

Electronic Supporting Information

Synthesis of α -aminophosphonic acid derivatives through the addition of *O*- and *S*-nucleophiles to 2*H*-azirines and their antiproliferative effect on A549 human lung adenocarcinoma cells.

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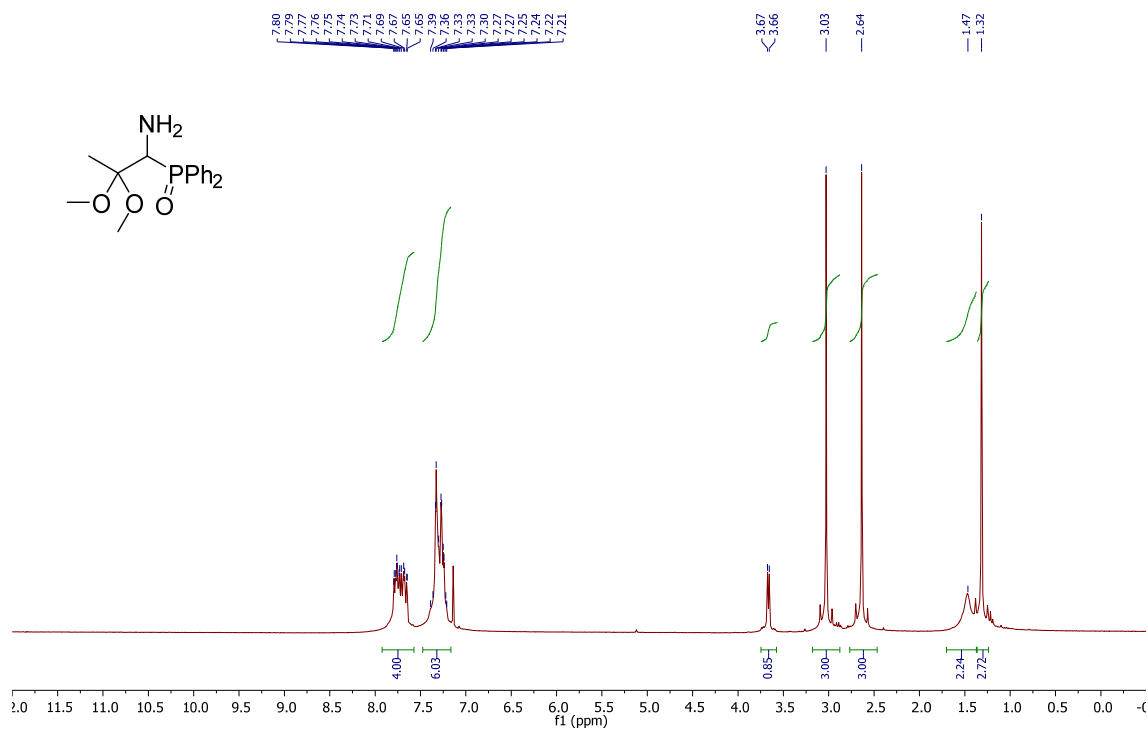
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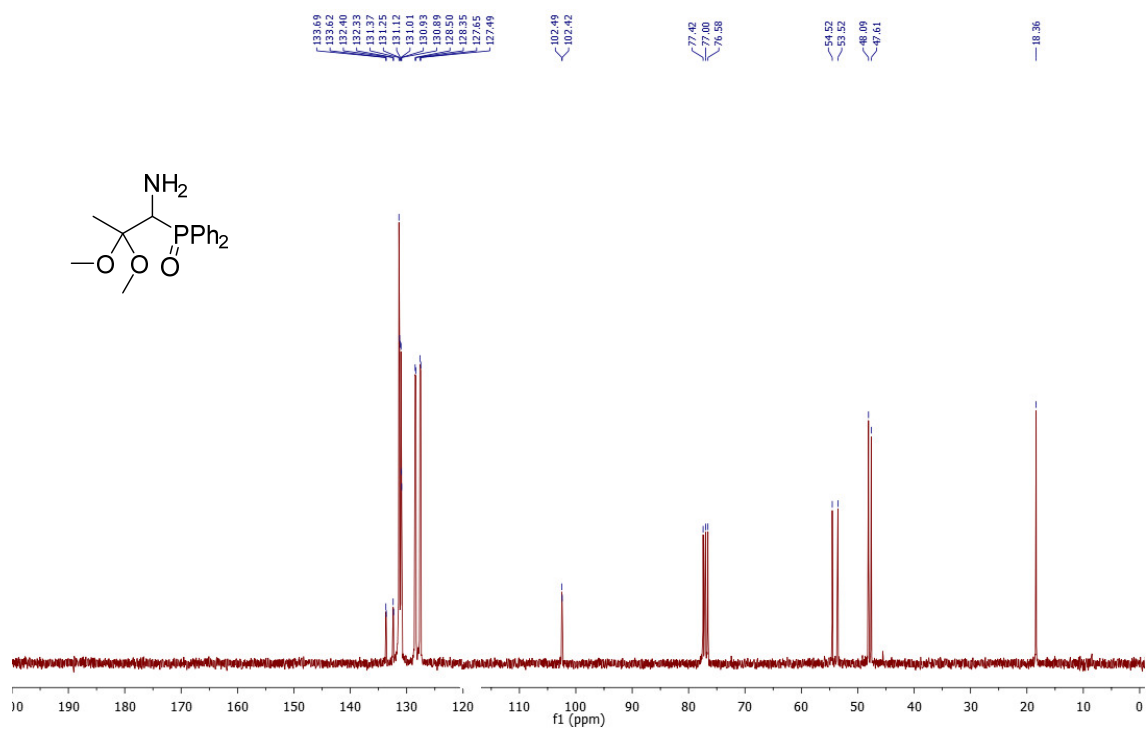
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^1H NMR (300 MHz, CDCl_3) of compound **4a**



^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **4a**



Chemical structure: CC(C)(COP(=O)(N)C1=CC=CC=C1)C(=O)O

¹H NMR spectrum (ppm):

- 7.81 (broad, NH)
- 7.31 (sharp, NH₂)
- 3.85 (multiplet, CH)
- 3.10 (sharp, CH₃)
- 1.94 (multiplet, CH₂)
- 1.00 (sharp, CH₃)

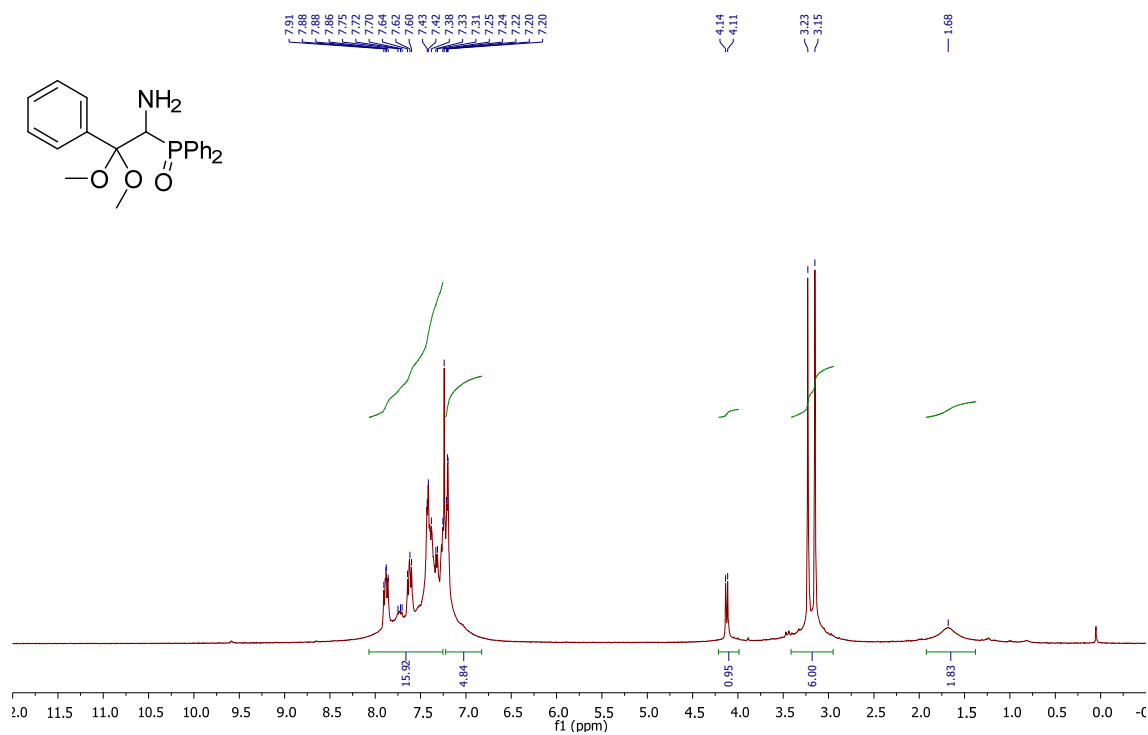
Integration values: 4.42, 6.76, 1.00, 3.04, 3.08, 2.42, 1.95, 3.23

CC(C)(COP(=O)(c1ccccc1)c2ccccc2)C(N)C

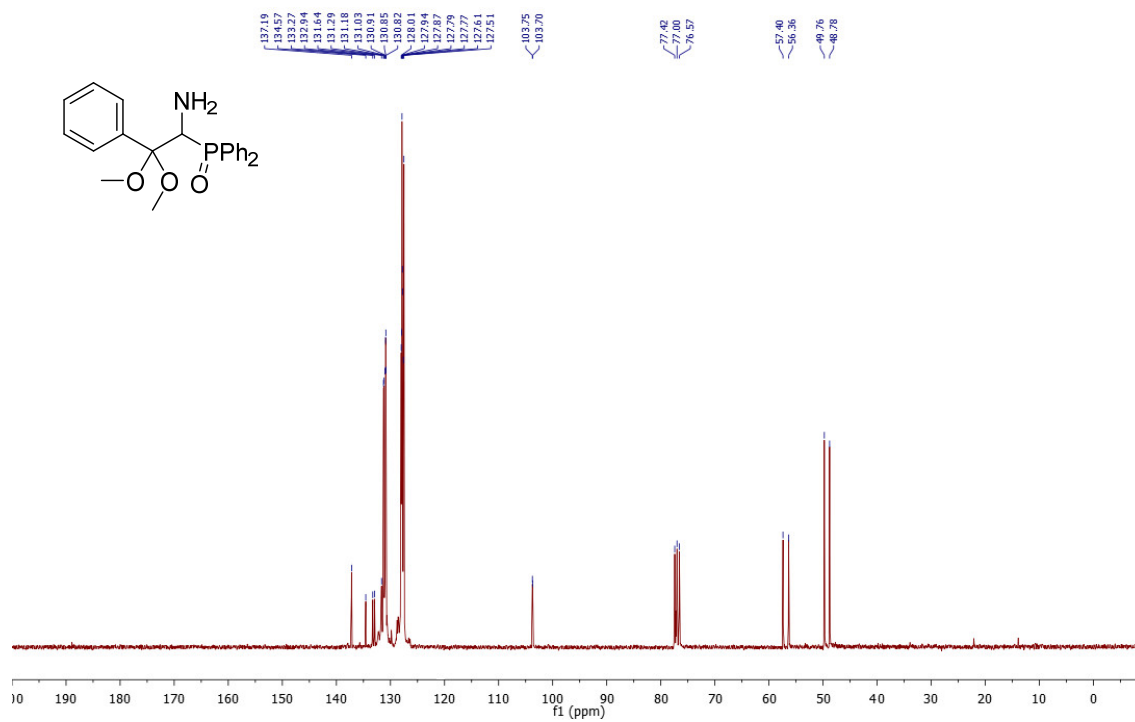
Chemical structure: CC(C)(COP(=O)(c1ccccc1)c2ccccc2)C(N)C

¹³C NMR peaks (ppm): 133.94, 132.94, 132.68, 132.66, 132.75, 131.41, 131.35, 131.27, 130.95, 128.50, 128.39, 127.72, 127.61, 103.20, 103.17, 77.32, 77.00, 76.68, 55.84, 55.09, 49.27, 48.45, 26.14, 8.76.

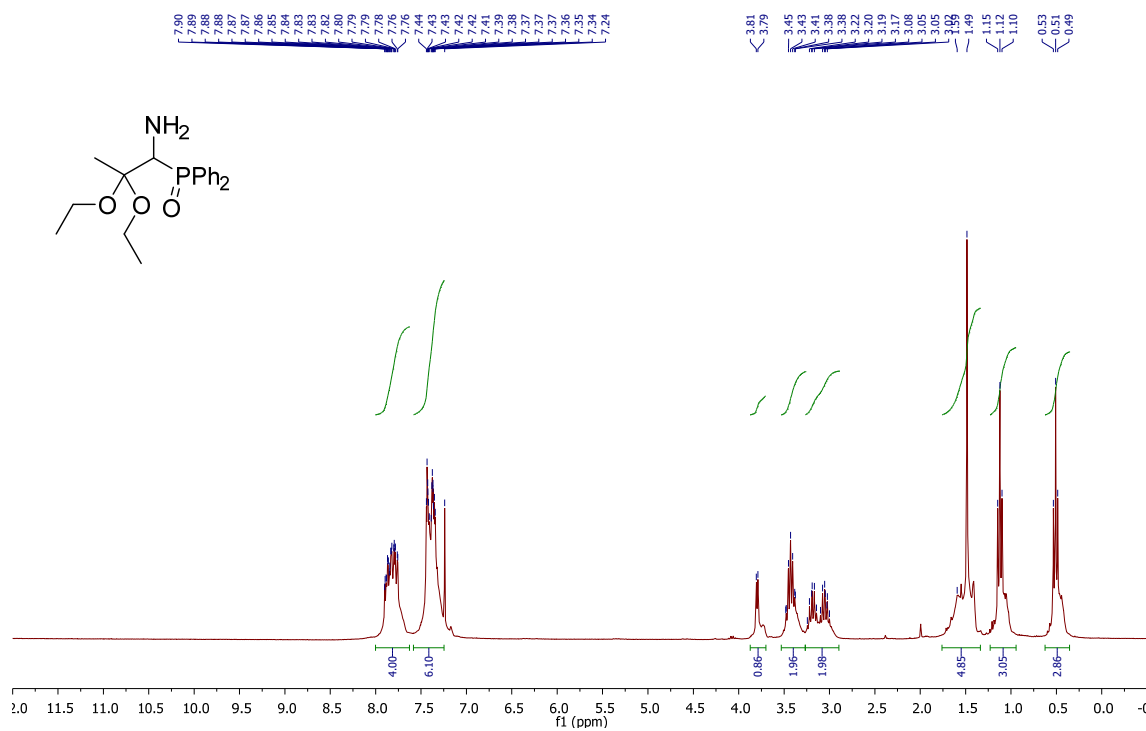
^1H NMR (400 MHz, CDCl_3) of compound **4c**



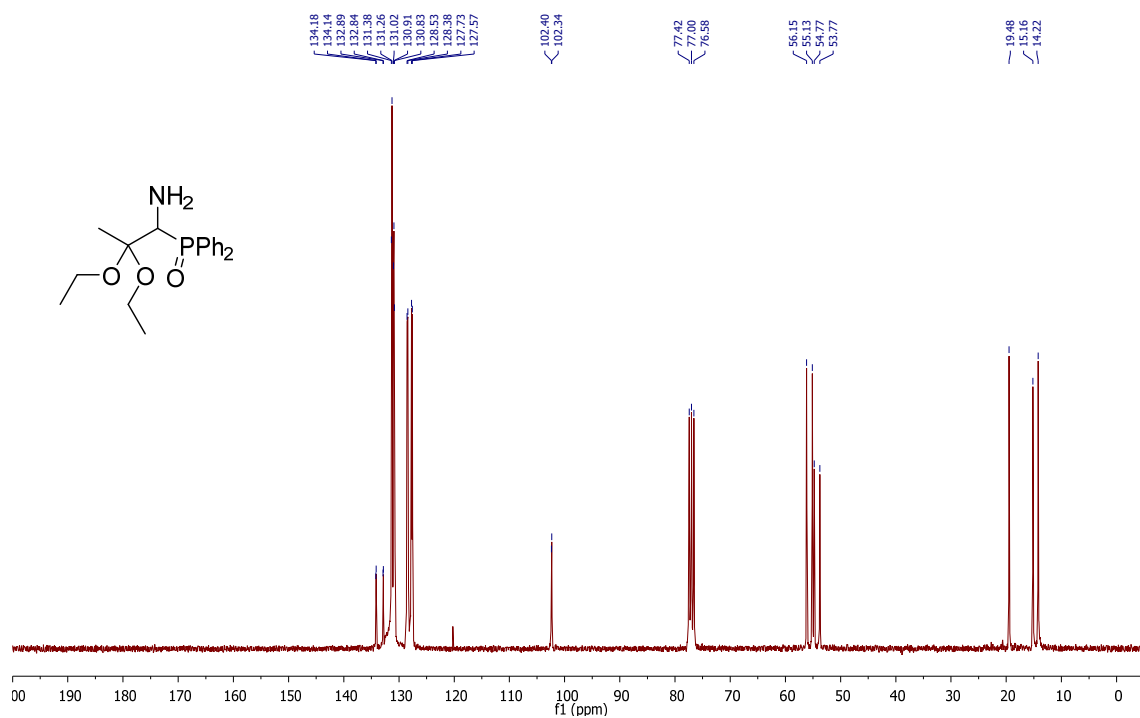
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **4c**



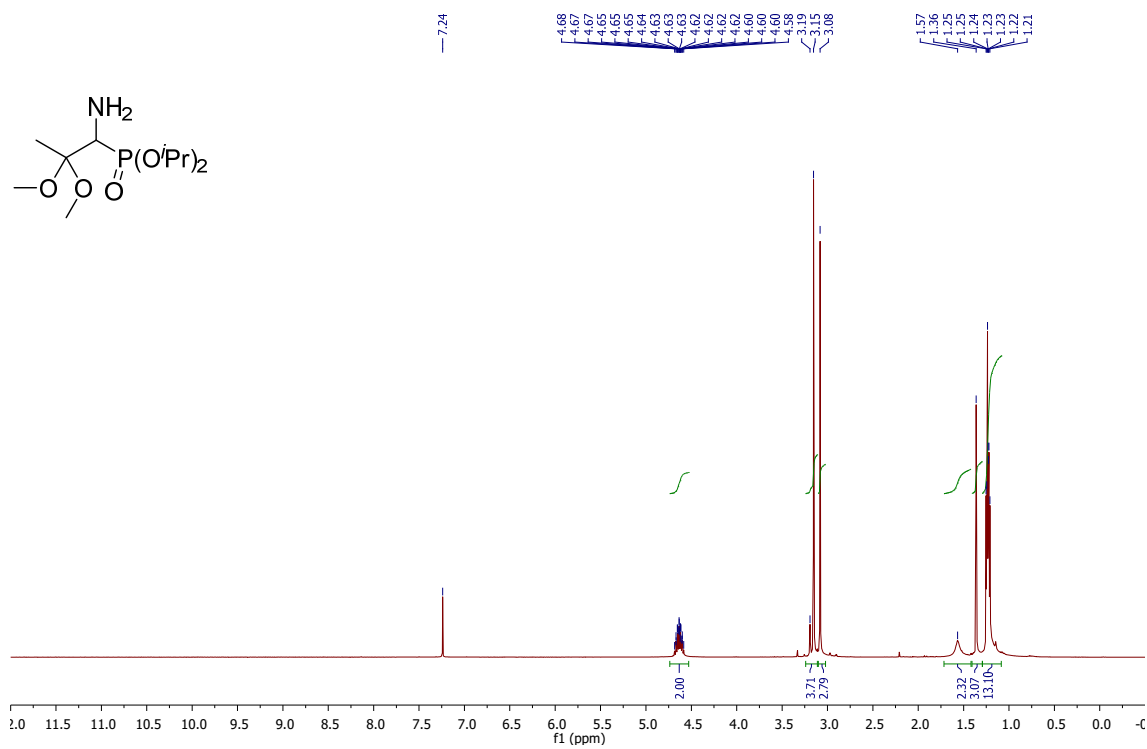
^1H NMR (300 Hz, CDCl_3) of compound **4d**



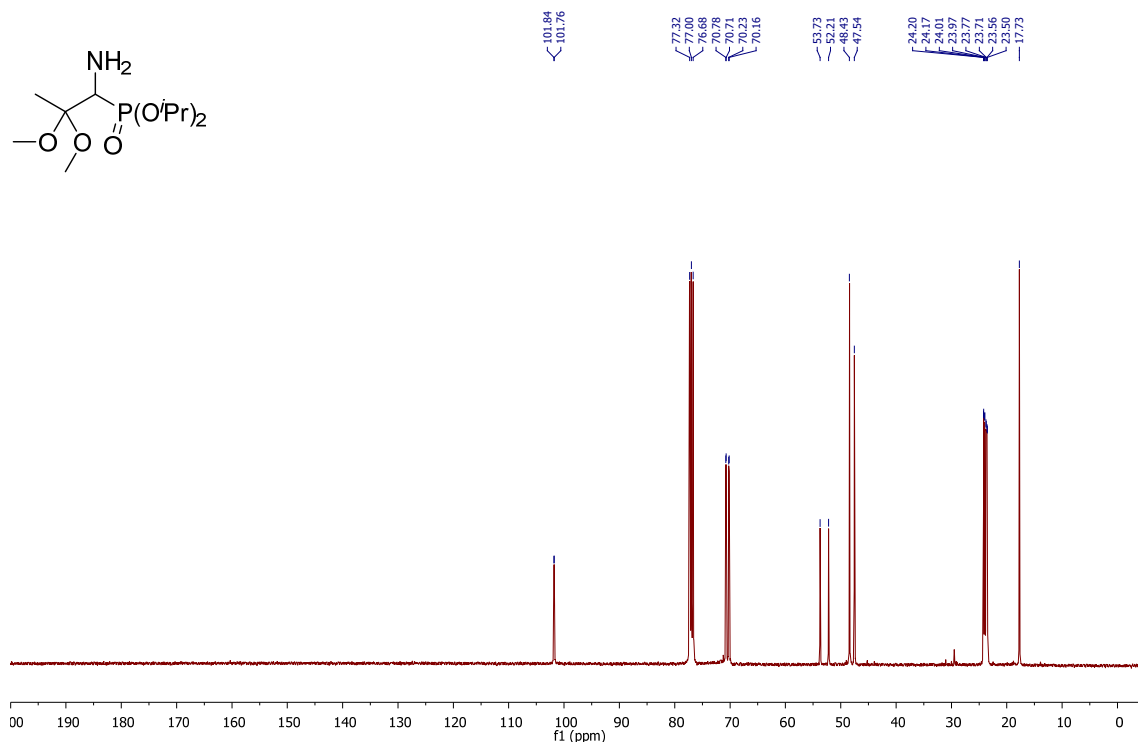
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **4d**



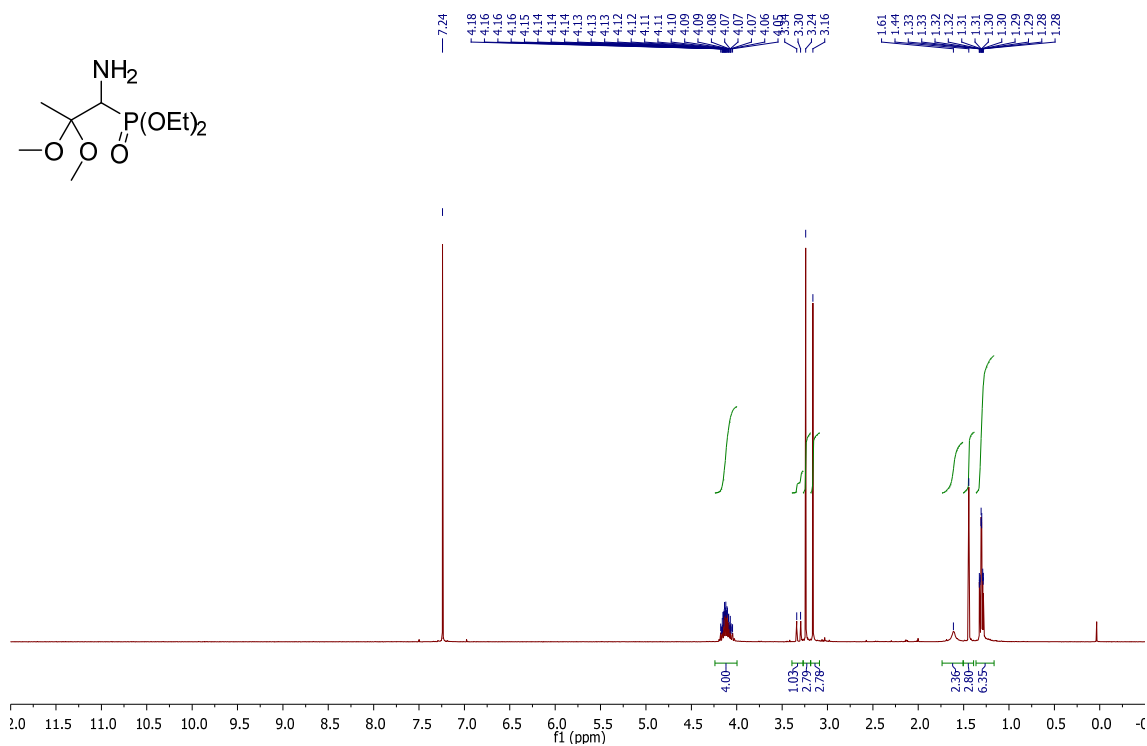
^1H NMR (400 MHz, CDCl_3) of compound **4e**



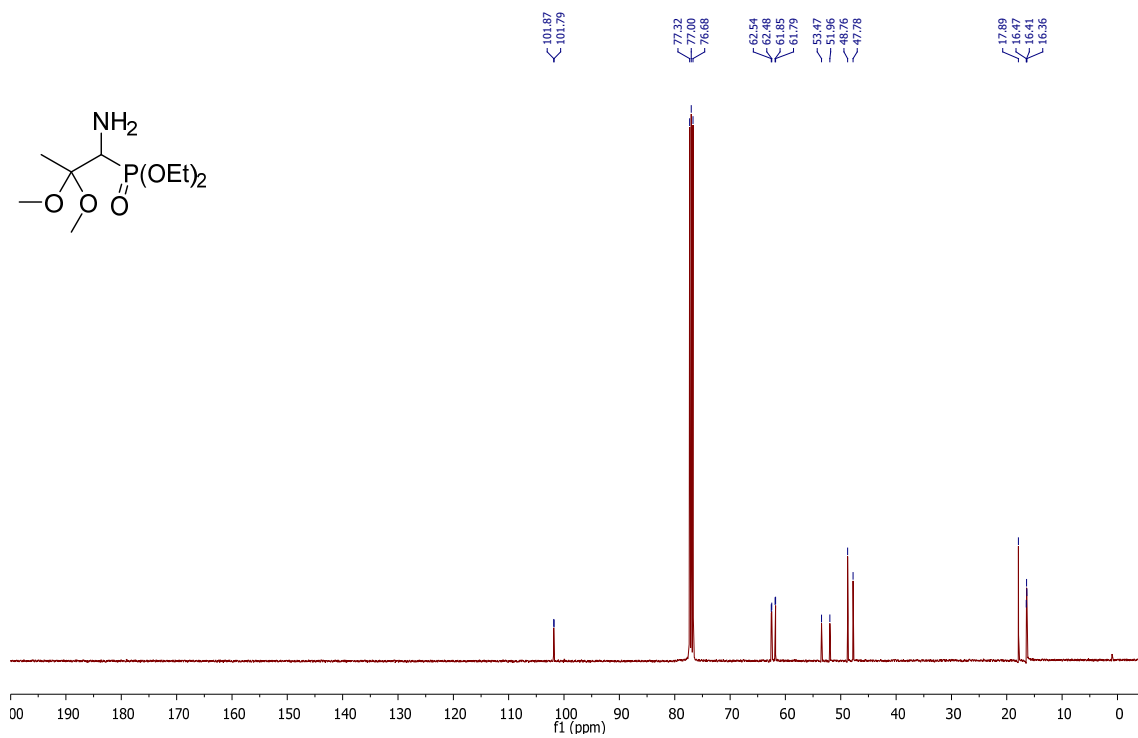
^{13}C { ^1H } NMR (100 MHz, CDCl_3) of compound **4e**



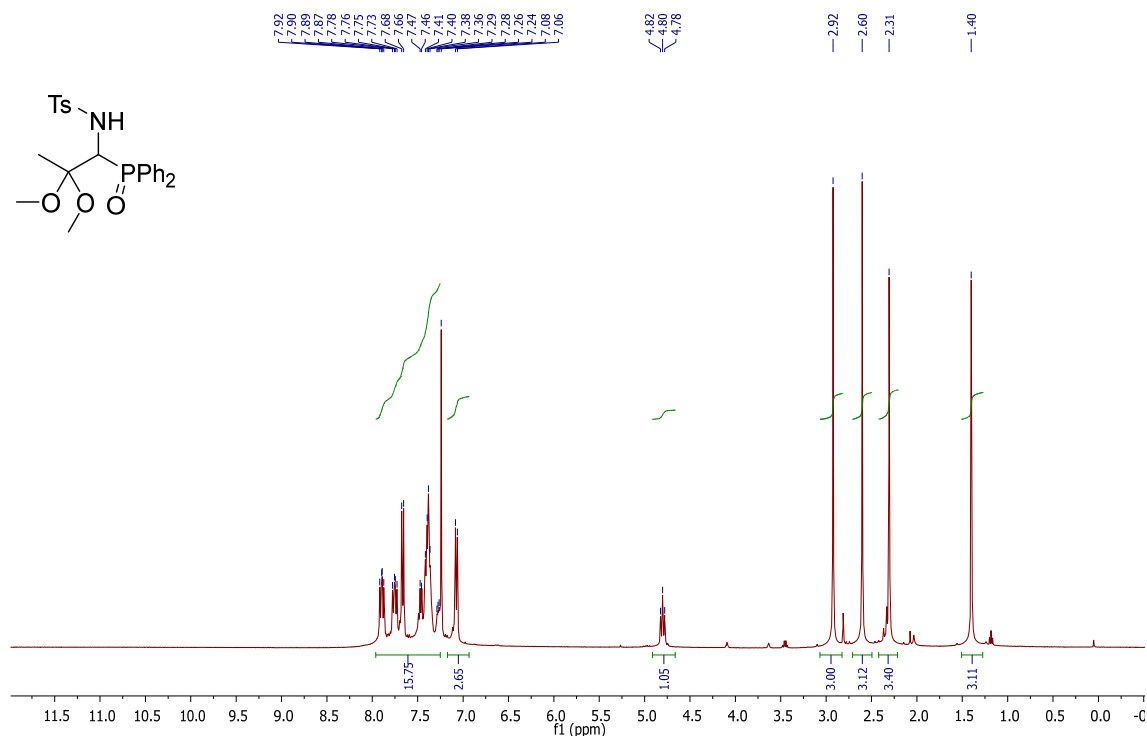
^1H NMR (400 MHz, CDCl_3) of compound **4f**



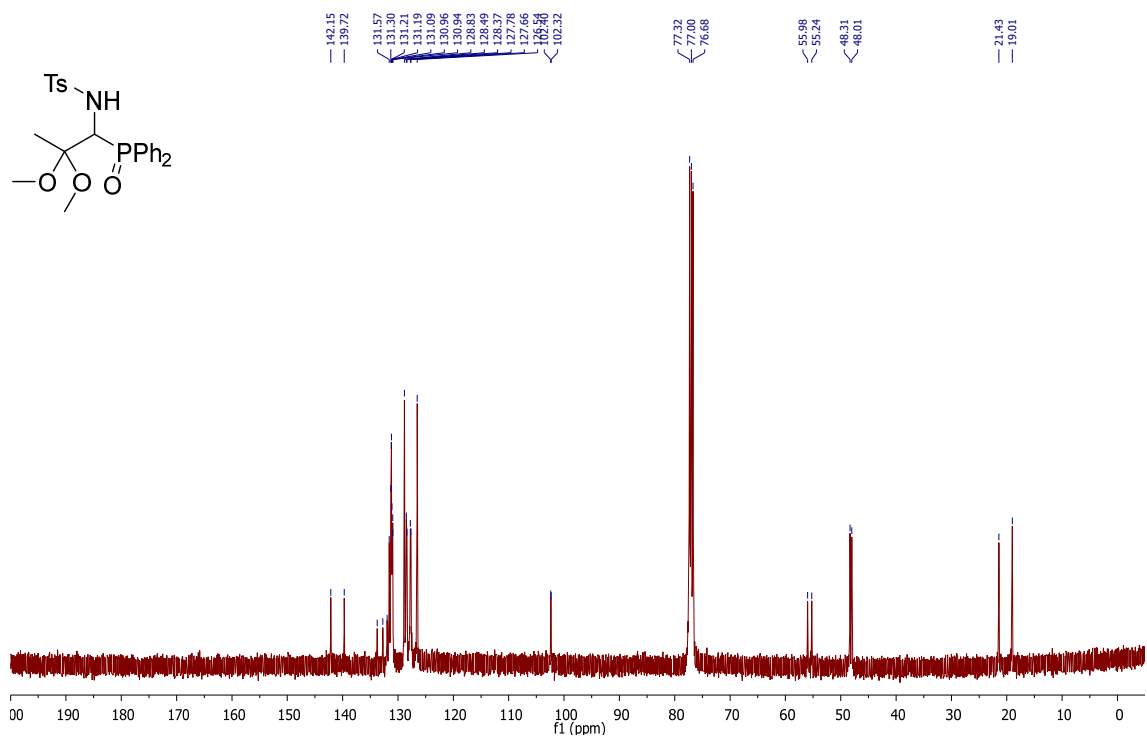
^{13}C $\{^1\text{H}\}$ NMR (100 MHz, CDCl_3) of compound **4f**



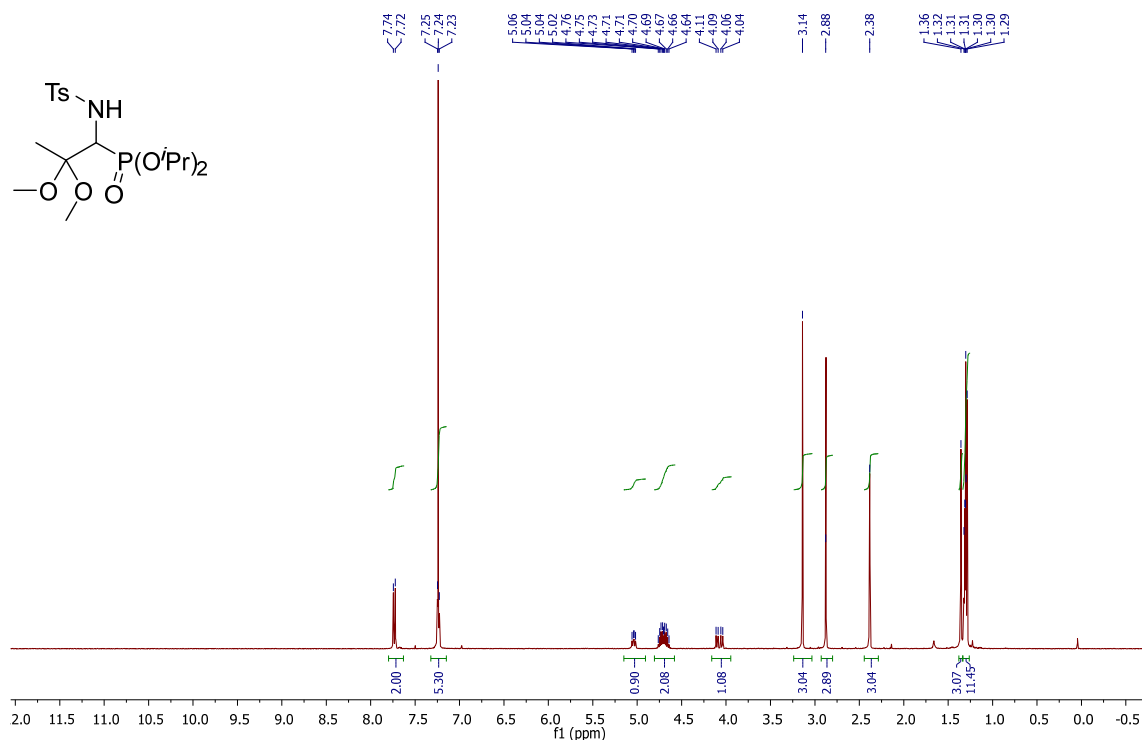
^1H NMR (400 MHz, CDCl_3) of compound **5a**



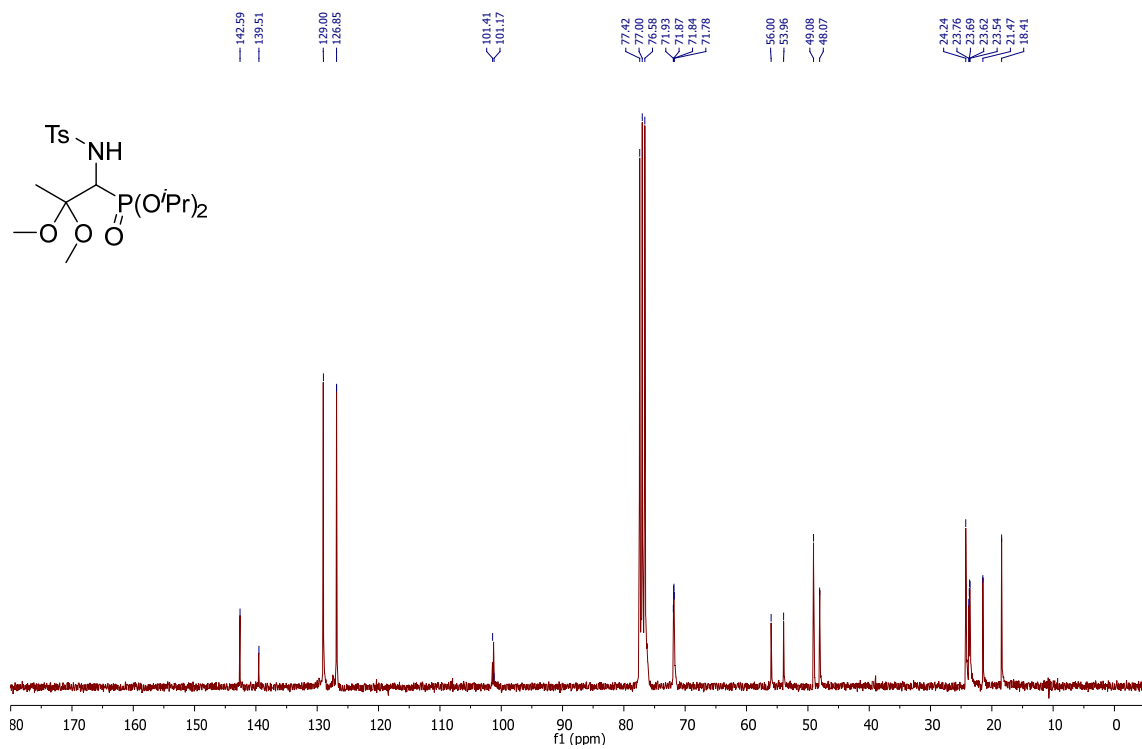
^{13}C $\{^1\text{H}\}$ NMR (100 MHz, CDCl_3) of compound **5a**



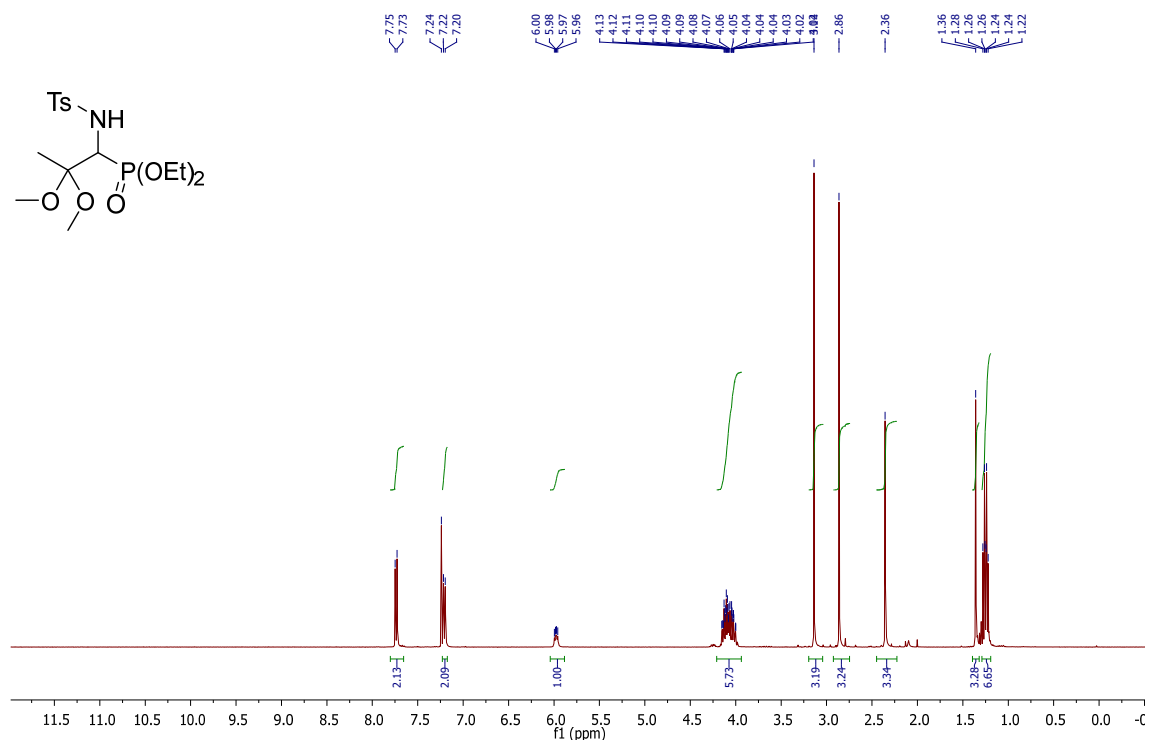
^1H NMR (400 MHz, CDCl_3) of compound **5b**



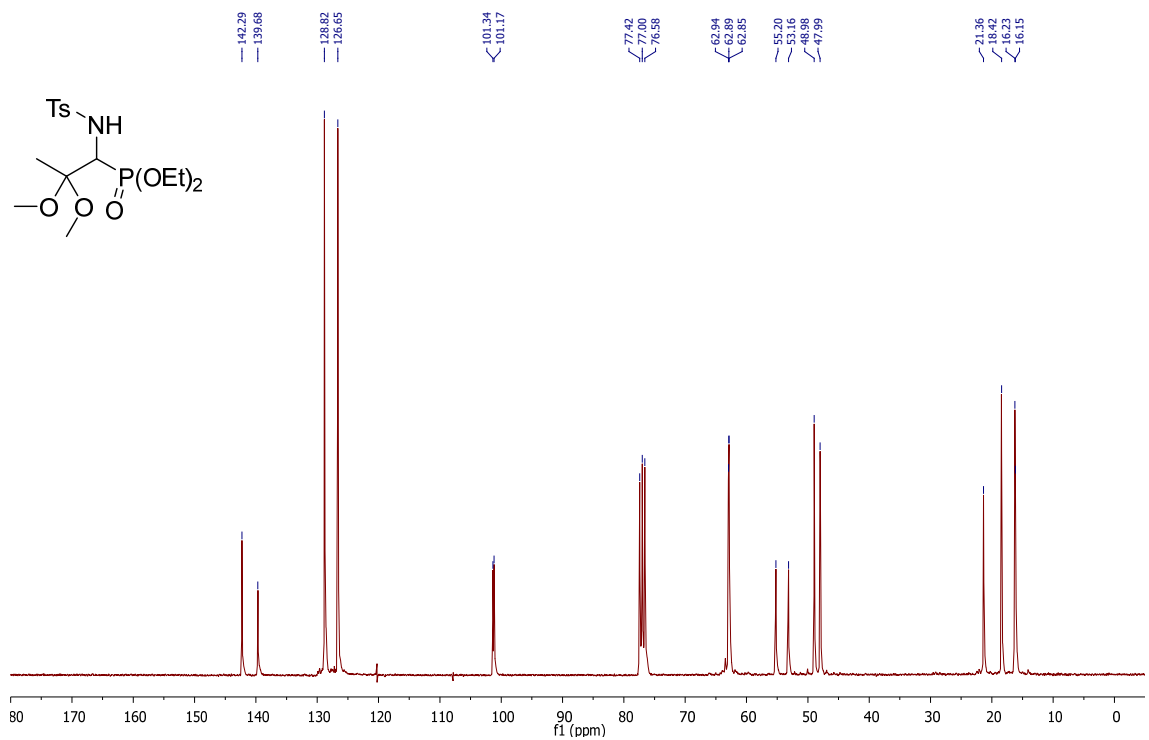
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **5b**



^1H NMR (400 MHz, CDCl_3) of compound **5c**



^{13}C { ^1H } NMR (75 MHz, CDCl_3) of compound **5c**



Chemical structure of 10: CCOC(=O)P(=O)(OCC)C1C(=O)OC(CC)OC1Nc2ccc(C)cc2

¹H NMR spectrum (CDCl₃):

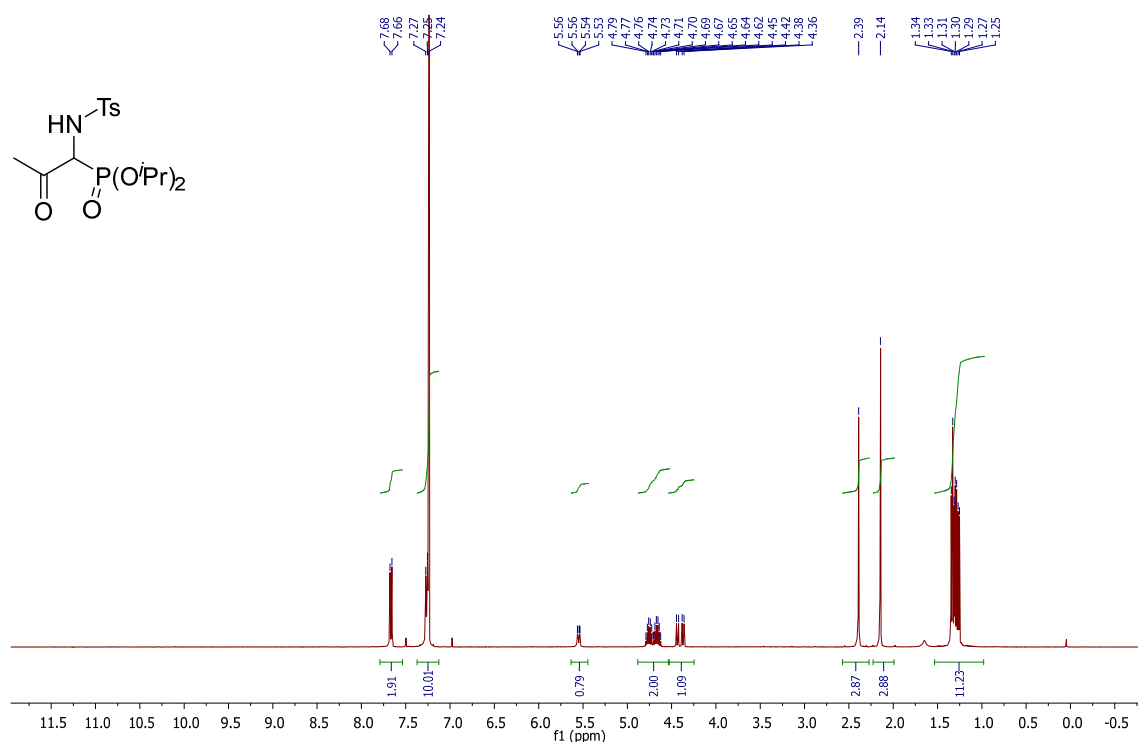
- Chemical shifts (ppm):** 7.77, 7.74, 7.24, 7.22, 7.20, 5.64, 5.62, 5.61, 5.59, 4.11, 4.09, 4.08, 4.07, 4.05, 4.03, 4.02, 4.00, 3.50, 3.45, 3.43, 3.40, 3.35, 3.37, 3.35, 3.28, 2.95, 2.50, 1.43, 1.35, 1.22, 1.19, 1.12, 1.10, 0.86, 0.87, 0.84.
- Integrations:** 2.00, 2.11, 1.00, 5.85, 4.38, 3.03, 3.67, 6.07, 3.47, 3.27.

Chemical structure of the compound is shown above the spectrum. The spectrum displays peaks corresponding to the chemical shifts (ppm) listed on the right:

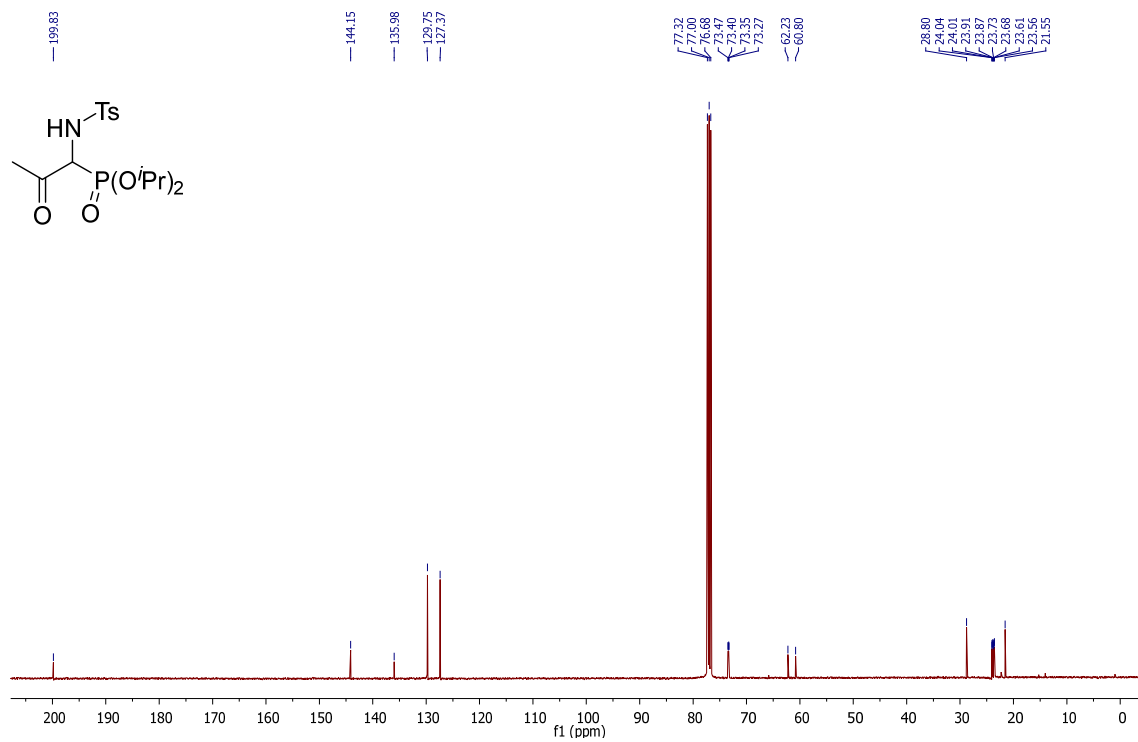
- 142.55, 139.53
- 129.01, 126.77
- 120.27
- 100.97, 100.82
- 77.42, 77.00, 76.58
- 62.71, 62.63
- 56.88, 56.14, 55.82, 54.10
- 21.37, 19.69, 16.33, 16.29, 16.25, 16.21, 15.85, 14.72

CCOP(=O)(OCC)C(C)(C)OC1=CC=C(C=C1)C(=O)N

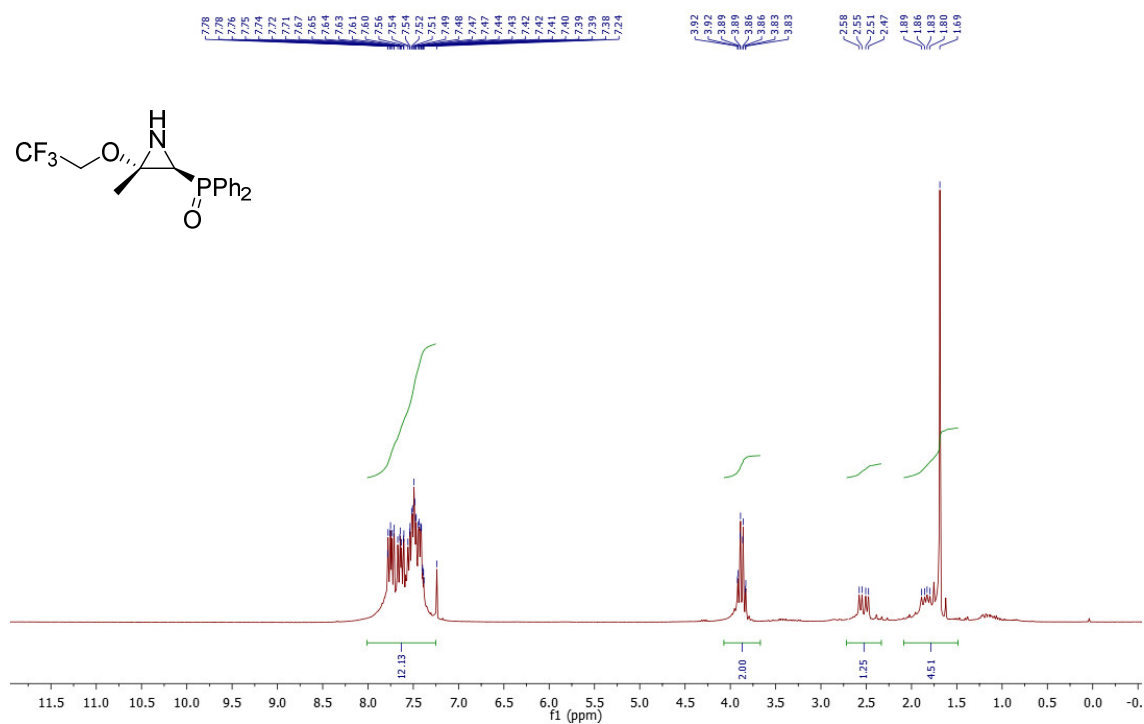
^1H NMR (400 MHz, CDCl_3) of compound **6**



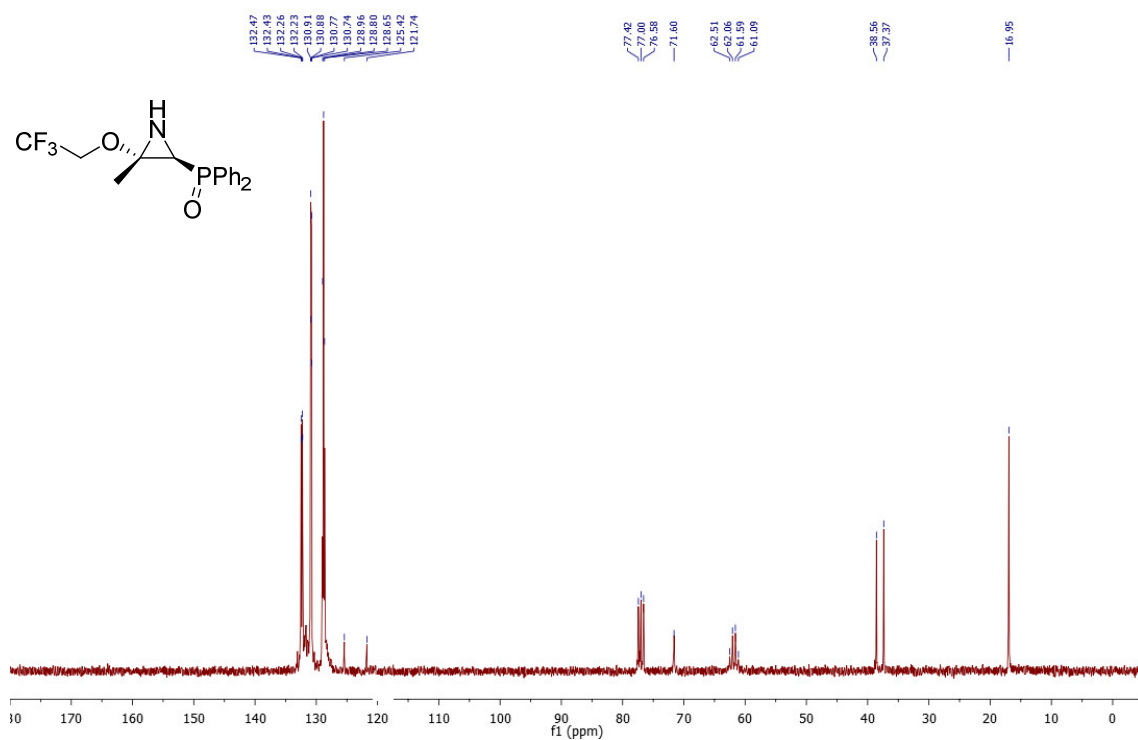
^{13}C { ^1H } NMR (100 MHz, CDCl_3) of compound **6**



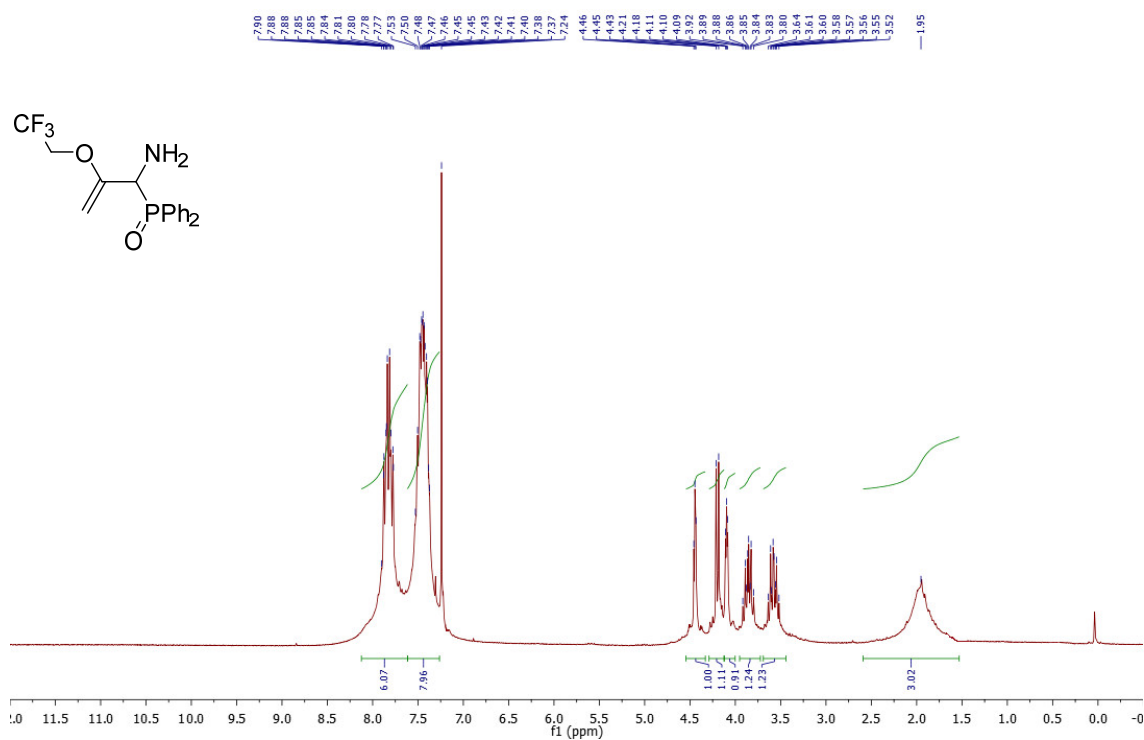
^1H NMR (300 Hz, CDCl_3) of compound **7**



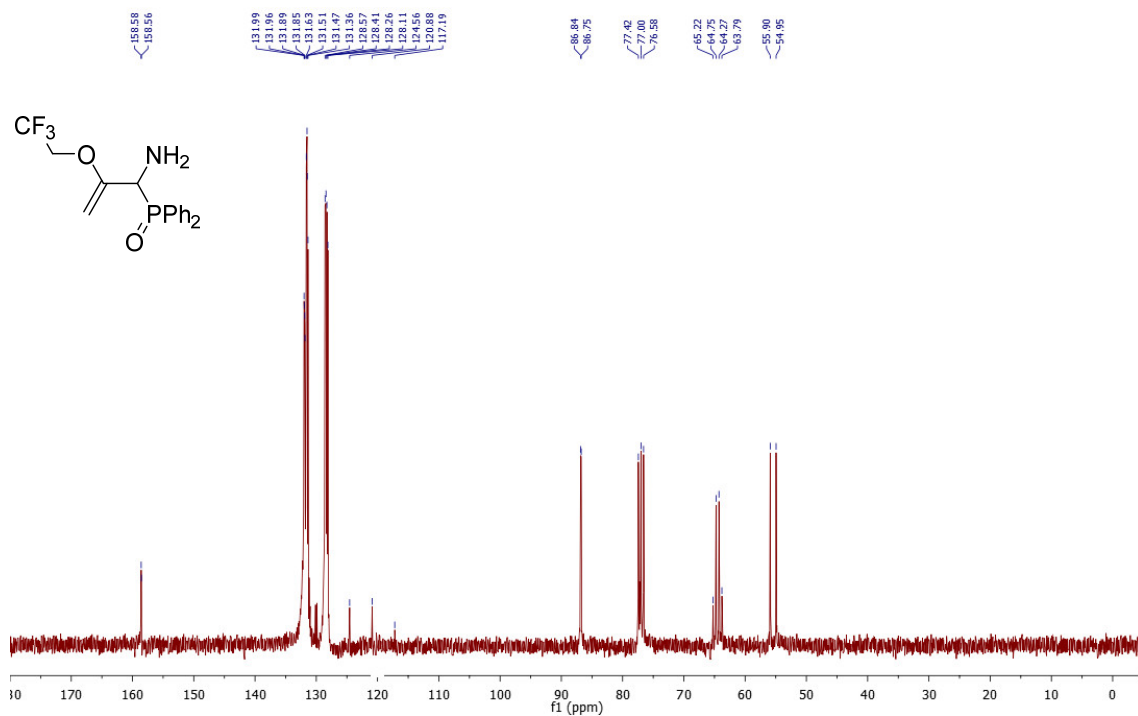
^{13}C { ^1H } NMR (75 MHz, CDCl_3) of compound **7**



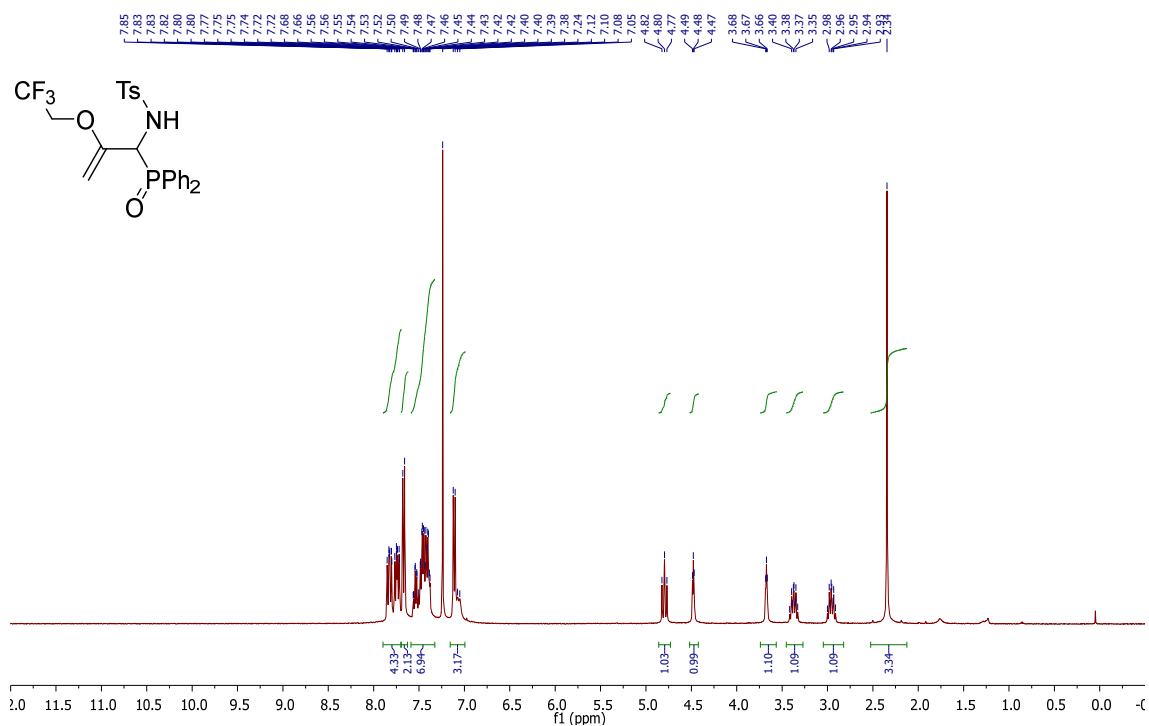
^1H NMR (300 Hz, CDCl_3) of compound **8**



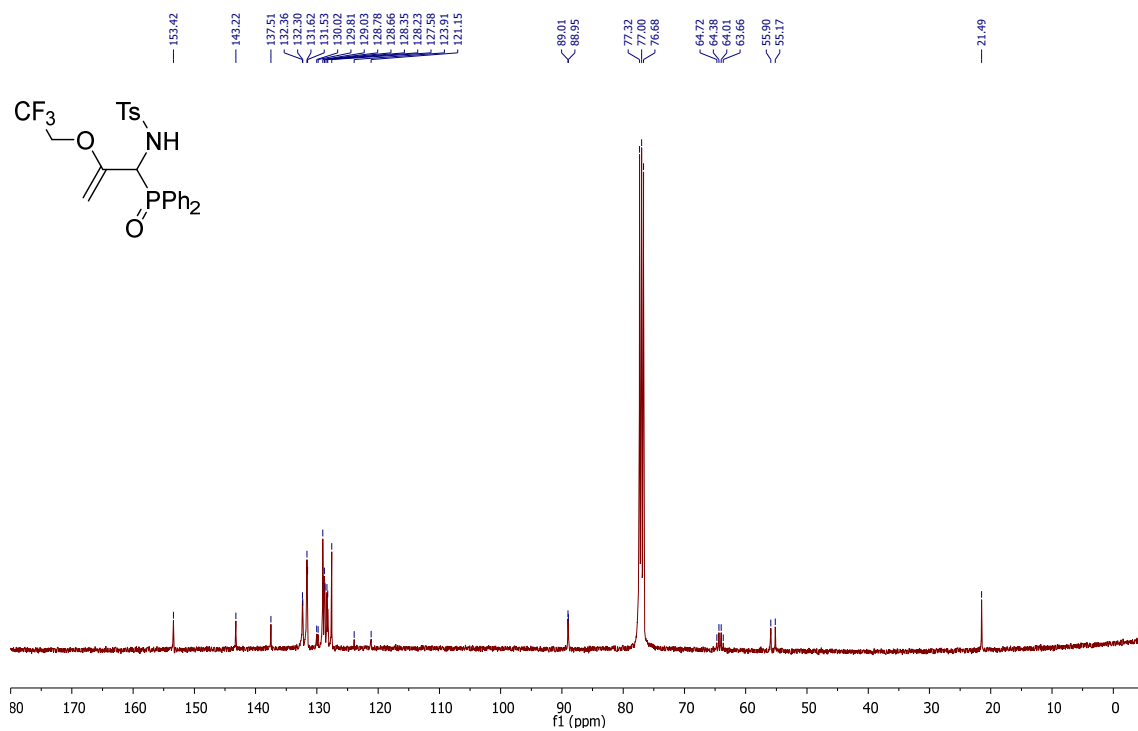
^{13}C { ^1H } NMR (75 MHz, CDCl_3) of compound **8**



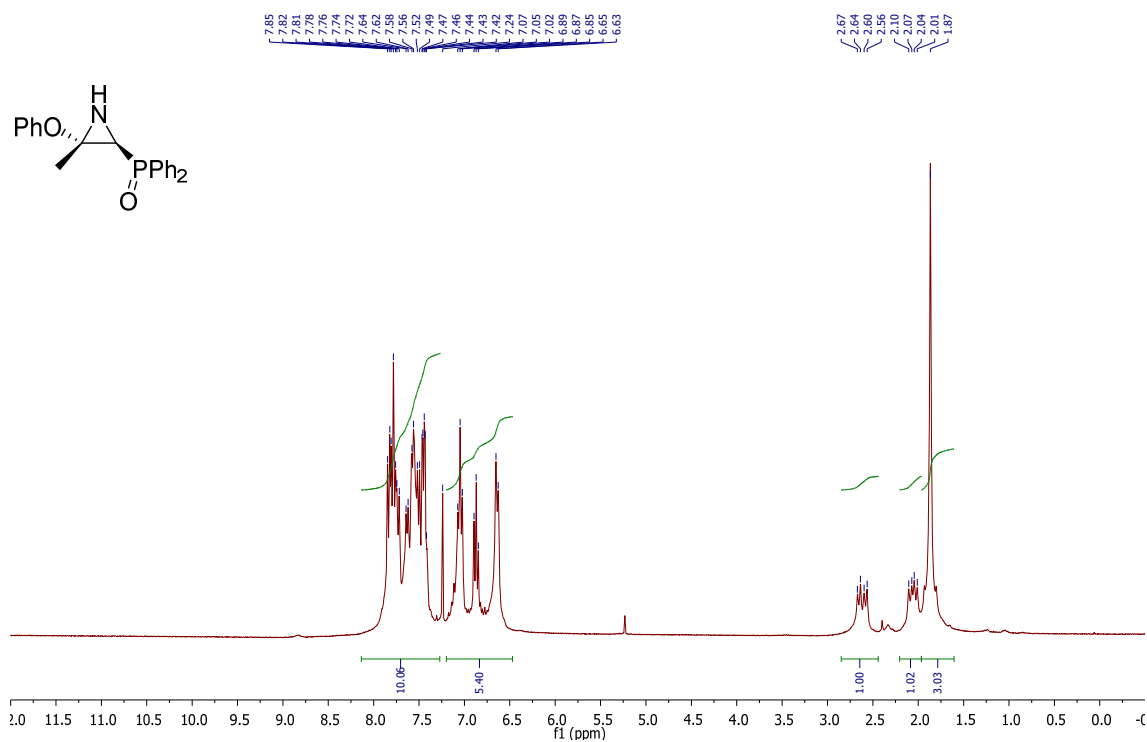
^1H NMR (400 Hz, CDCl_3) of compound **9**



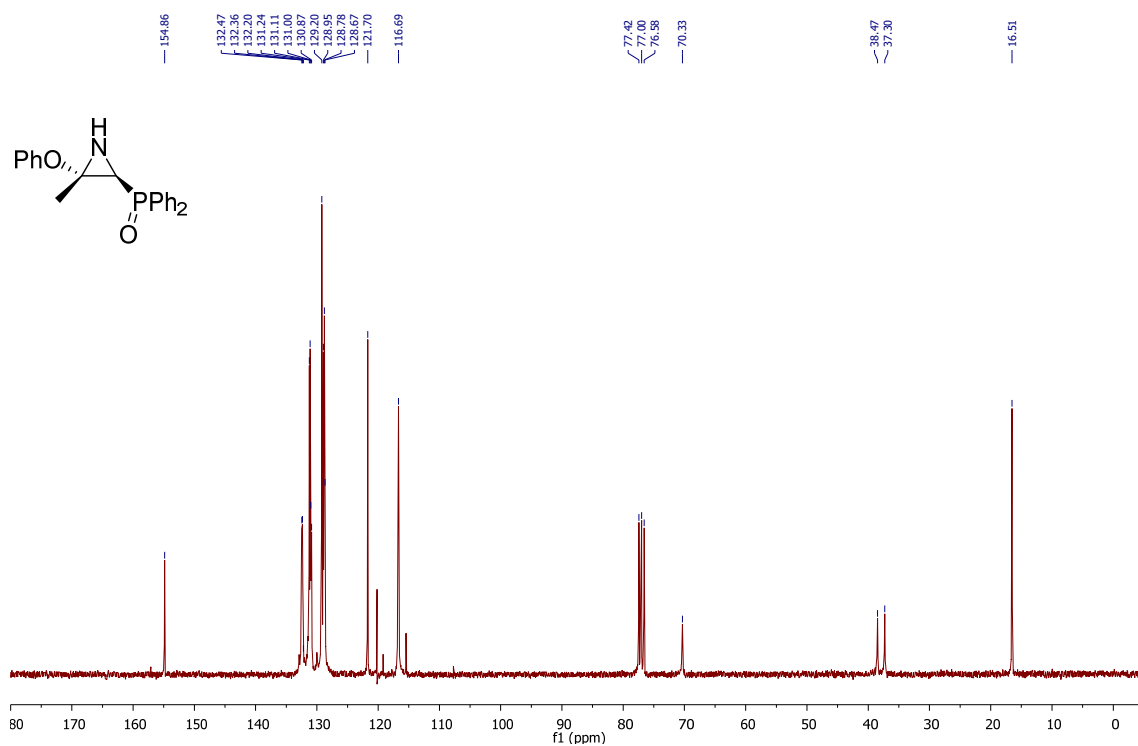
^{13}C $\{^1\text{H}\}$ NMR (100 MHz, CDCl_3) of compound **9**



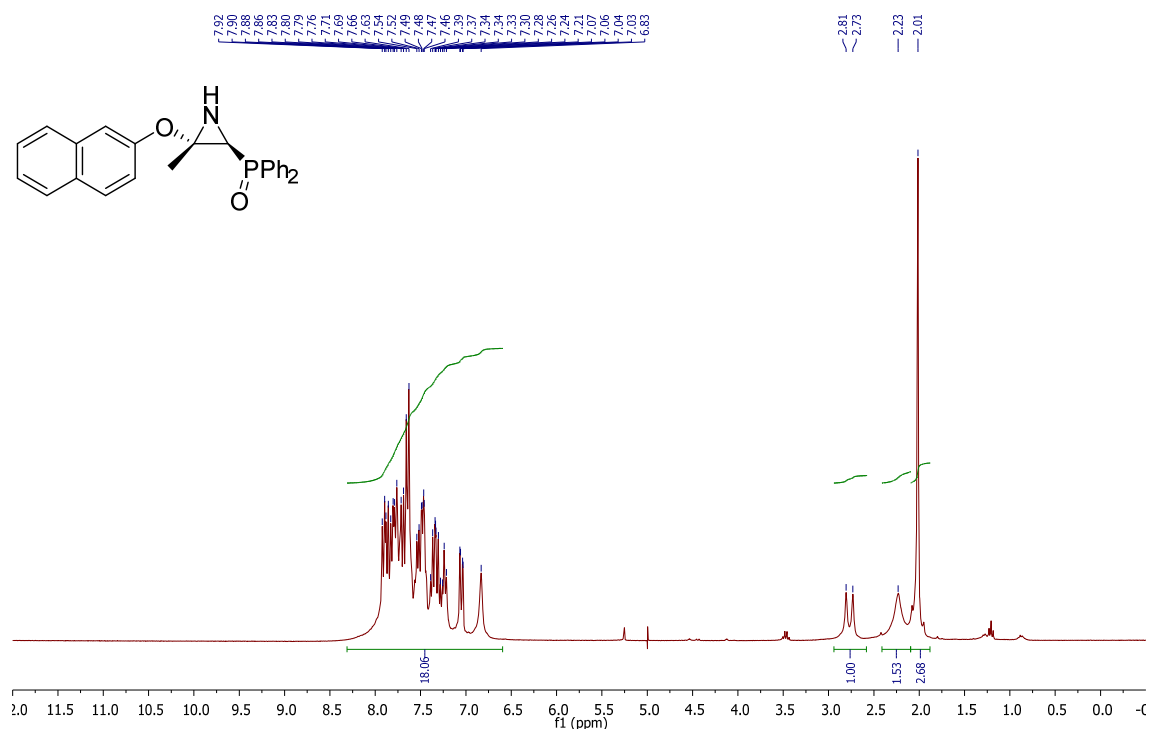
^1H NMR (300 Hz, CDCl_3) of compound **10a**



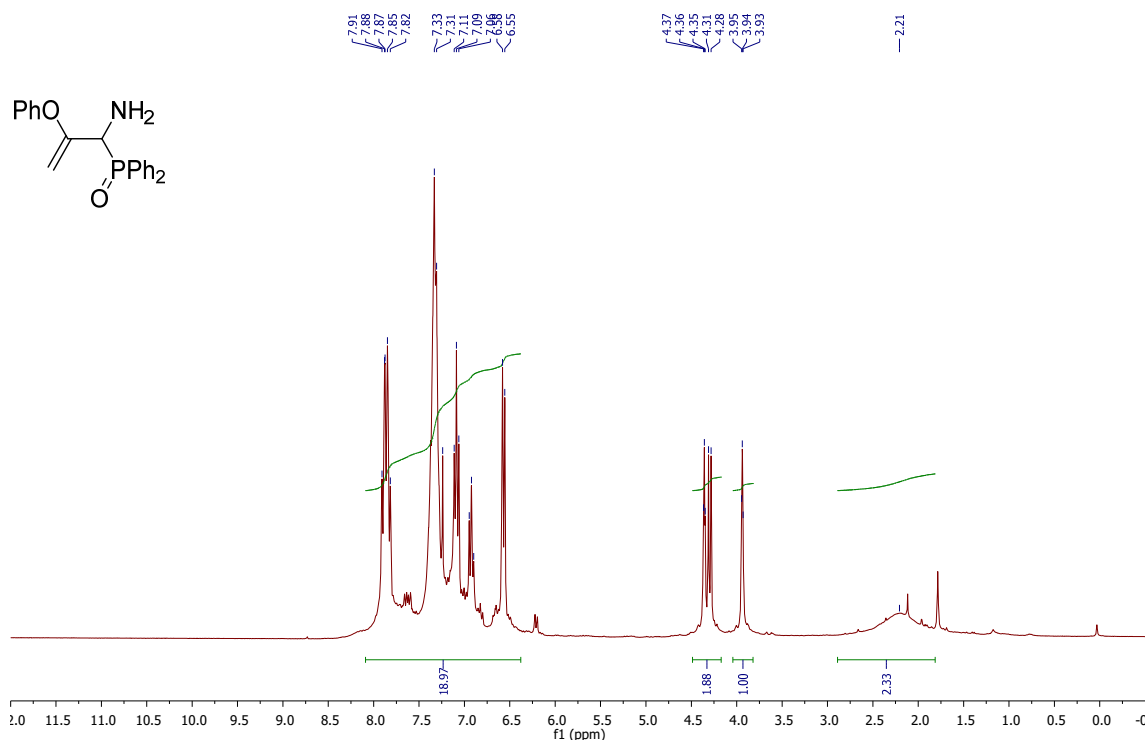
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **10a**



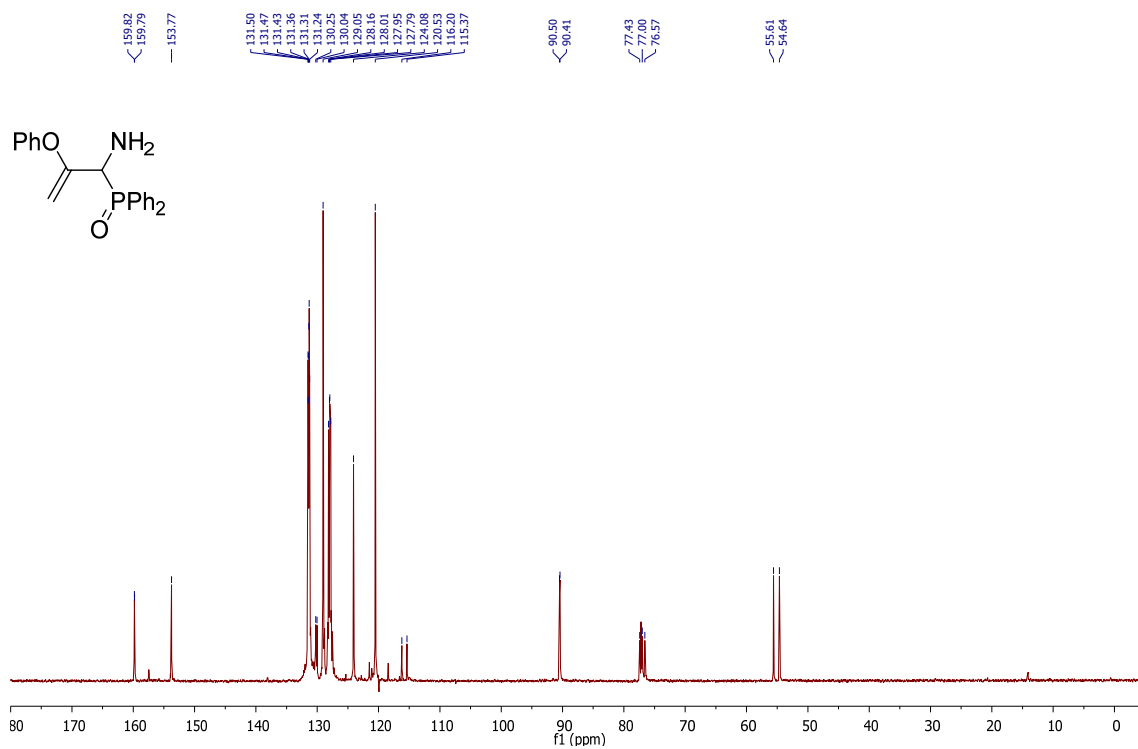
^1H NMR (300 Hz, CDCl_3) of compound **10b**



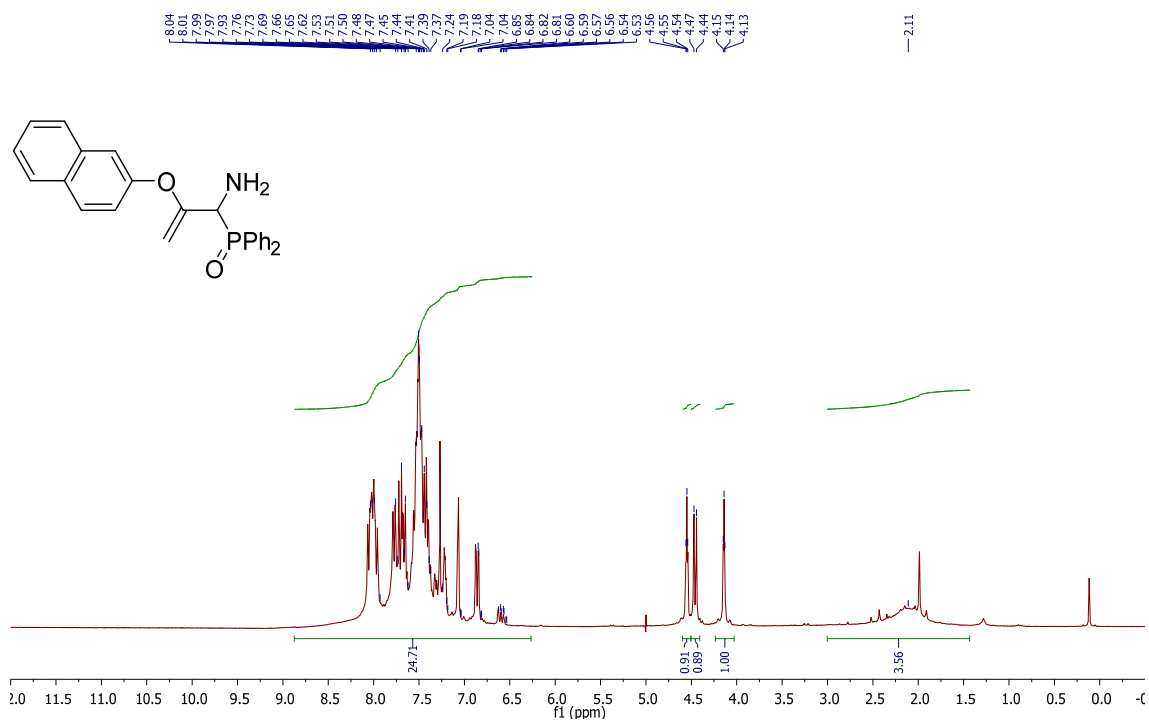
^1H NMR (300 Hz, CDCl_3) of compound **11a**



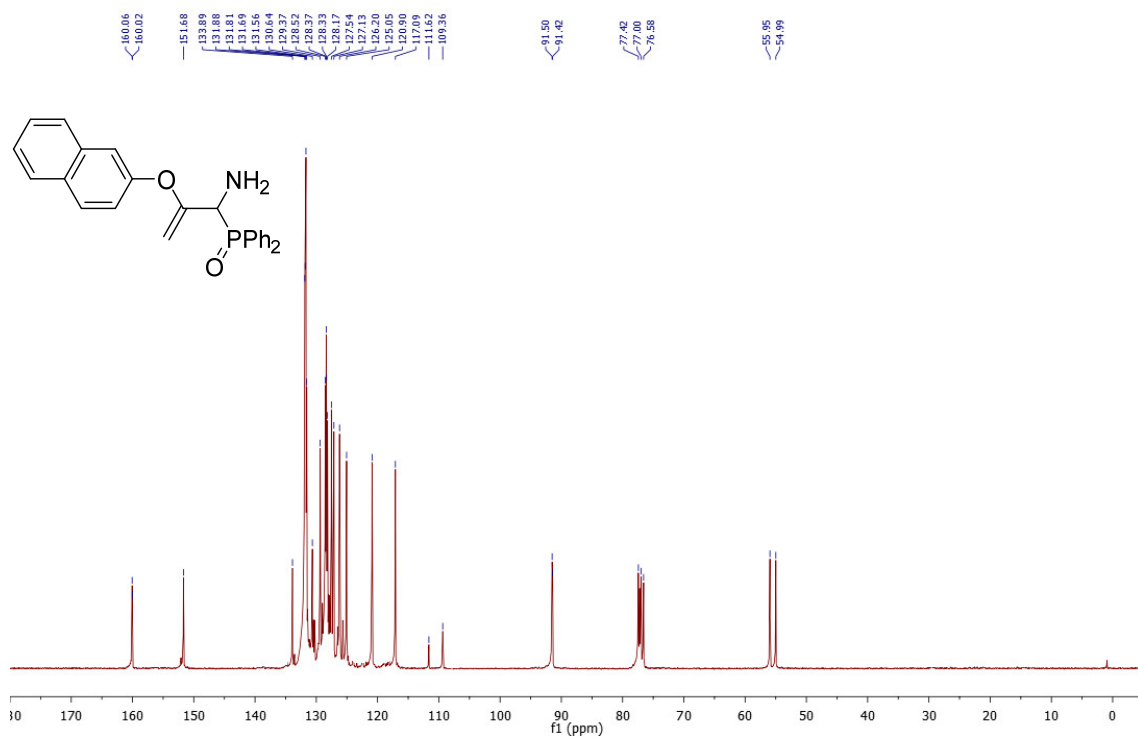
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **11a**



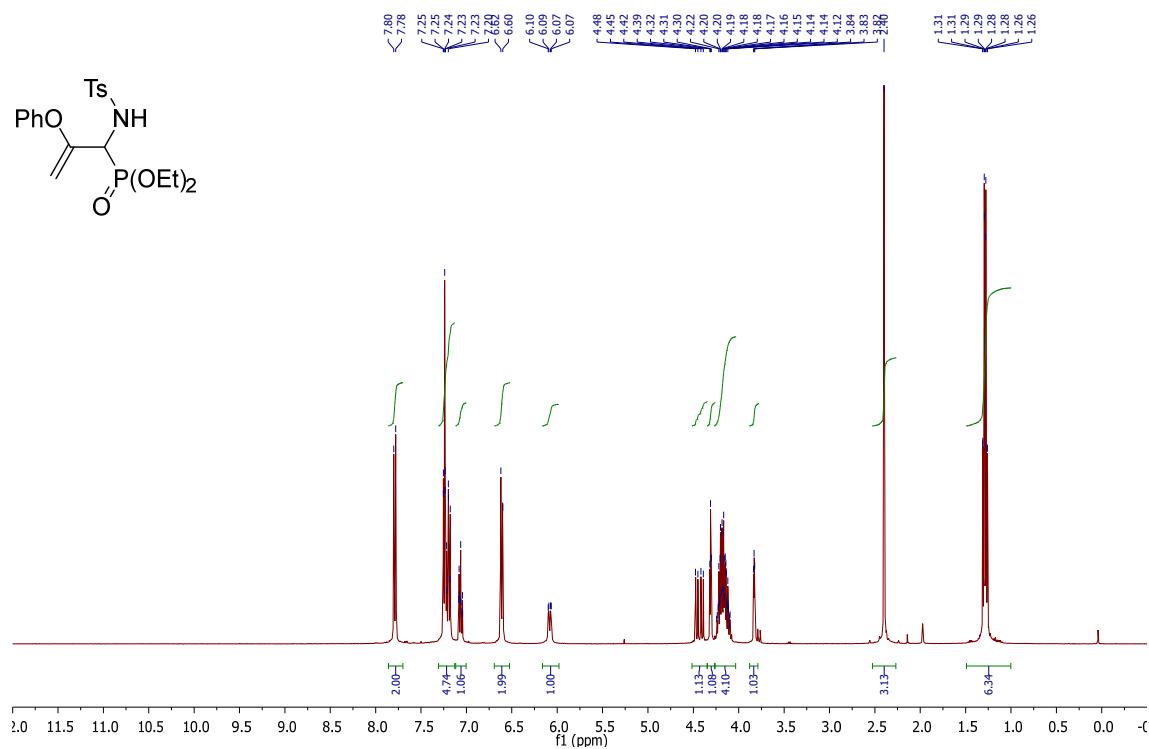
^1H NMR (300 Hz, CDCl_3) of compound **11b**



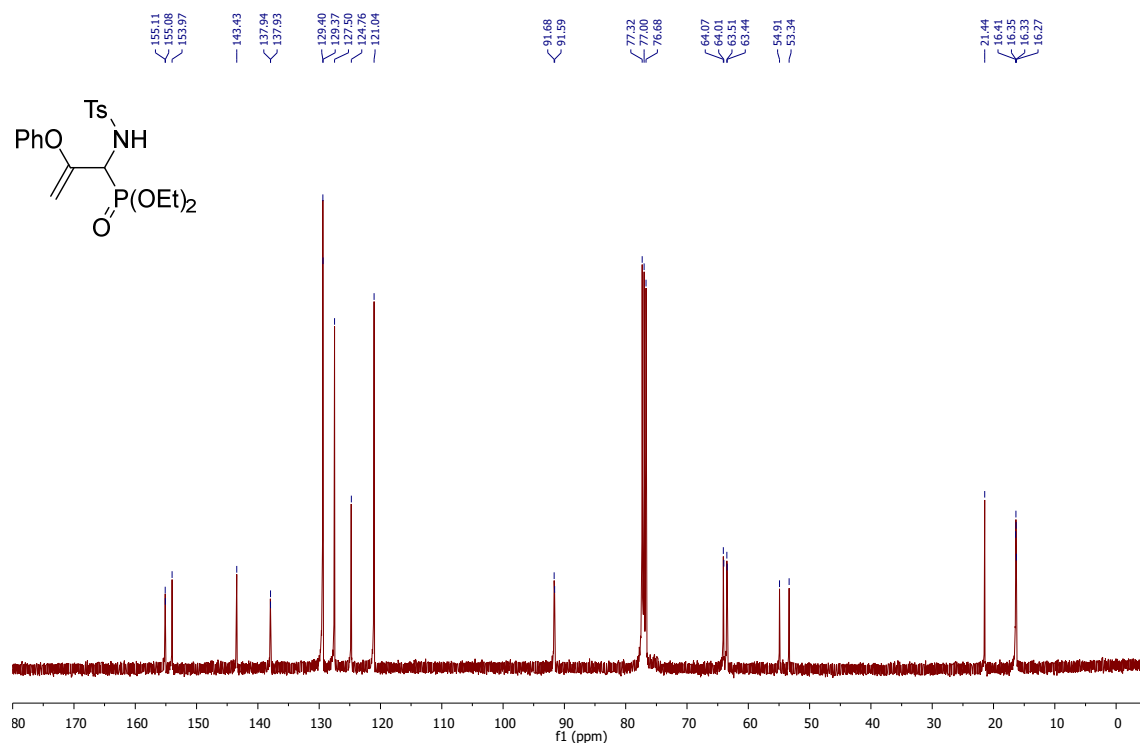
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **11b**



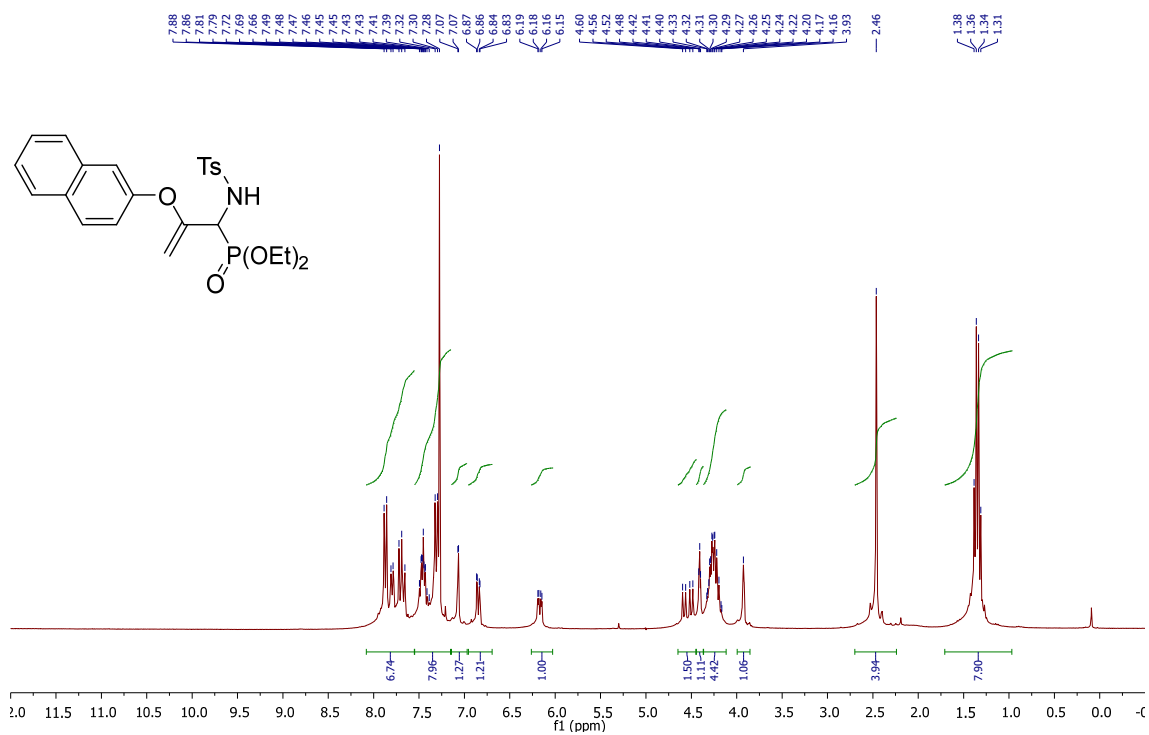
^1H NMR (400 Hz, CDCl_3) of compound **12a**



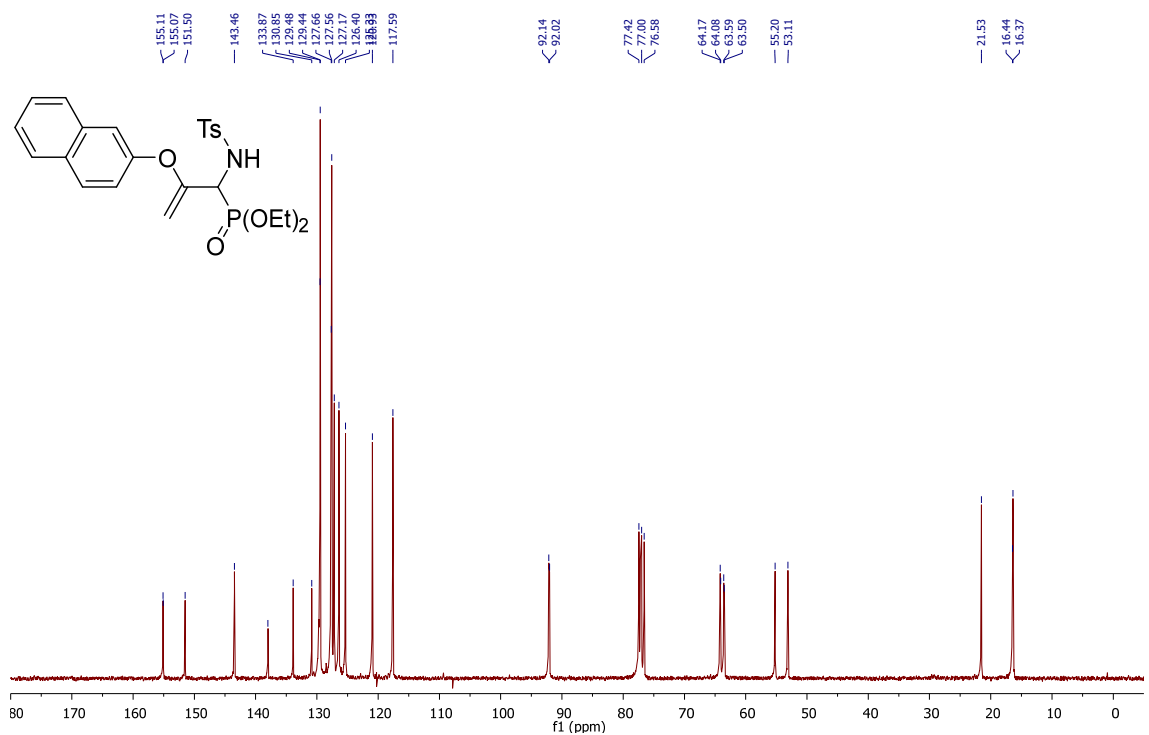
^{13}C $\{^1\text{H}\}$ NMR (100 MHz, CDCl_3) of compound **12a**



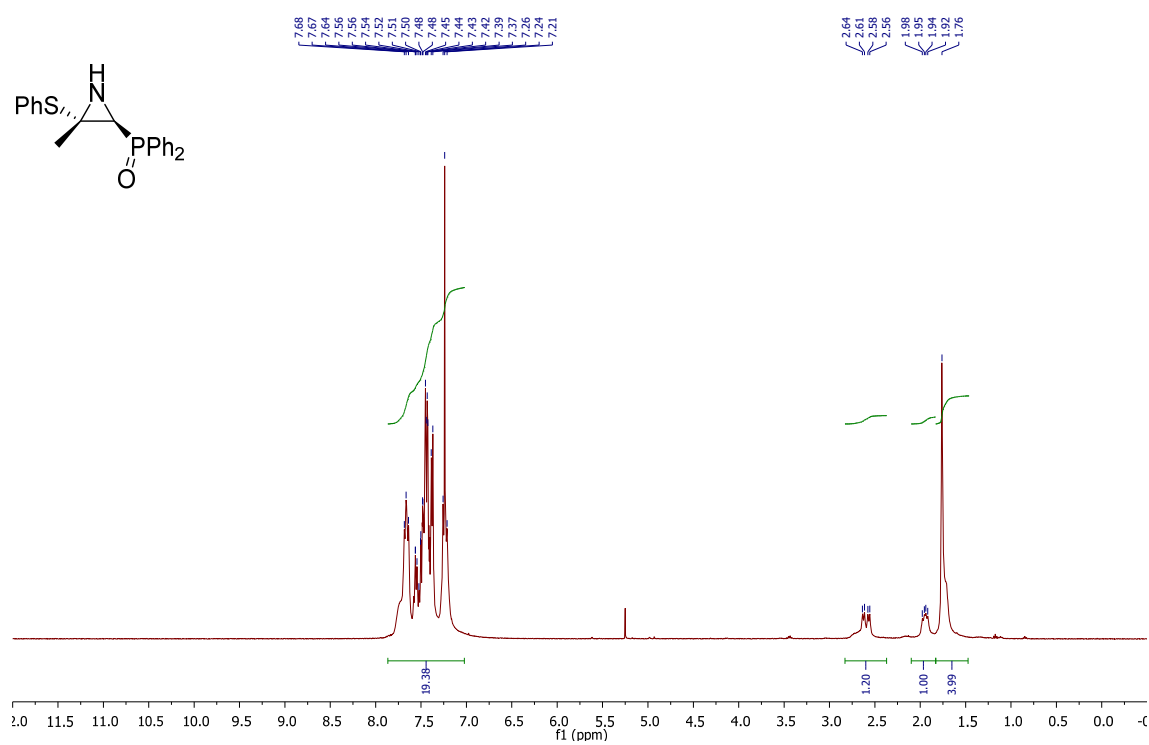
^1H NMR (300 Hz, CDCl_3) of compound **12b**



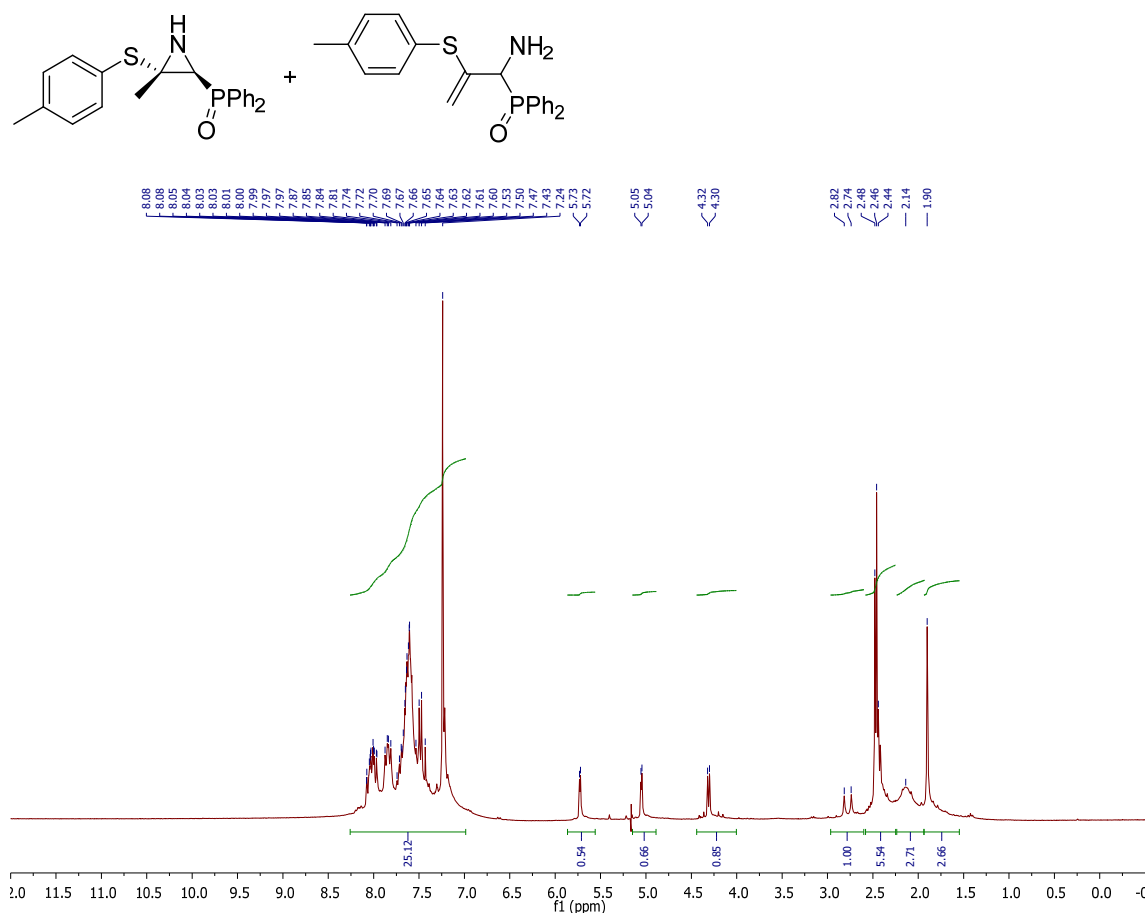
^{13}C { ^1H } NMR (75 MHz, CDCl_3) of compound **12b**



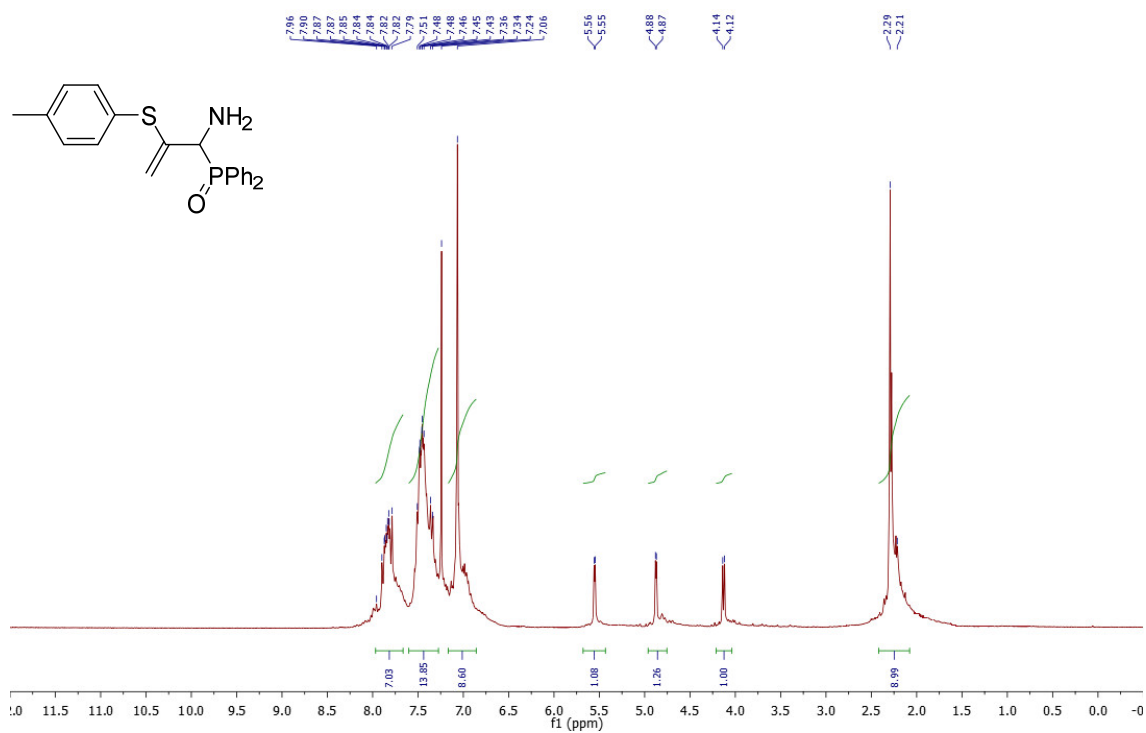
¹H NMR (400 Hz, CDCl₃) of compound **14a**



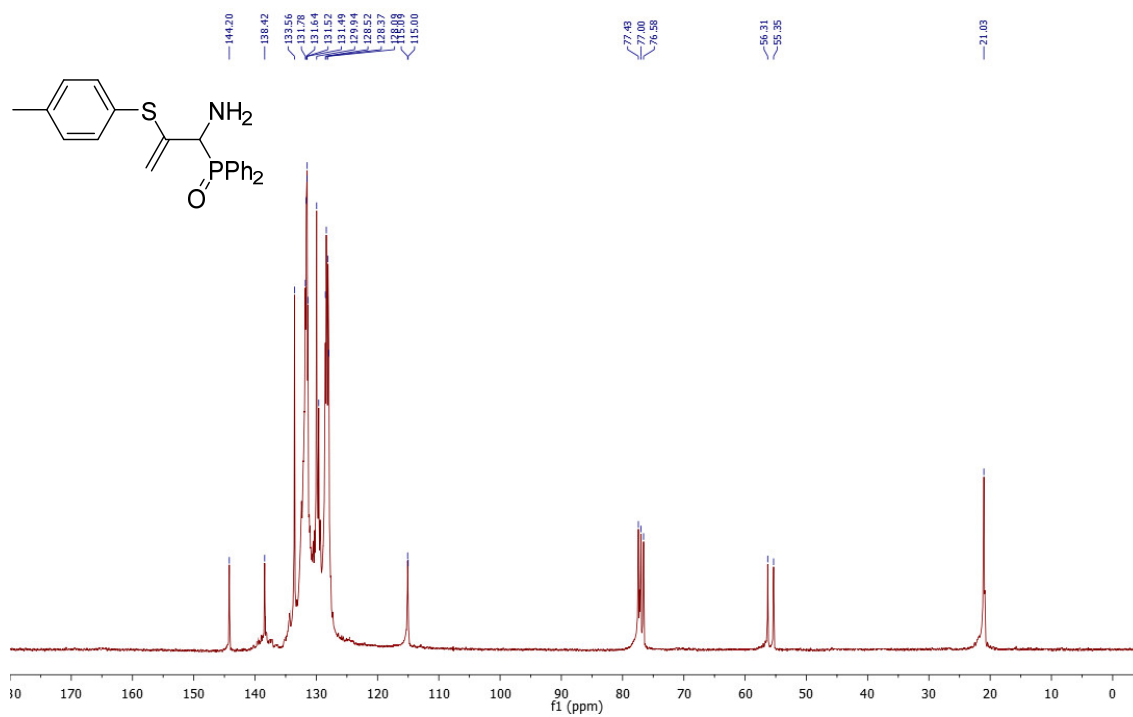
^1H NMR (300 Hz, CDCl_3) of a crude mixture of **14b** + **15b**.



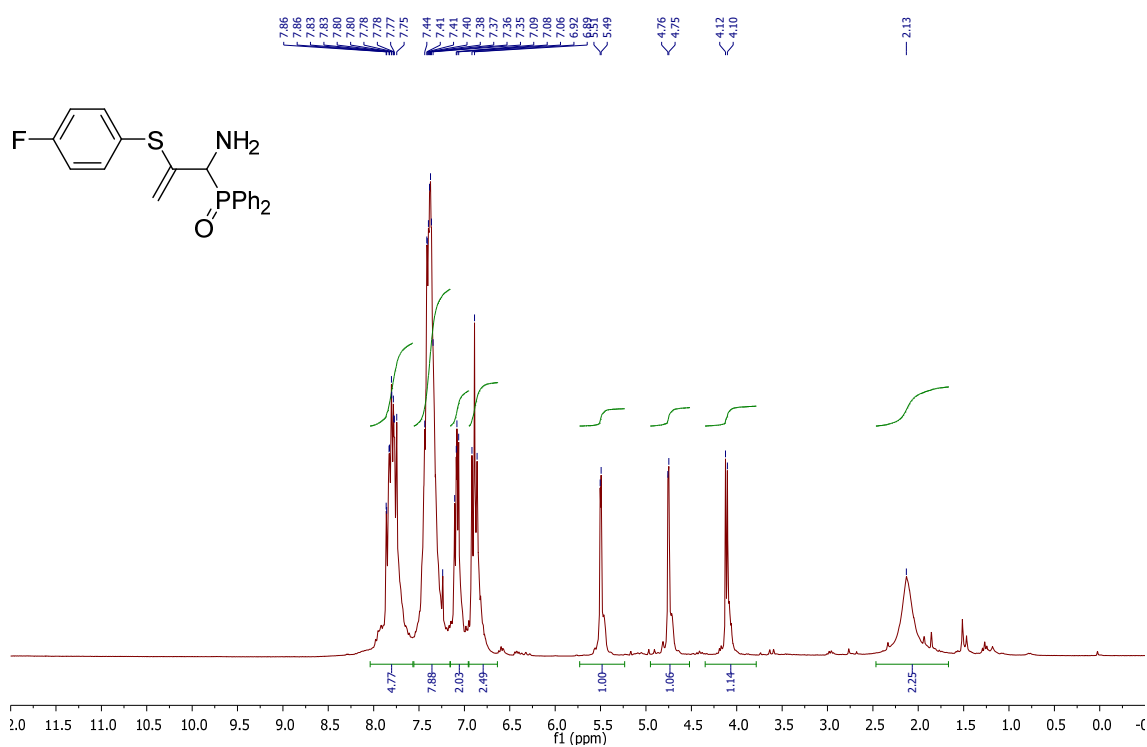
^1H NMR (300 Hz, CDCl_3) of compound **15b**



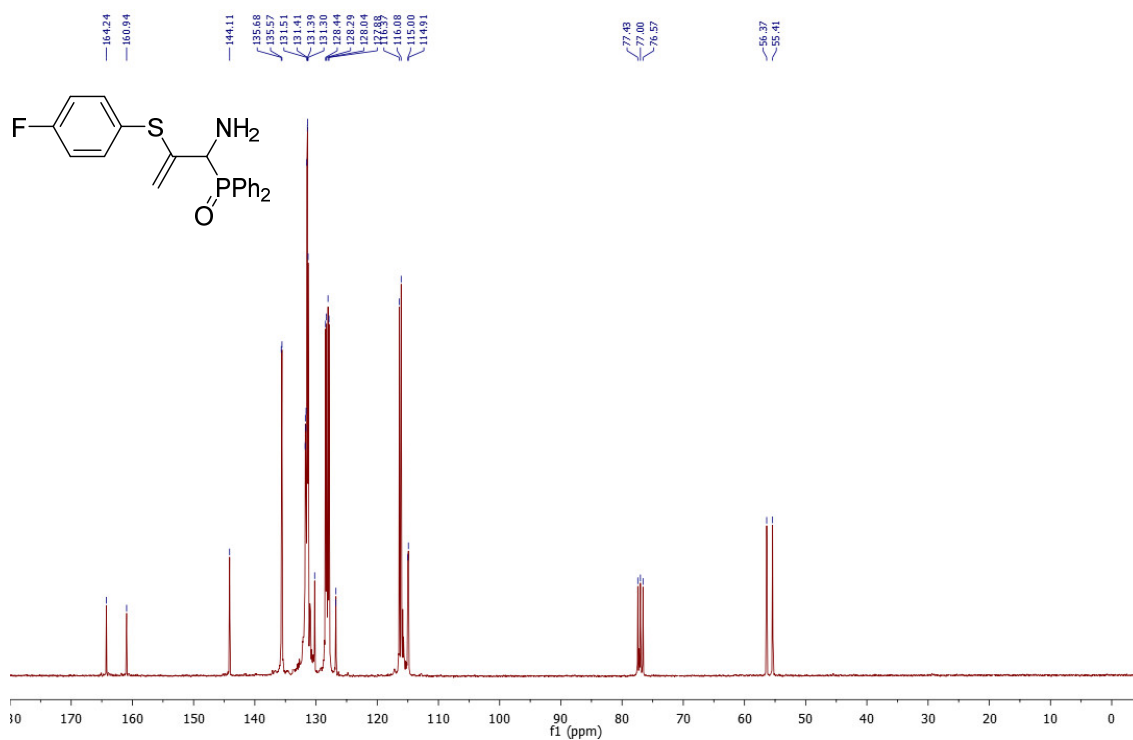
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **15b**



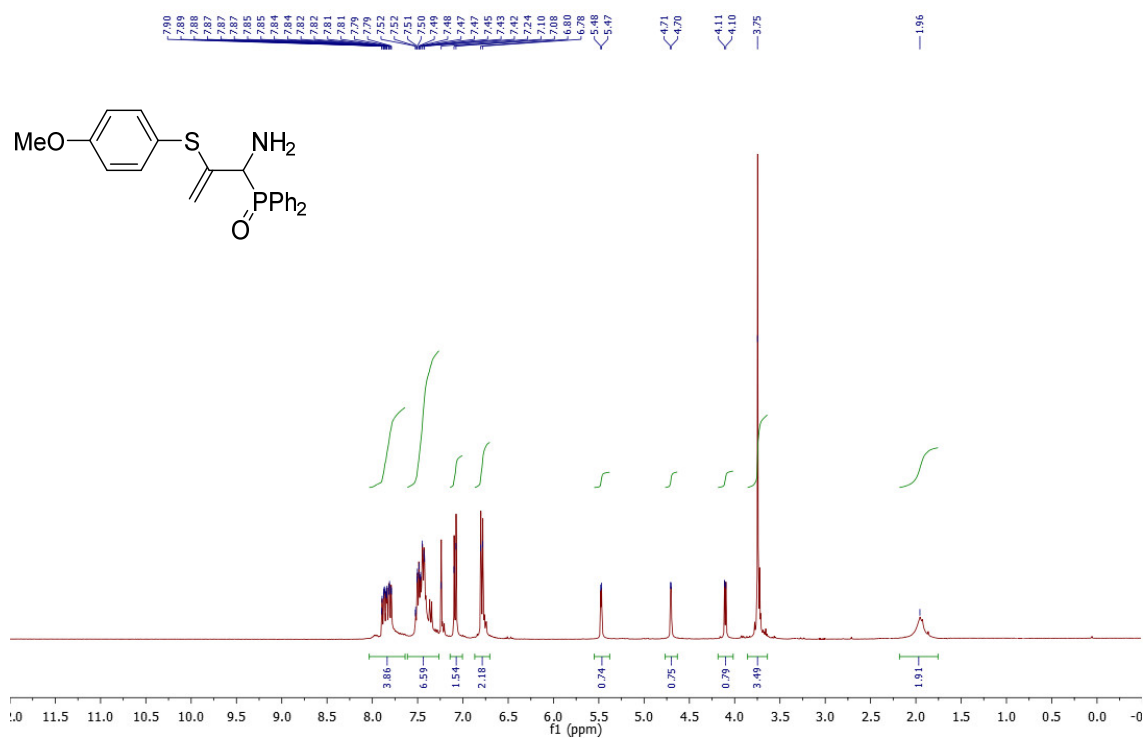
^1H NMR (300 Hz, CDCl_3) of compound **15c**



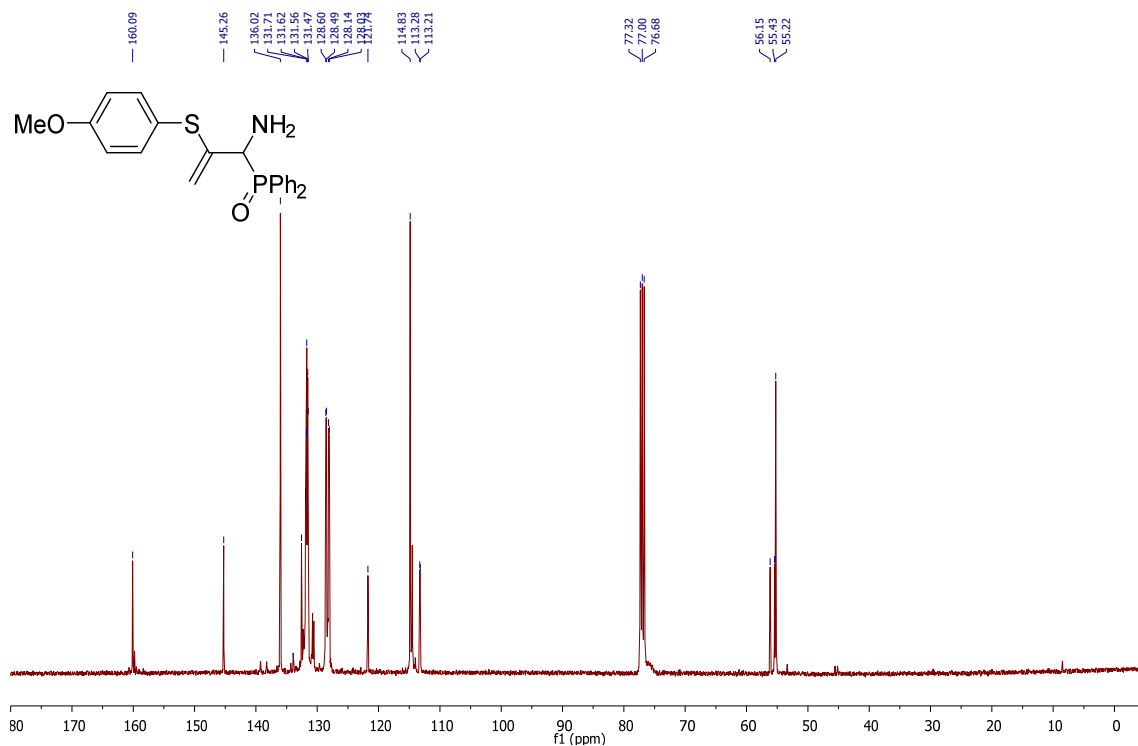
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **15c**



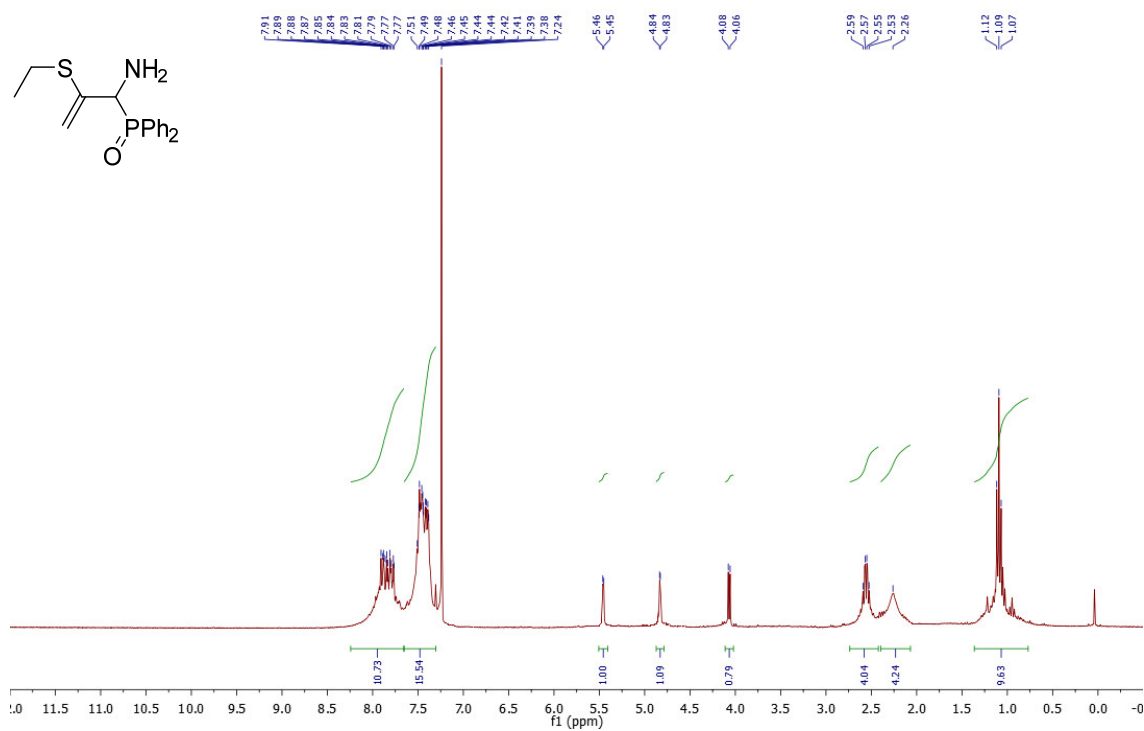
^1H NMR (400 Hz, CDCl_3) of compound **15d**



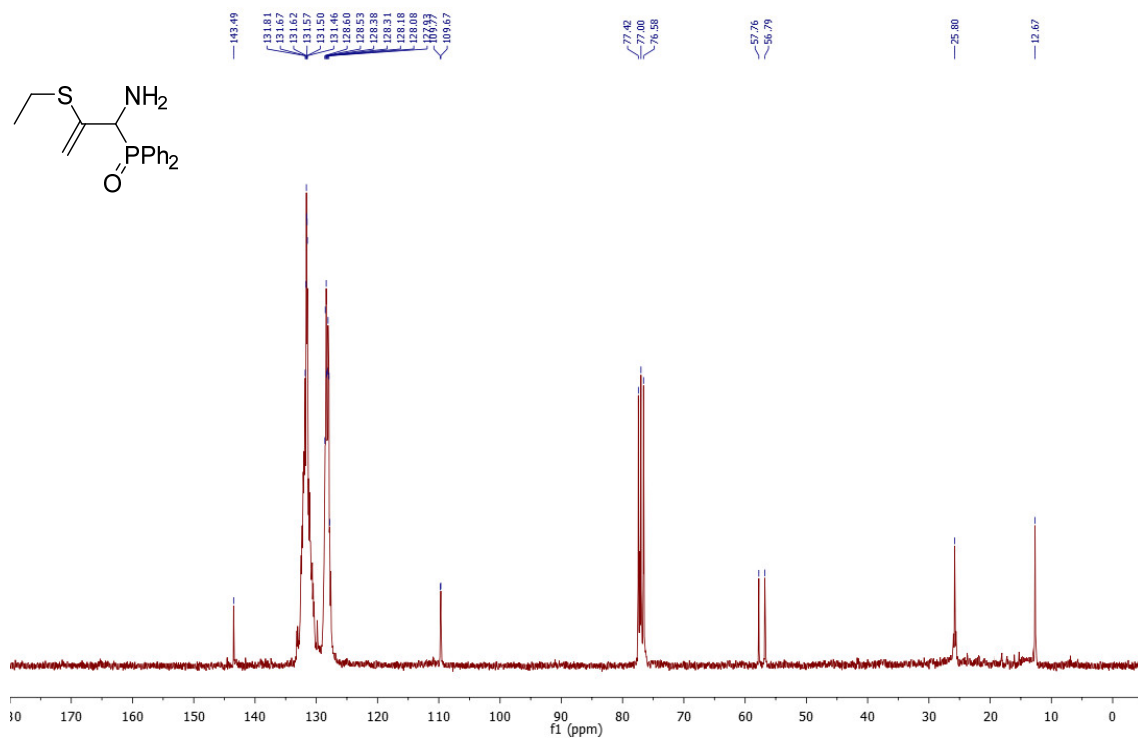
^{13}C $\{^1\text{H}\}$ NMR (100 MHz, CDCl_3) of compound **15d**



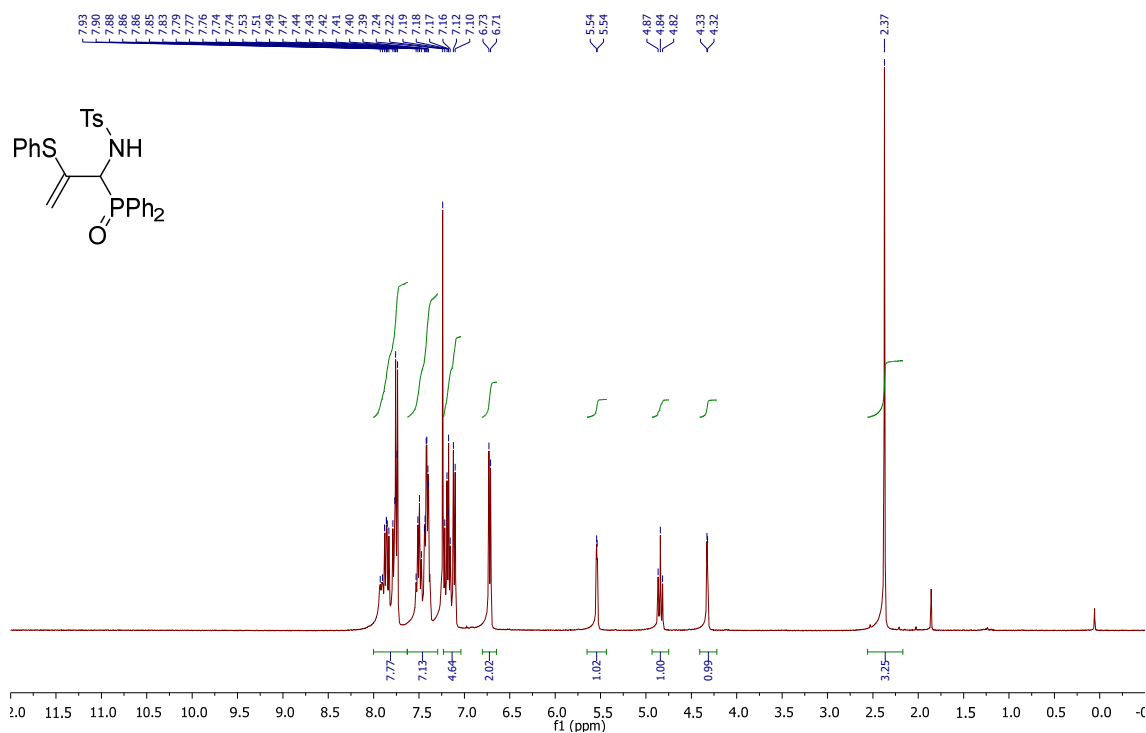
^1H NMR (300 Hz, CDCl_3) of compound **15f**



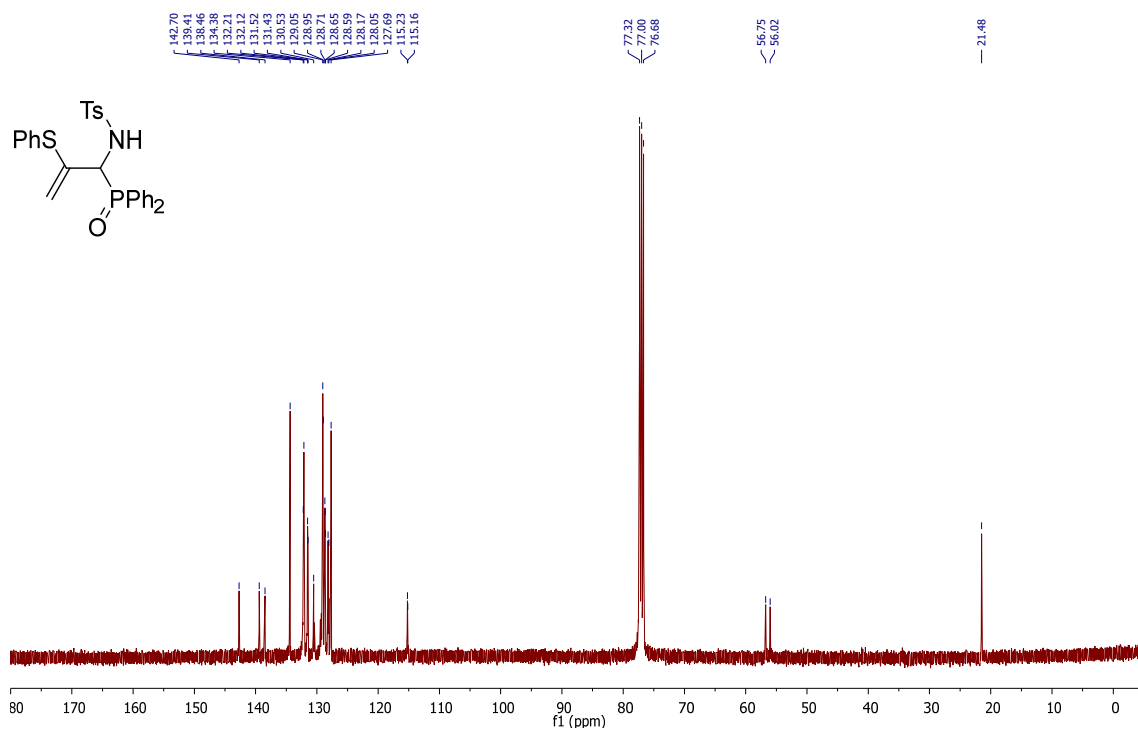
^{13}C { ^1H } NMR (75 MHz, CDCl_3) of compound **15f**



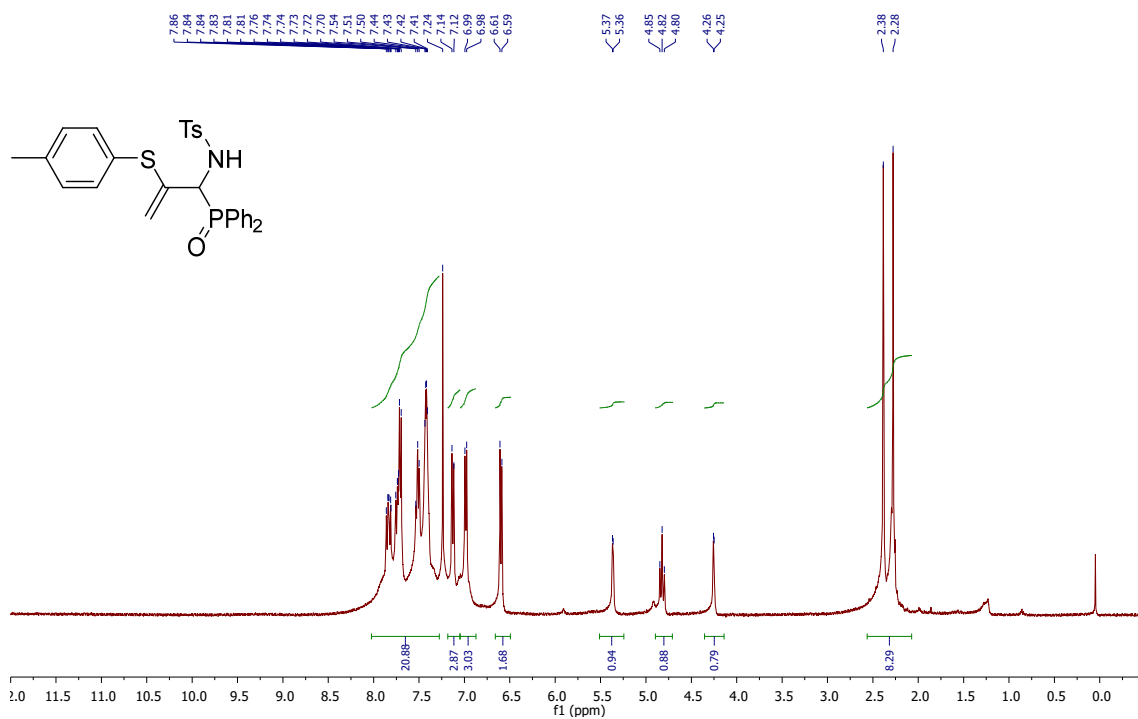
^1H NMR (400 Hz, CDCl_3) of compound **16a**



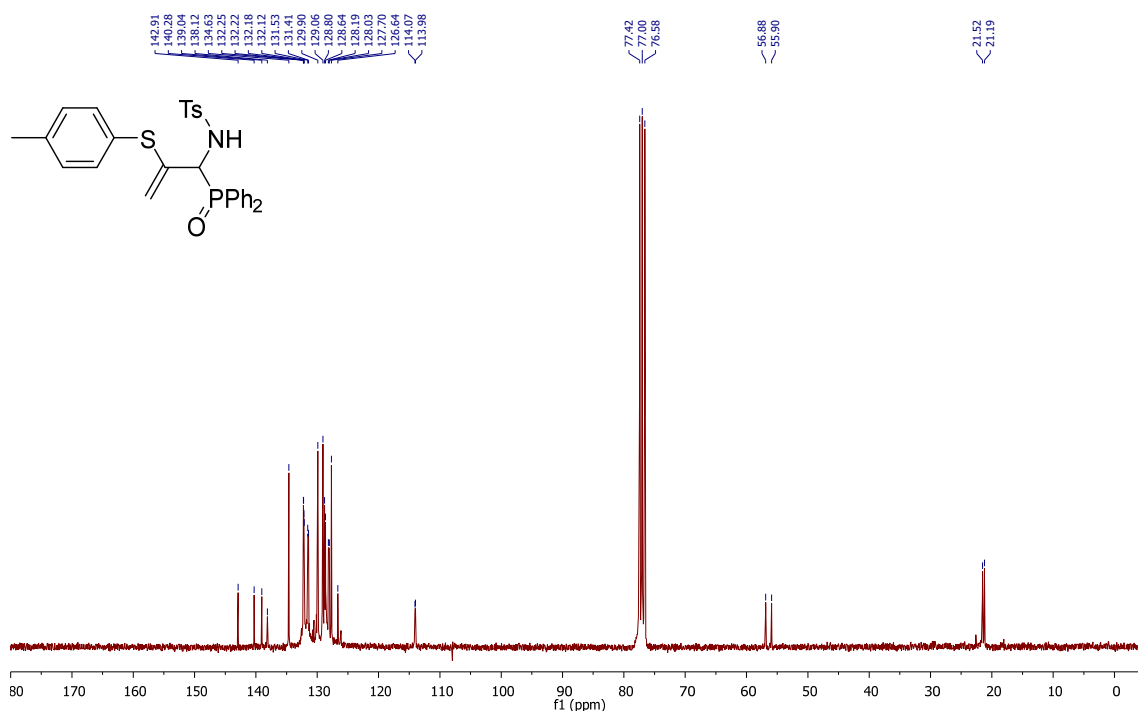
^{13}C { ^1H } NMR (100 MHz, CDCl_3) of compound **16a**



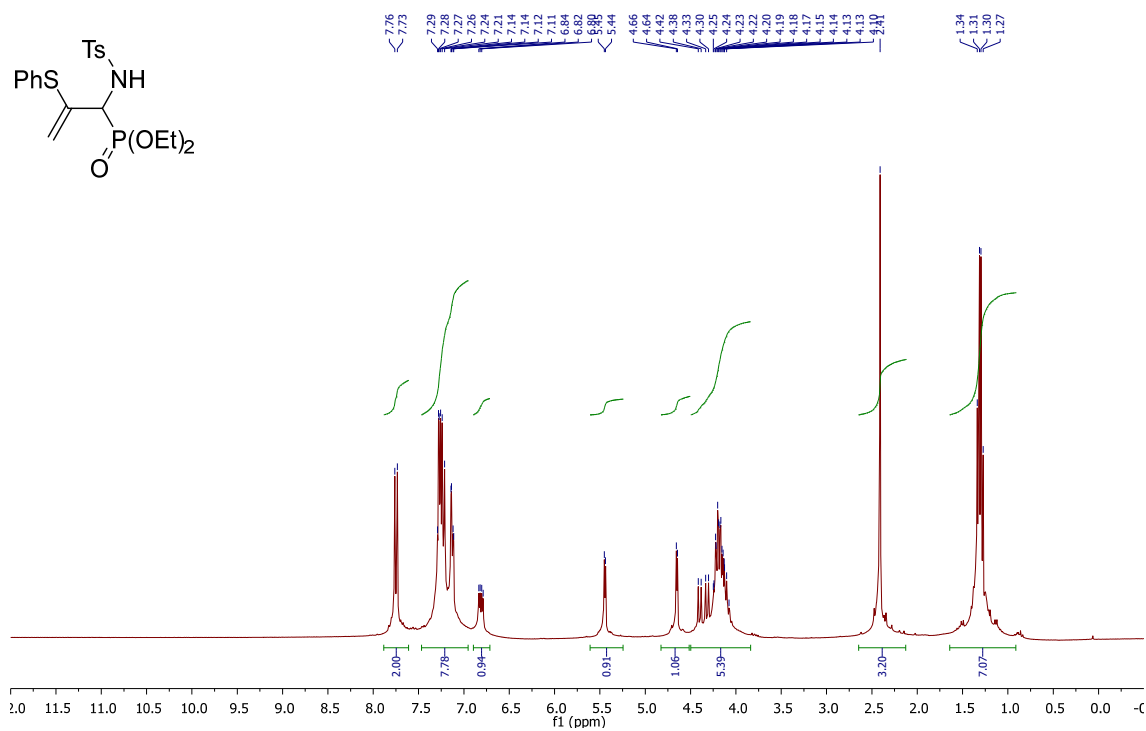
^1H NMR (400 Hz, CDCl_3) of compound **16b**



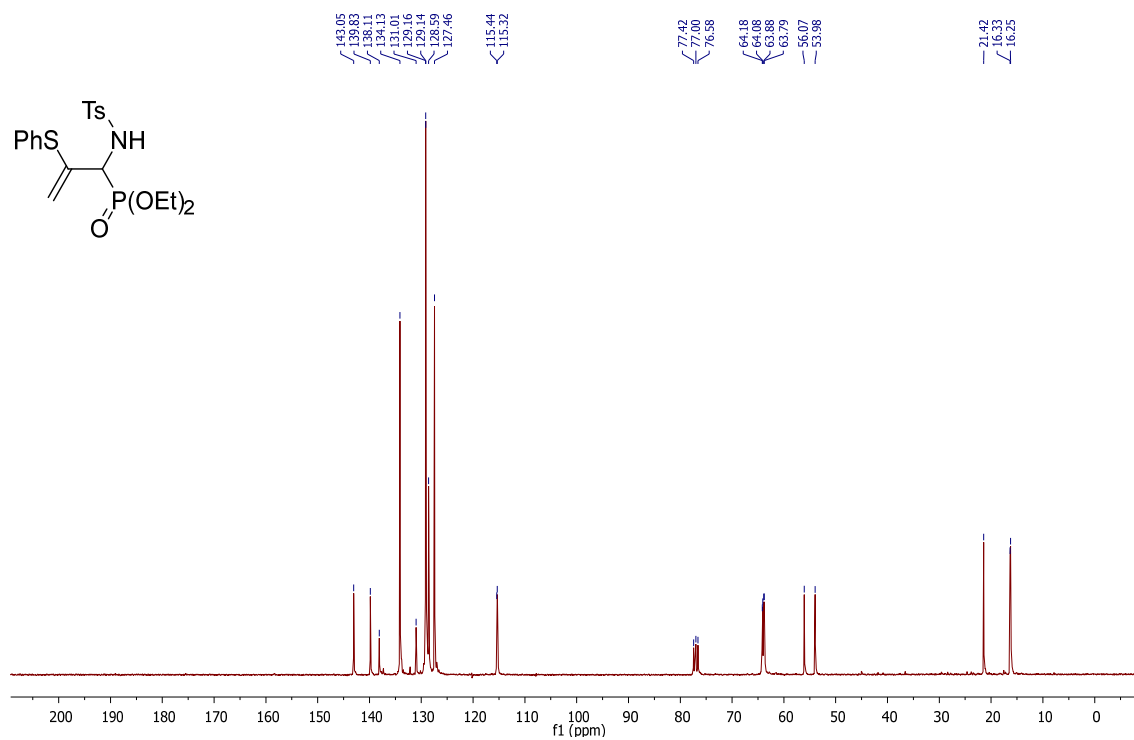
^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **16b**



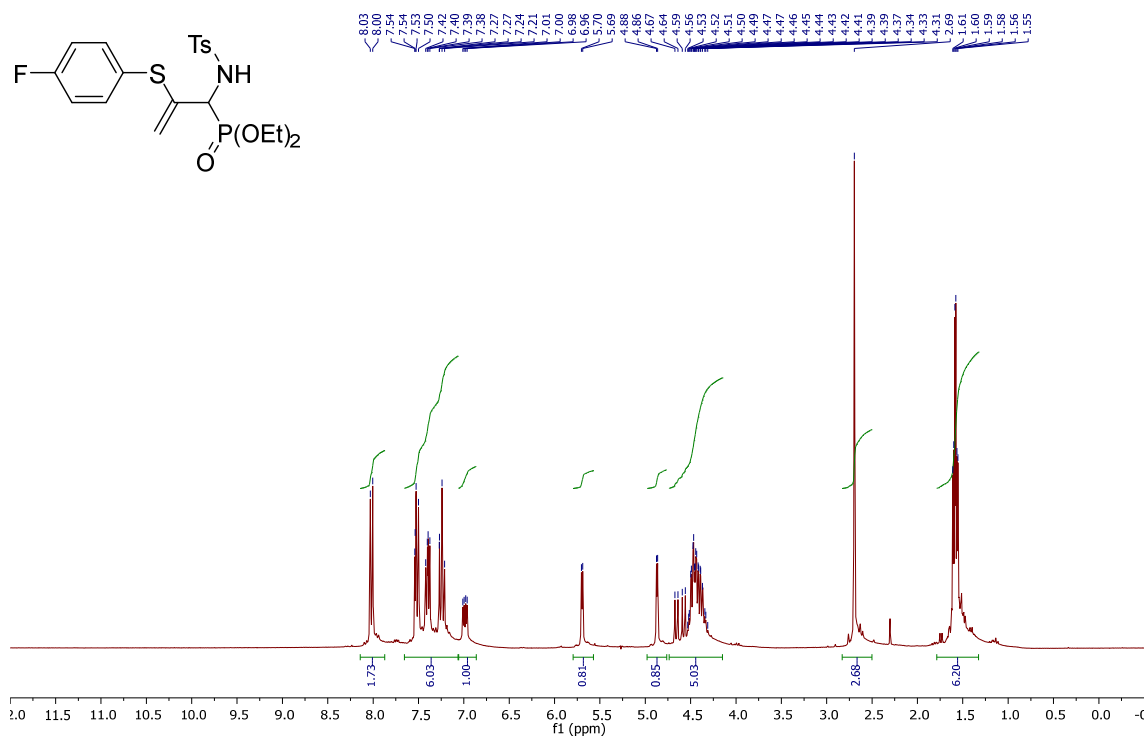
^1H NMR (300 Hz, CDCl_3) of compound **16c**



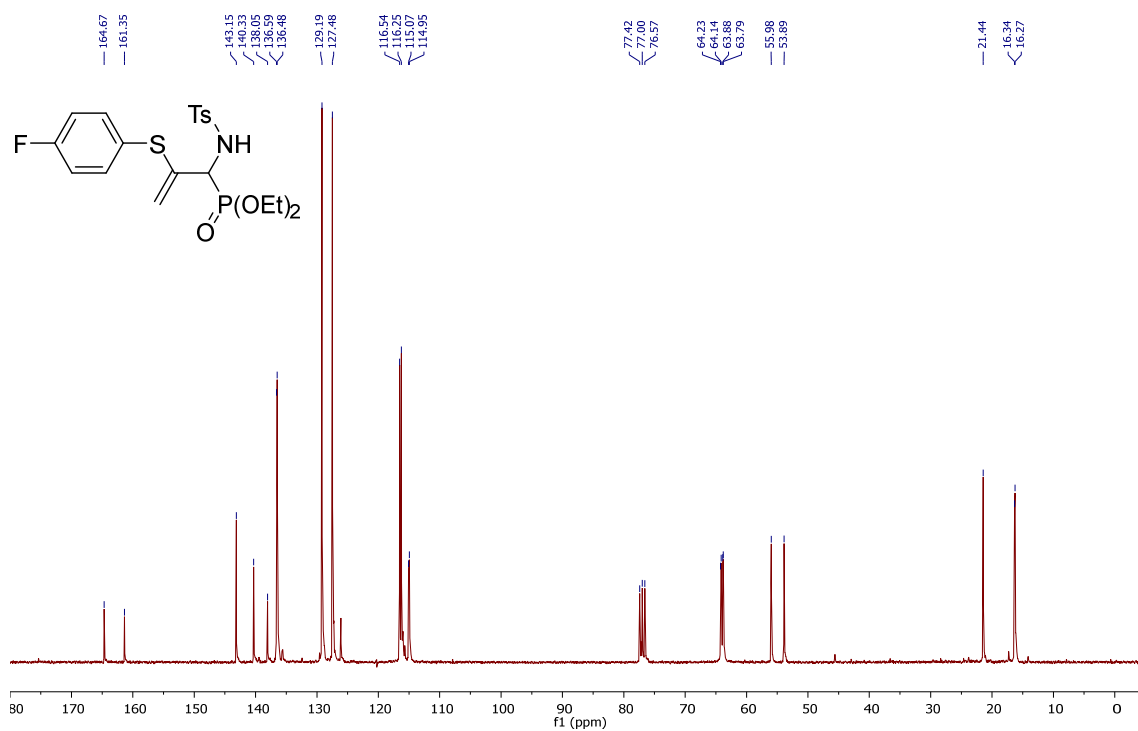
^{13}C { ^1H } NMR (75 MHz, CDCl_3) of compound **16c**



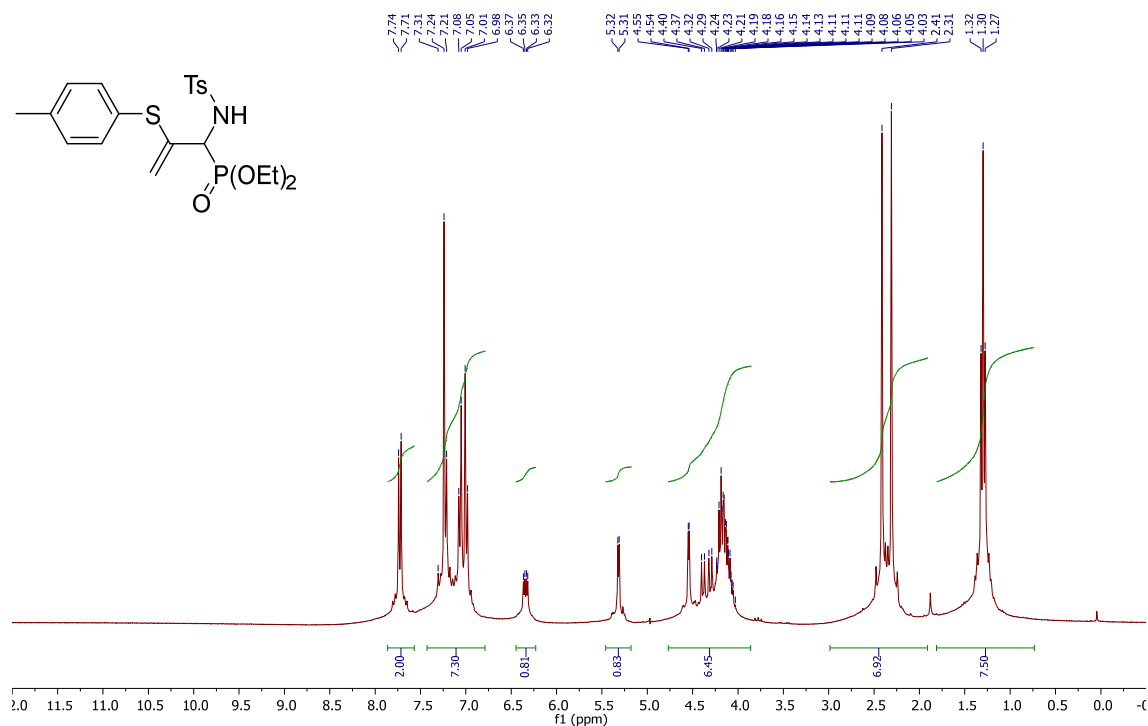
^1H NMR (300 Hz, CDCl_3) of compound **16d**



^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **16d**



^1H NMR (300 Hz, CDCl_3) of compound **16e**



^{13}C $\{^1\text{H}\}$ NMR (75 MHz, CDCl_3) of compound **16e**

