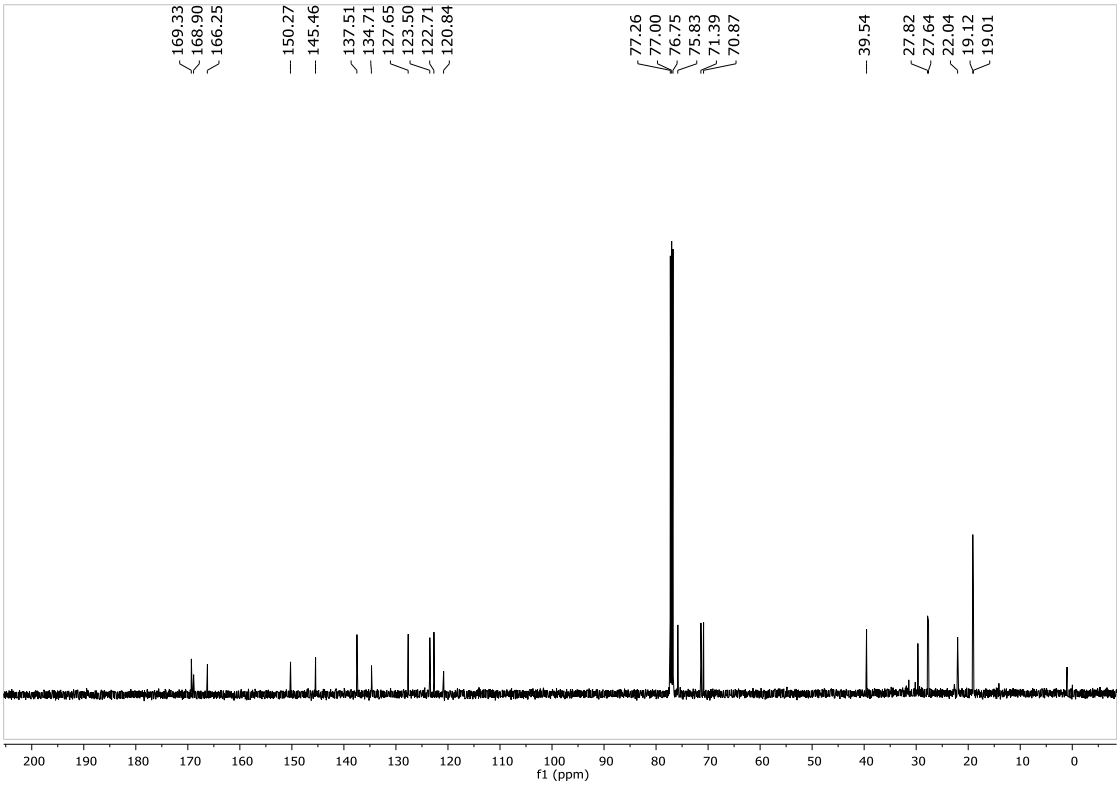
^{1}H and ^{13}C of Compound 3ac (500 & 125 MHz, $CDCl_3$):



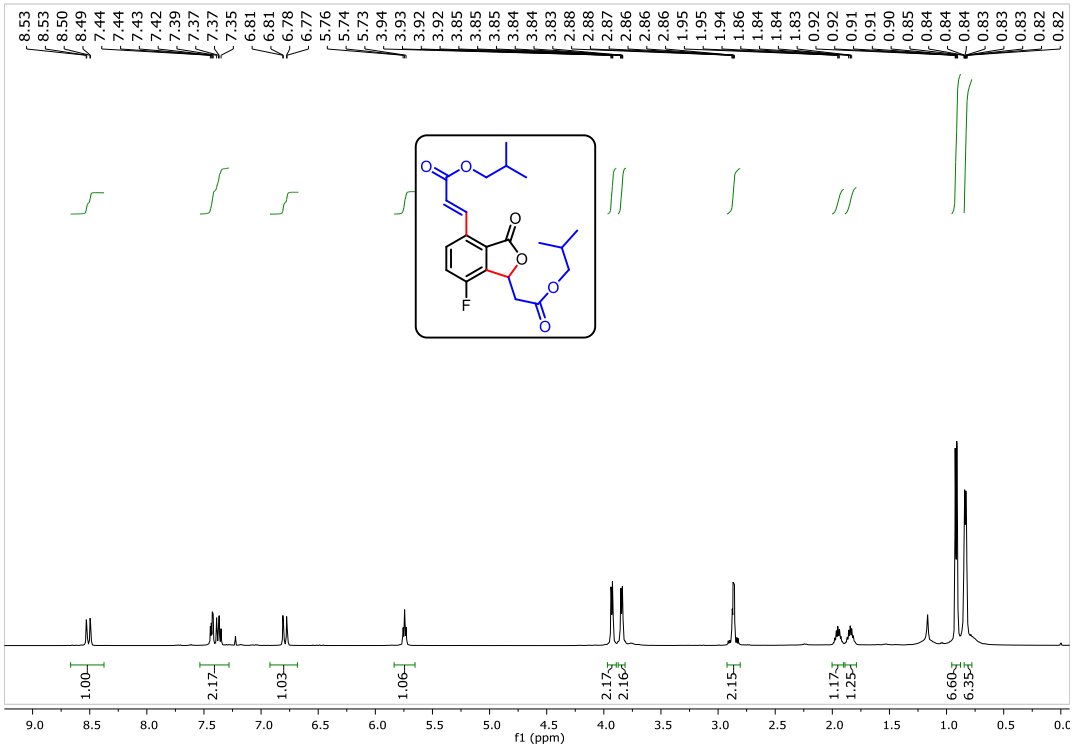


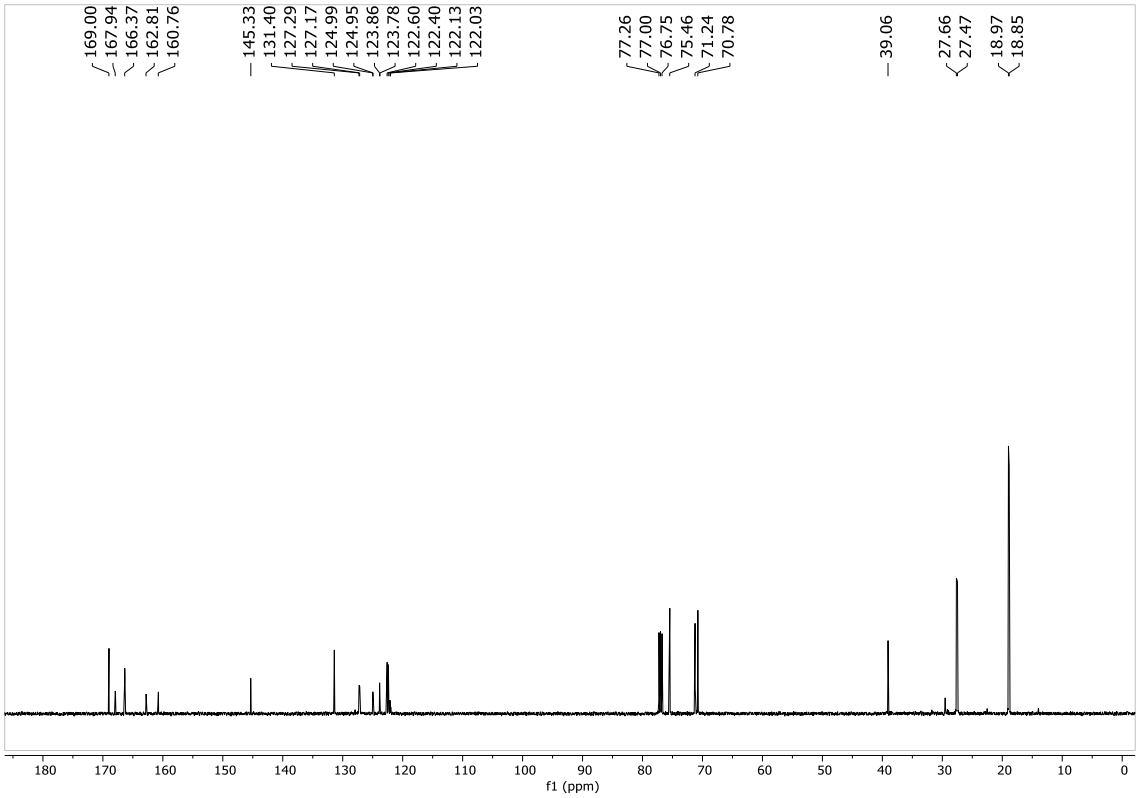
^{1}H and ^{13}C of Compound 3bc (500 & 125 MHz, $CDCl_3$):



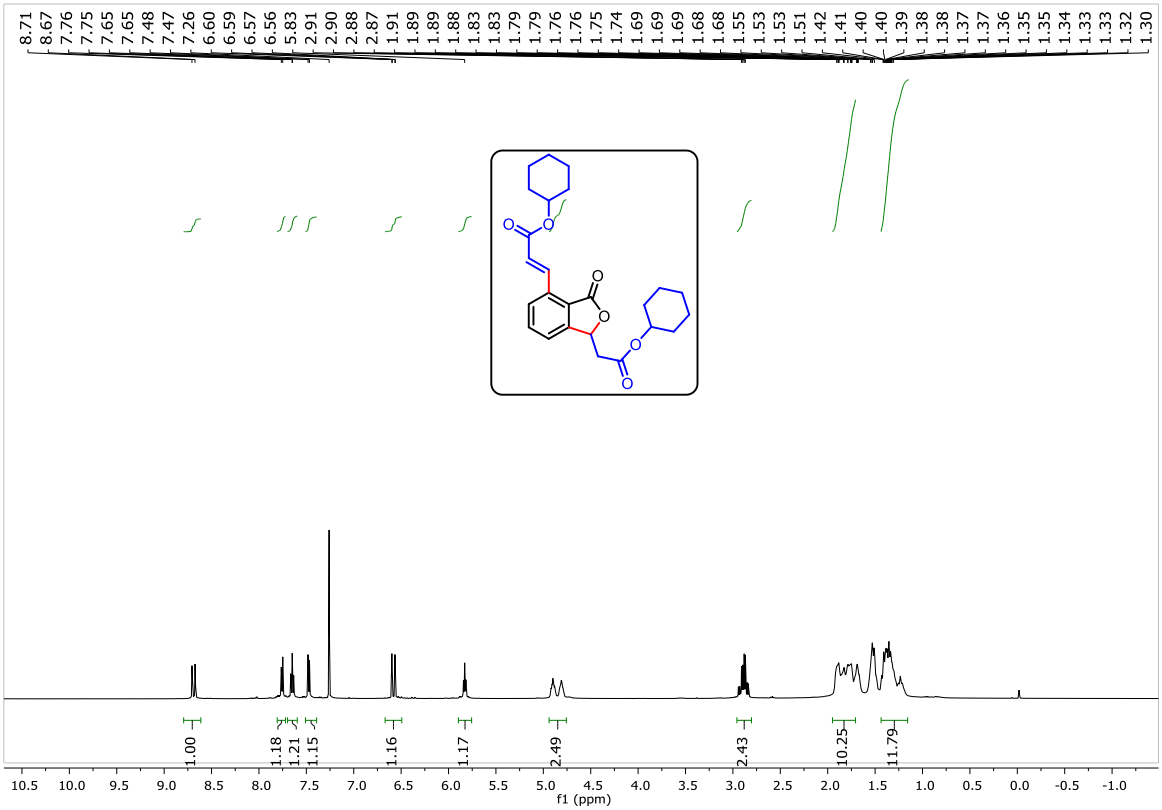


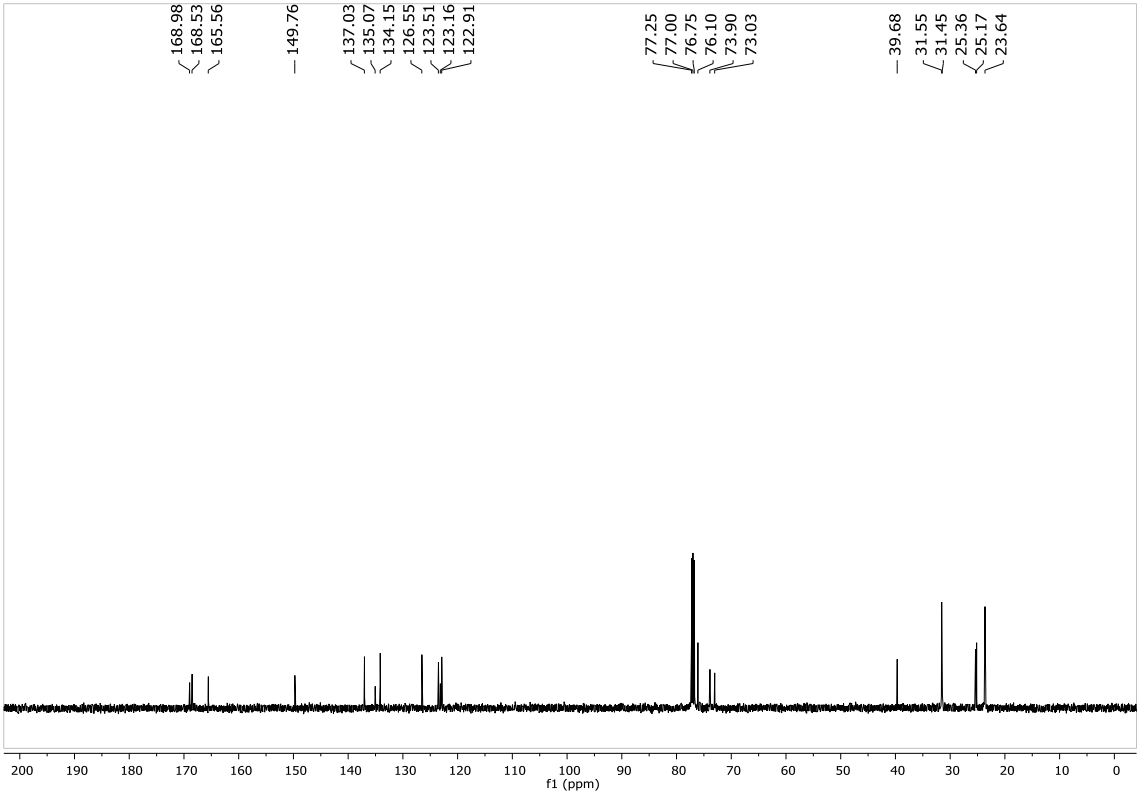
^{1}H and ^{13}C of Compound 3gc (500 & 125 MHz, $CDCl_3$):



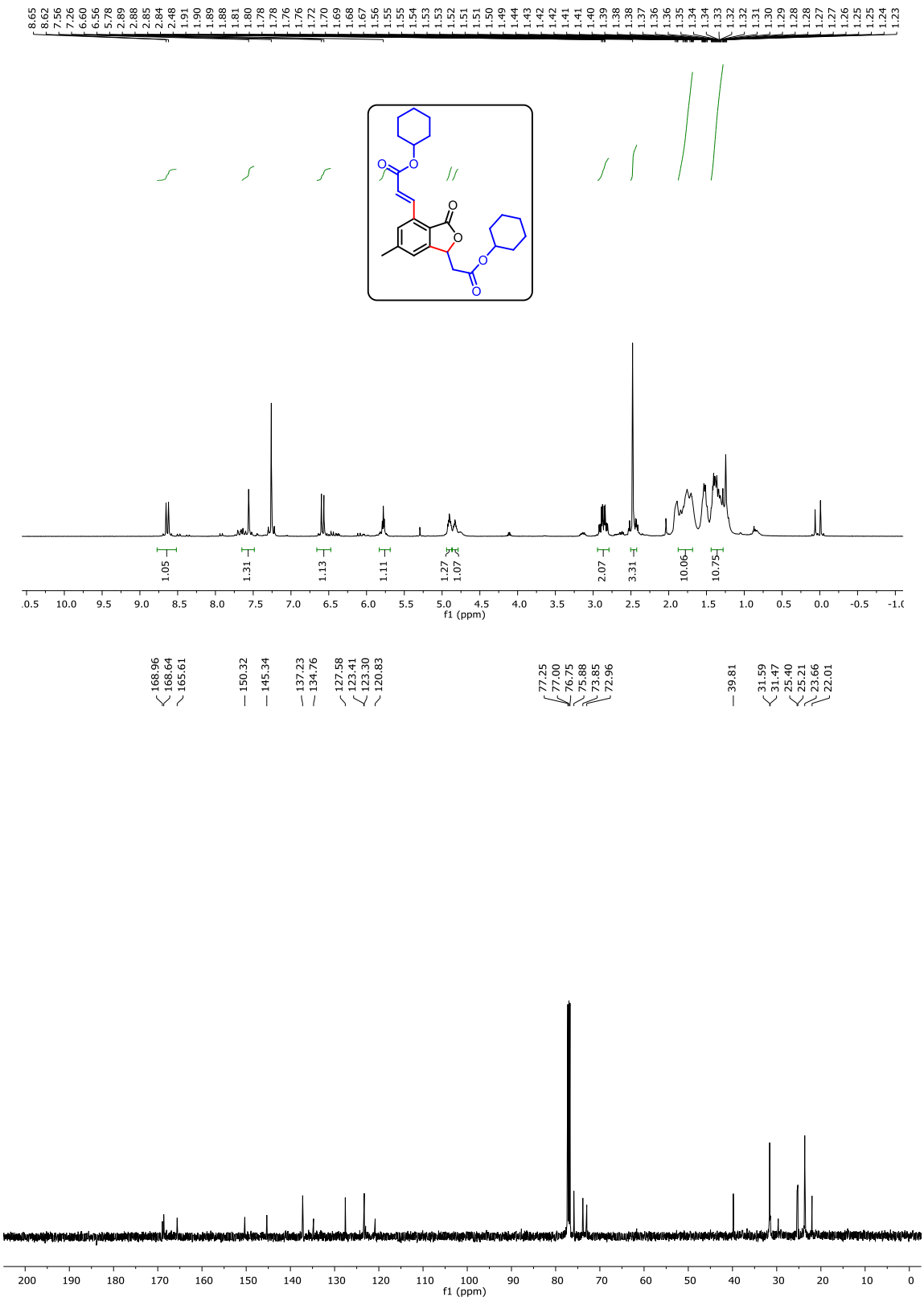


^{1}H and ^{13}C of Compound 3ad (500 & 125 MHz, $CDCl_3$):

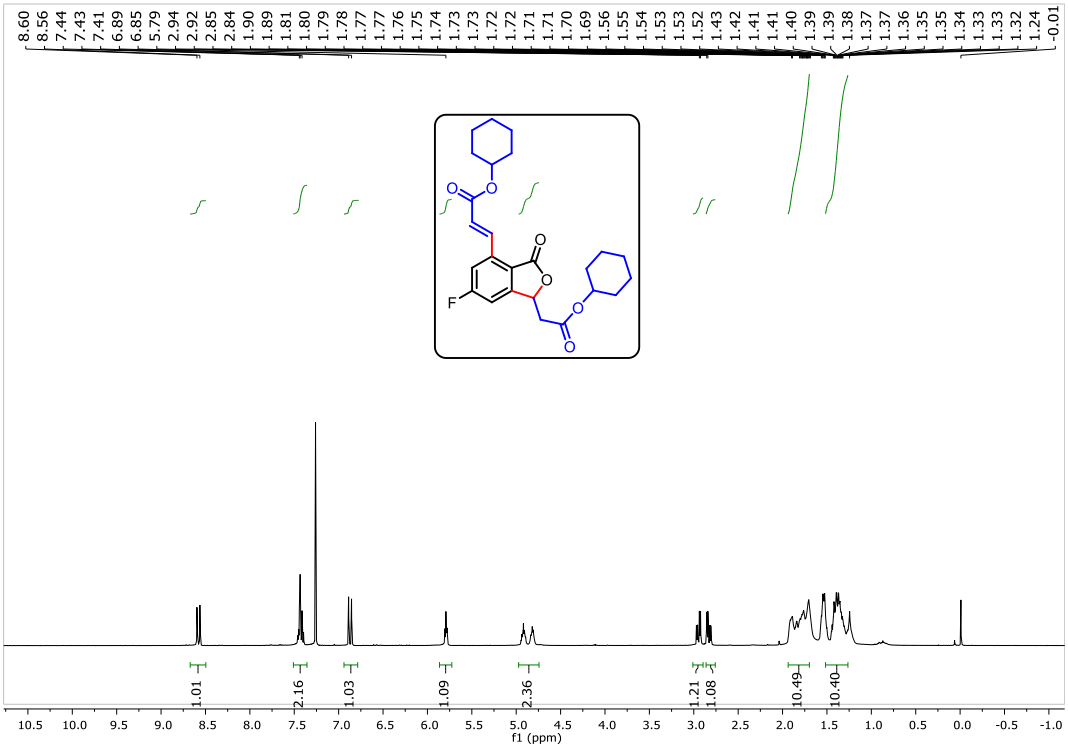


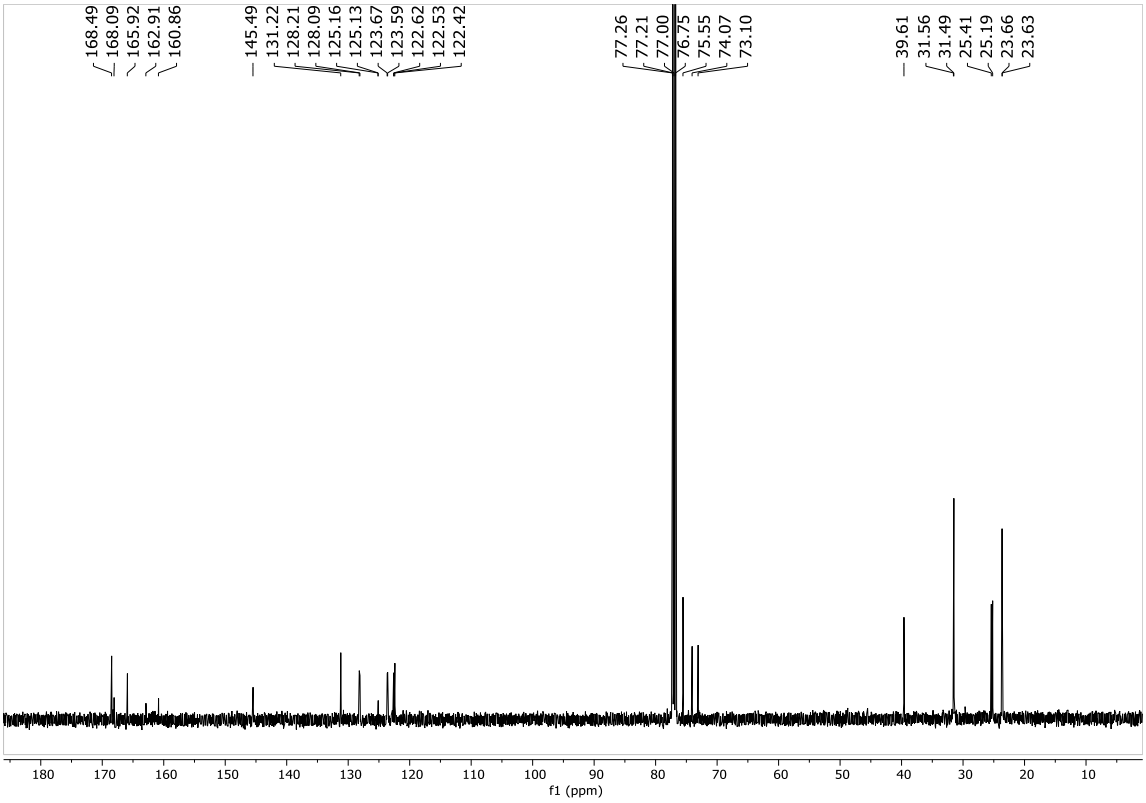


^{1}H and ^{13}C of Compound 3bd (500 & 125 MHz, $CDCl_3$):

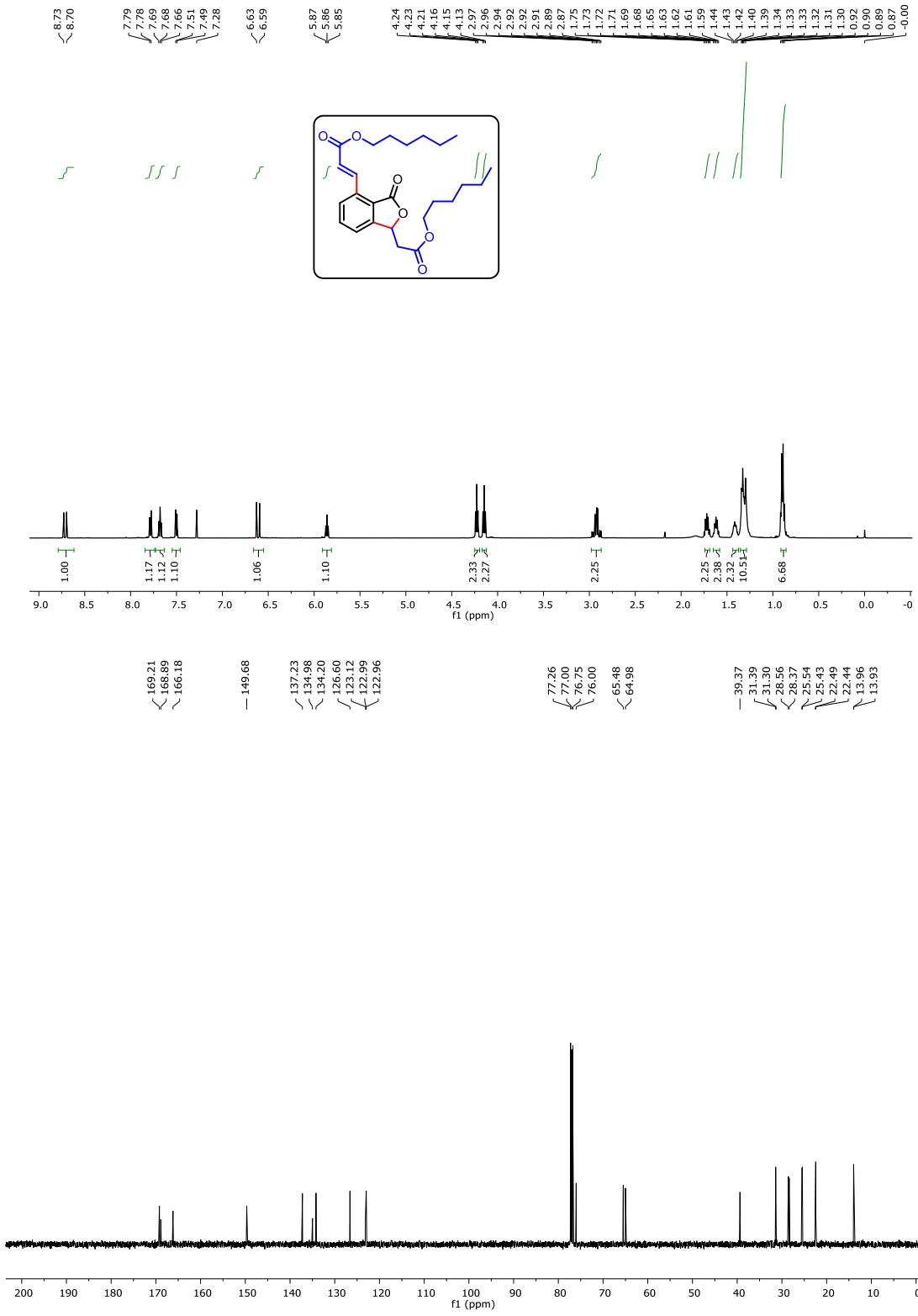


^{1}H and ^{13}C of Compound 3dd (500 & 125 MHz, $CDCl_3$):

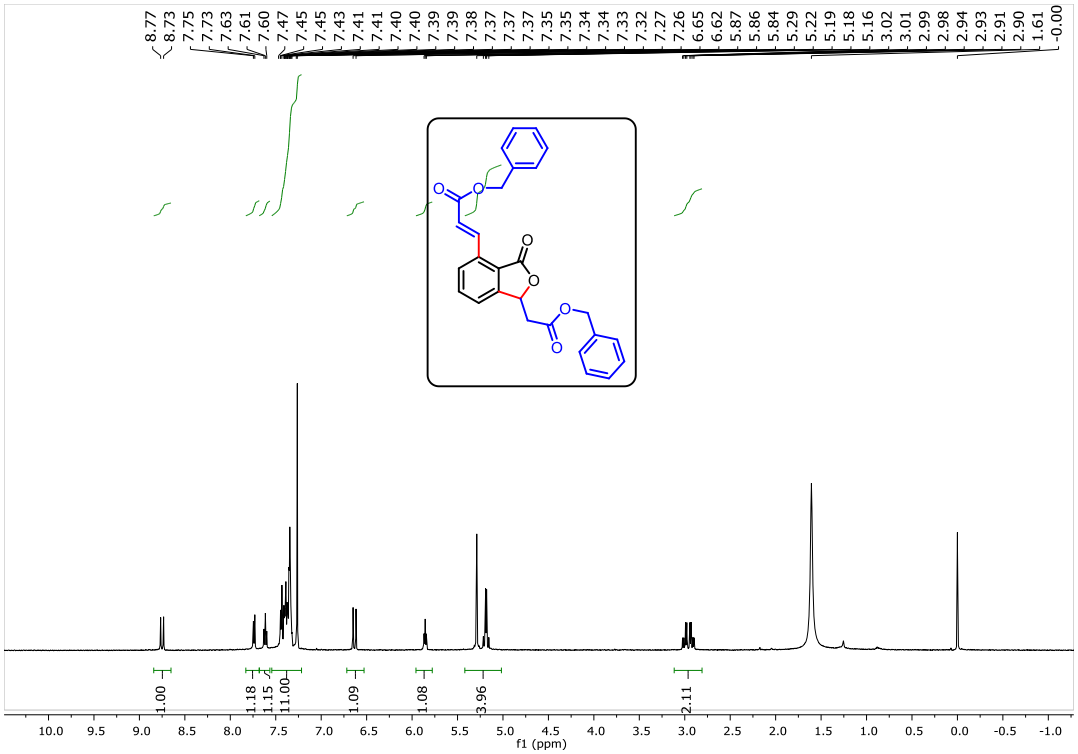


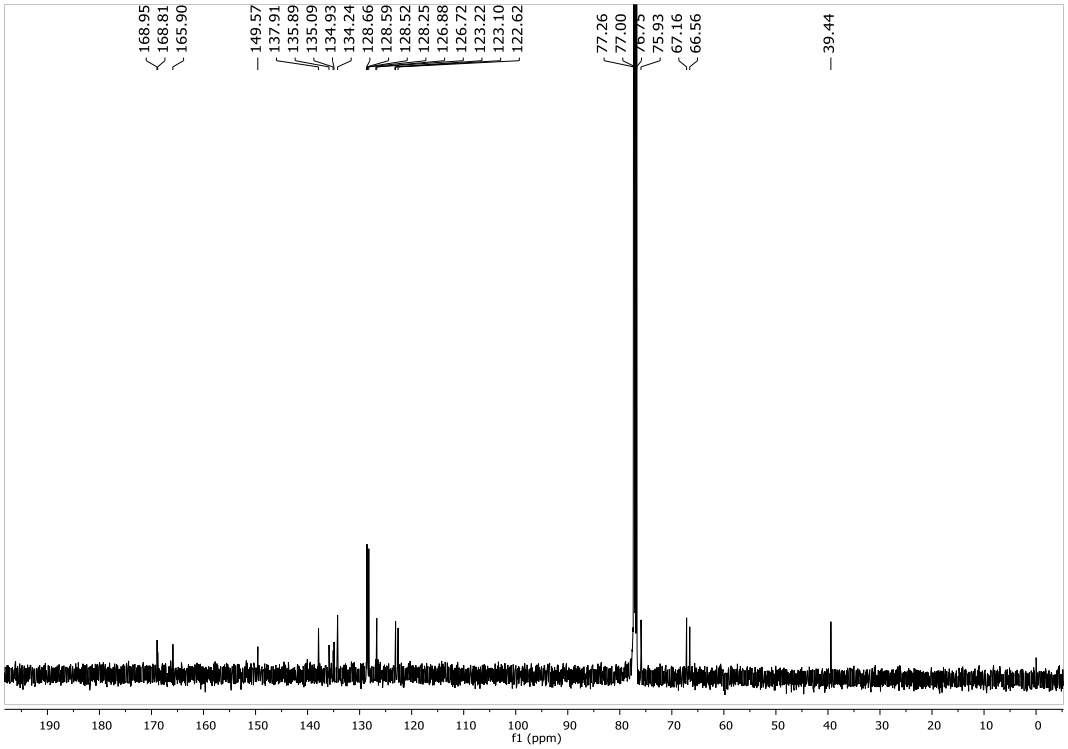


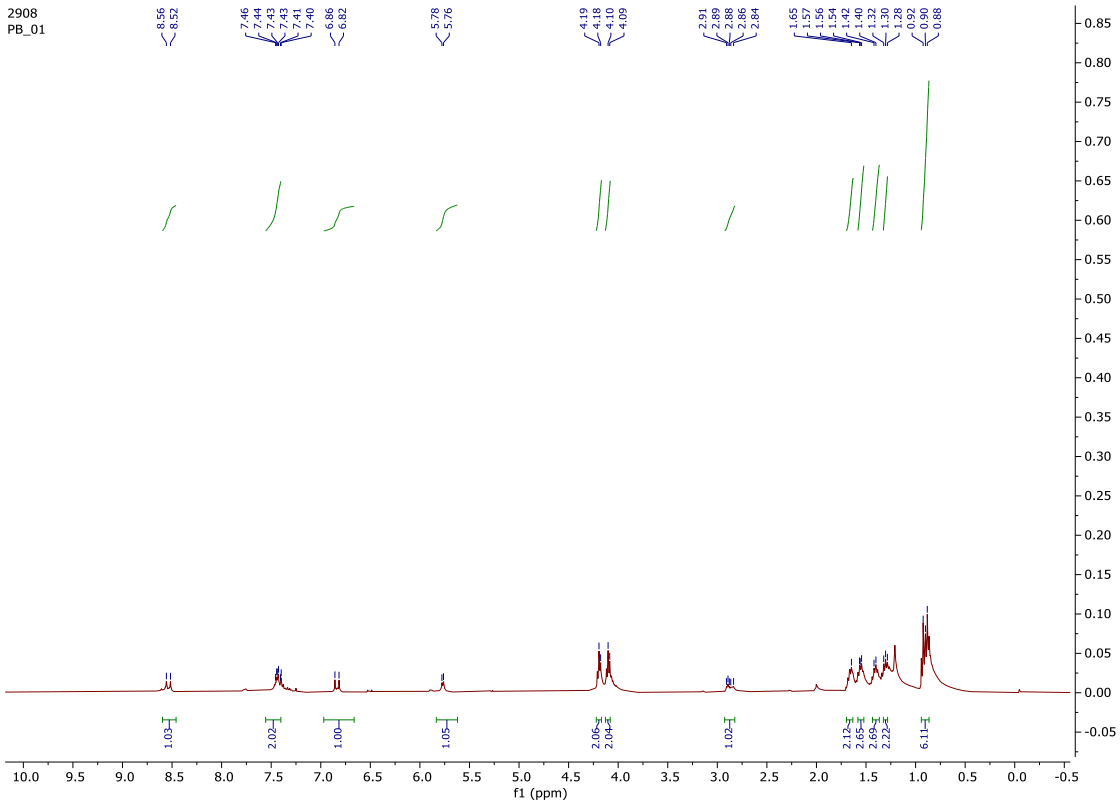
^{1}H and ^{13}C of Compound 3ae (500 & 125 MHz, $CDCl_3$):

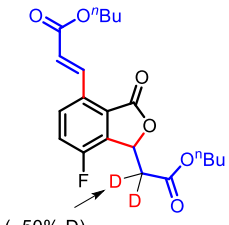


^{1}H and ^{13}C of Compound 3af (500 & 125 MHz, $CDCl_3$):






2908
PB_01
8.56
8.52
7.46
7.44
7.43
7.43
7.41
7.40
6.86
6.82
5.78
5.76
4.19
4.18
4.10
4.09
2.91
2.89
2.88
2.86
2.84
1.65
1.57
1.56
1.54
1.42
1.40
1.32
1.30
1.28
0.92
0.90
0.88
1.03
2.02
1.00
1.05
2.06
2.04
1.02
2.12
2.65
2.69
2.22
6.11
f1 (ppm)


O
O^{n}Bu
O
O
F
D
D
O^{n}Bu
O

(~50% D)

3gb-D

Test for evolution of CO gas: (Reference: *Angew. Chem. Int. Ed.* 2018, **57**,456-460)

$PdCl_2$ (100 mg) was dissolved in one drops of conc. HCl and diluted with 5 mL of distilled water. A cold saturated solution of phosphomolybdic acid in water was prepared separately. These two solutions were then mixed in a separate vial in 1:2 (PMA:$PdCl_2$) ratio. Some narrow pieces of filter papers were then dipped in this PMA:$PdCl_2$ solution and then these were dried at room temperature for 1 hour. In a round bottom flask, phthalic anhydride (**1a**, 0.5 mmol), *tert*-butylacrylate (**2a**, 1.0 mmol), $[RuCl_2(p\text{-cymene})]_2$ (2.5 mol %), $Cu(OAc)_2$ (0.5 mmol) in ^{t}AmOH (4.0 mL) were added. Then, one strip of the above dried filter paper was fitted inside the round bottom flask with the help of a septum as shown in the pictures below. The reaction mixture was then heated at 100 ^{o}C. After 1.5 hours of heating, it was observed that the yellow colour of the strip was changed to dark-blue colour, indicating the evolution of CO gas from the reaction mixture.

Figure S1: Test for evolution of CO gas from the reaction mixture