APPENDIX 6

Spectra Related to Chapter 4:

Enantio-, Diastereo- and Regioselective Iridium-Catalyzed

Asymmetric Allylic Alkylation of Acyclic β-Ketoesters

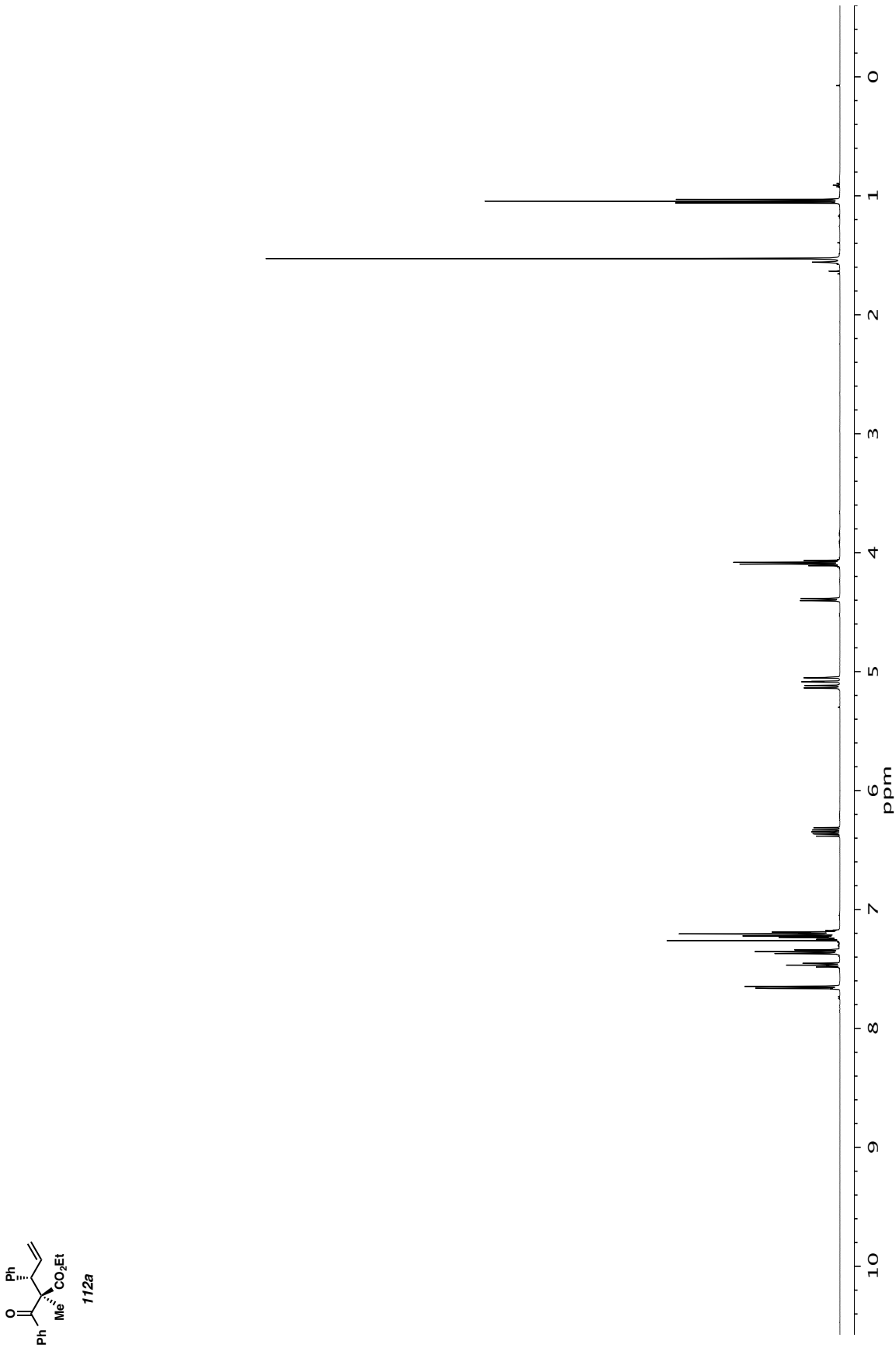


Figure A6.1 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112a**.

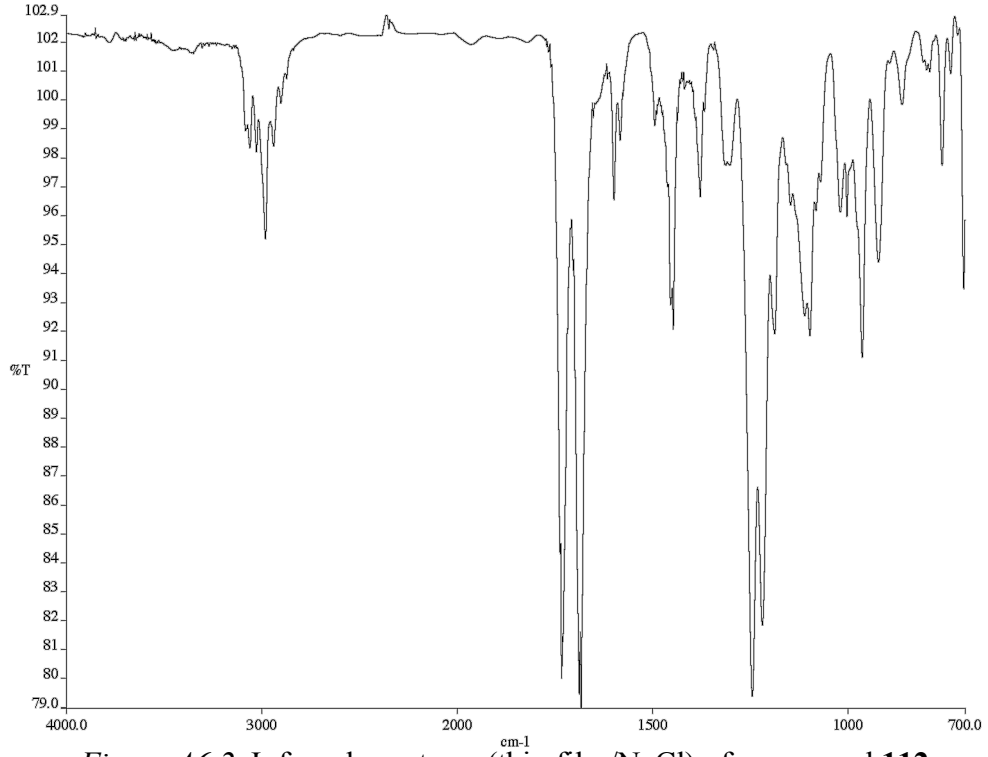


Figure A6.2 Infrared spectrum (thin film/NaCl) of compound **112a**.

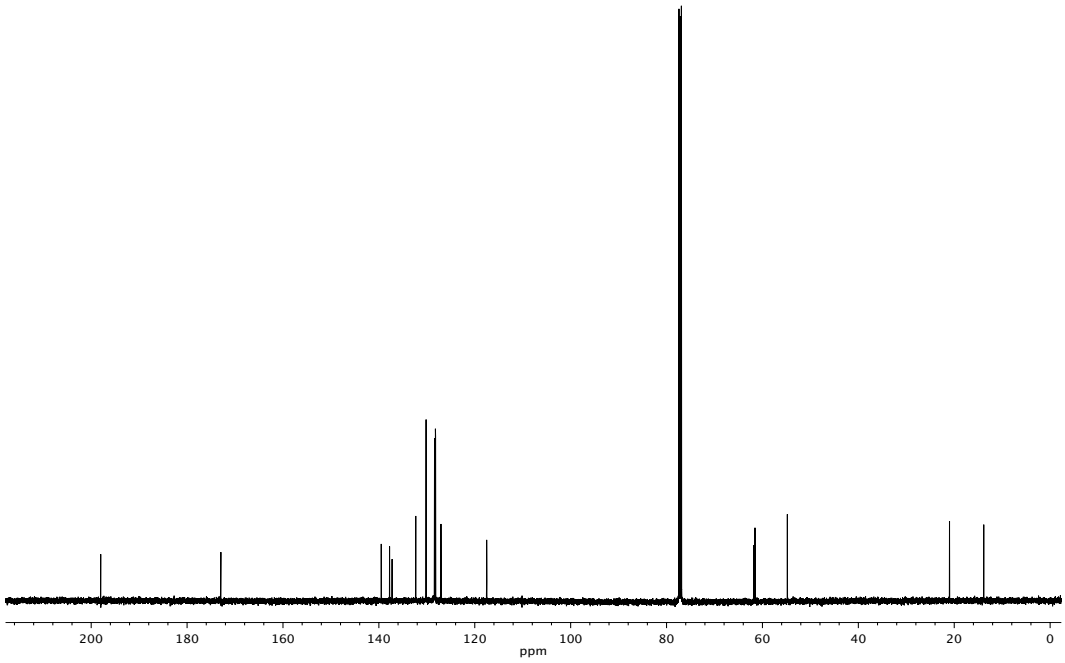


Figure A6.3 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112a**.

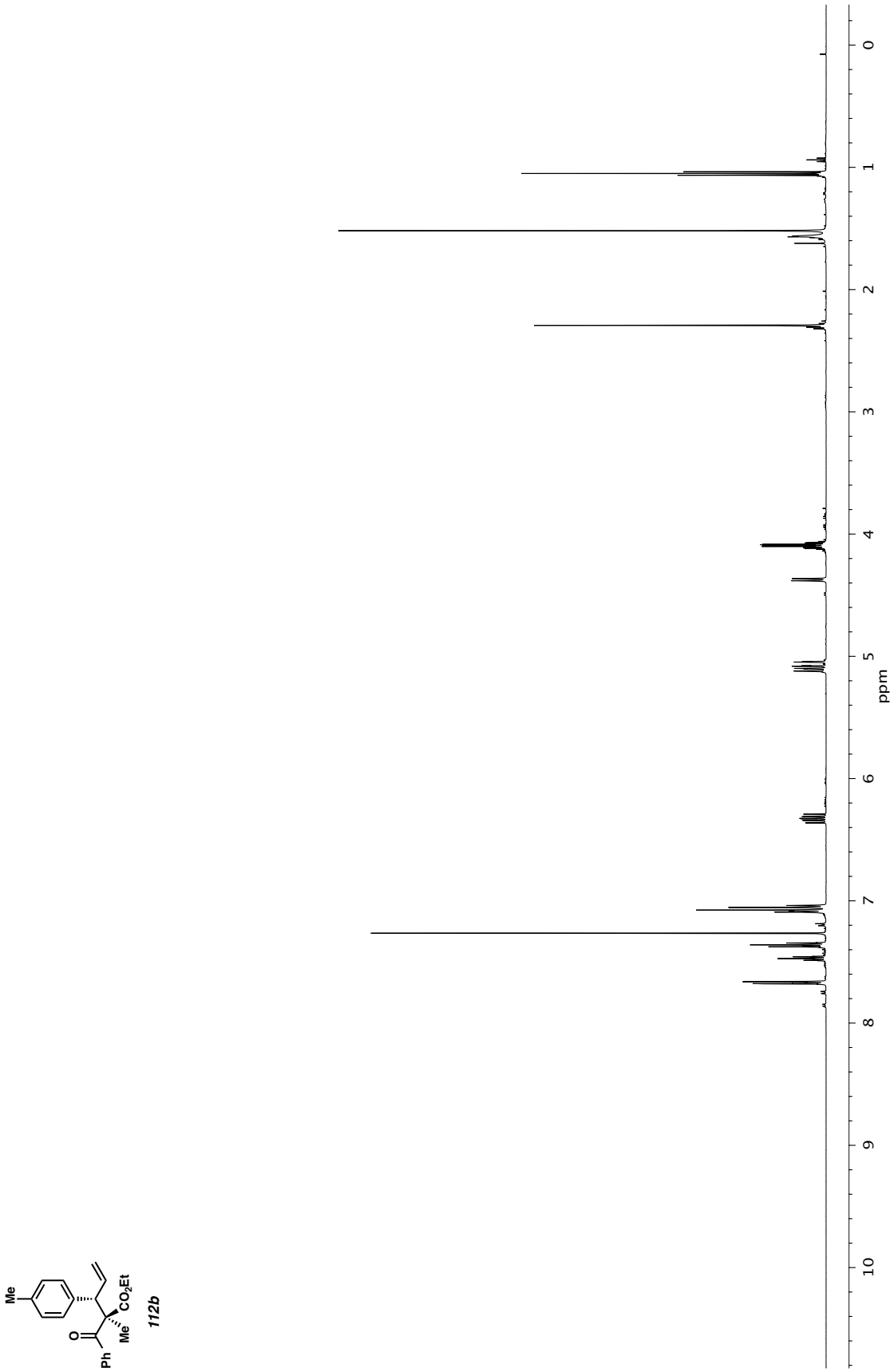


Figure A6.4 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112b**.

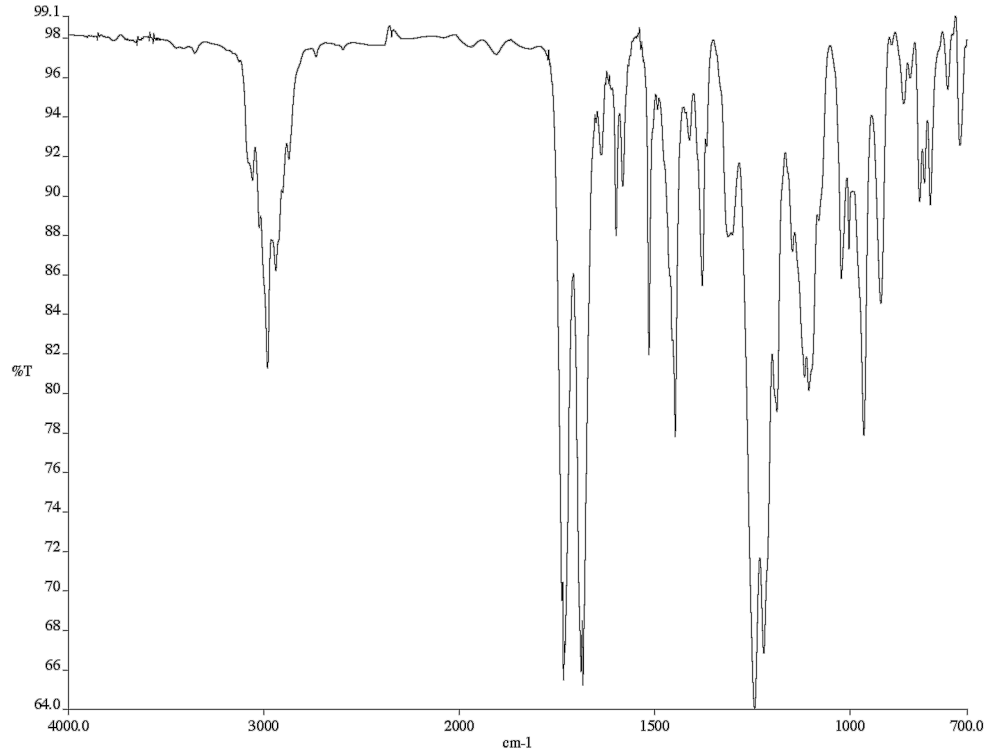


Figure A6.5 Infrared spectrum (thin film/NaCl) of compound **112b**.

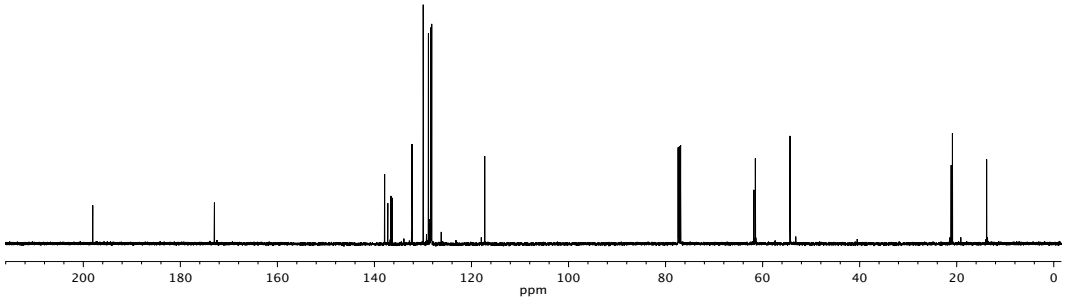


Figure A6.6 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112b**.

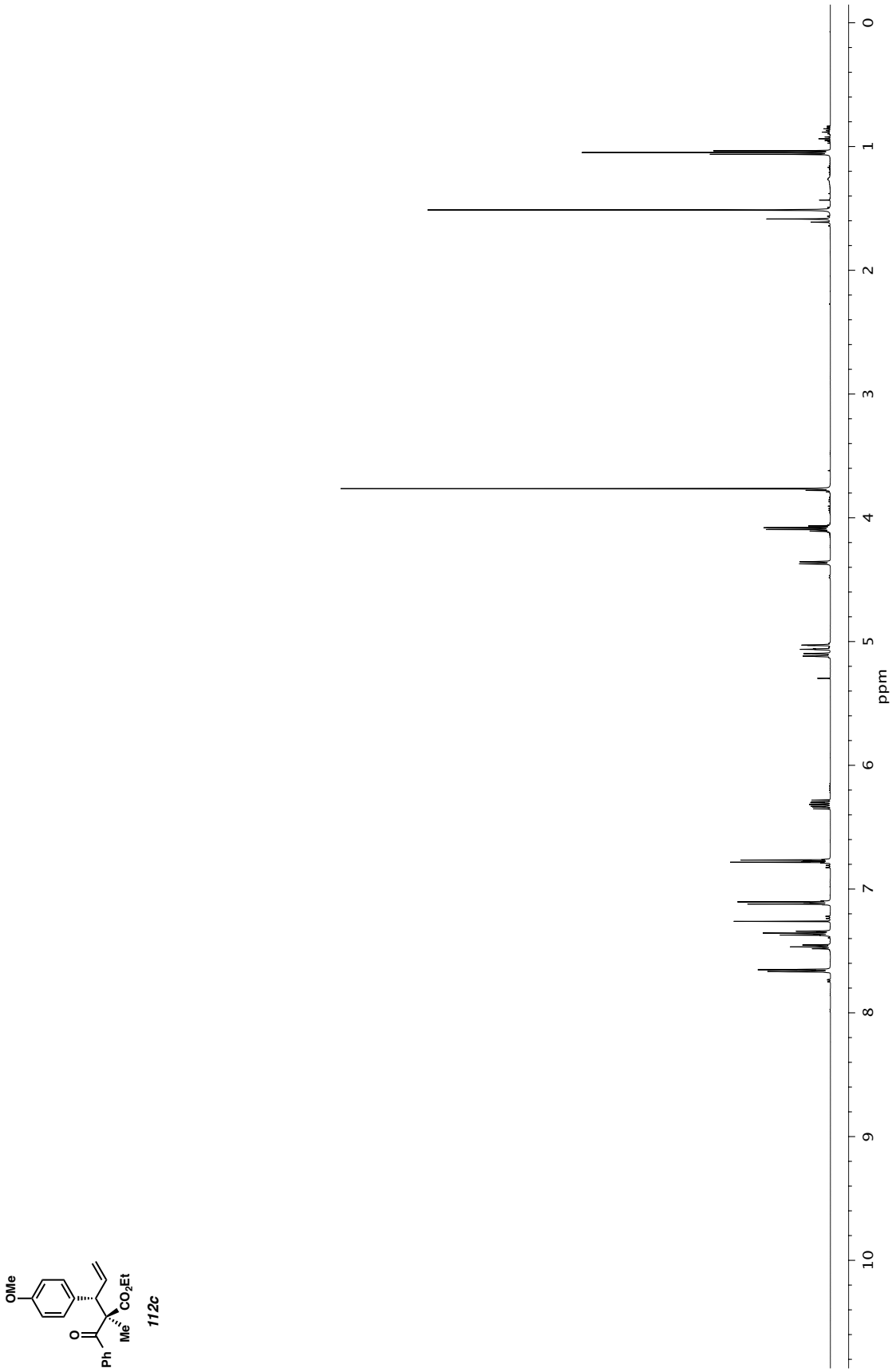


Figure A6.7 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112c**.

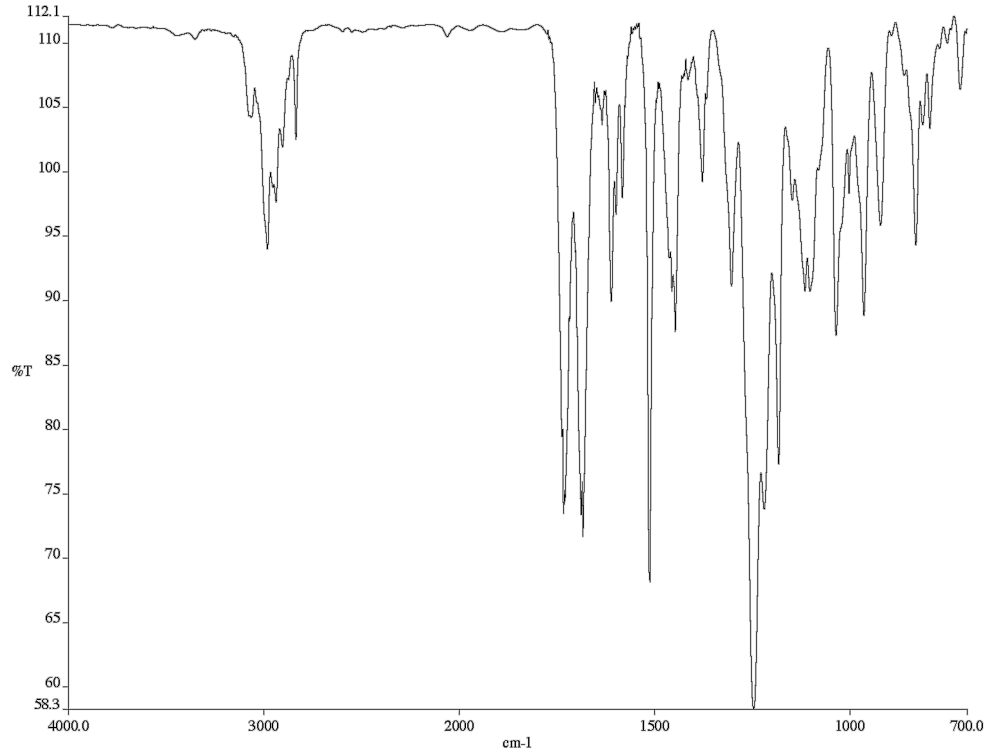


Figure A6.8 Infrared spectrum (thin film/NaCl) of compound **112c**.

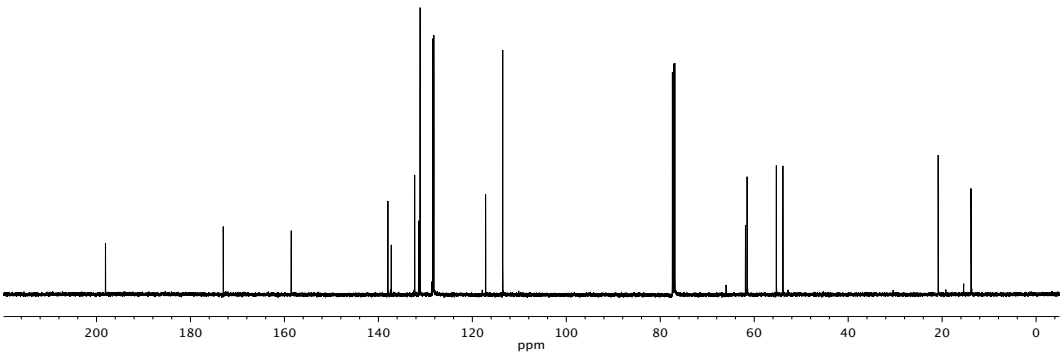


Figure A6.9 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112c**.

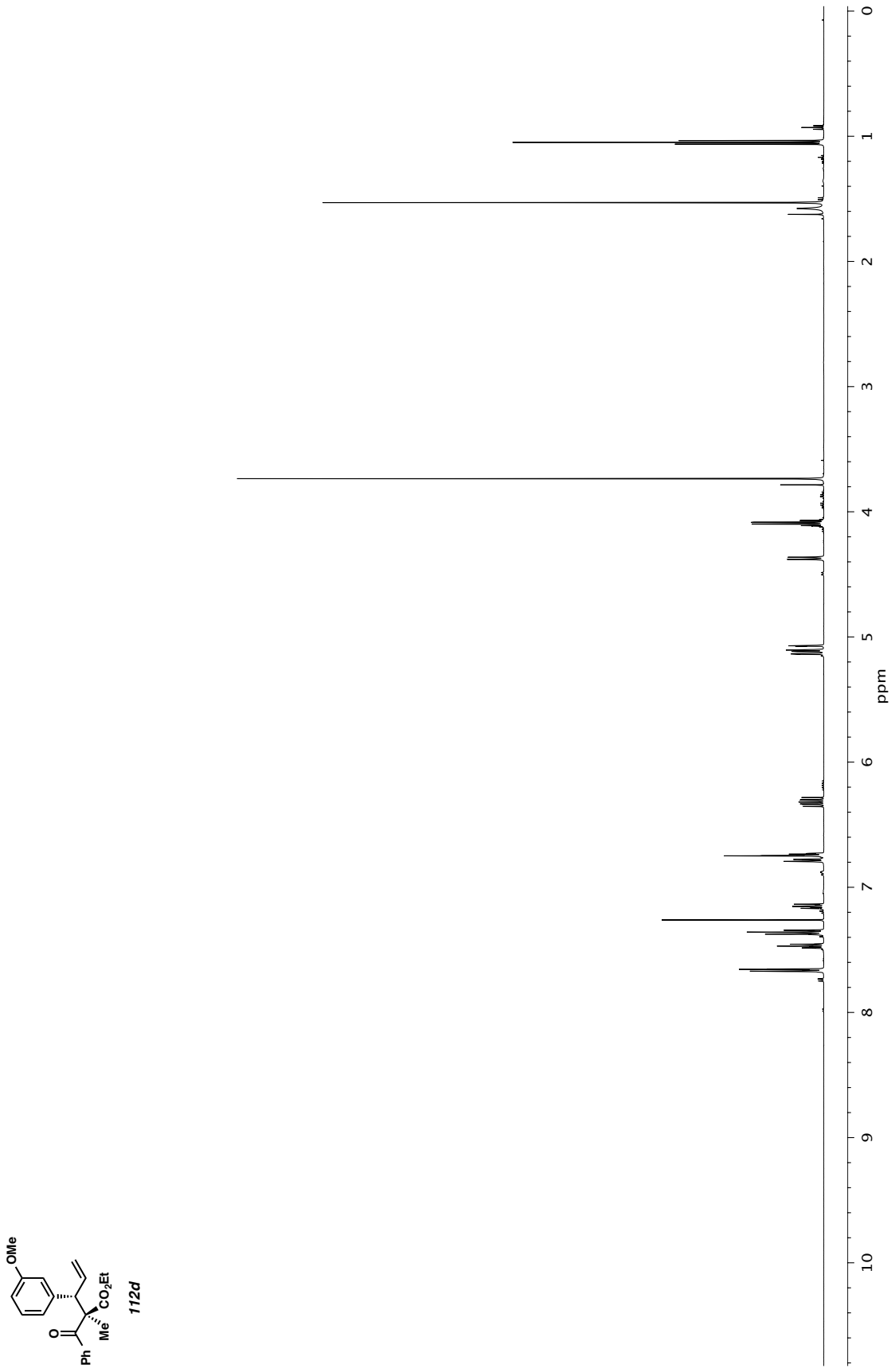


Figure A6.10 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112d**.

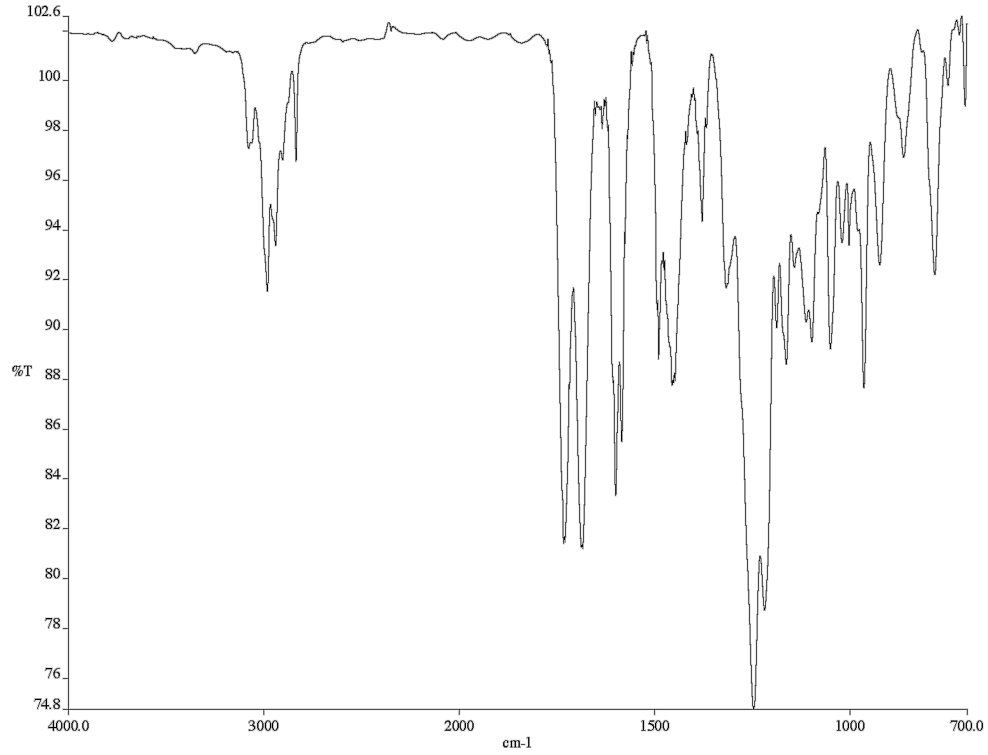


Figure A6.11 Infrared spectrum (thin film/NaCl) of compound **112d**.

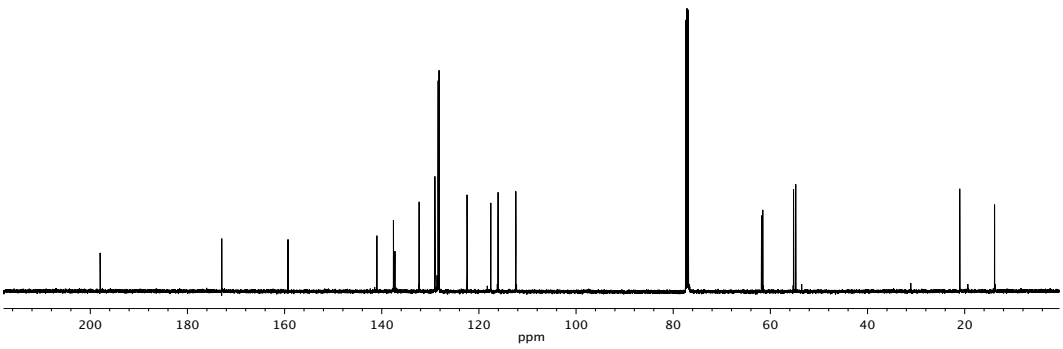


Figure A6.12 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112d**.

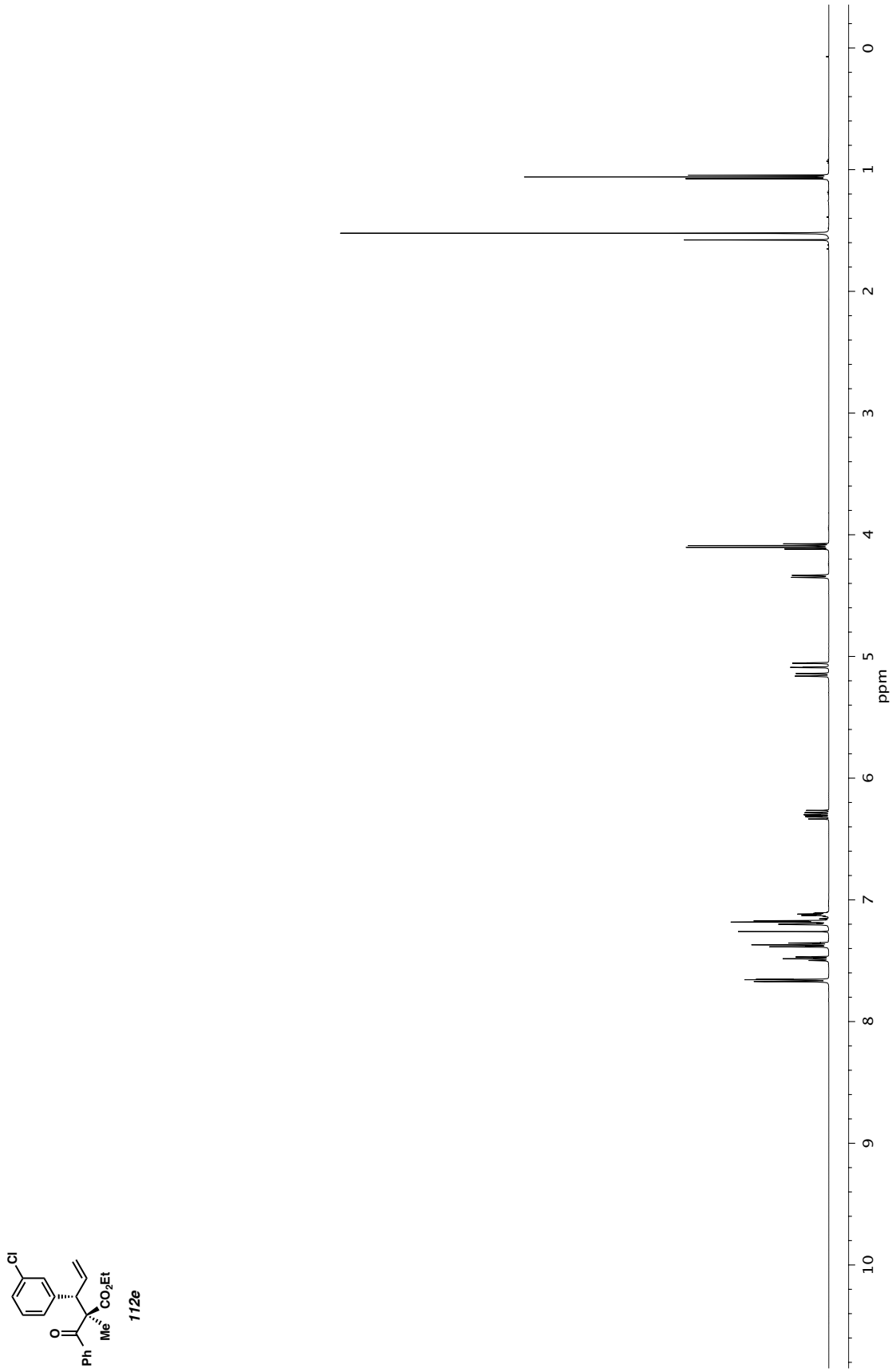


Figure A6.13 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112e**.

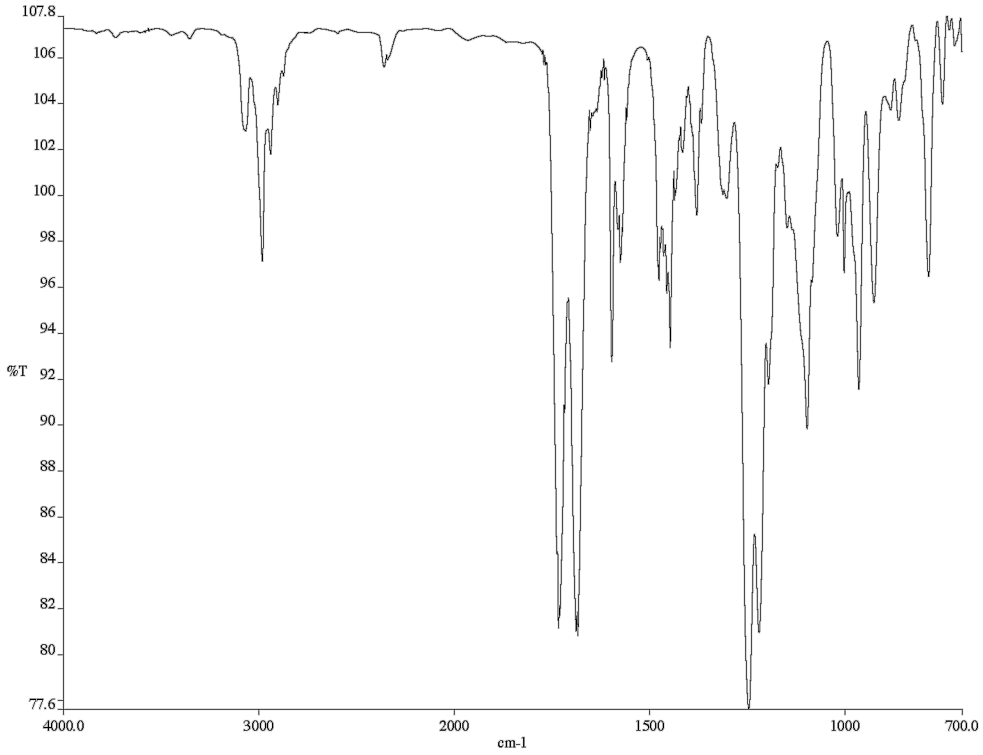


Figure A6.14 Infrared spectrum (thin film/NaCl) of compound **112e**.

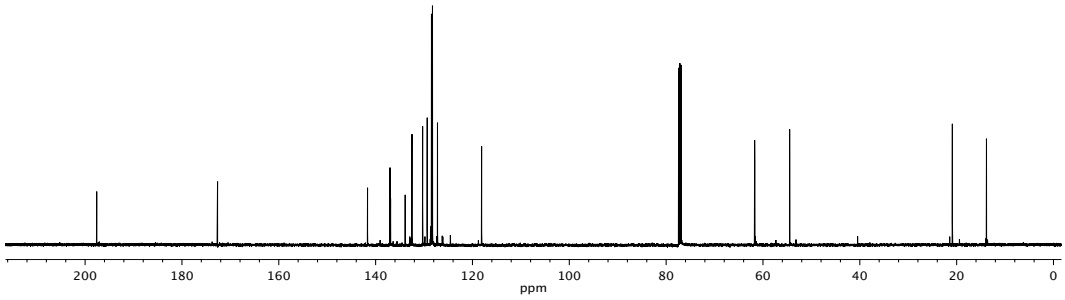


Figure A6.15 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112e**.

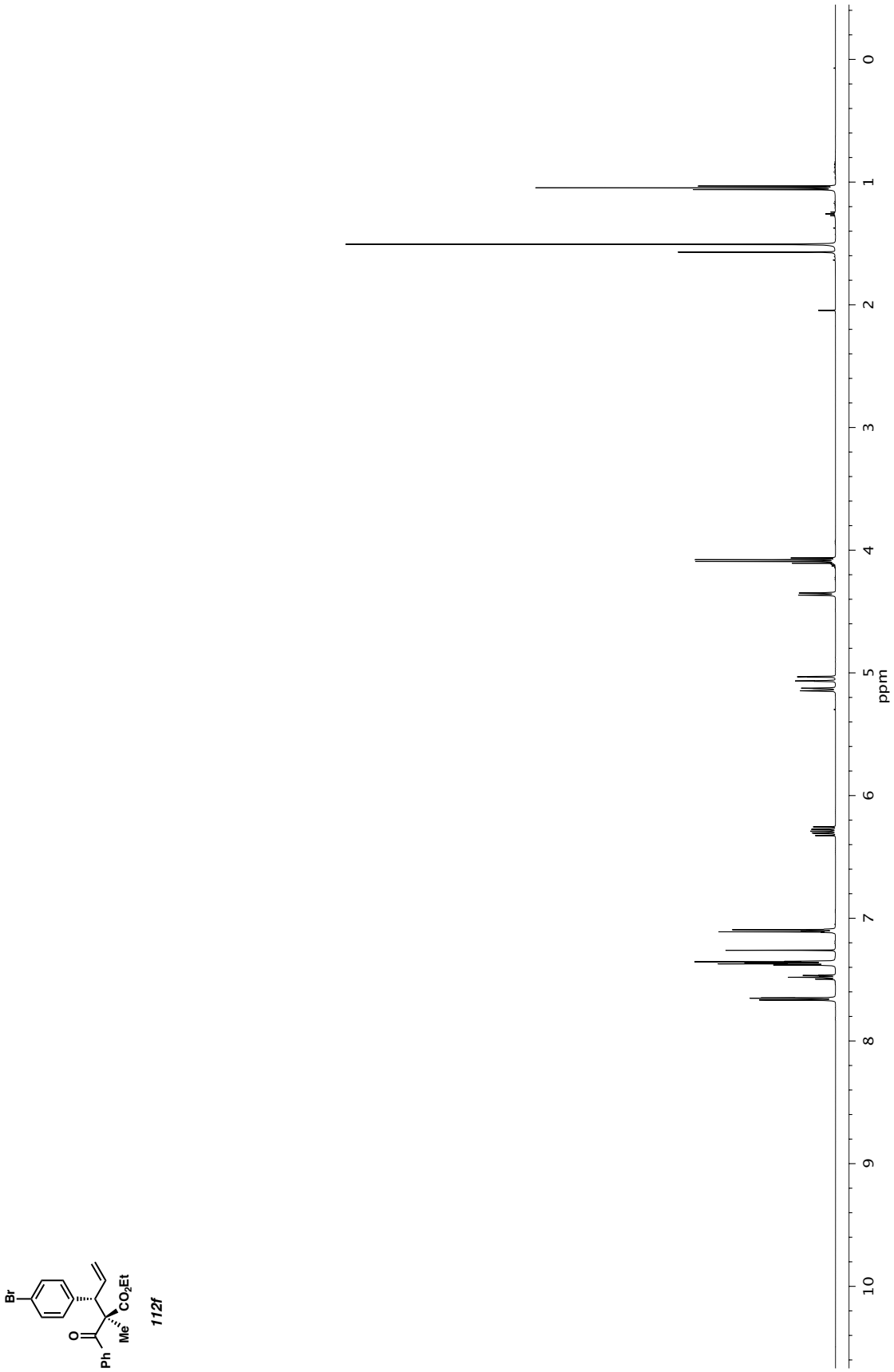


Figure A6.16 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112f**.

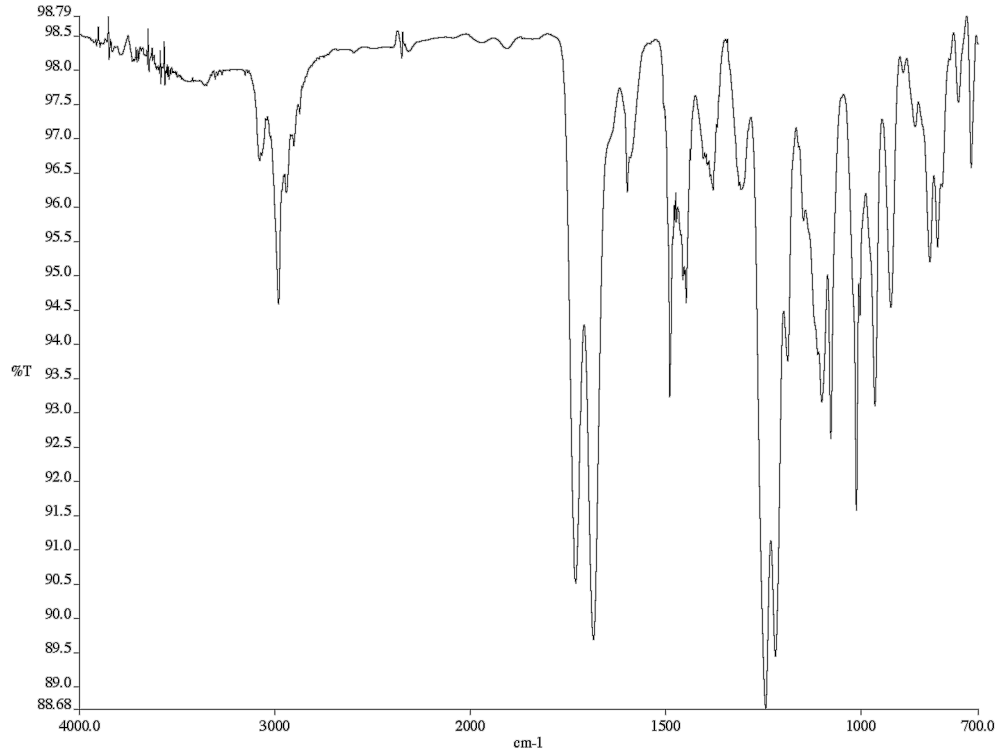


Figure A6.17 Infrared spectrum (thin film/NaCl) of compound **112f**.

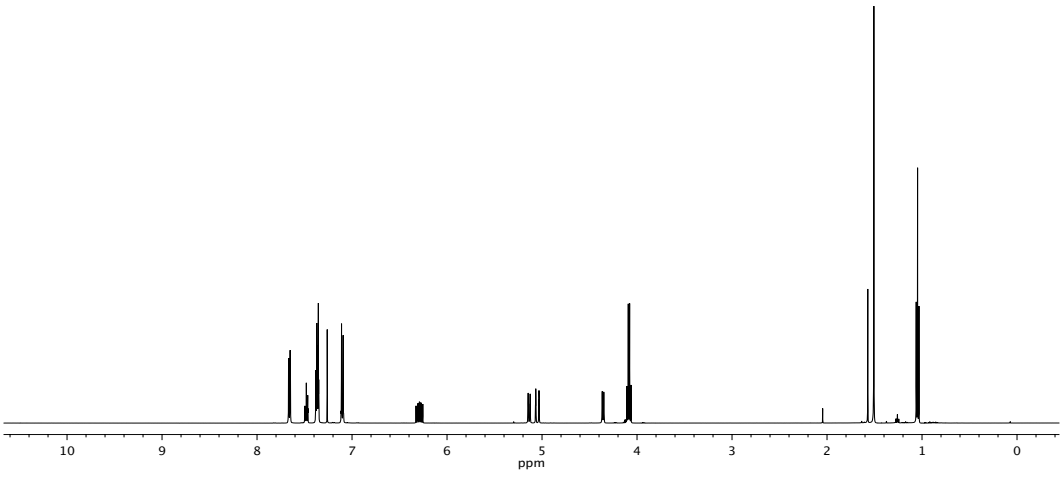


Figure A6.18 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112f**.

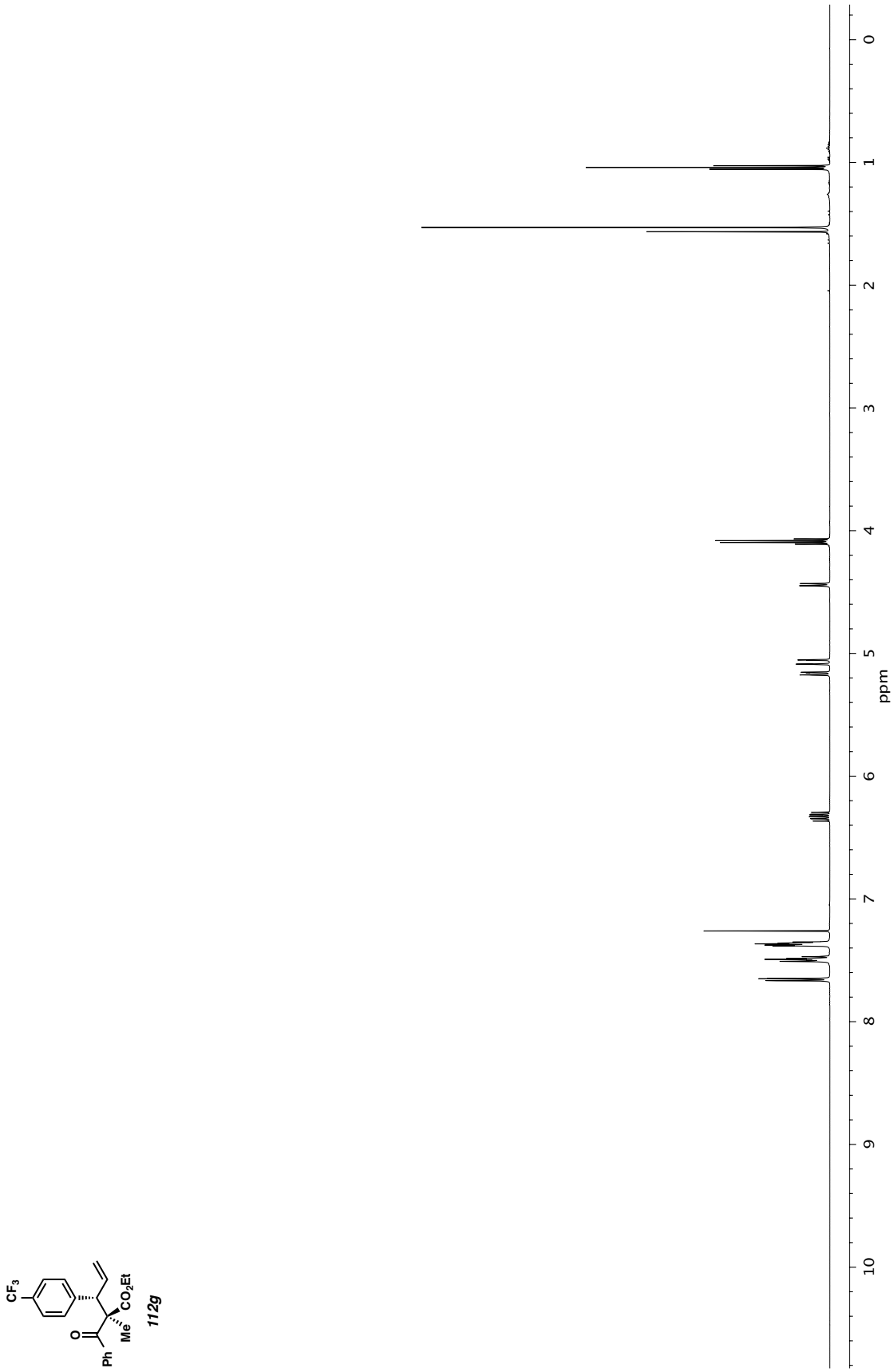


Figure A6.19 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112g**.

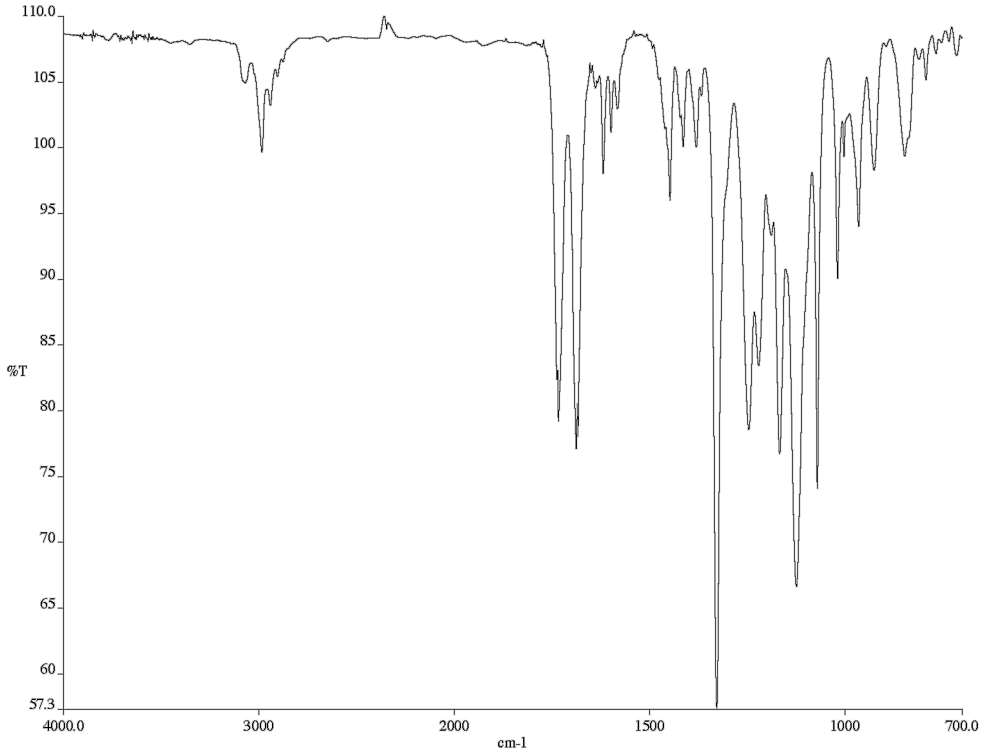


Figure A6.20 Infrared spectrum (thin film/NaCl) of compound **112g**.

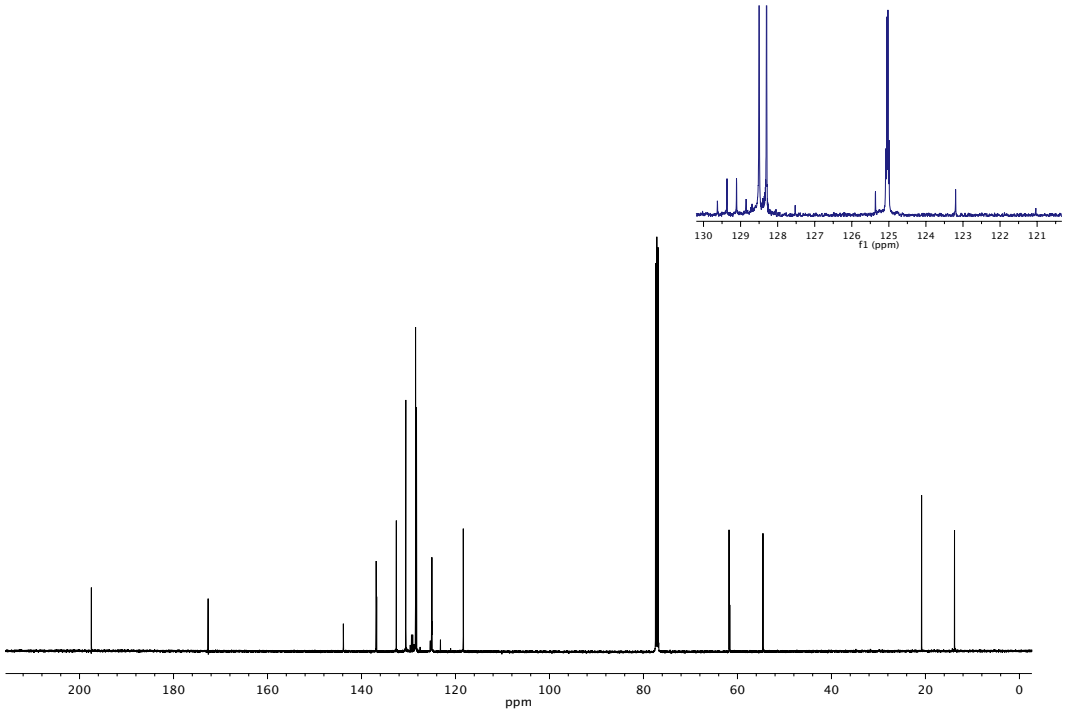


Figure A6.21 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112g**.

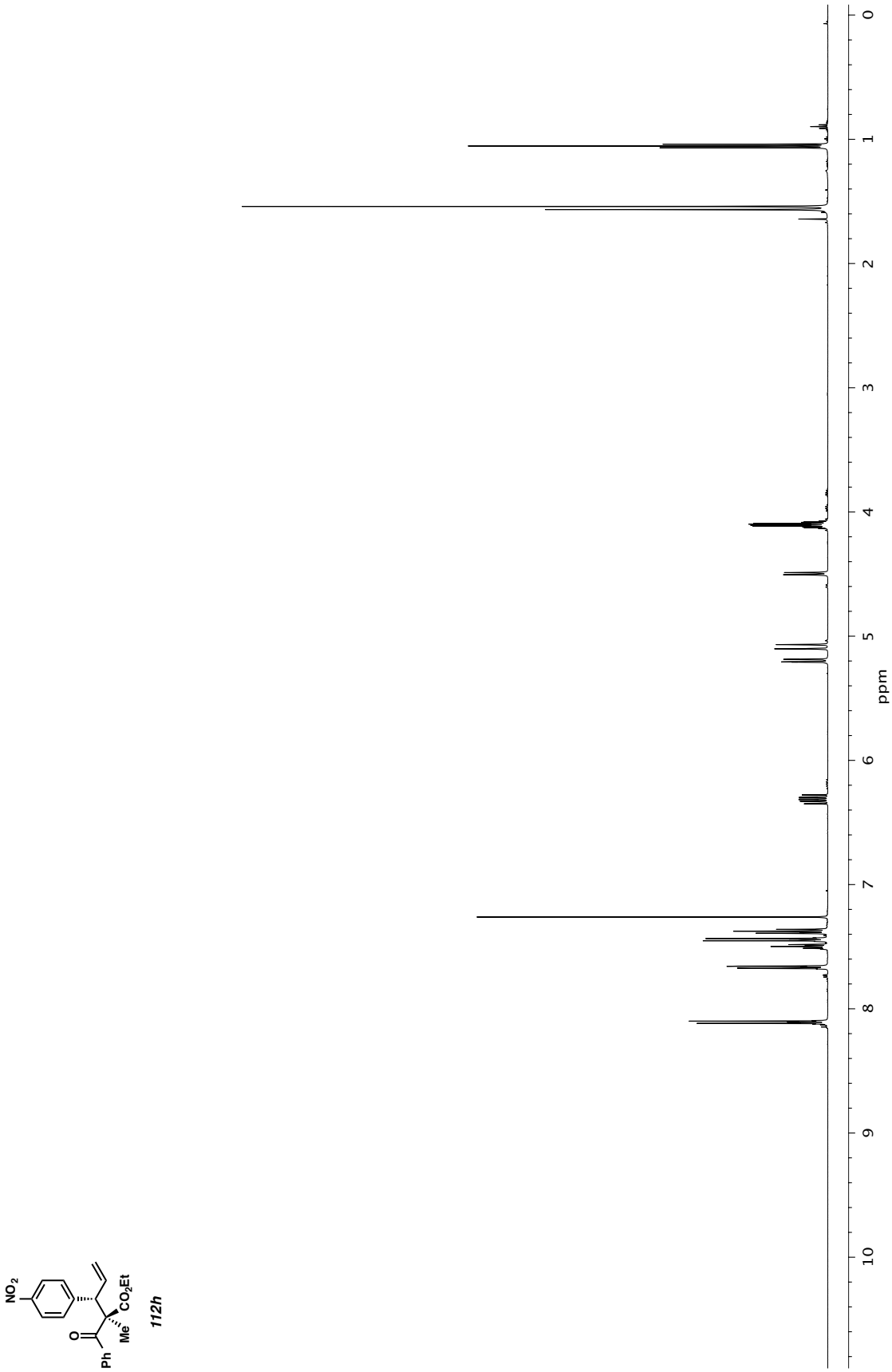


Figure A6.22 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112h**.

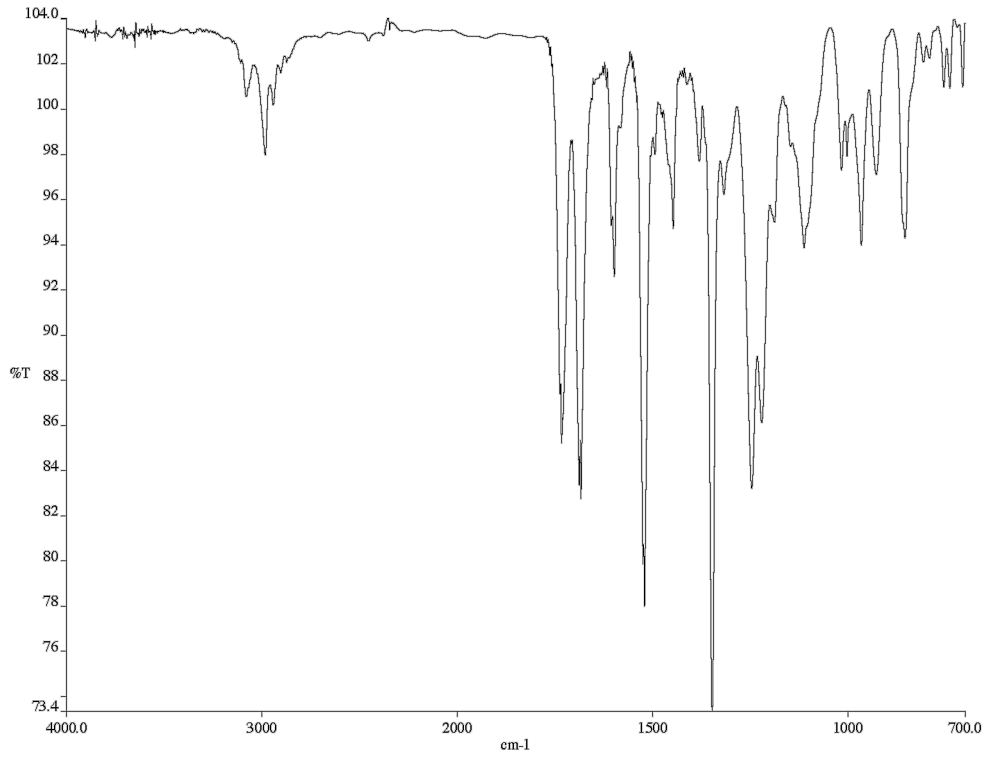


Figure A6.23 Infrared spectrum (thin film/NaCl) of compound **112h**.

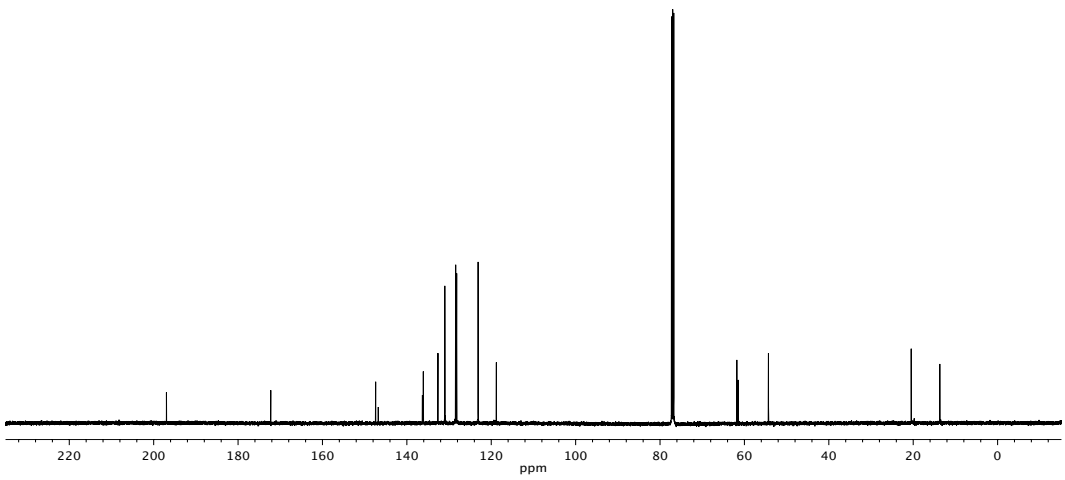


Figure A6.24 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112h**.

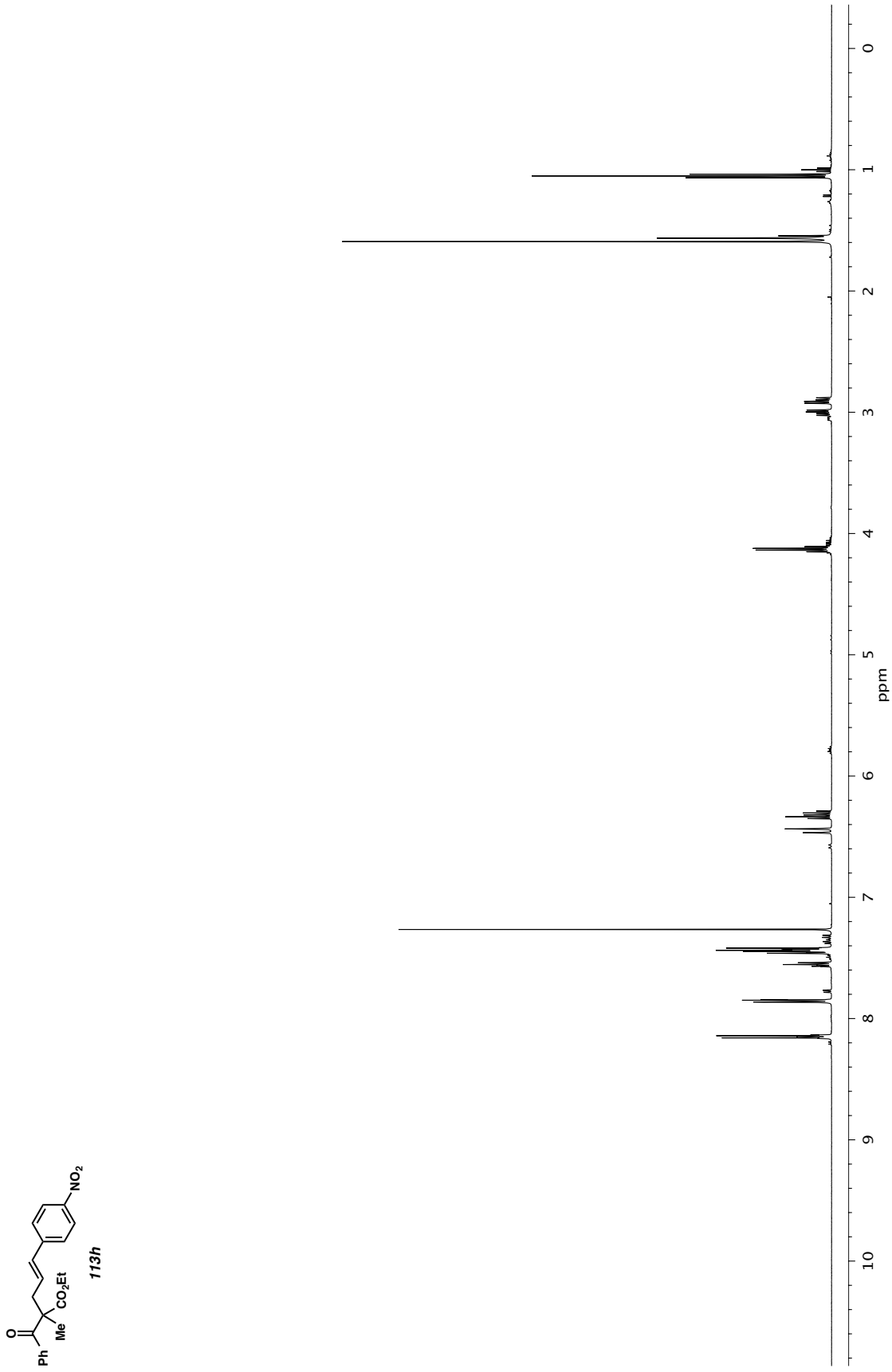


Figure A6.25 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **113h**.

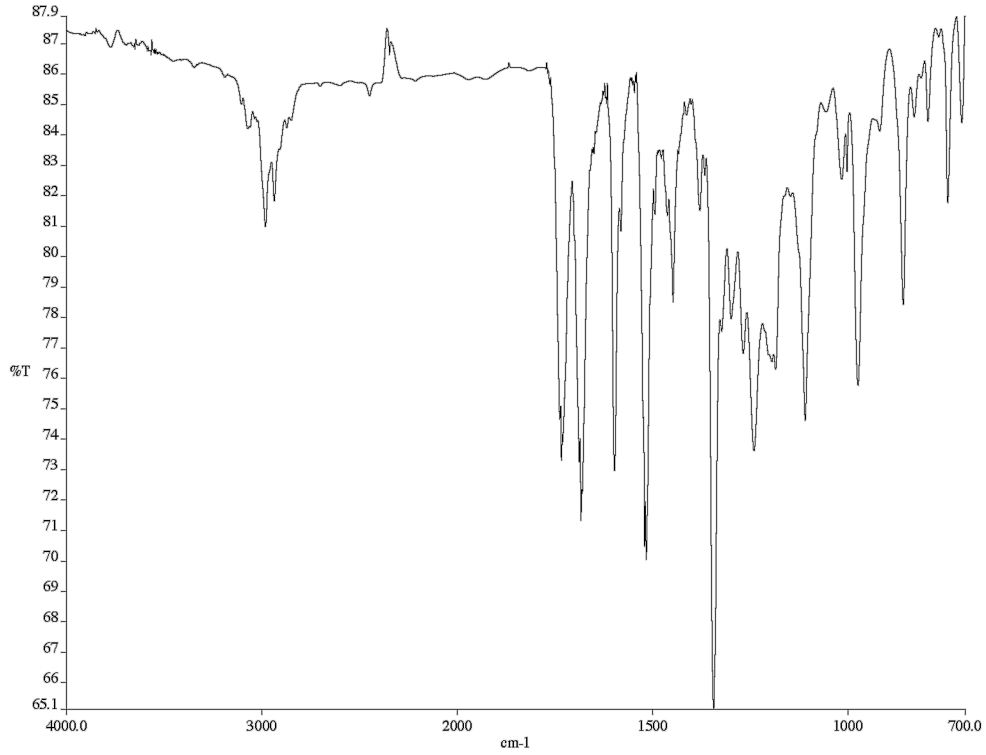


Figure A6.26 Infrared spectrum (thin film/NaCl) of compound **113h**.

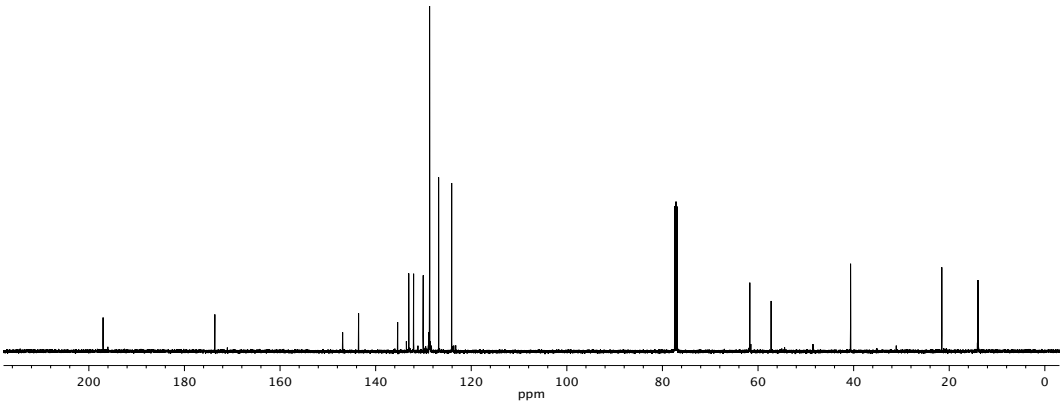


Figure A6.27 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **113h**.

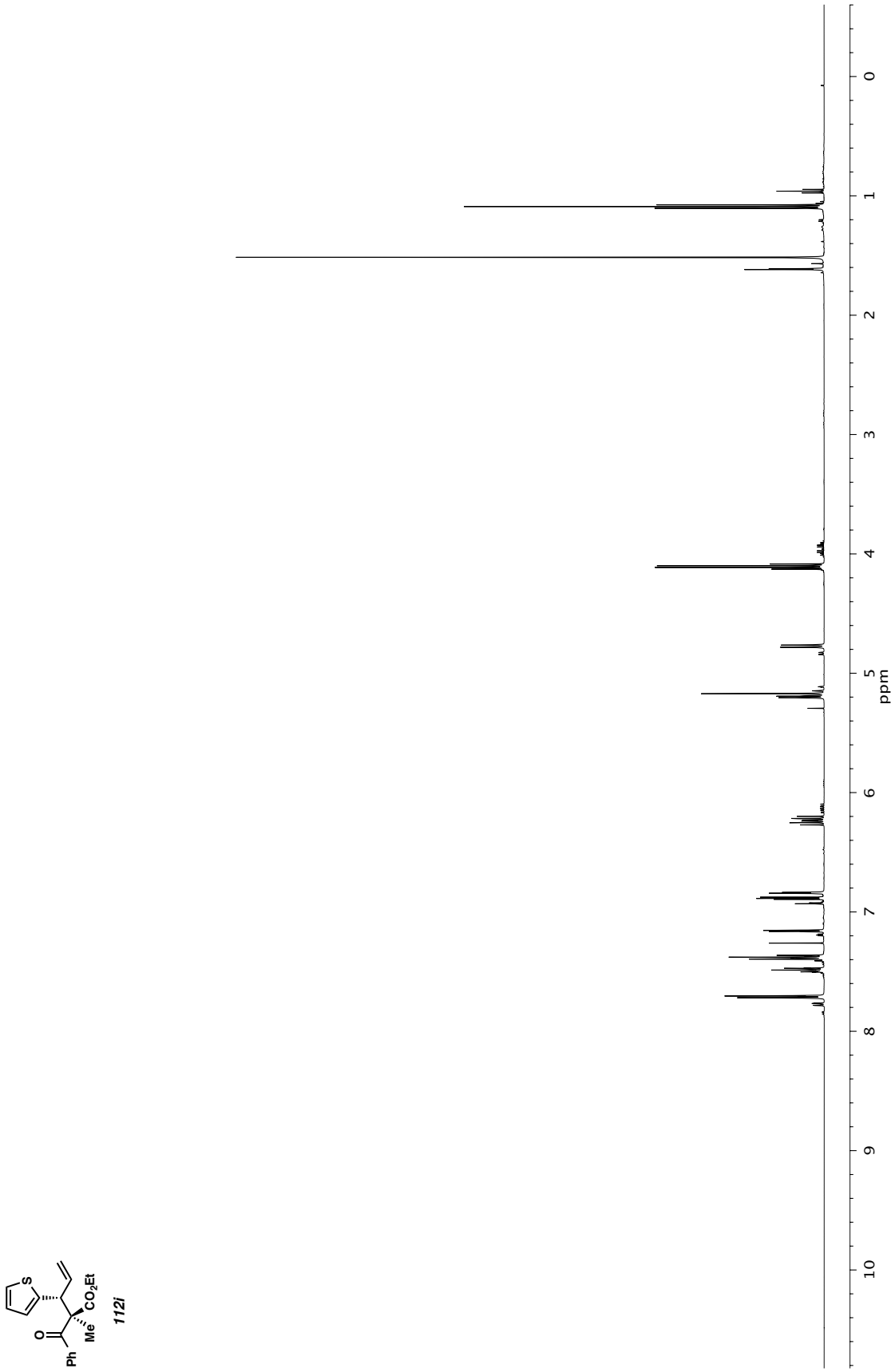


Figure A6.28 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112i**.

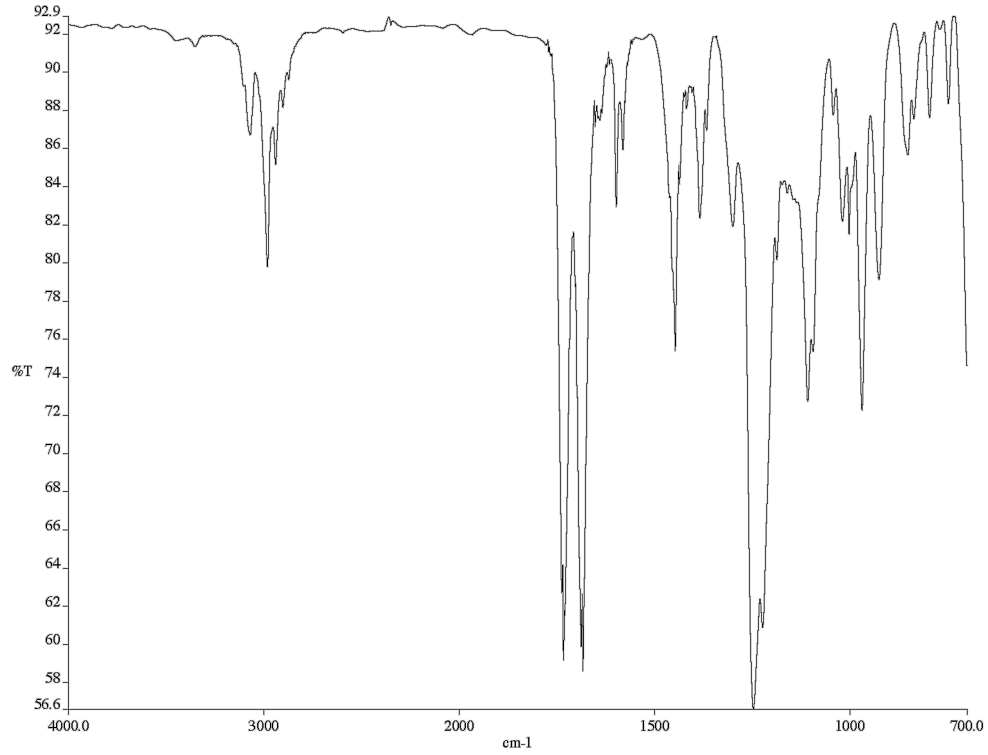


Figure A6.29 Infrared spectrum (thin film/NaCl) of compound **112i**.

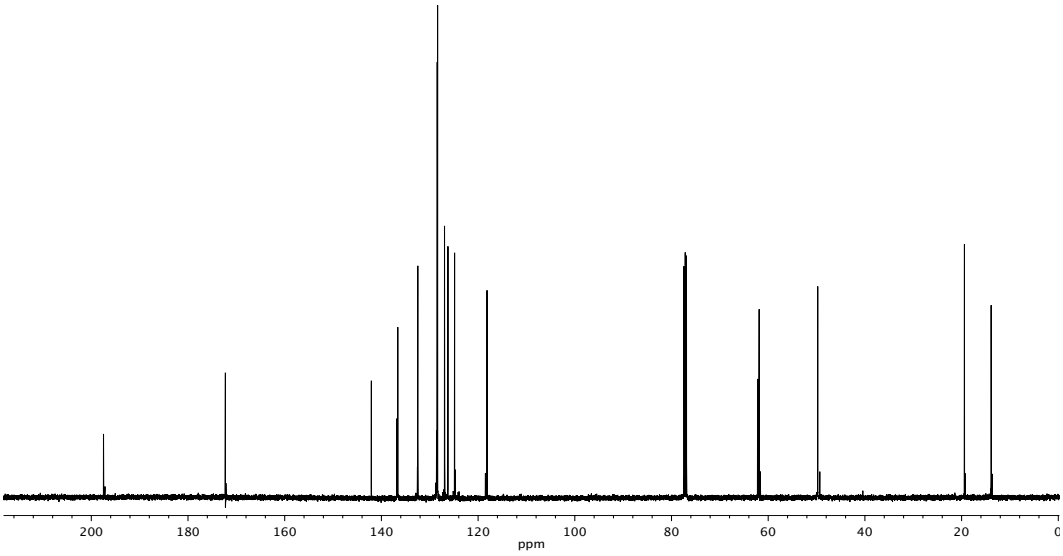


Figure A6.30 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112i**.

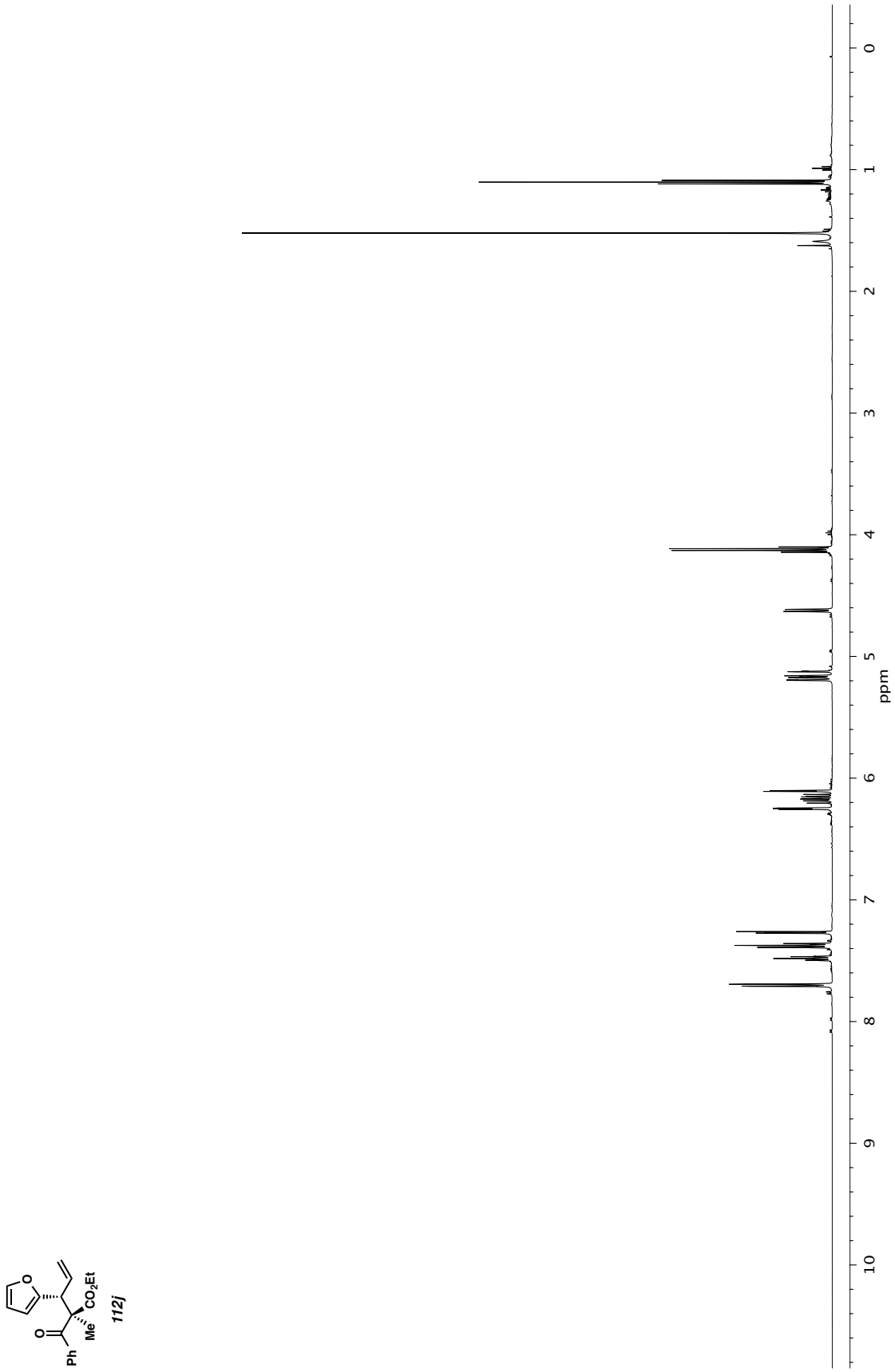


Figure A6.31 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112j**.

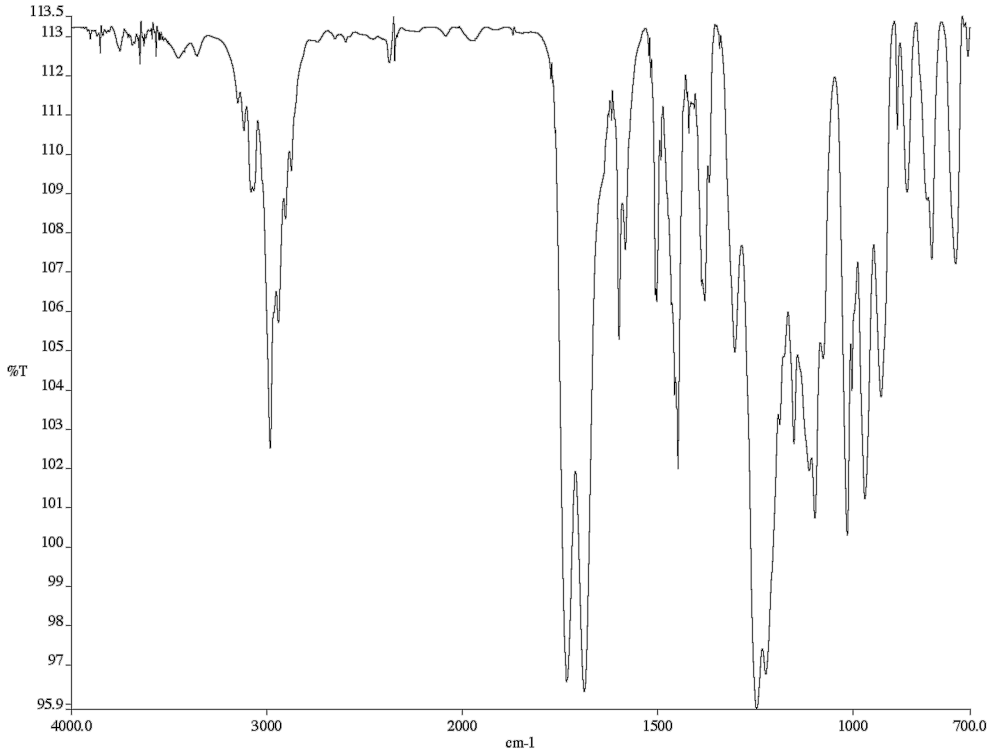


Figure A6.32 Infrared spectrum (thin film/NaCl) of compound **112j**.

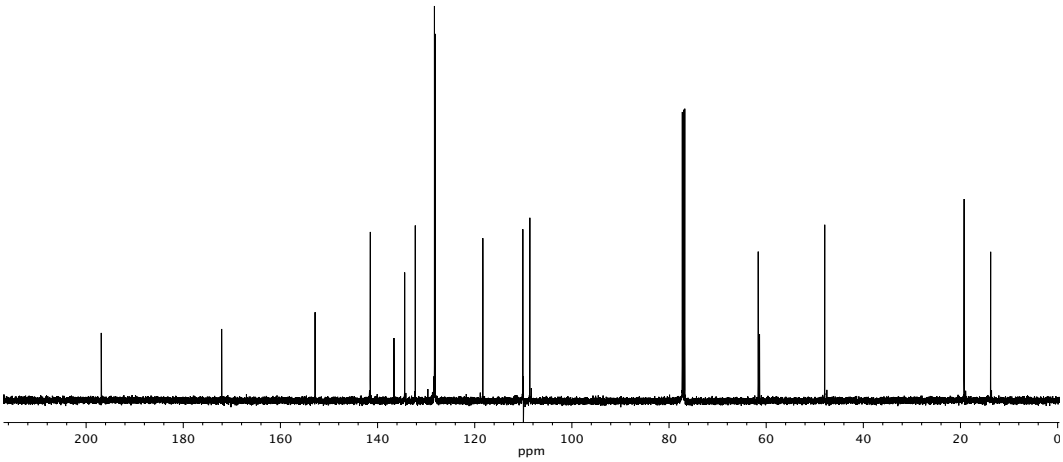


Figure A6.33 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112j**.

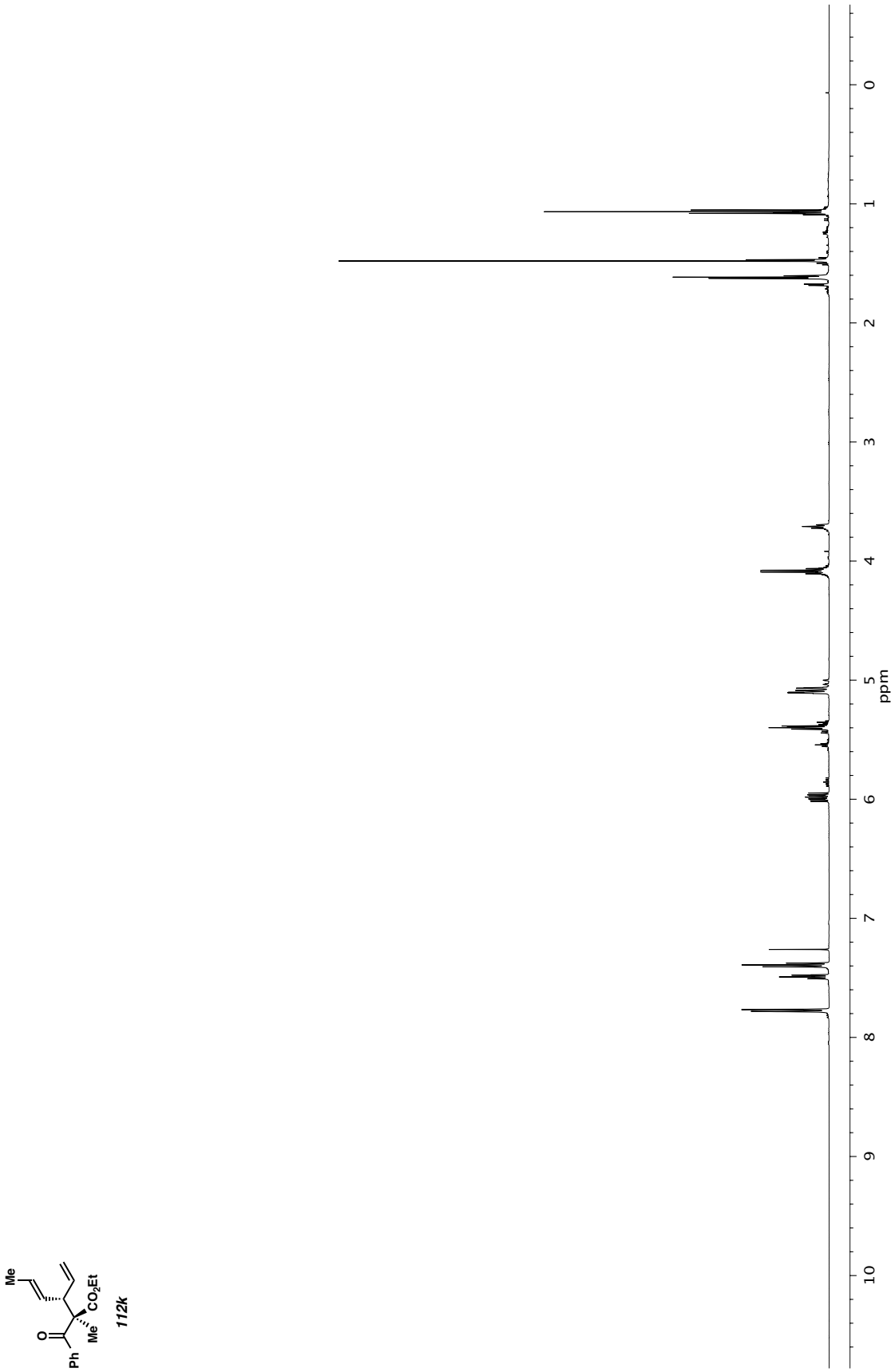


Figure A6.34 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112k**.

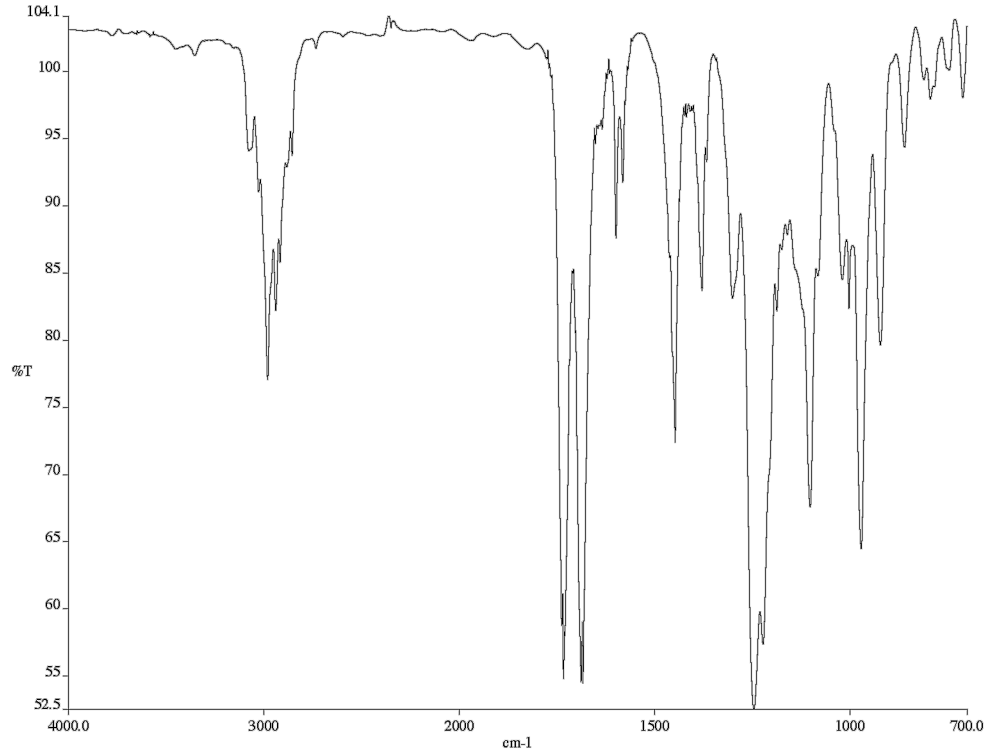


Figure A6.35 Infrared spectrum (thin film/NaCl) of compound **112k**.

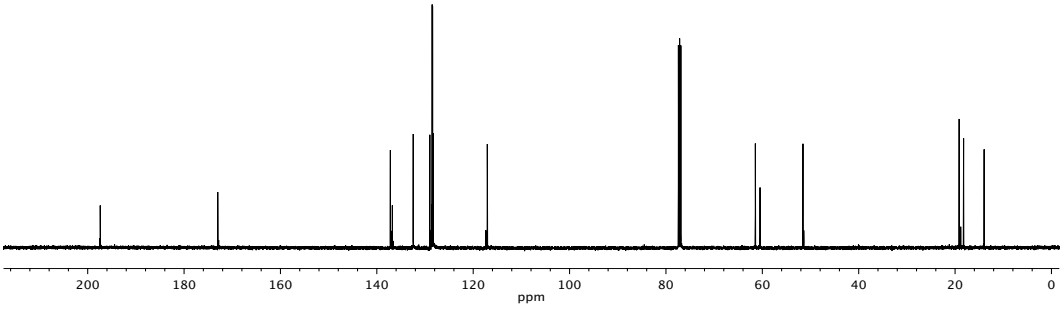


Figure A6.36 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112k**.

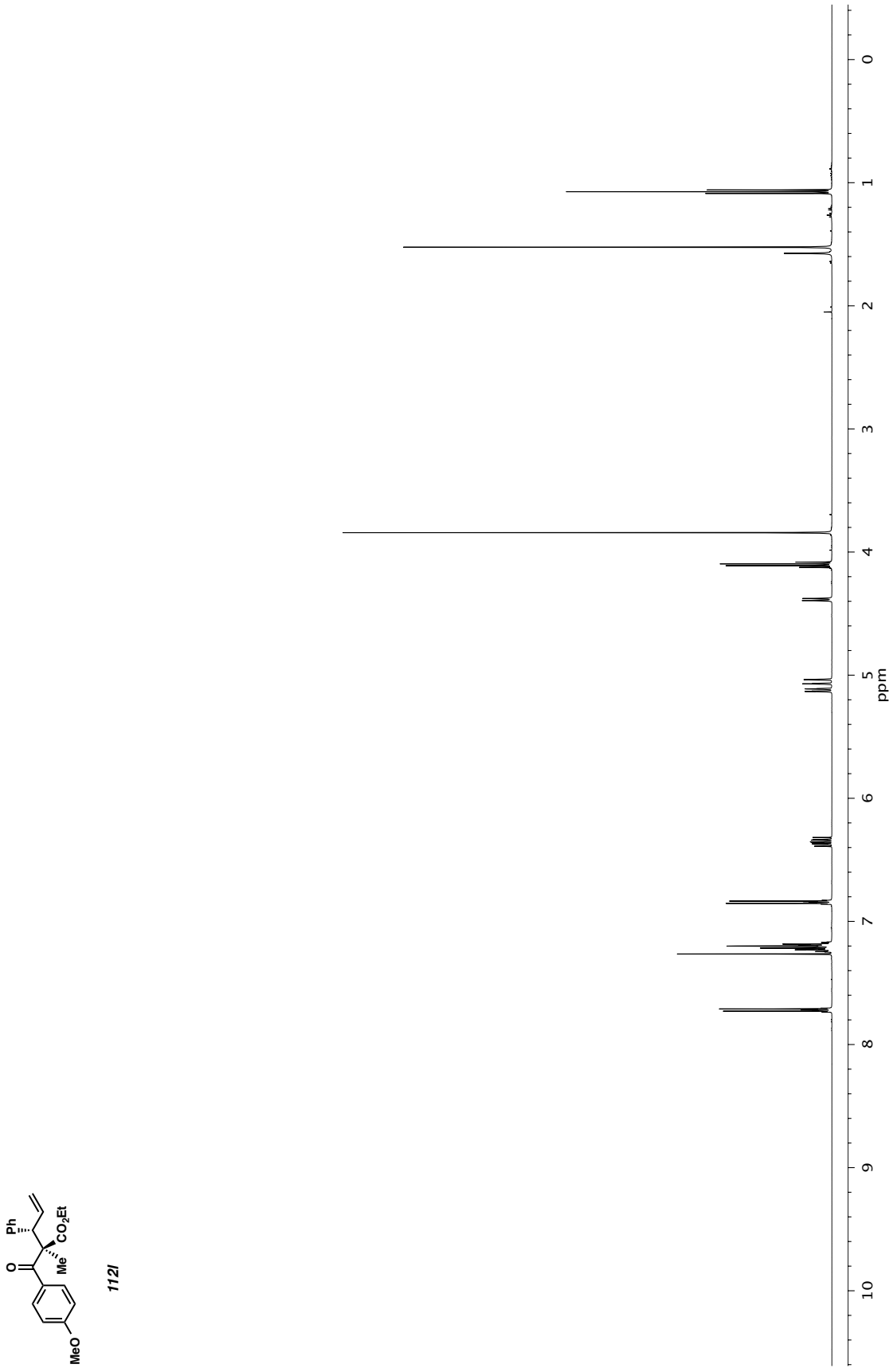


Figure A6.37 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112l**.

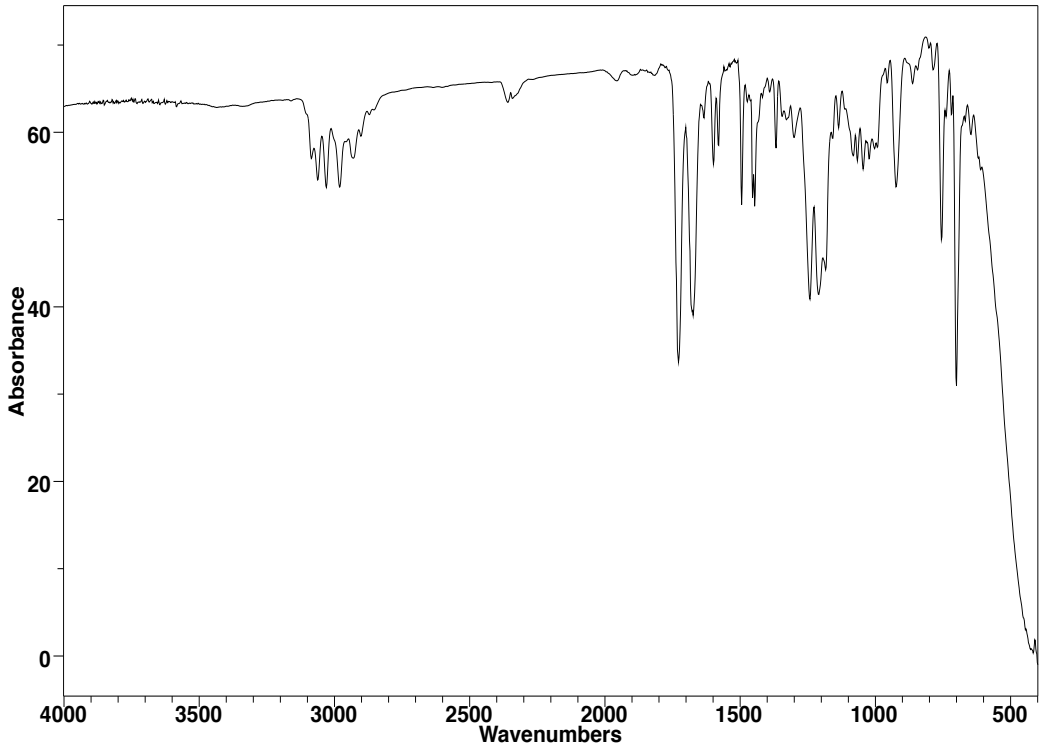


Figure A6.38 Infrared spectrum (thin film/NaCl) of compound **112l**.

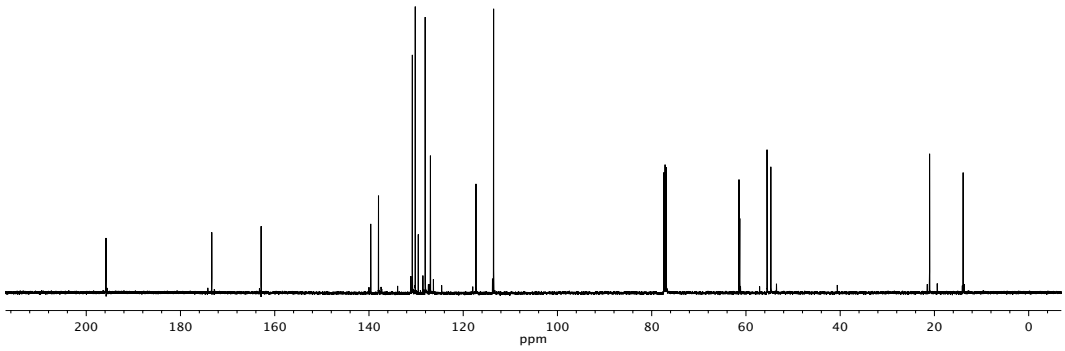


Figure A6.39 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112l**.

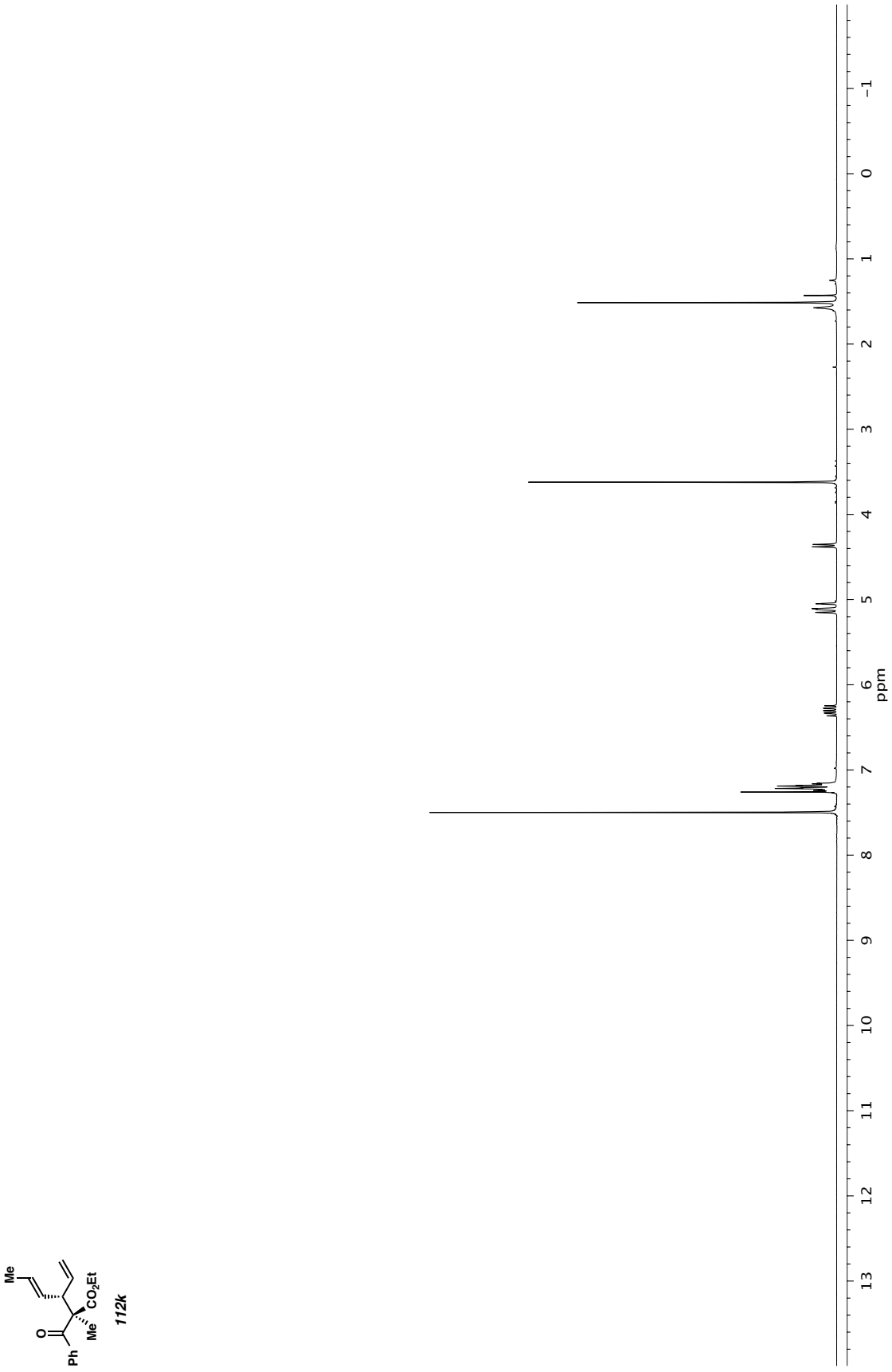


Figure A6.40 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112m**.

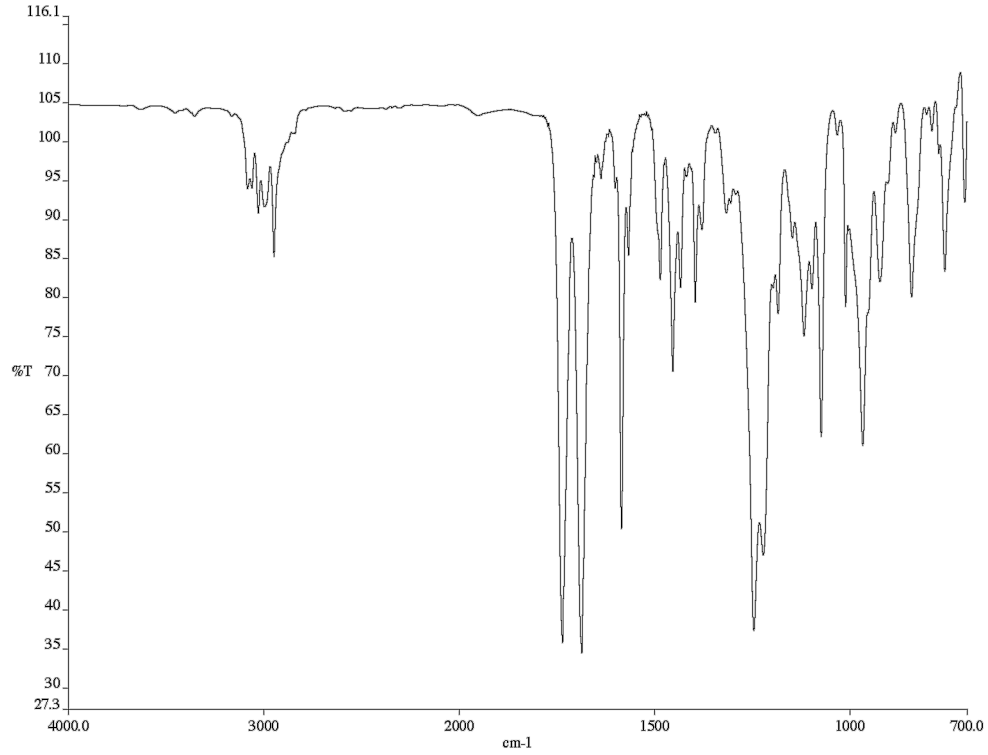


Figure A6.41 Infrared spectrum (thin film/NaCl) of compound **112m**.

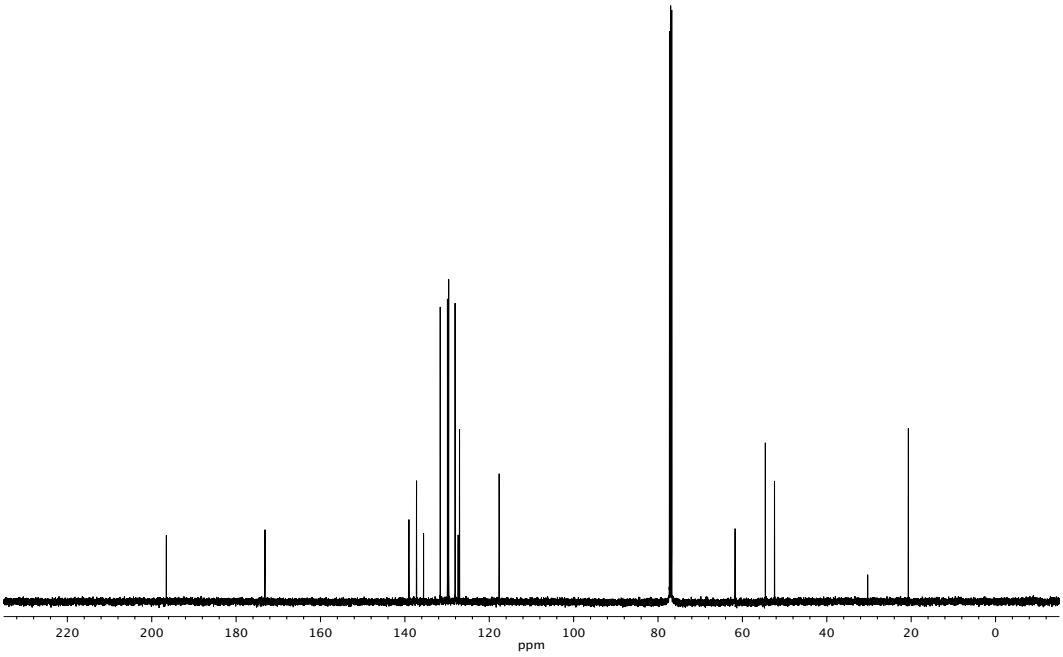


Figure A6.42 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112m**.

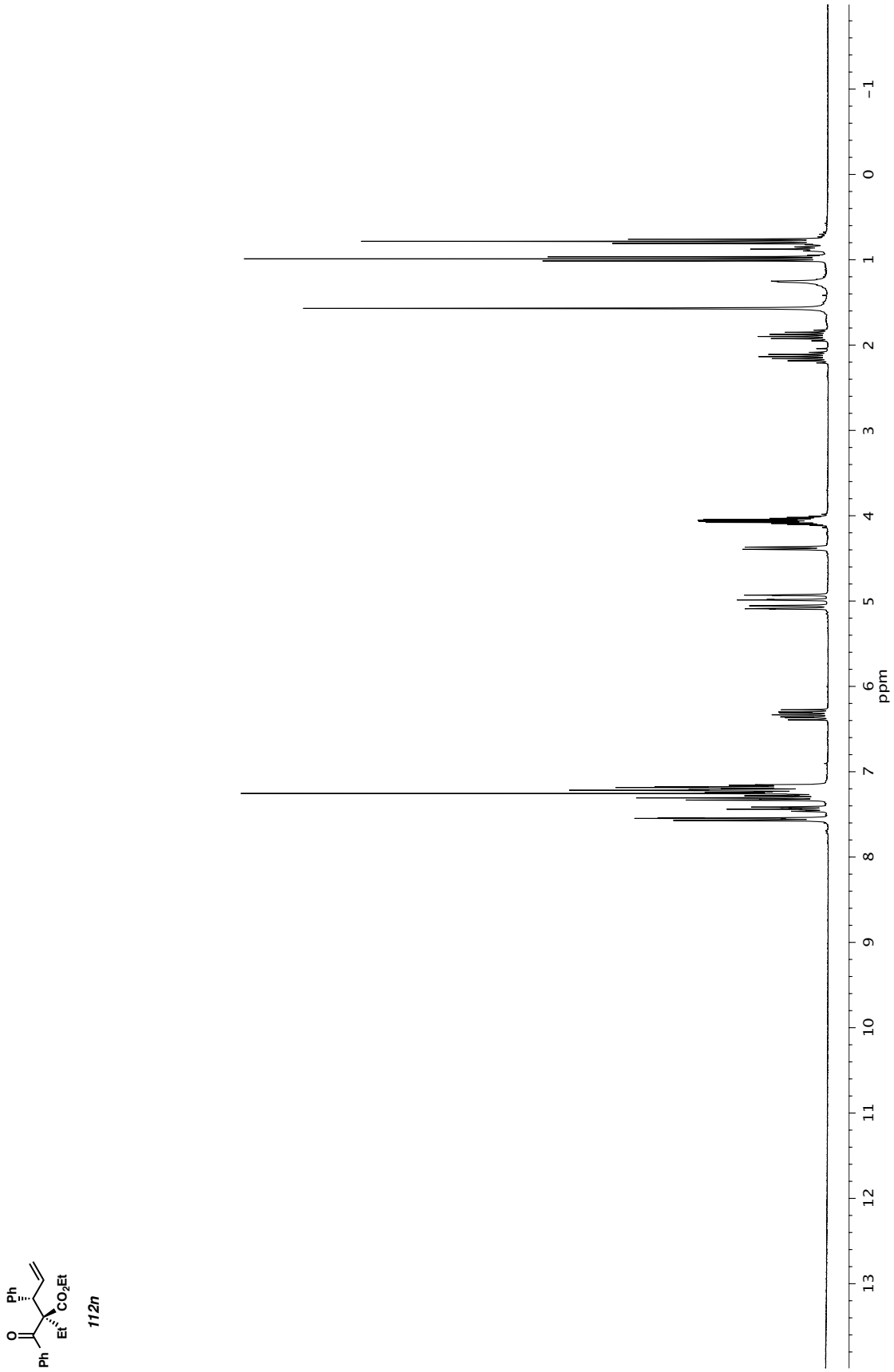


Figure A6.43 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112n**.

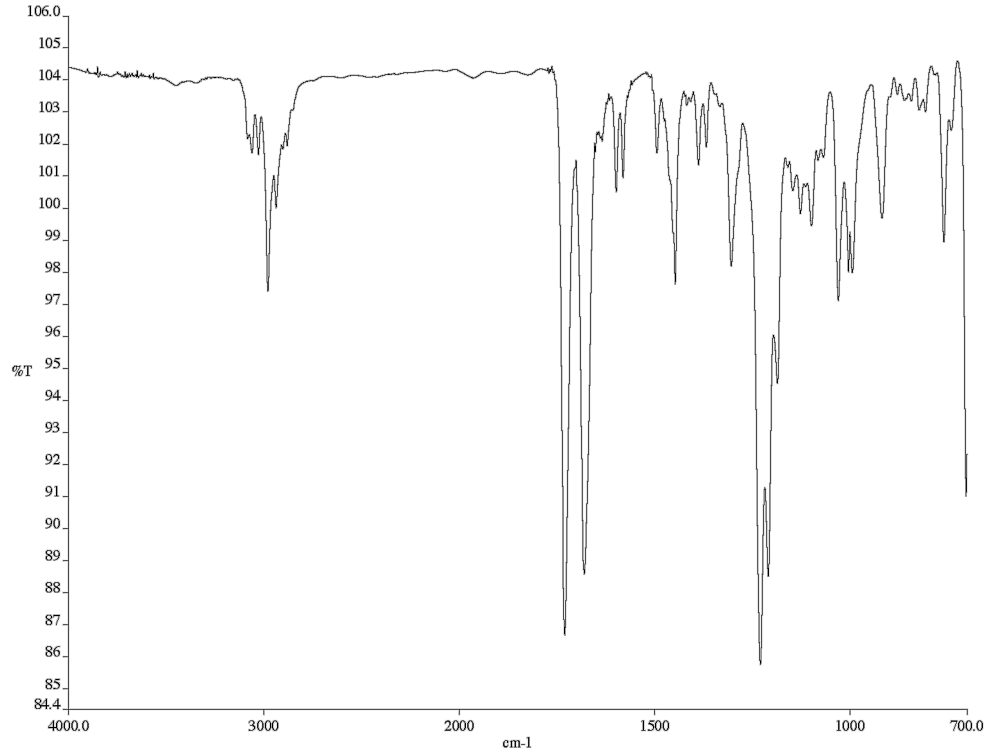


Figure A6.44 Infrared spectrum (thin film/NaCl) of compound **112n**.

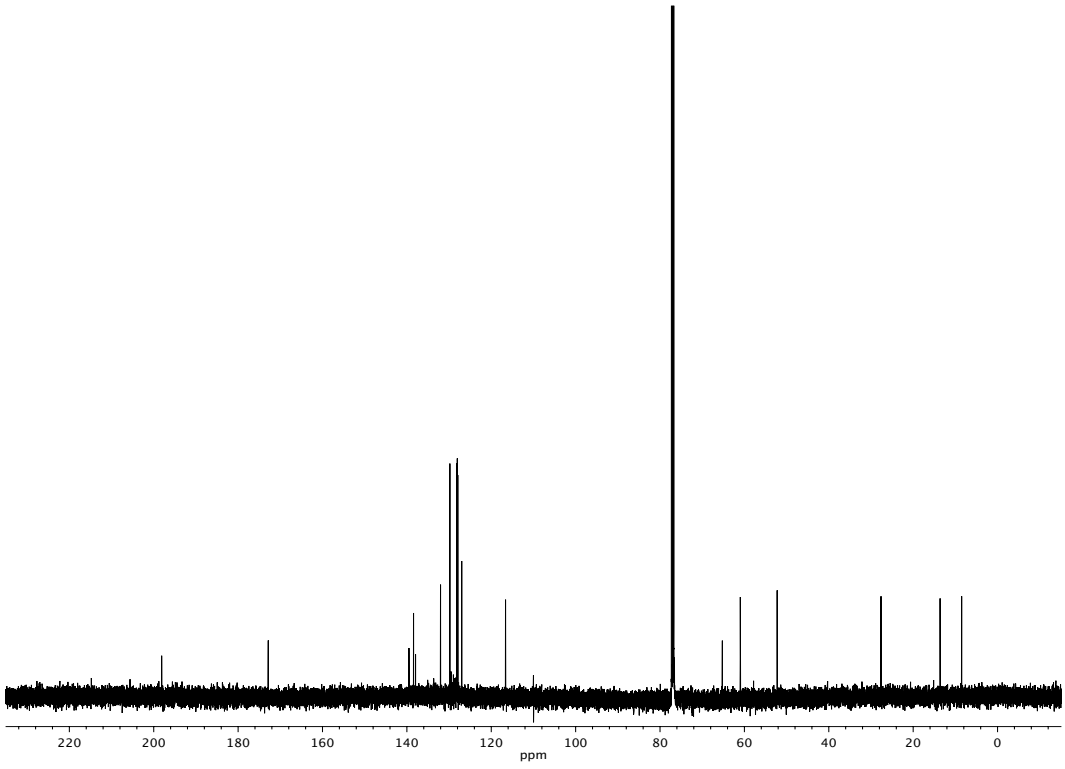


Figure A6.45 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112n**.

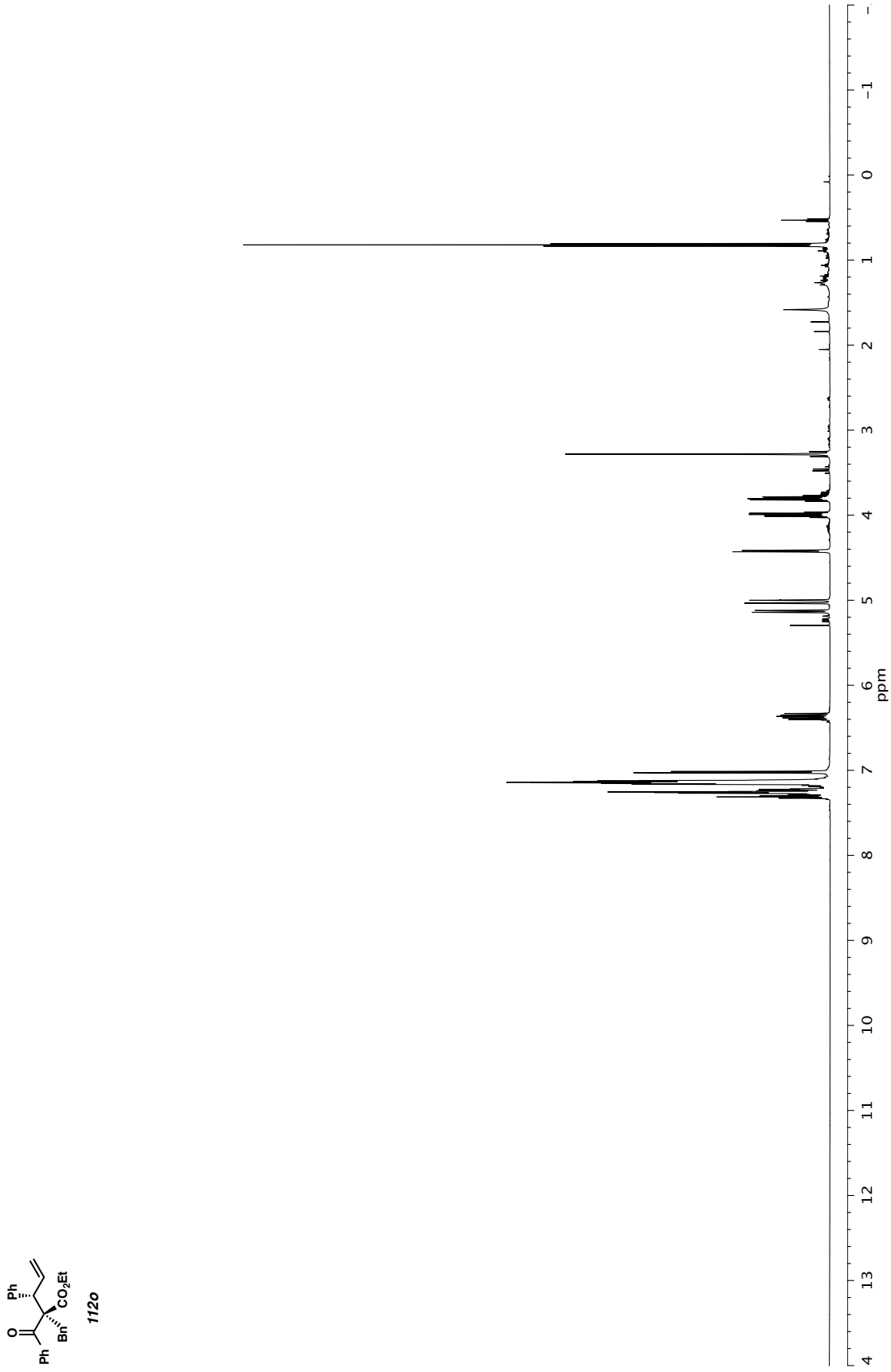


Figure A6.46 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112o**.

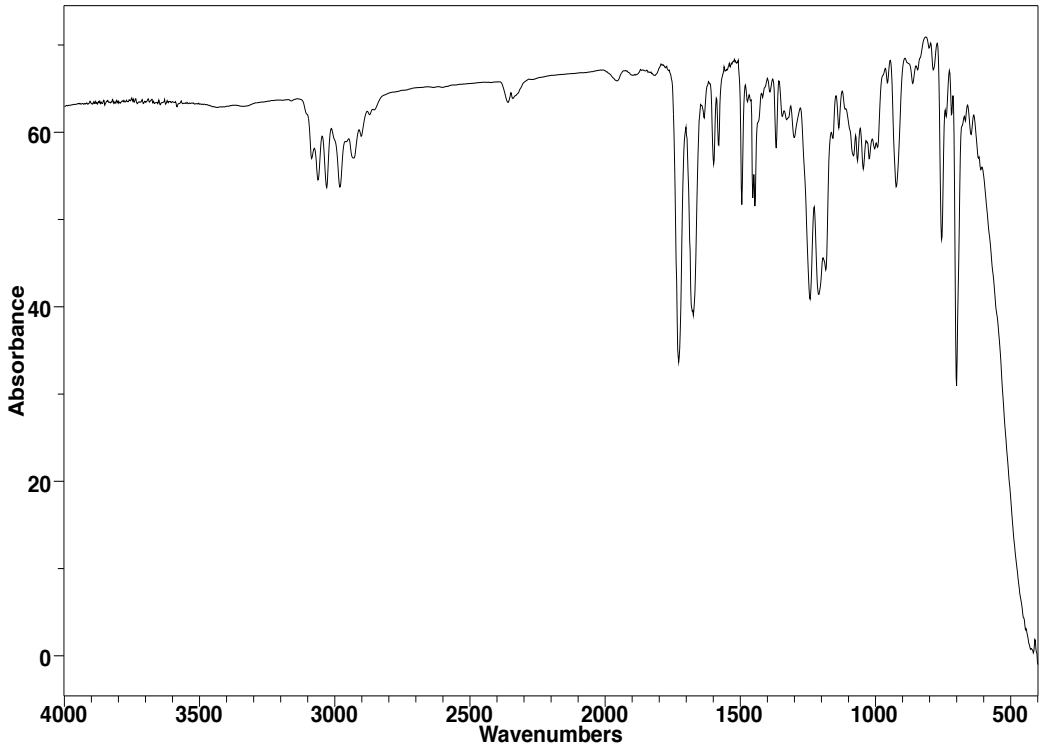


Figure A6.47 Infrared spectrum (thin film/NaCl) of compound **112o**.

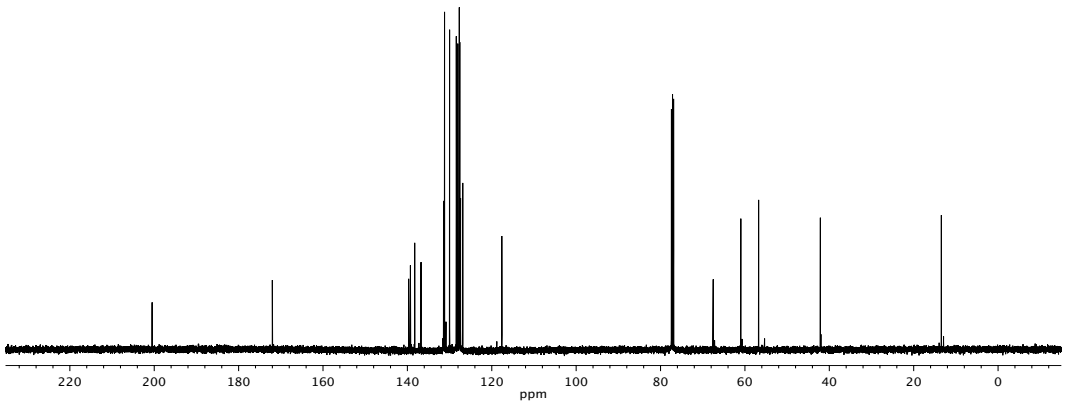


Figure A6.48 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112o**.

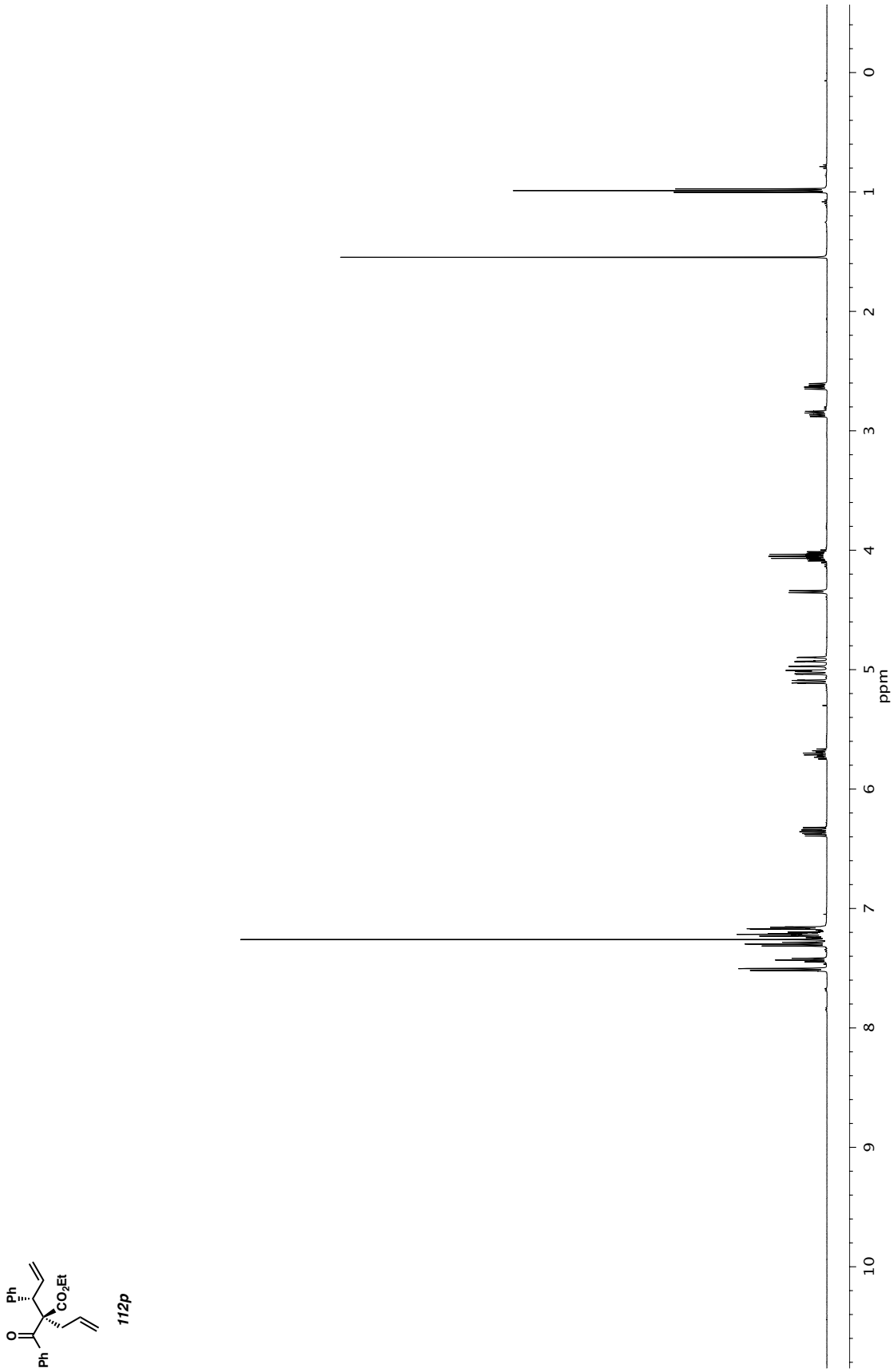


Figure A6.49 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112p**.

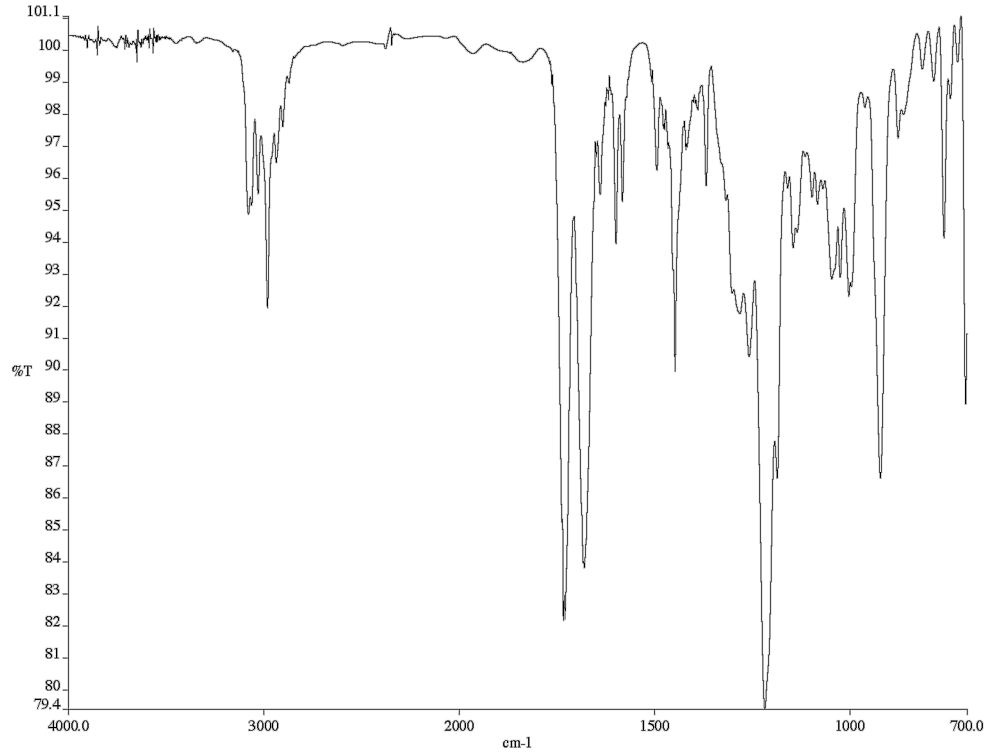


Figure A6.50 Infrared spectrum (thin film/NaCl) of compound **112p**.

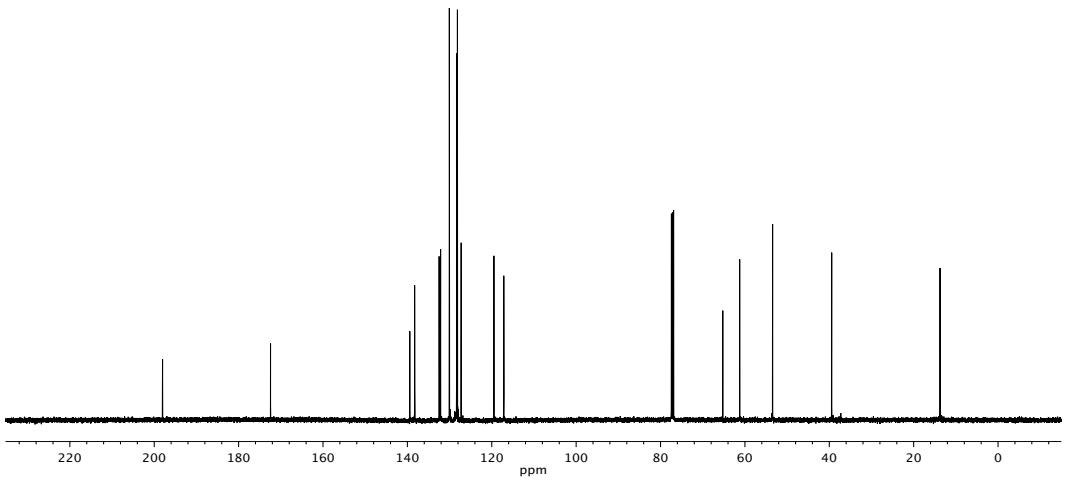


Figure A6.51 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112p**.

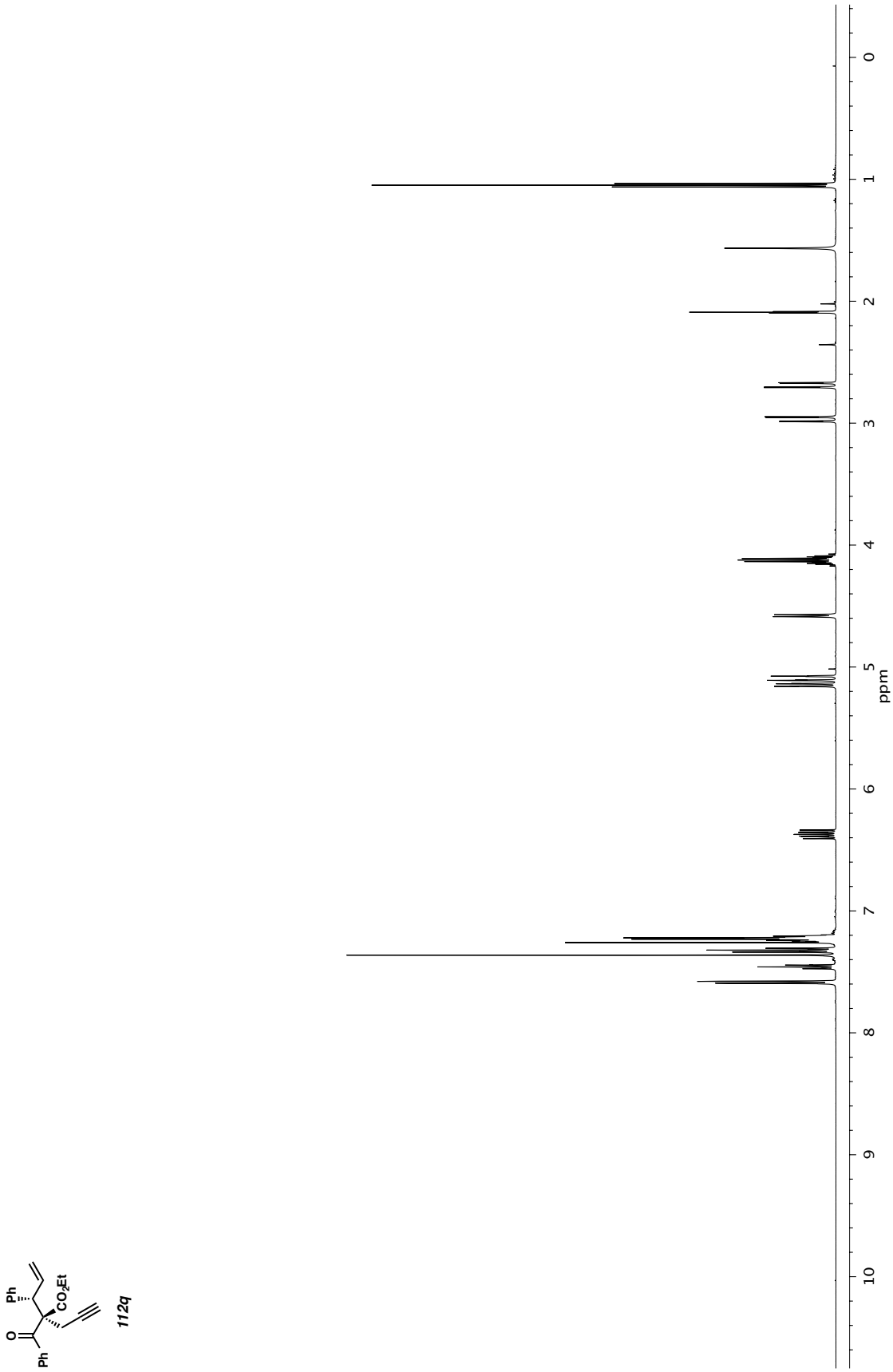


Figure A6.52 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112q**.

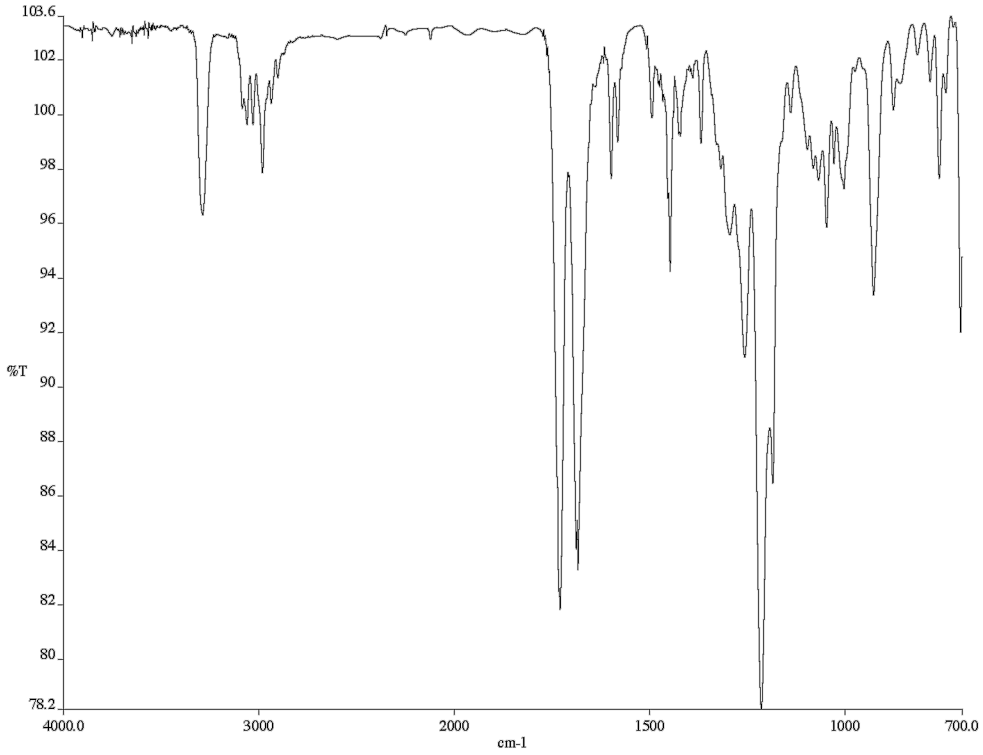


Figure A6.53 Infrared spectrum (thin film/NaCl) of compound **112q**.

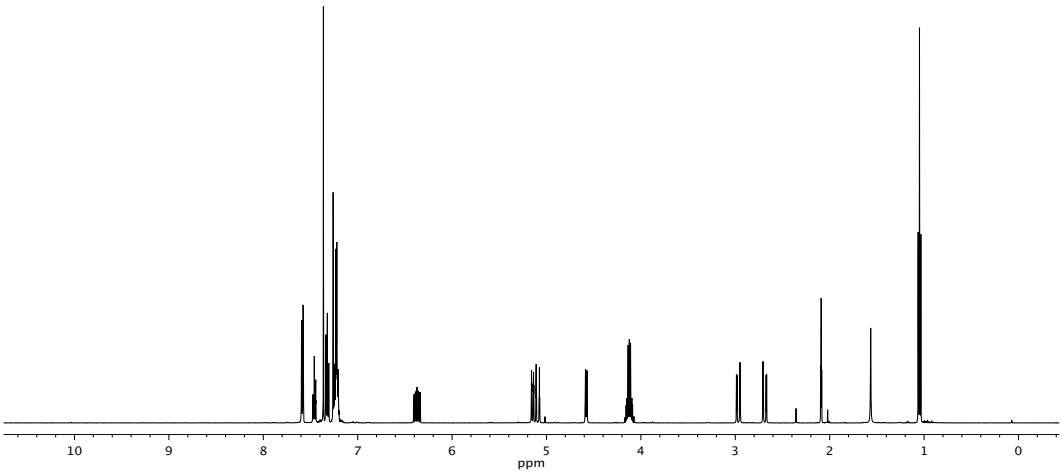


Figure A6.54 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112q**.

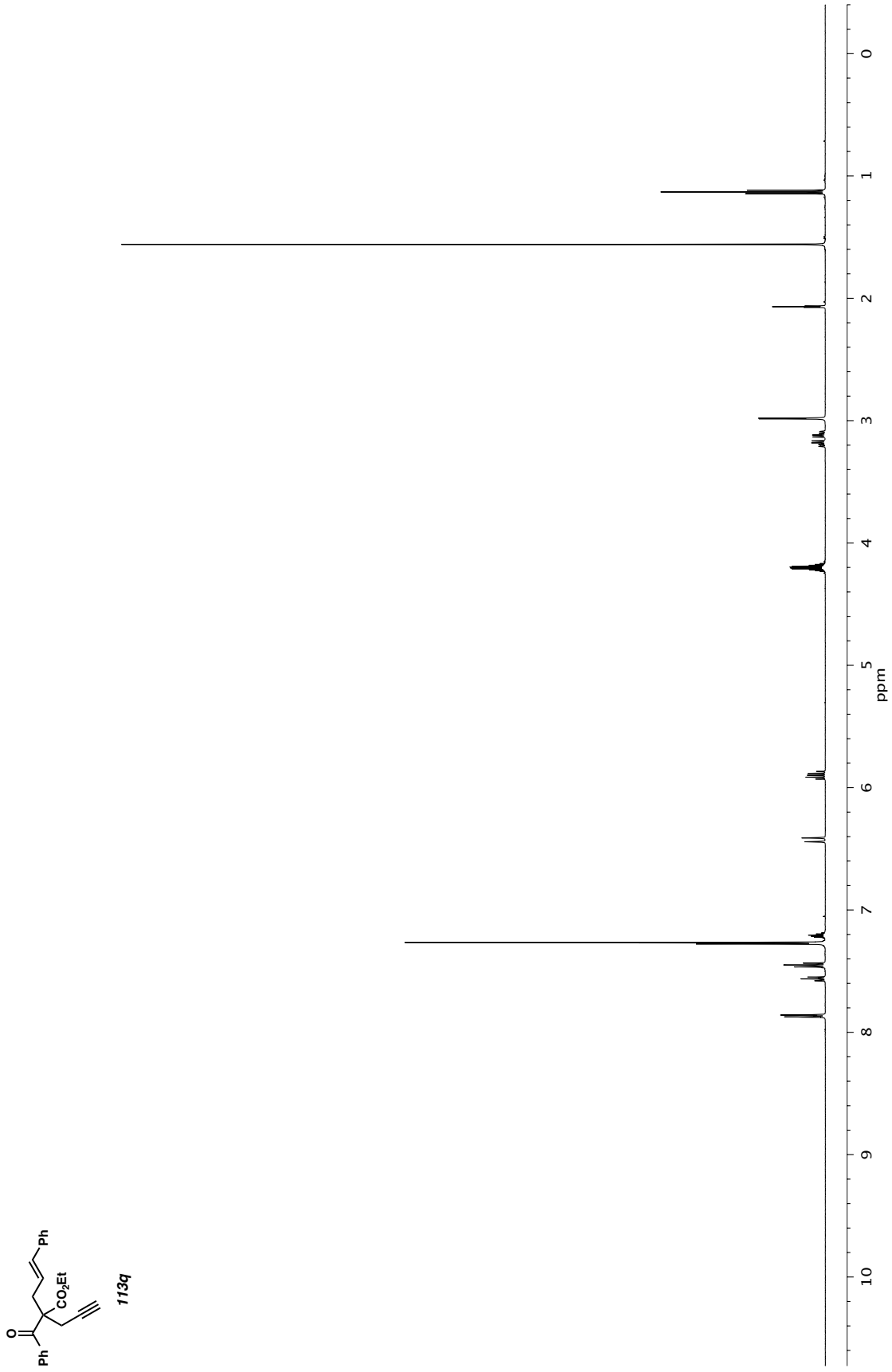


Figure A6.55 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **113q**.

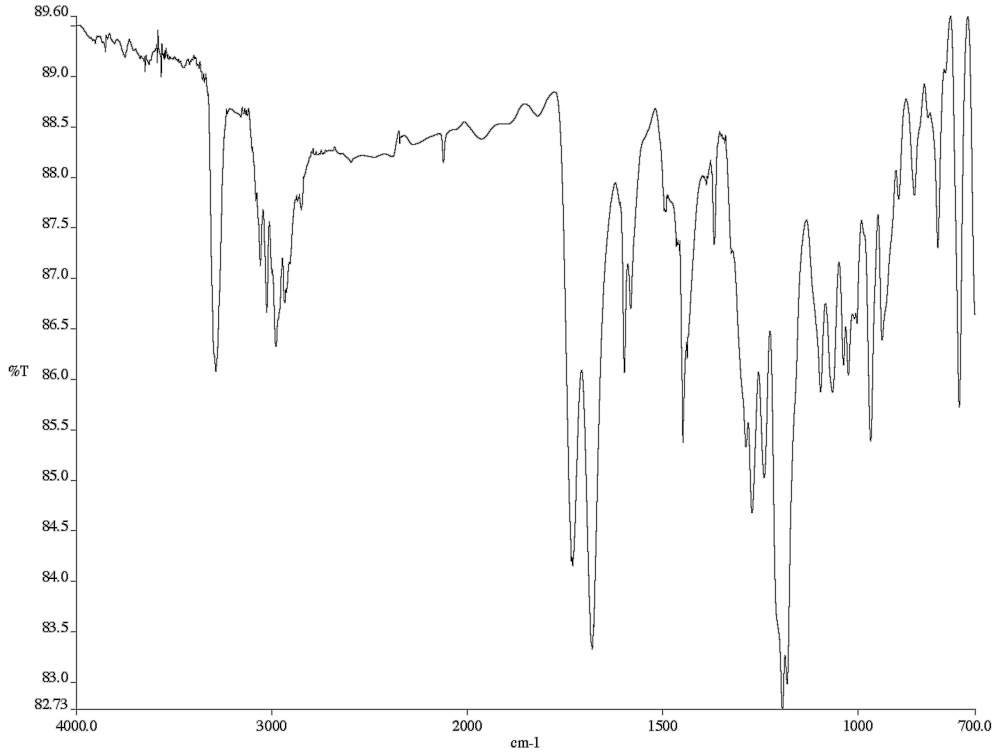


Figure A6.56 Infrared spectrum (thin film/NaCl) of compound **113q**.

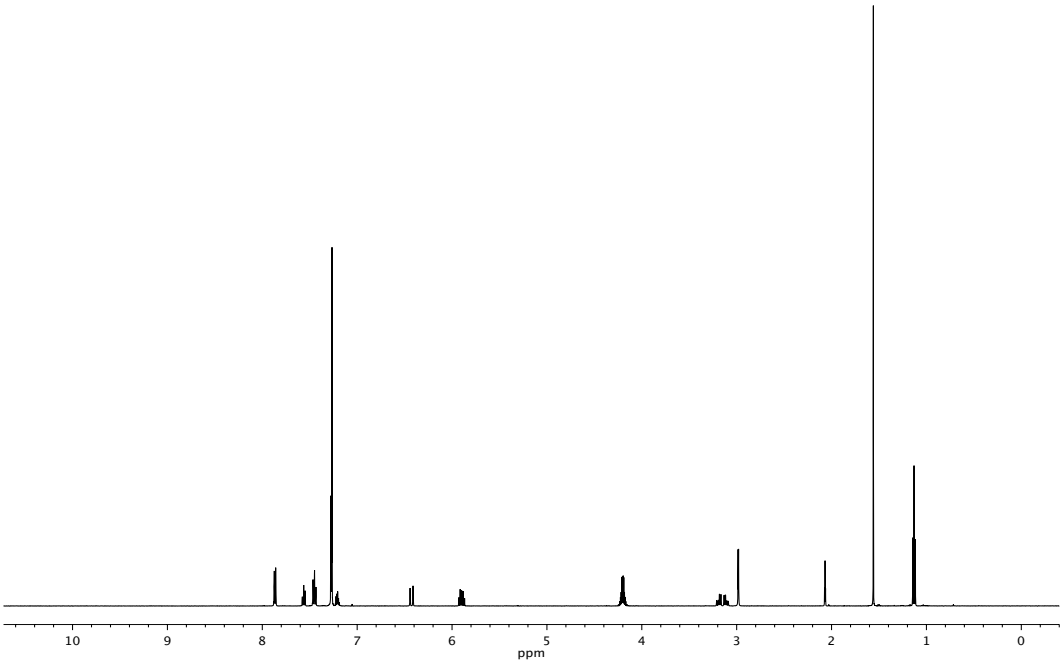


Figure A6.57 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **113q**.

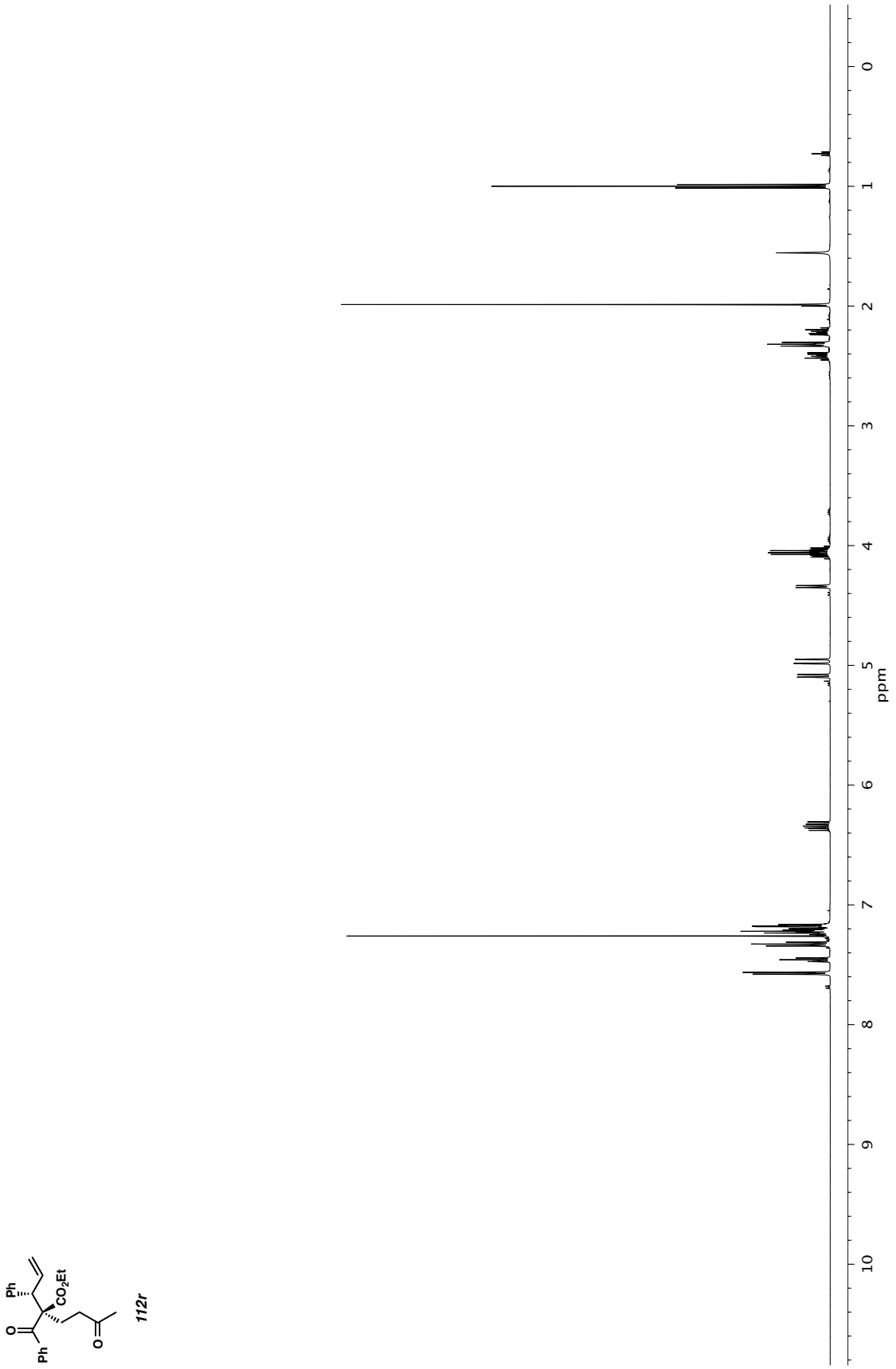


Figure A6.58 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112r**.

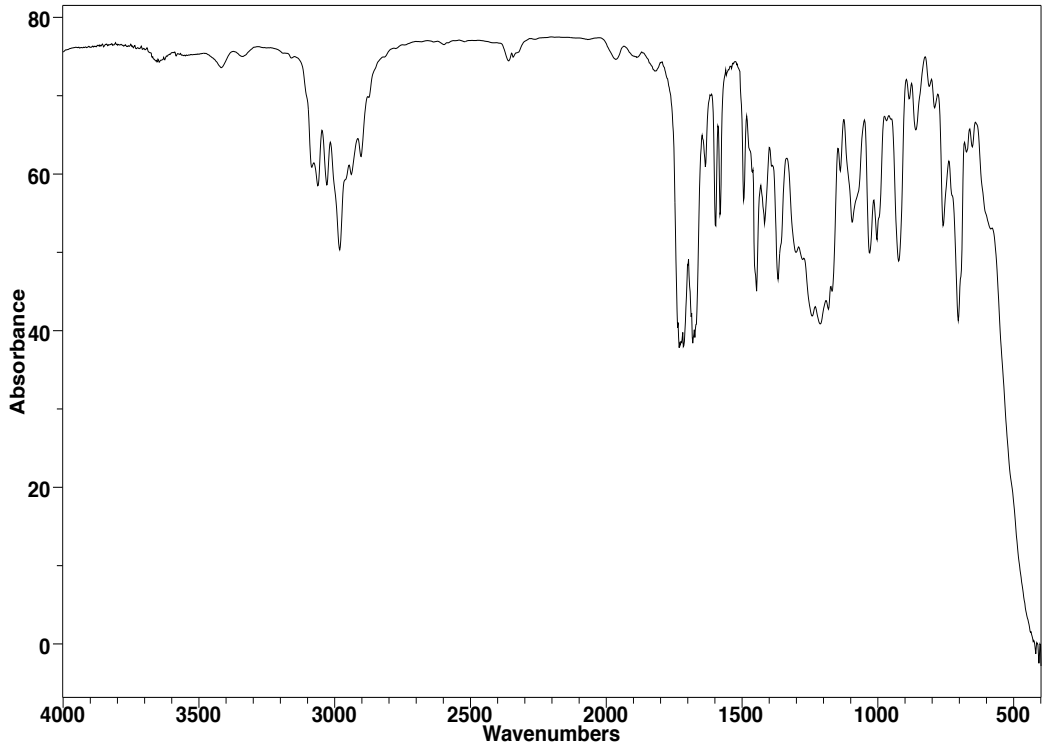


Figure A6.59 Infrared spectrum (thin film/NaCl) of compound **112r**.

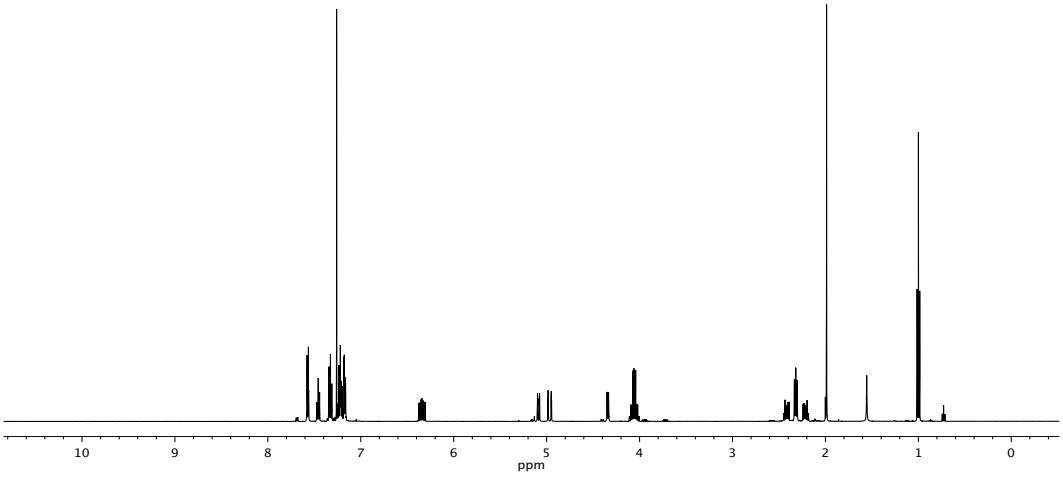


Figure A6.60 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112r**.

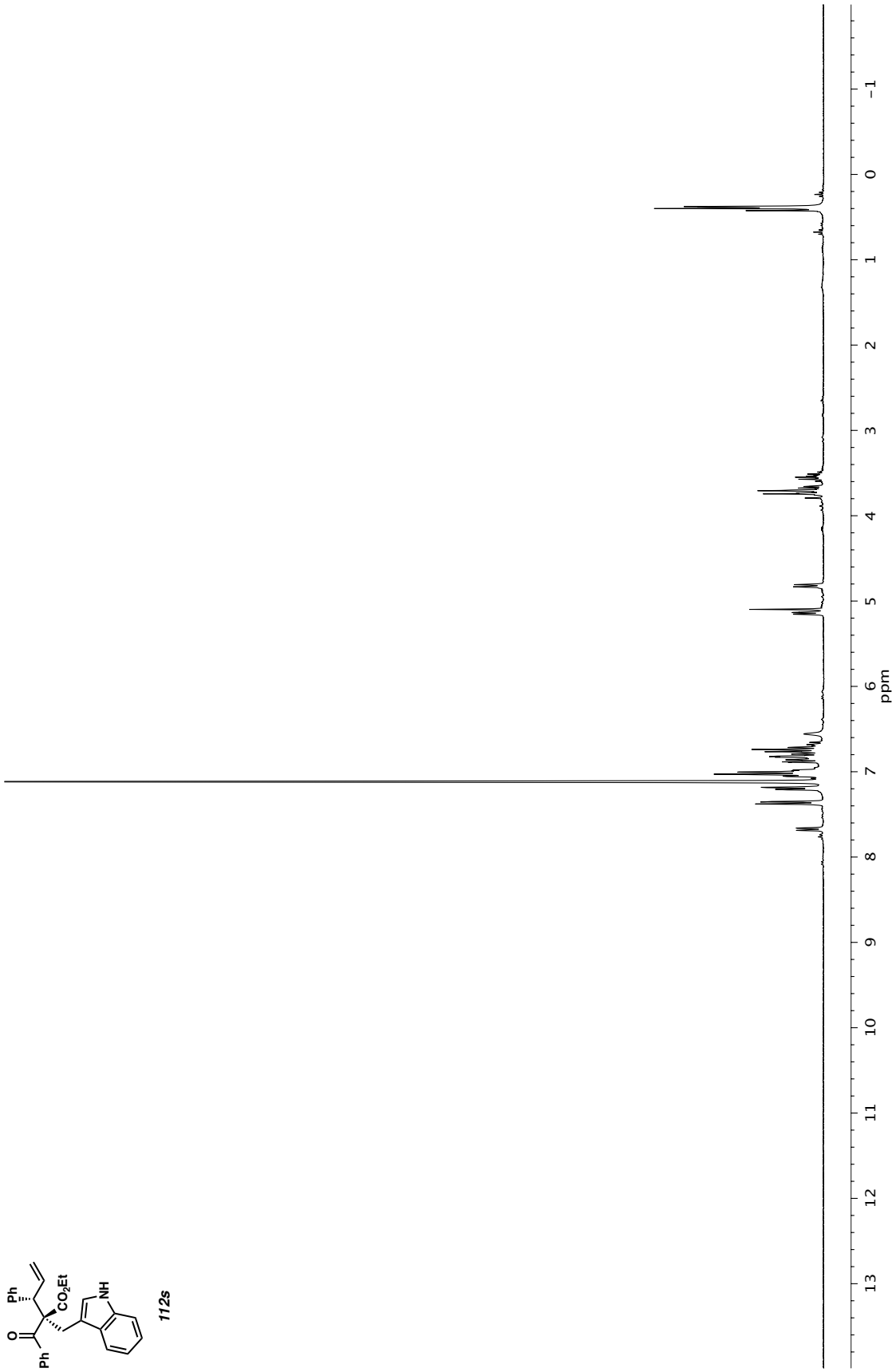


Figure A6.61 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112s**.

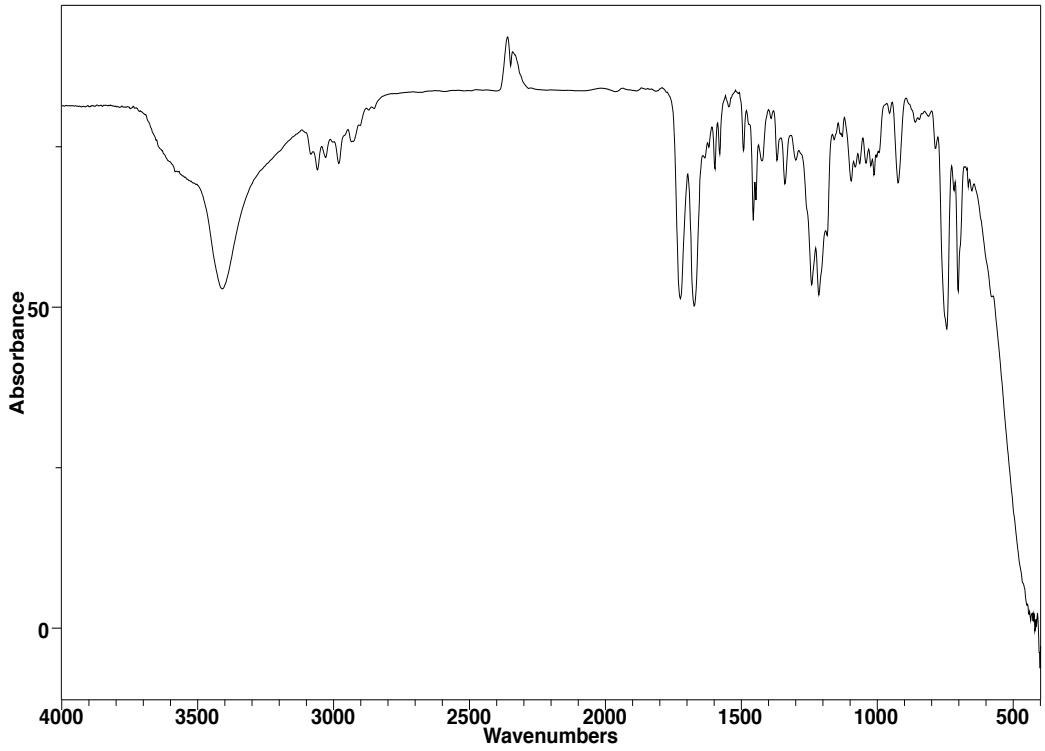


Figure A6.62 Infrared spectrum (thin film/NaCl) of compound **112s**.

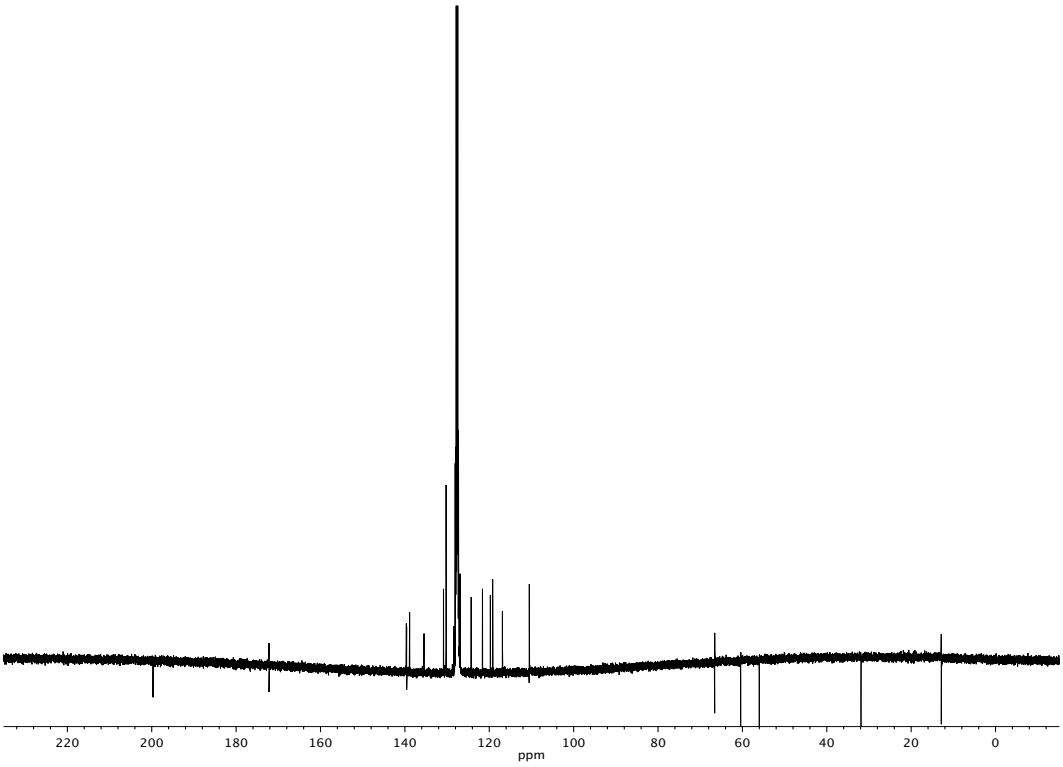


Figure A6.63 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112s**.

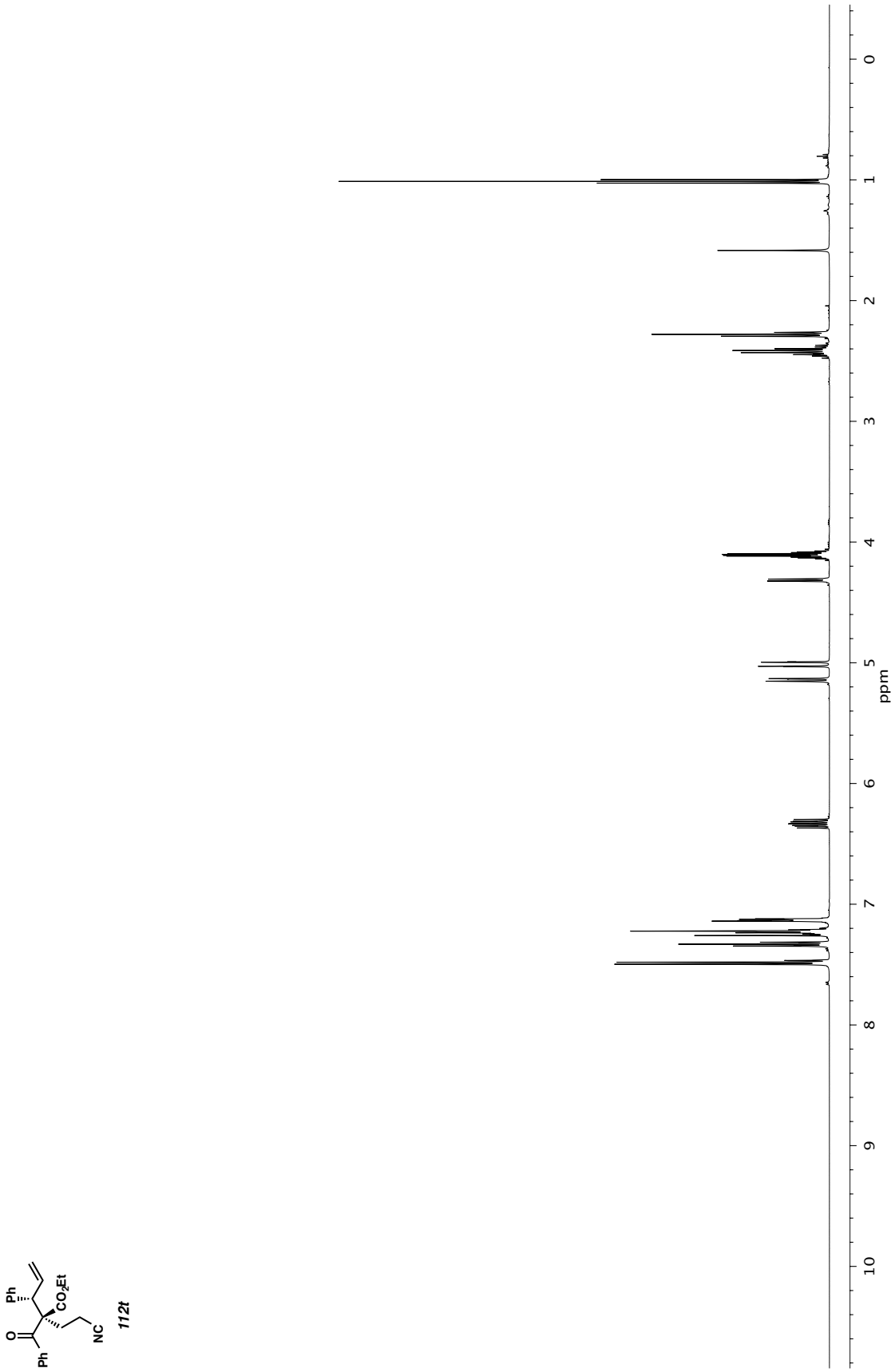


Figure A6.64 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112t**.

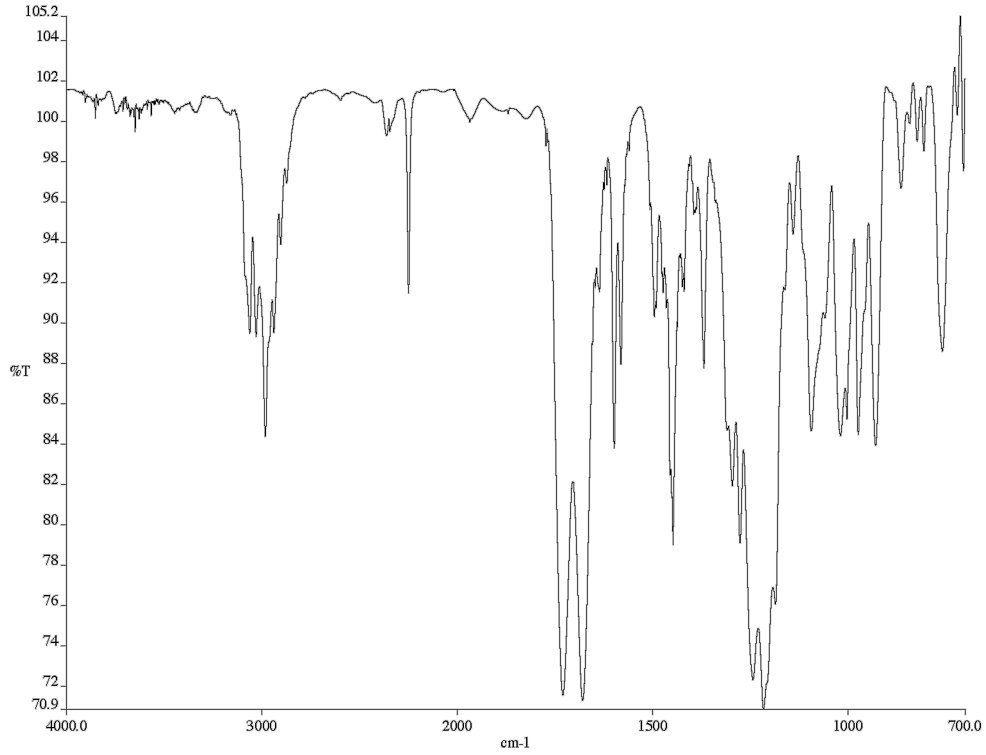


Figure A6.65 Infrared spectrum (thin film/NaCl) of compound **112t**.

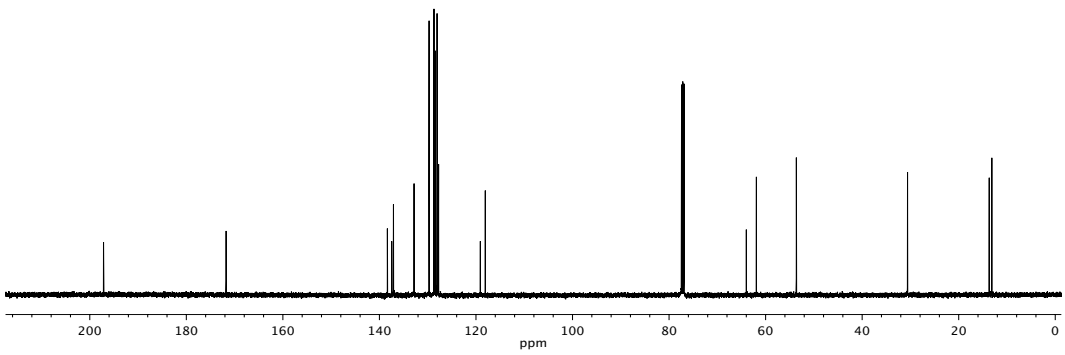


Figure A6.66 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112t**.

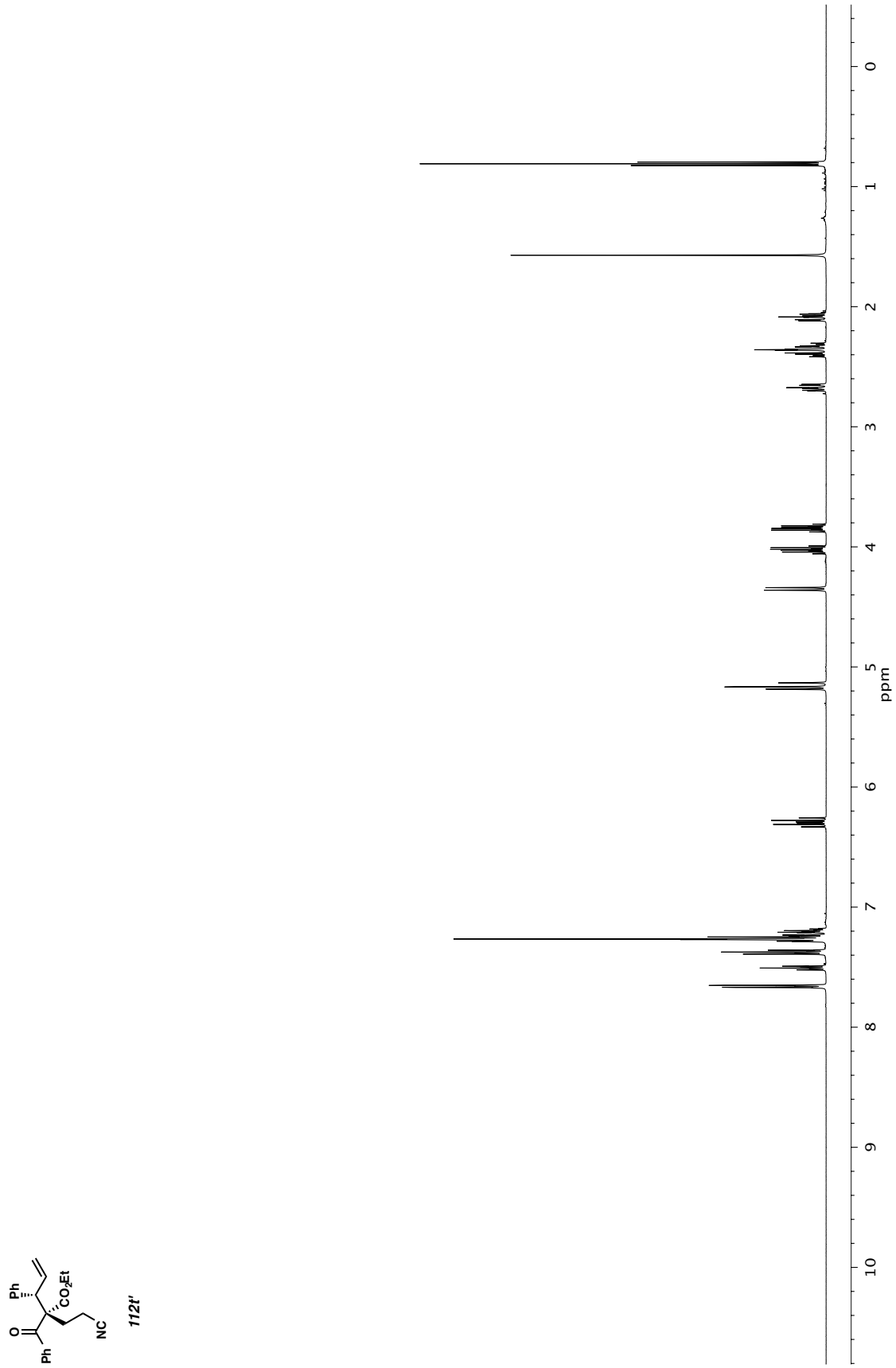


Figure A6.67 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112t'**.

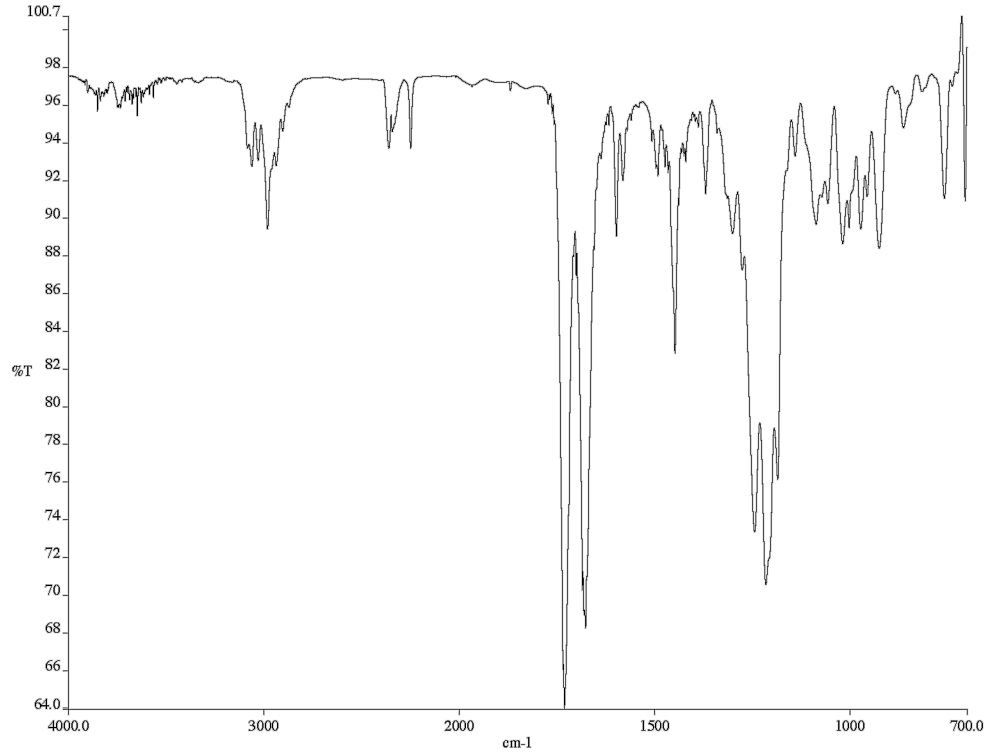


Figure A6.68 Infrared spectrum (thin film/NaCl) of compound **112t'**.

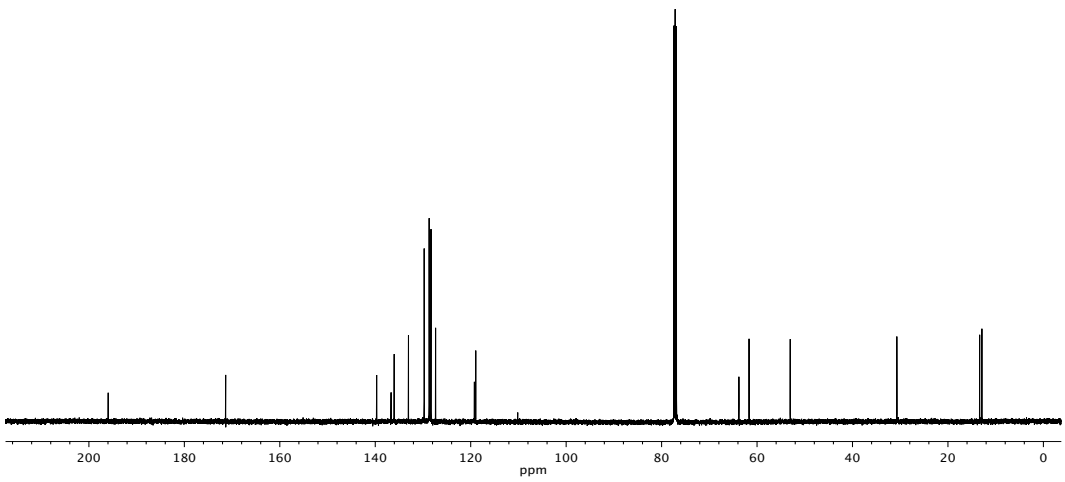


Figure A6.69 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112t'**.

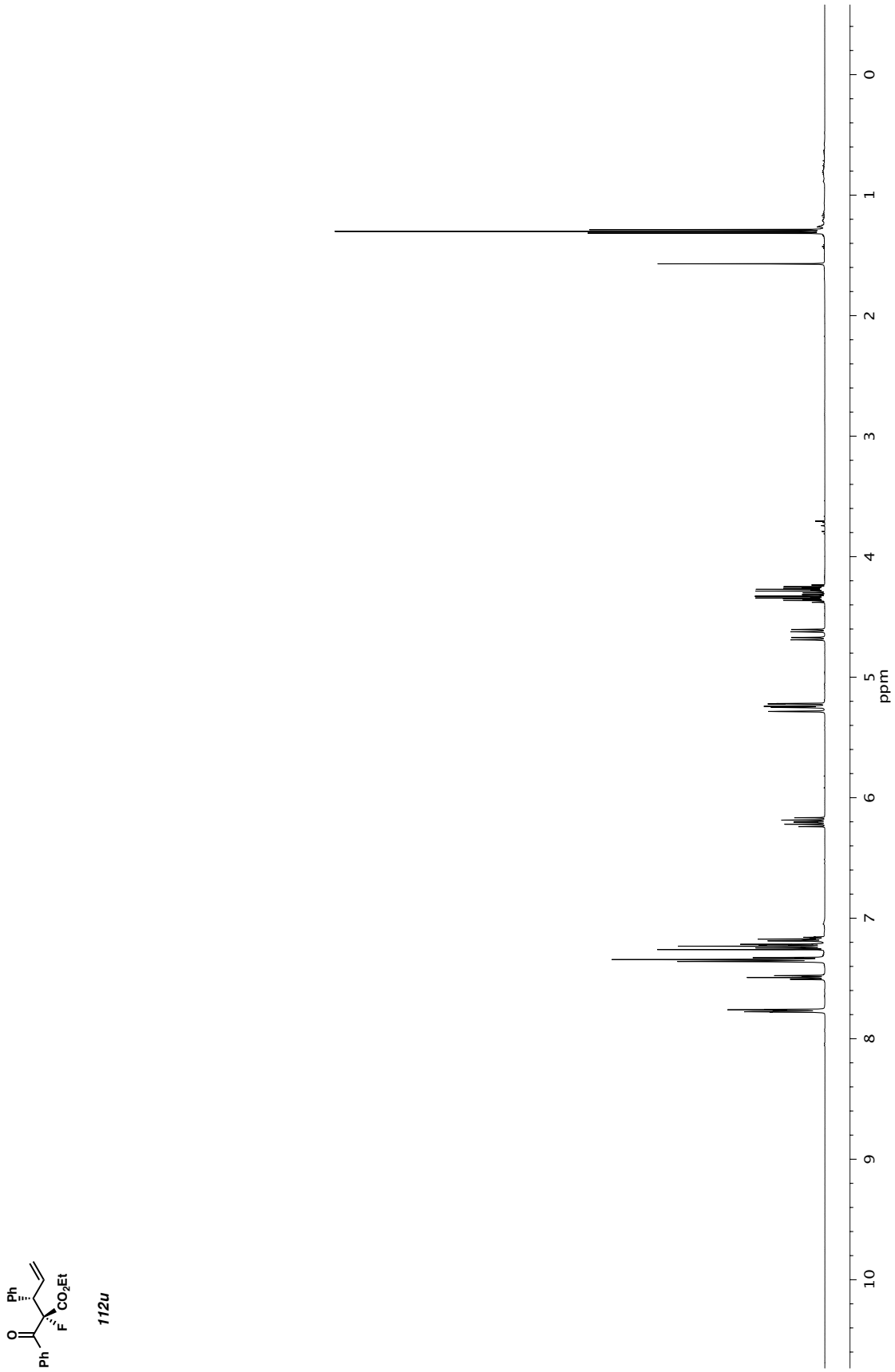


Figure A6.70 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112u**.

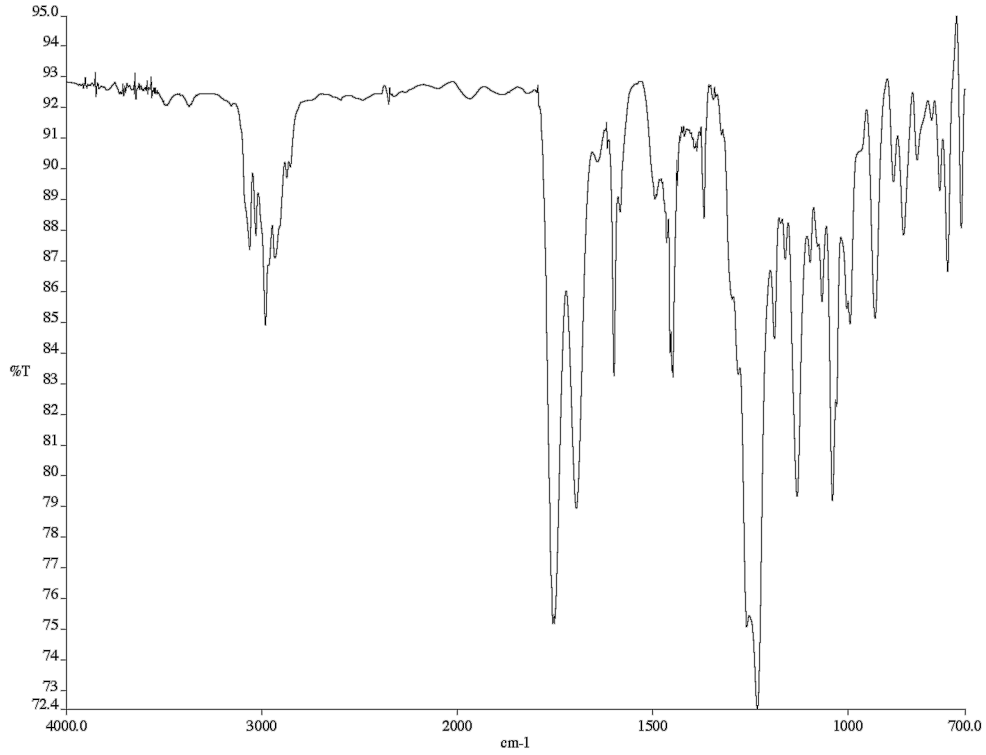


Figure A6.71 Infrared spectrum (thin film/NaCl) of compound **112u**.

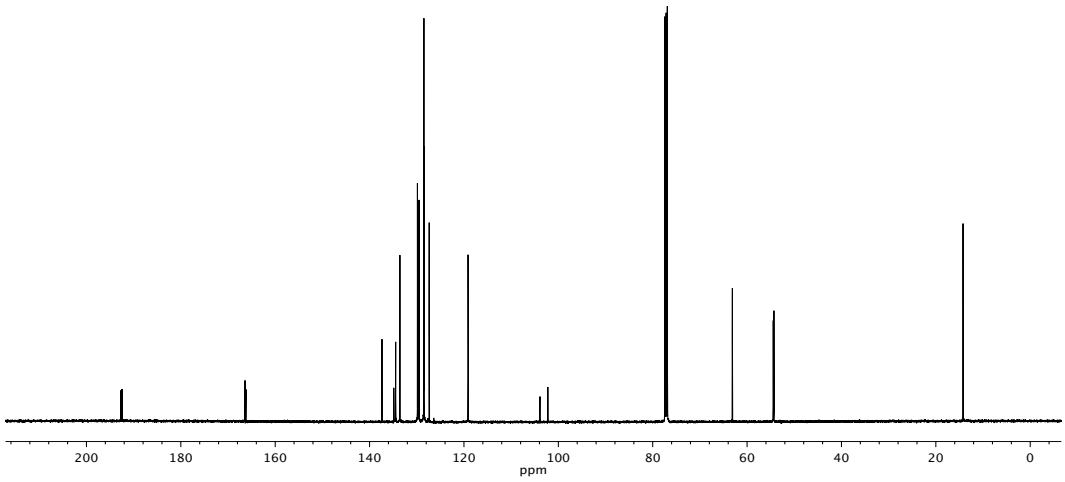


Figure A6.72 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112u**.

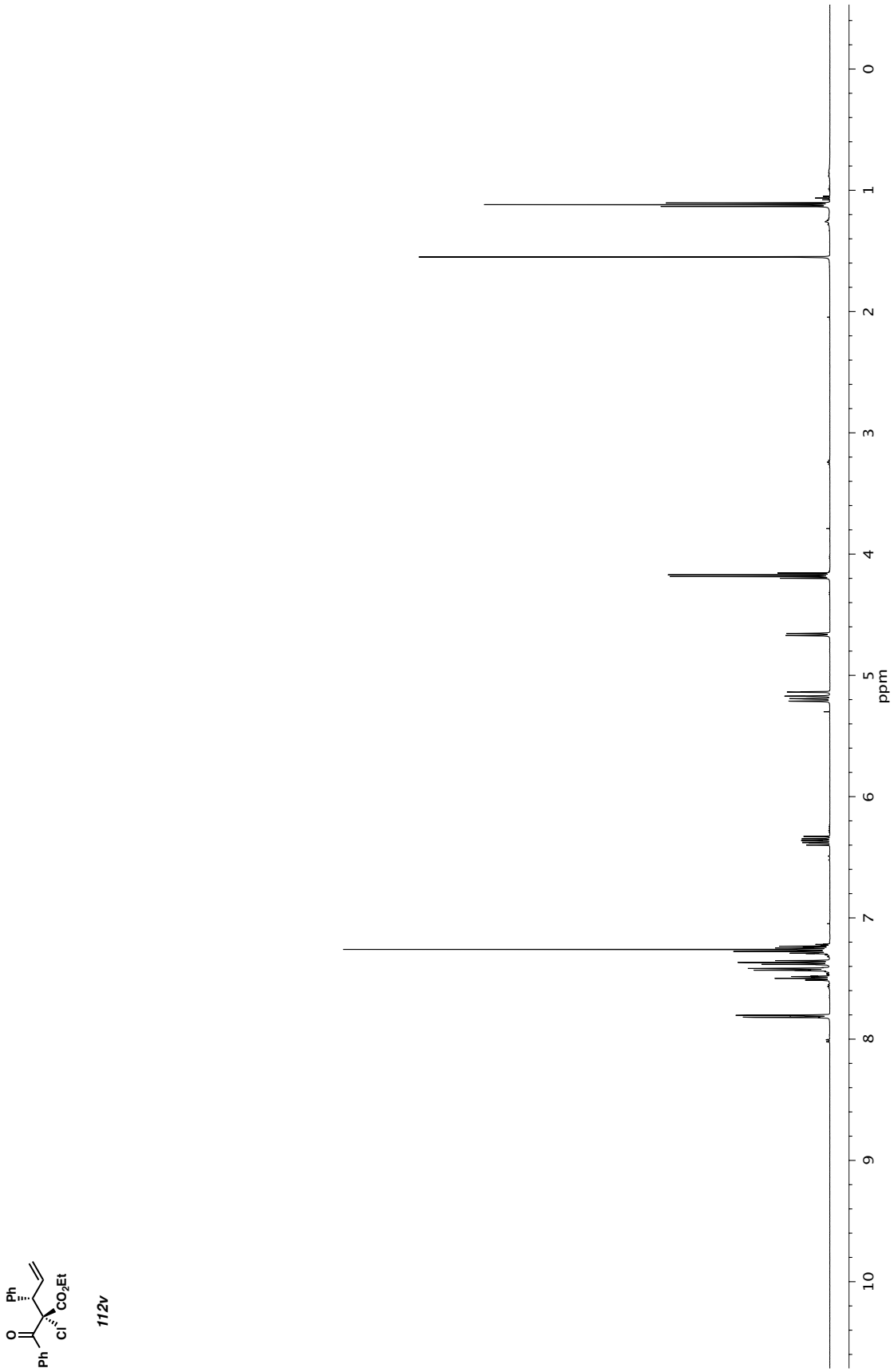


Figure A6.73 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112v**.

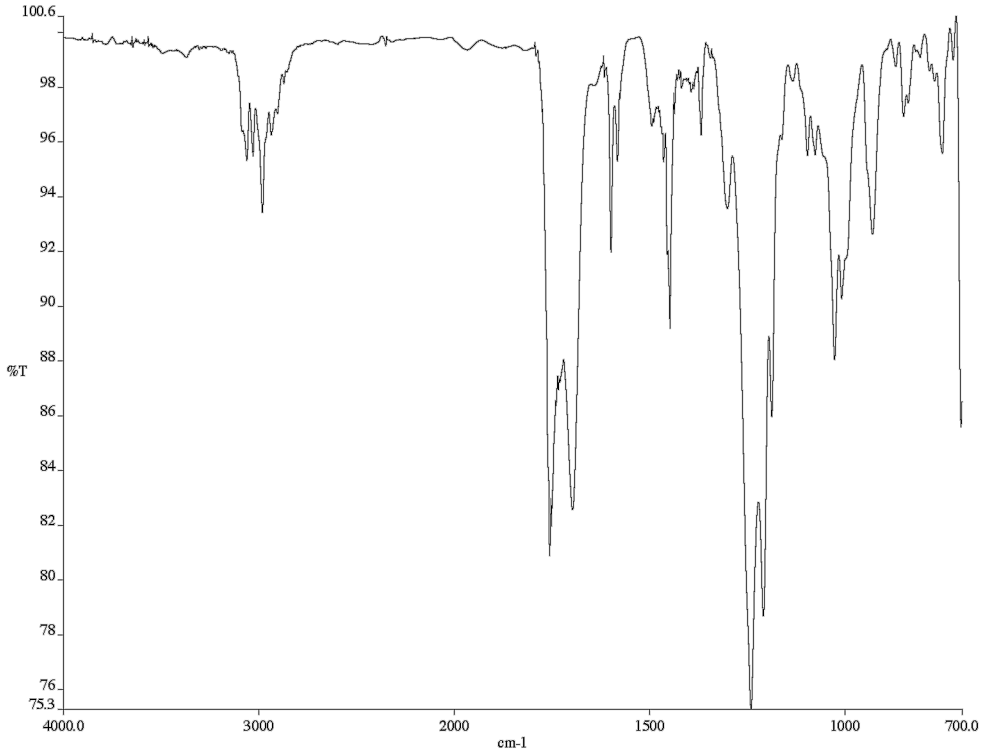


Figure A6.74 Infrared spectrum (thin film/NaCl) of compound **112v**.

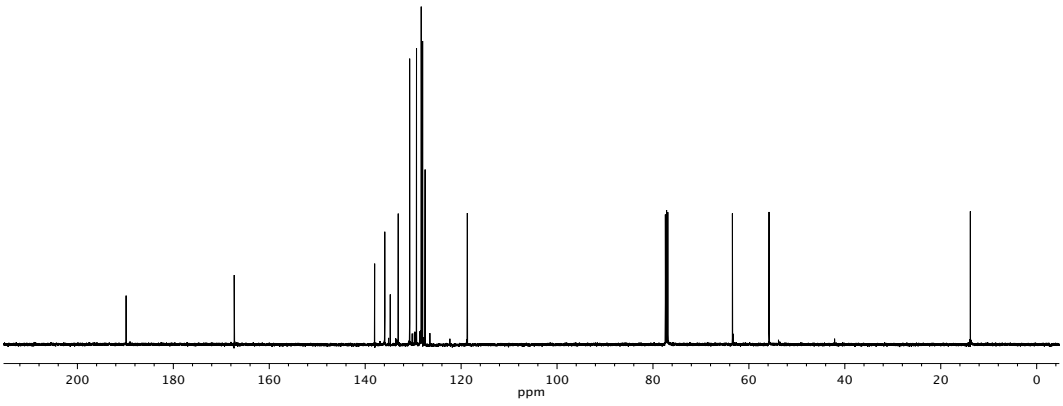


Figure A6.75 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112v**.

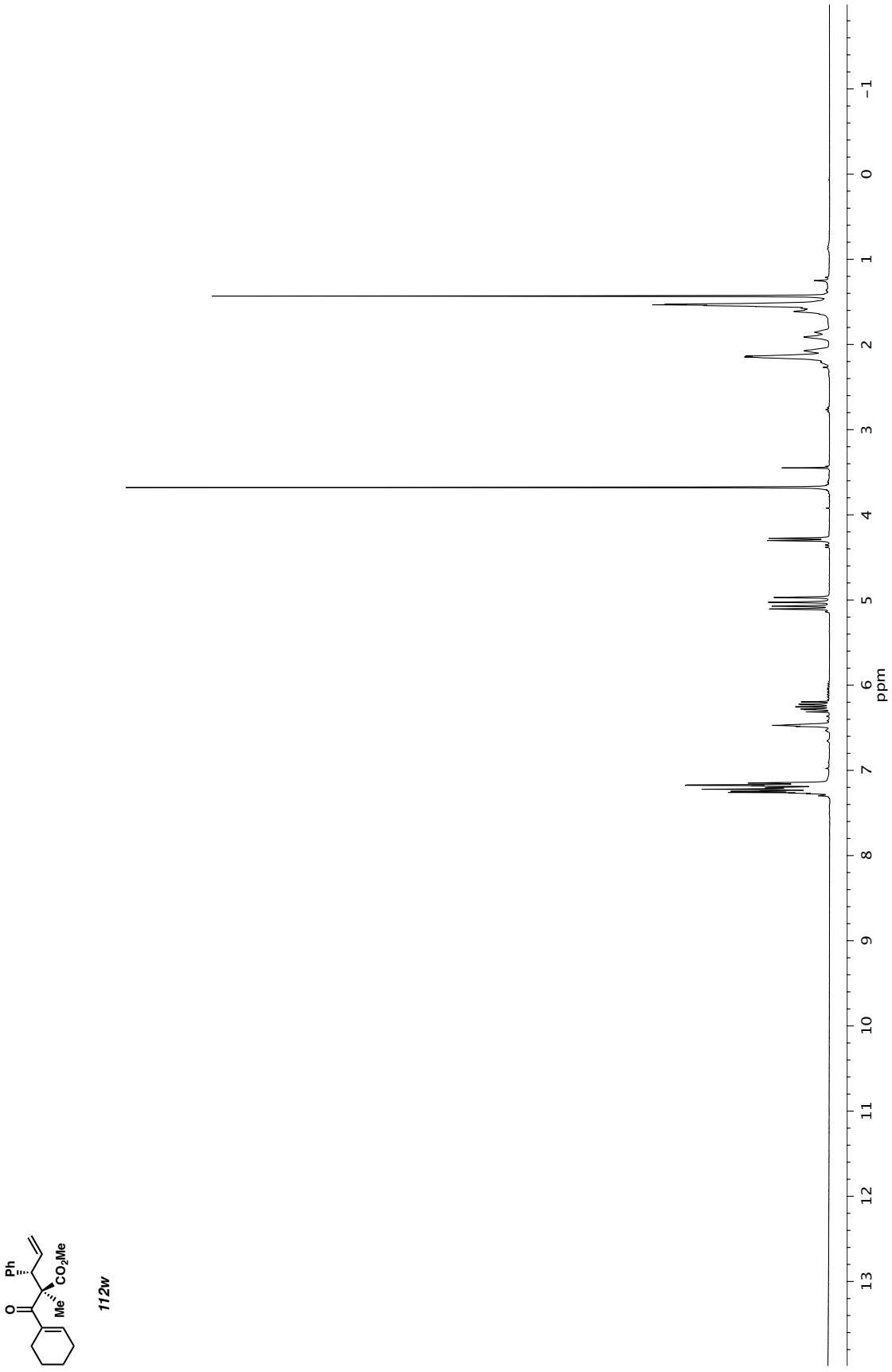


Figure A6.76 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112w**.

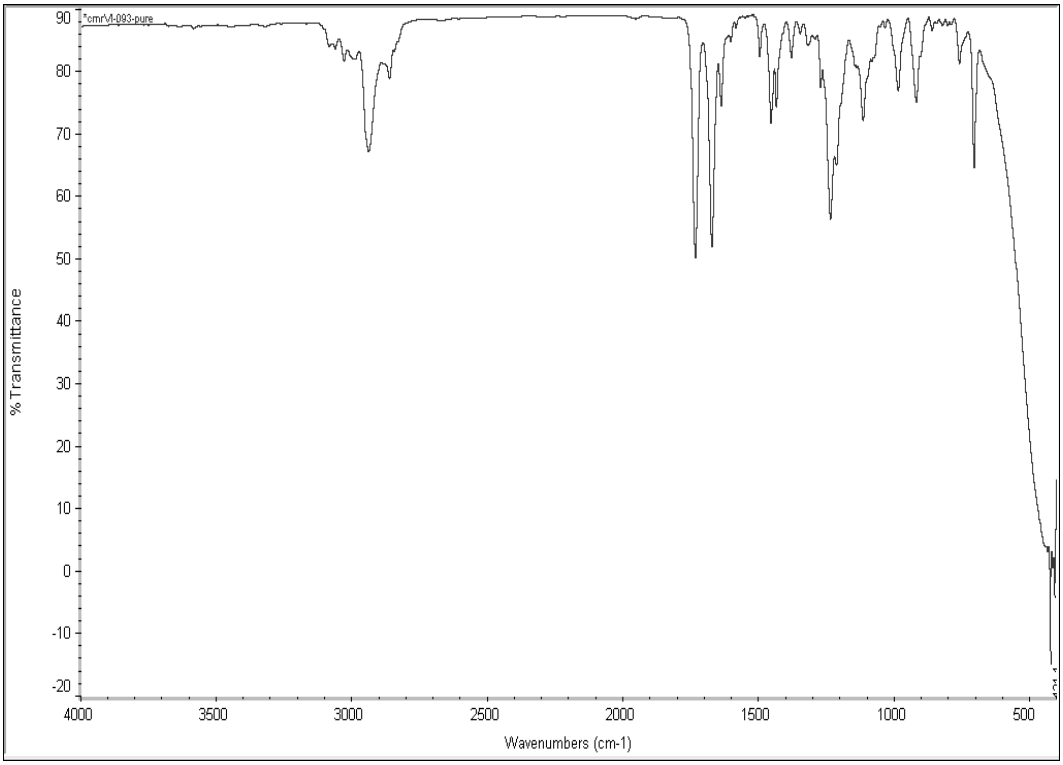


Figure A6.77 Infrared spectrum (thin film/NaCl) of compound **112w**.

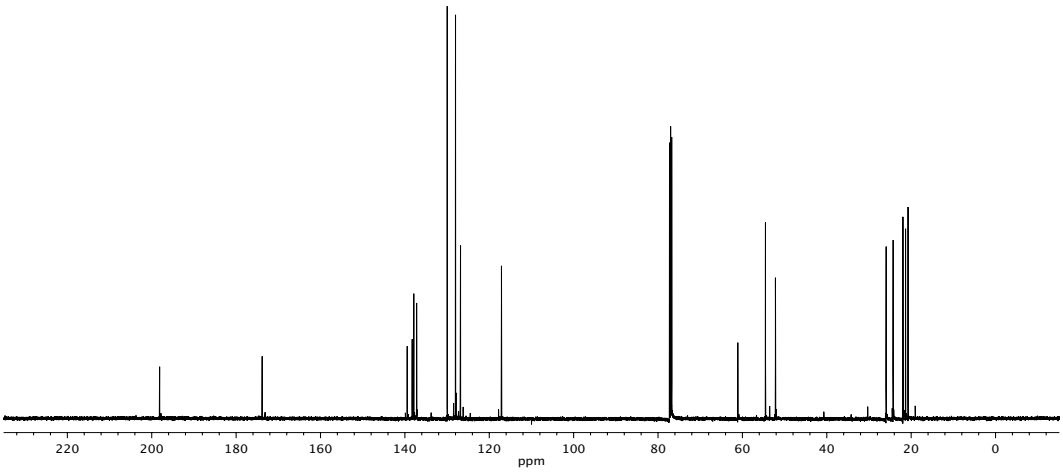


Figure A6.78 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112w**.

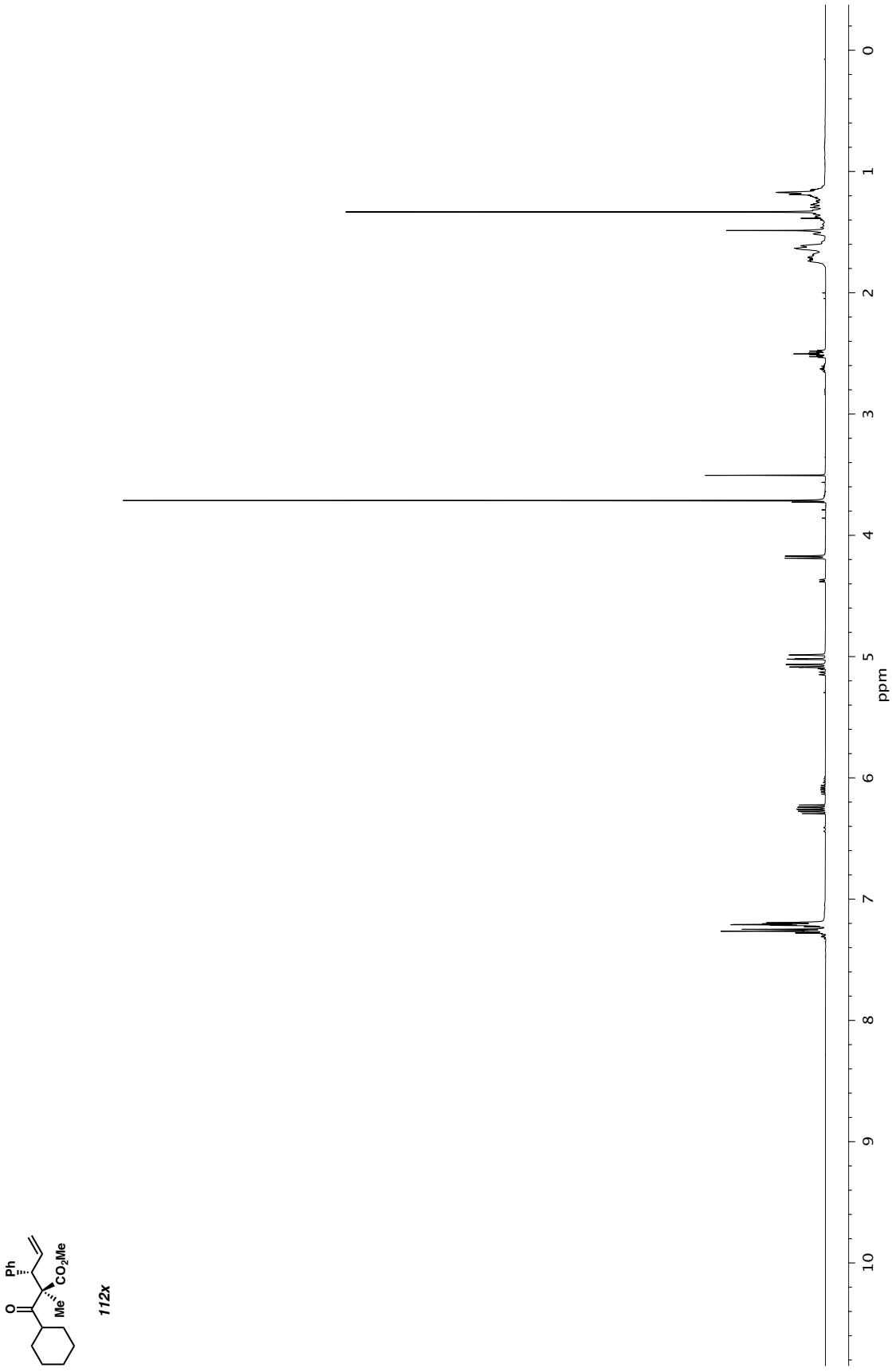


Figure A6.79 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112x**.

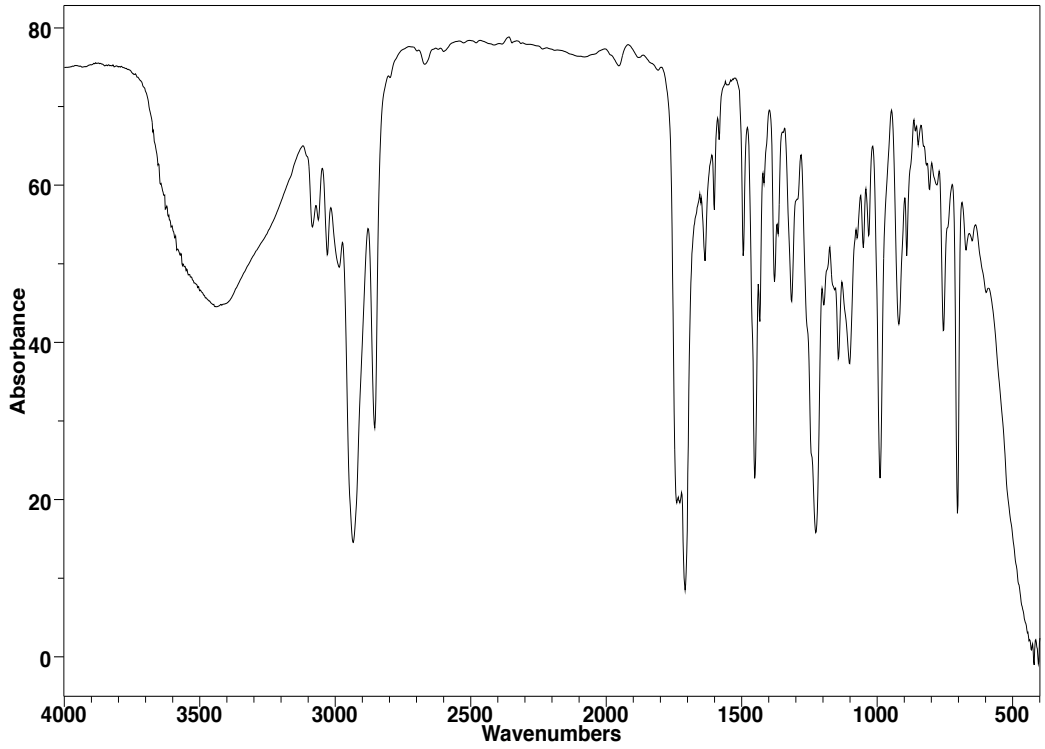


Figure A6.80 Infrared spectrum (thin film/NaCl) of compound **112x**.

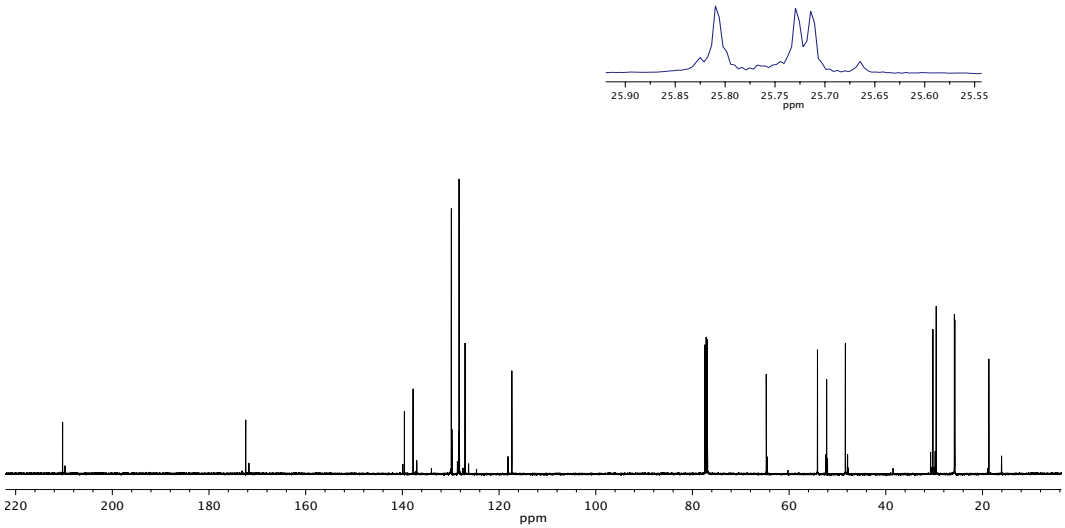


Figure A6.81 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112x**.

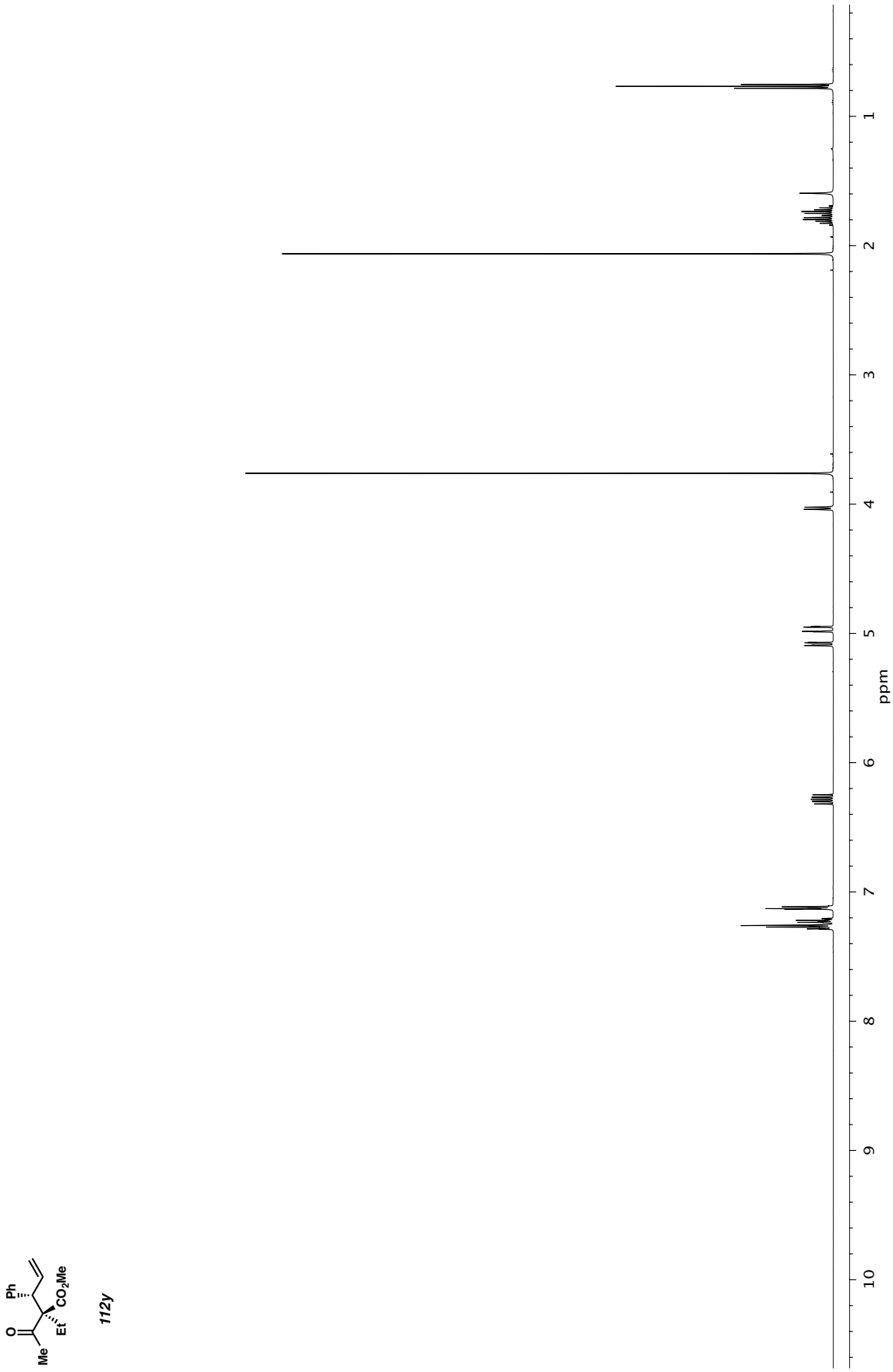


Figure A6.82 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112y**.

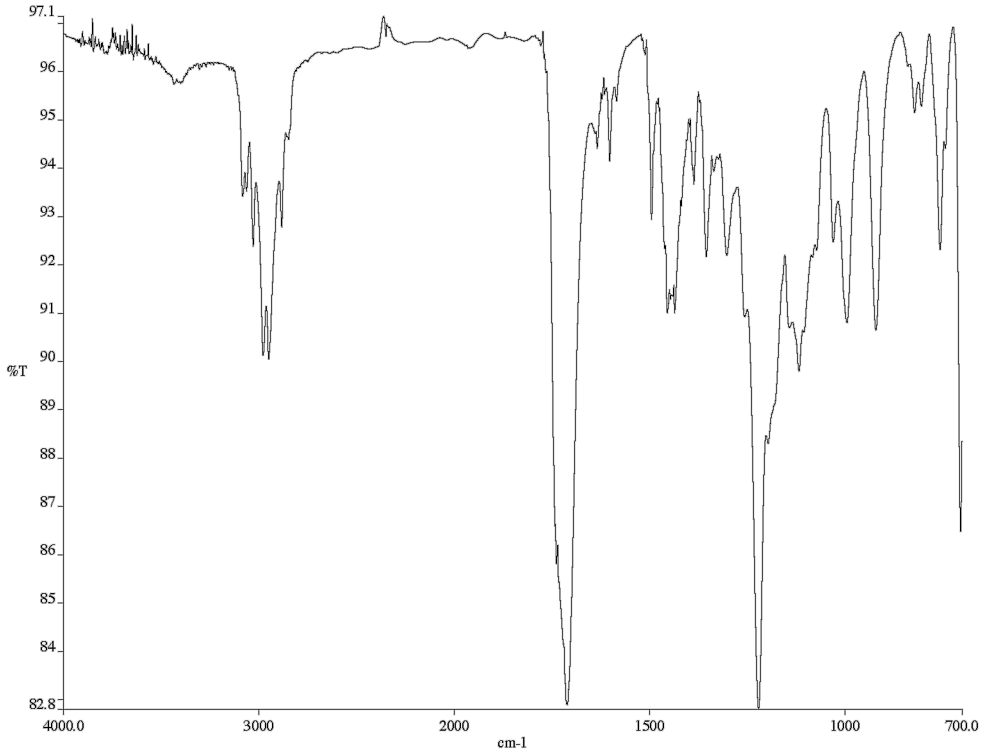


Figure A6.83 Infrared spectrum (thin film/NaCl) of compound **112y**.

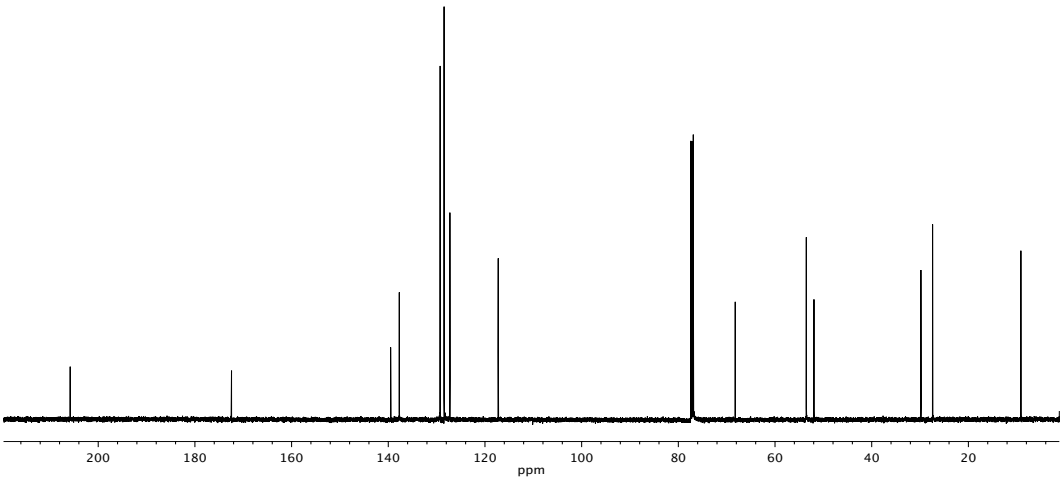


Figure A6.84 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112y**.

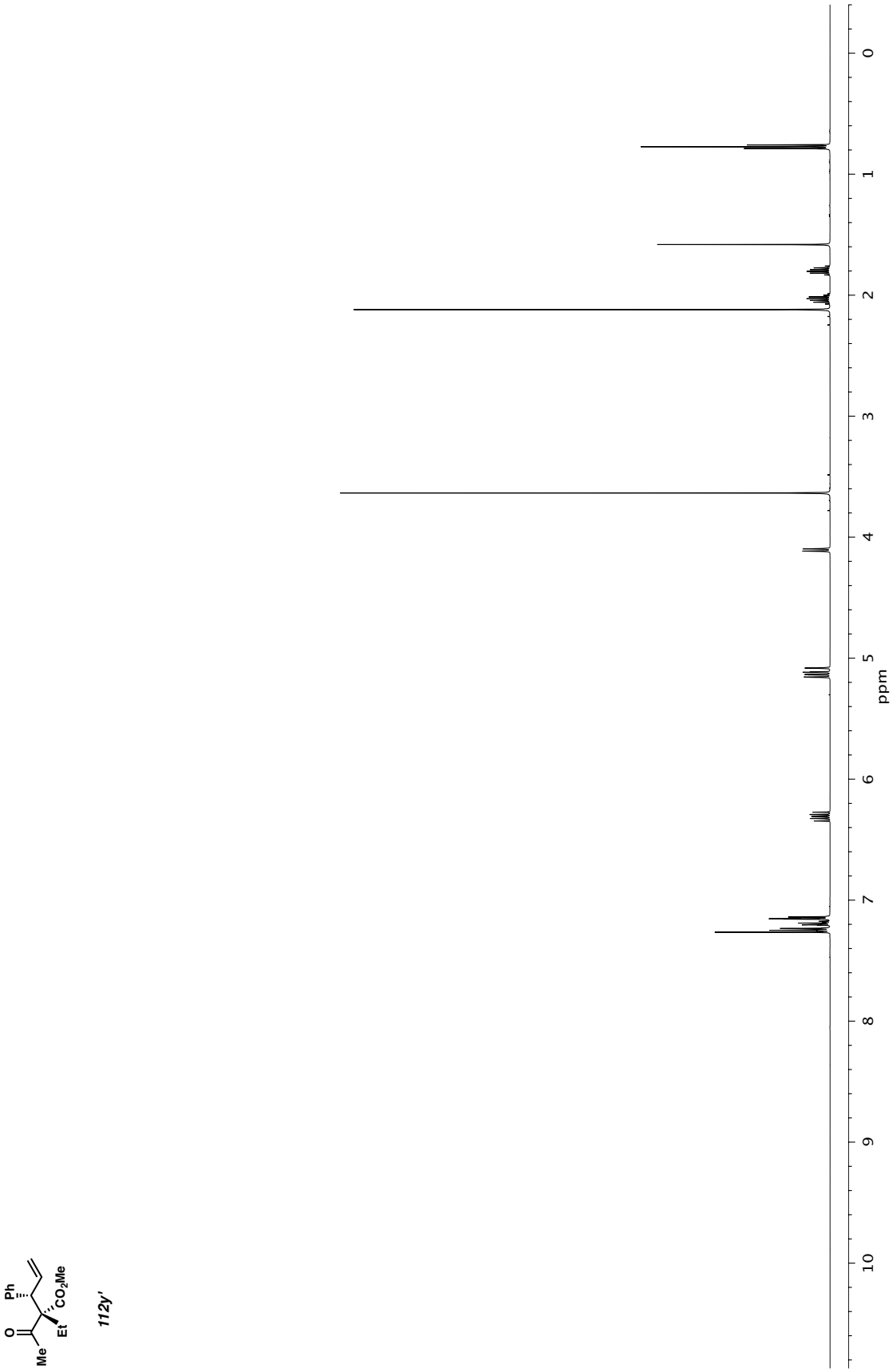


Figure A6.85 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112y'**.

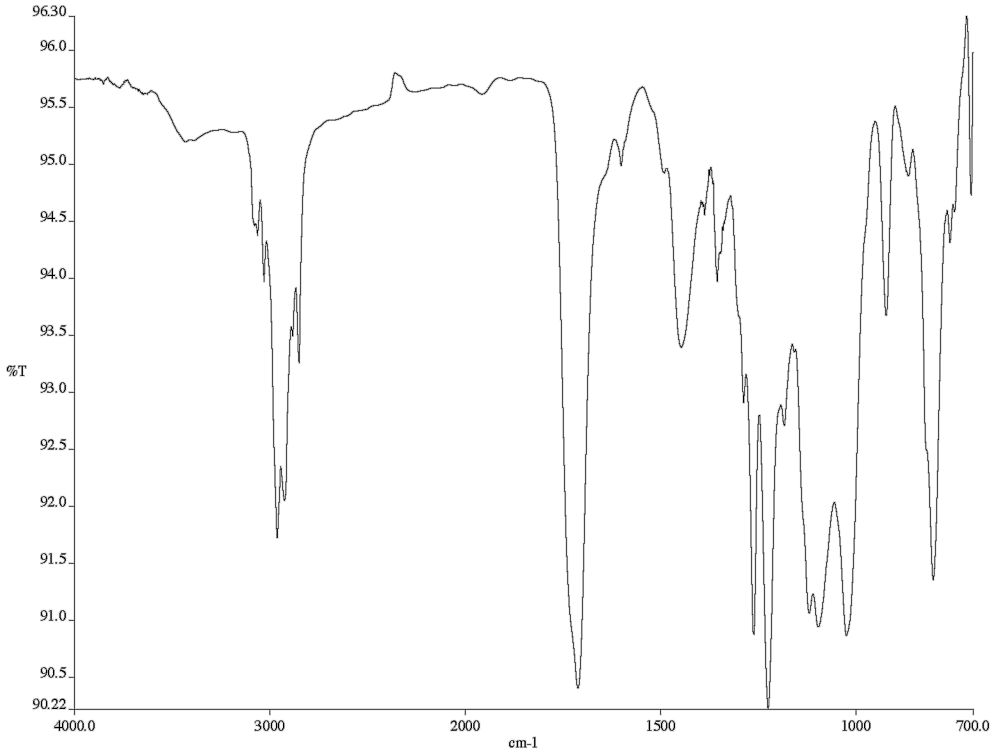


Figure A6.86 Infrared spectrum (thin film/NaCl) of compound **112y'**.

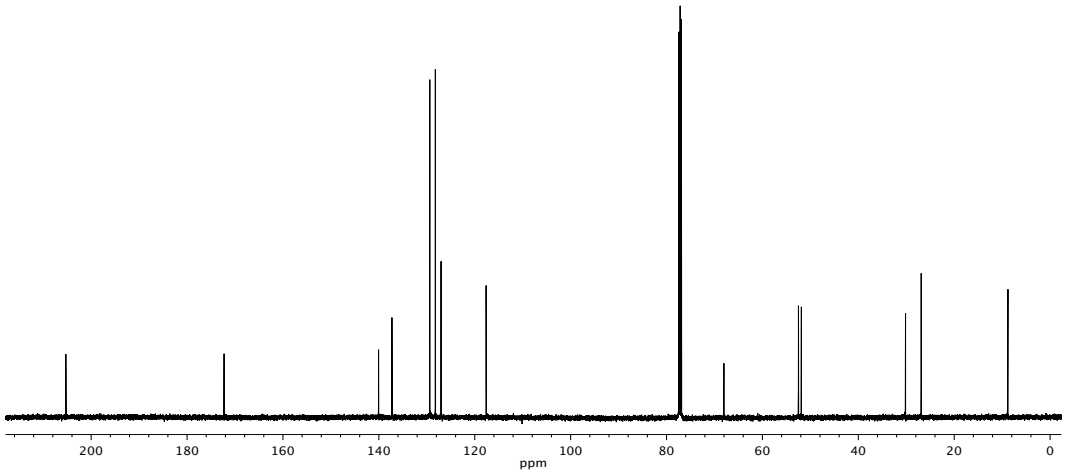


Figure A6.87 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112y'**.

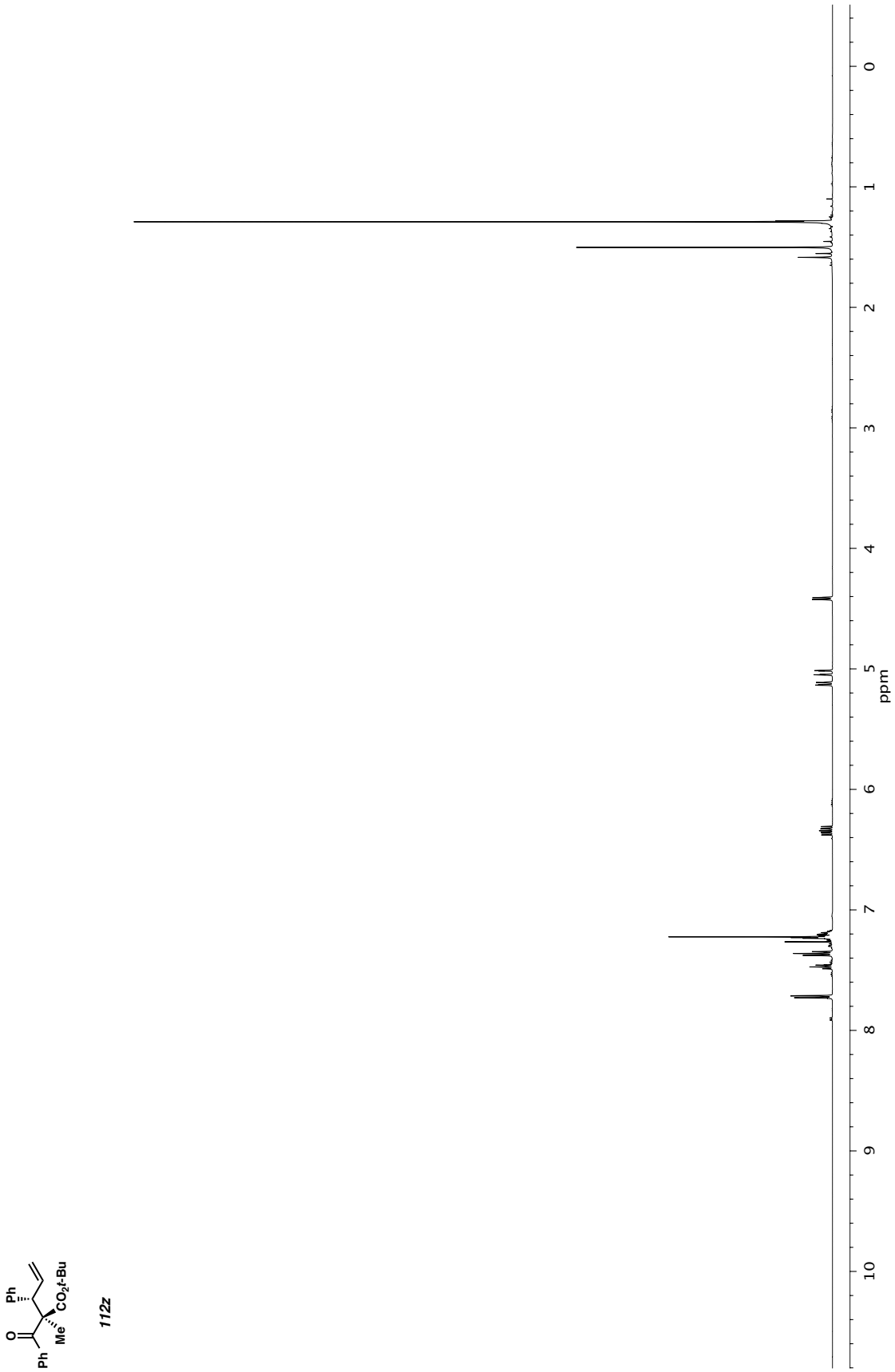


Figure A6.88 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **112z**.

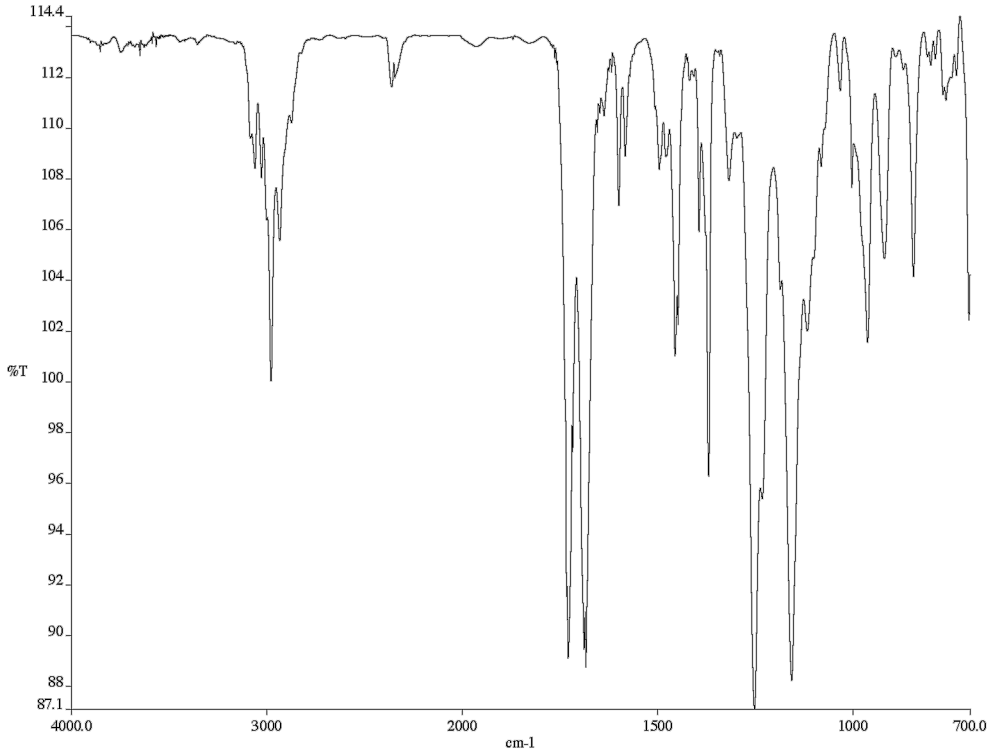


Figure A6.89 Infrared spectrum (thin film/NaCl) of compound **112z**.

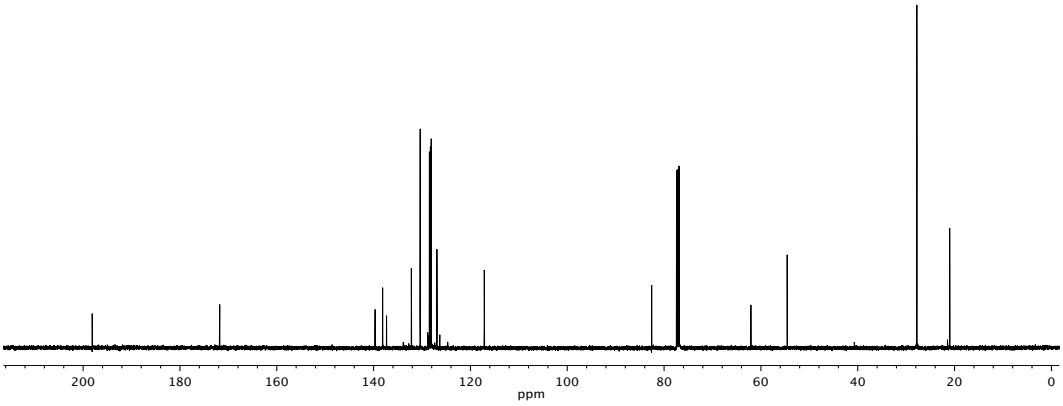


Figure A6.90 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **112z**.

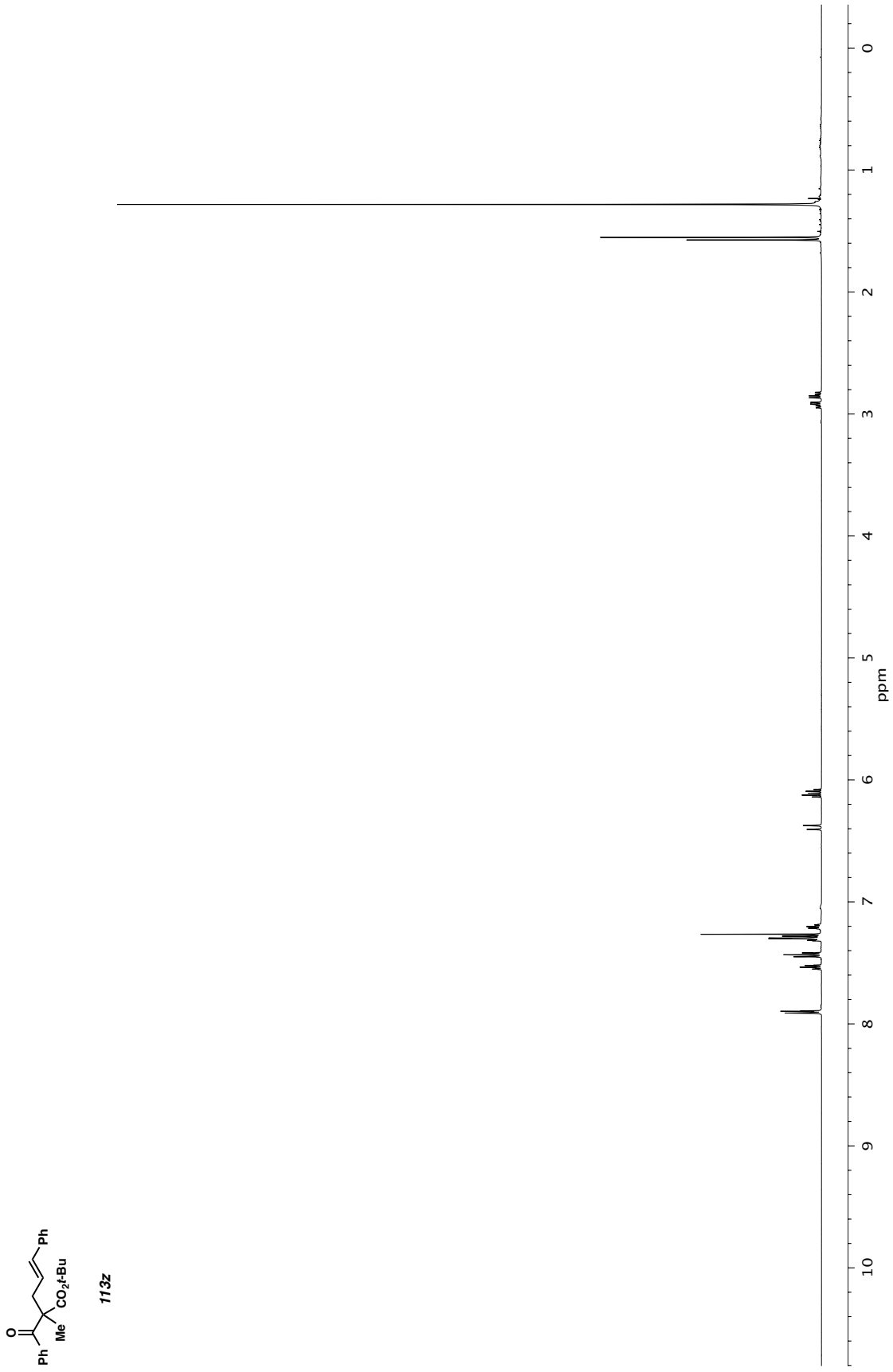


Figure A6.91 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **113z**.

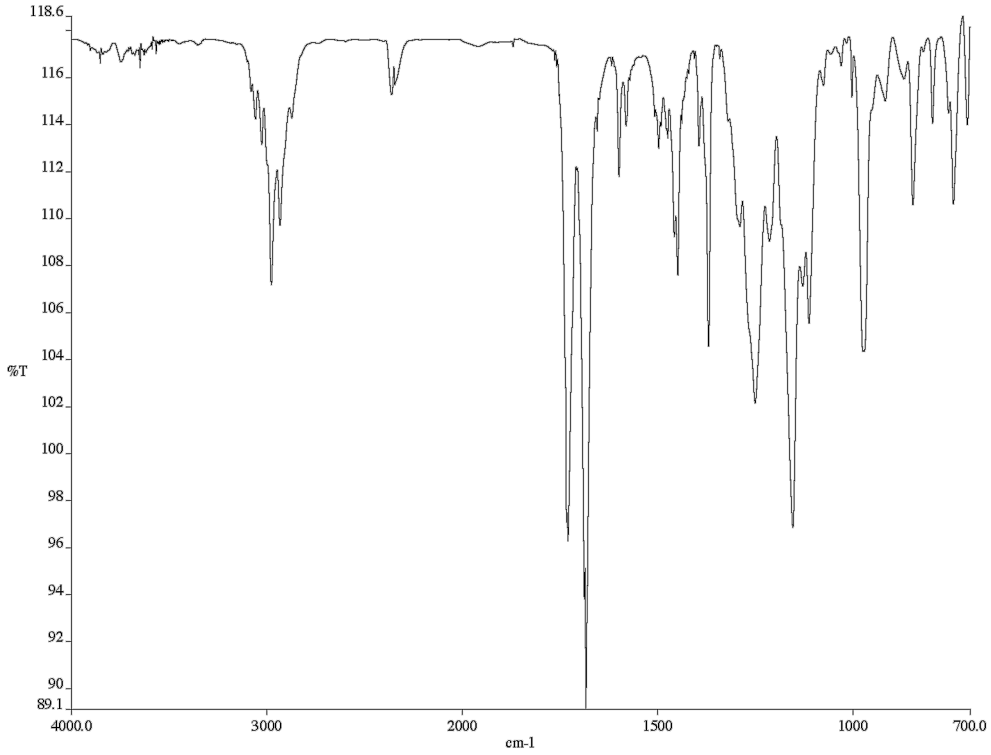


Figure A6.92 Infrared spectrum (thin film/NaCl) of compound **113z**.

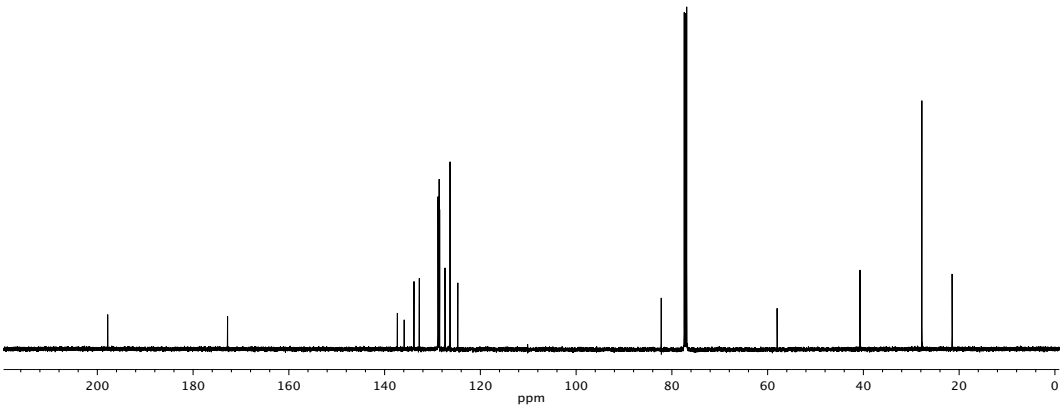


Figure A6.93 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **113z**.

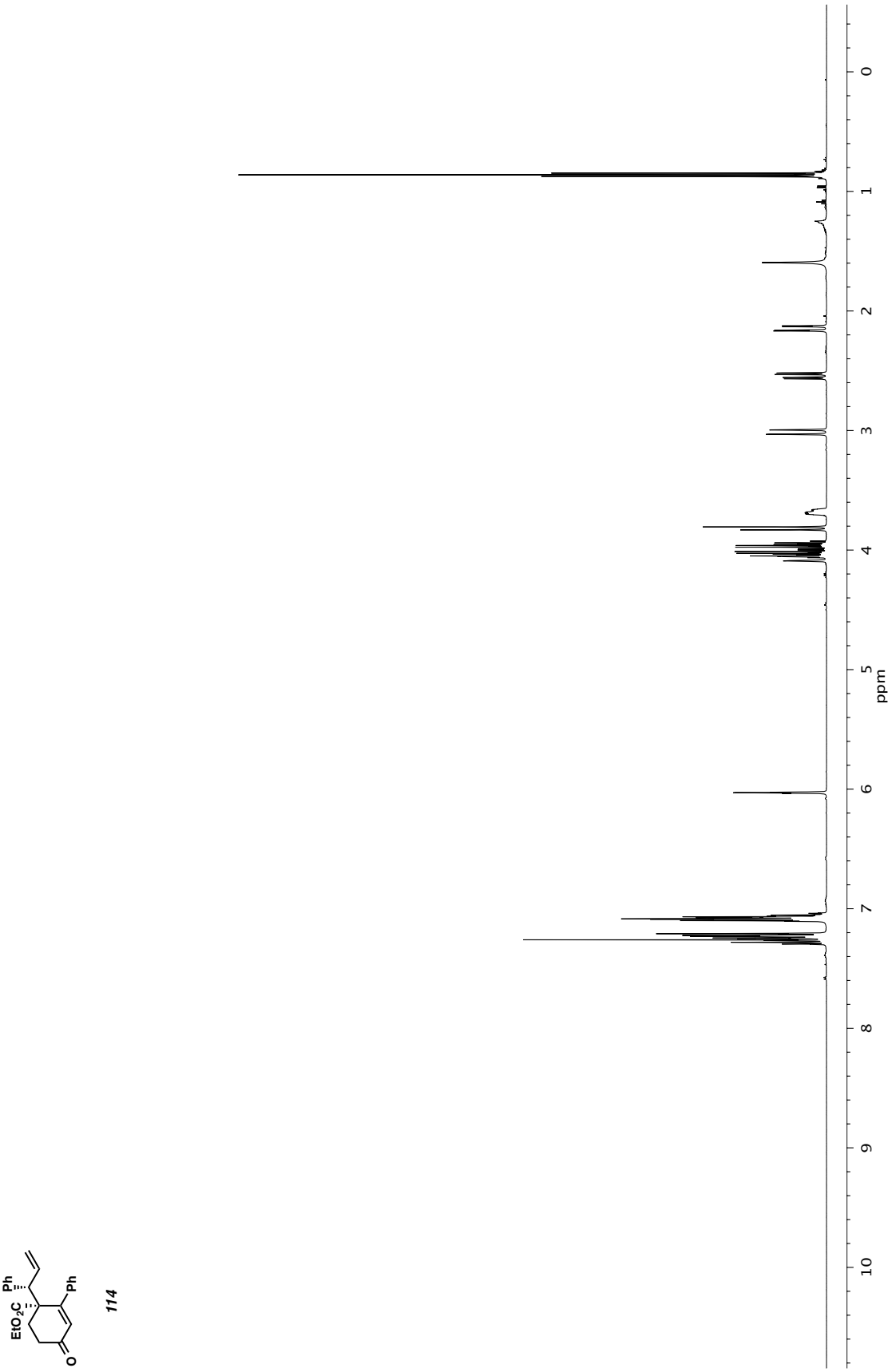


Figure A6.94 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **114**.

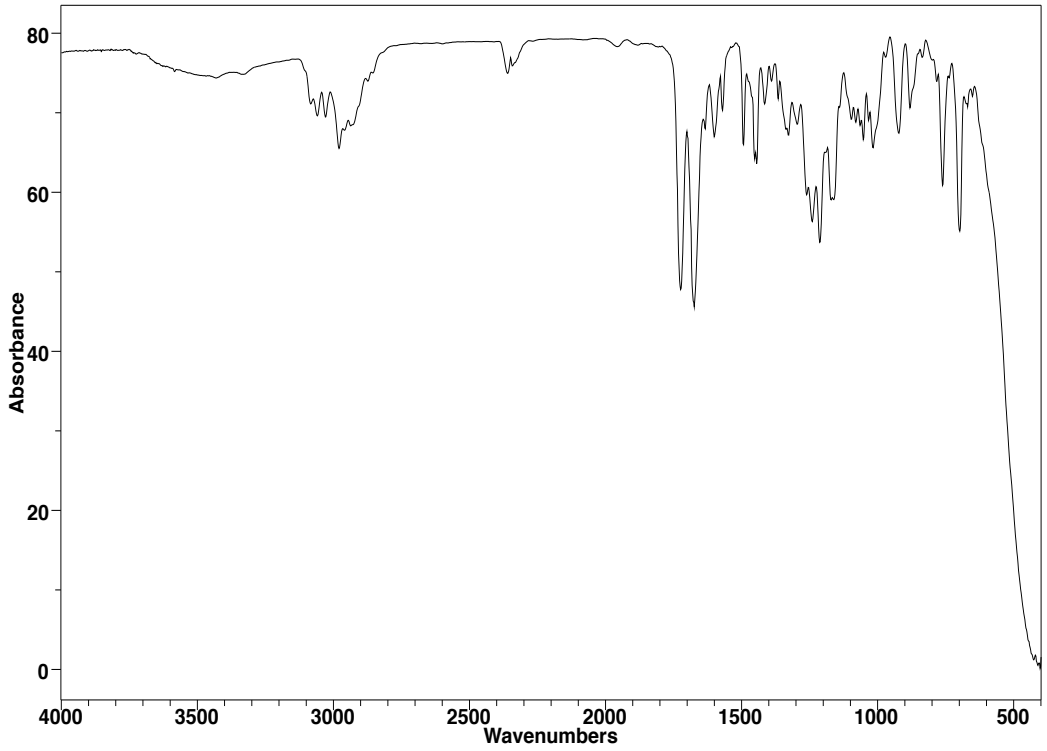


Figure A6.95 Infrared spectrum (thin film/NaCl) of compound **114**.

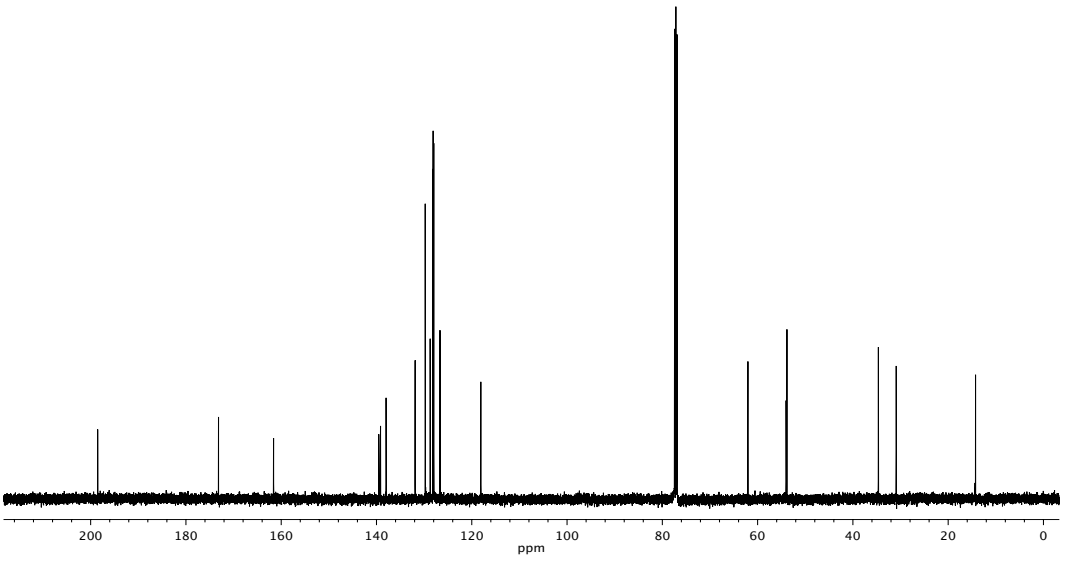


Figure A6.96 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **114**.

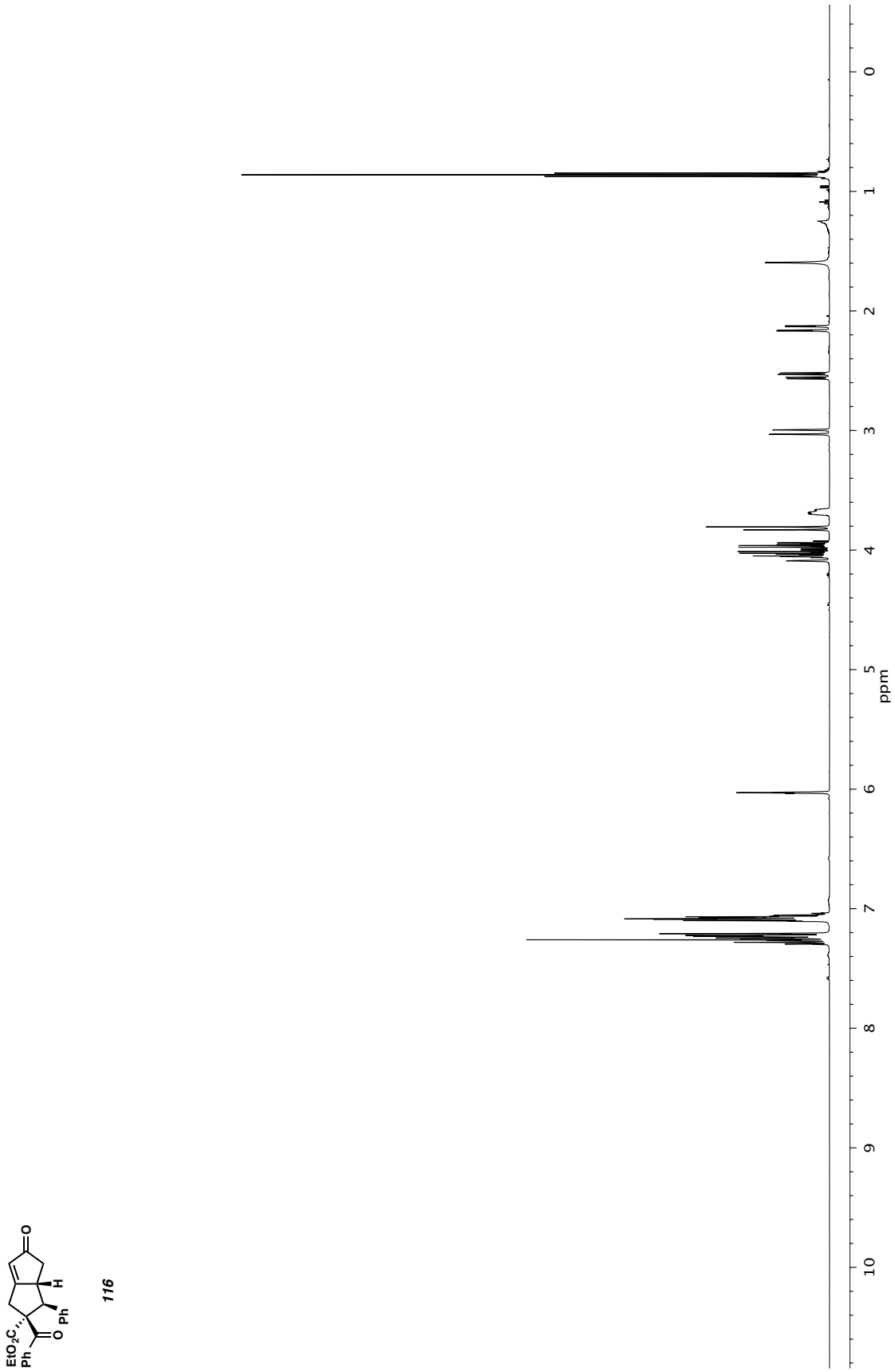


Figure A6.97 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **116**.

116

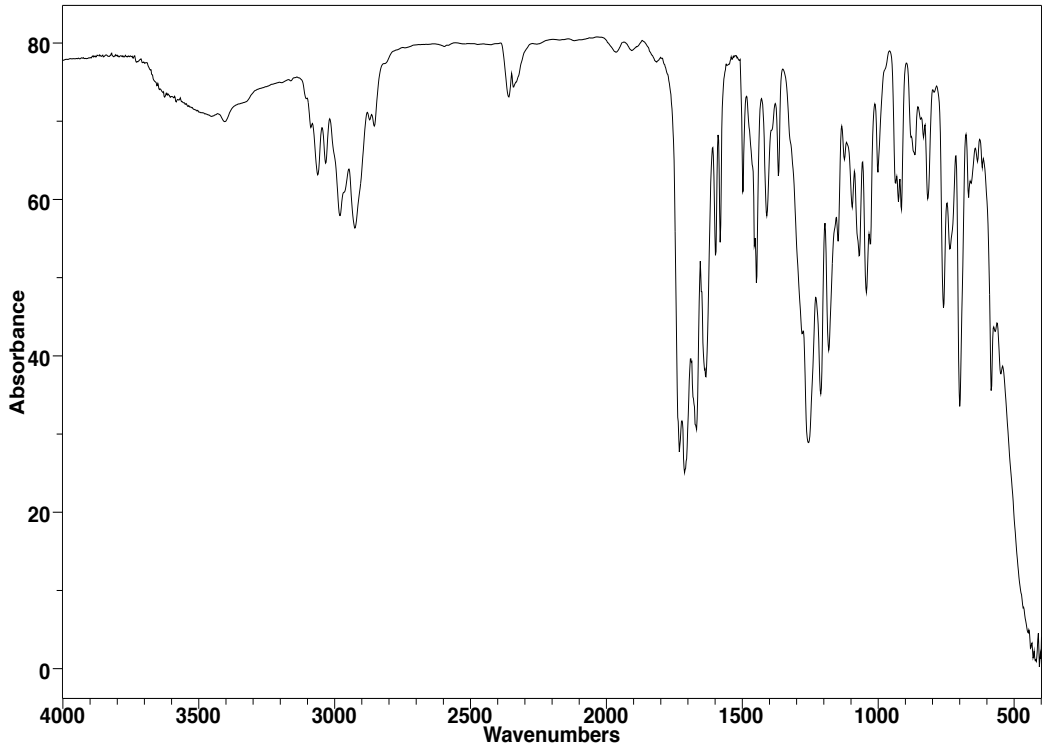


Figure A6.98 Infrared spectrum (thin film/NaCl) of compound **116**.

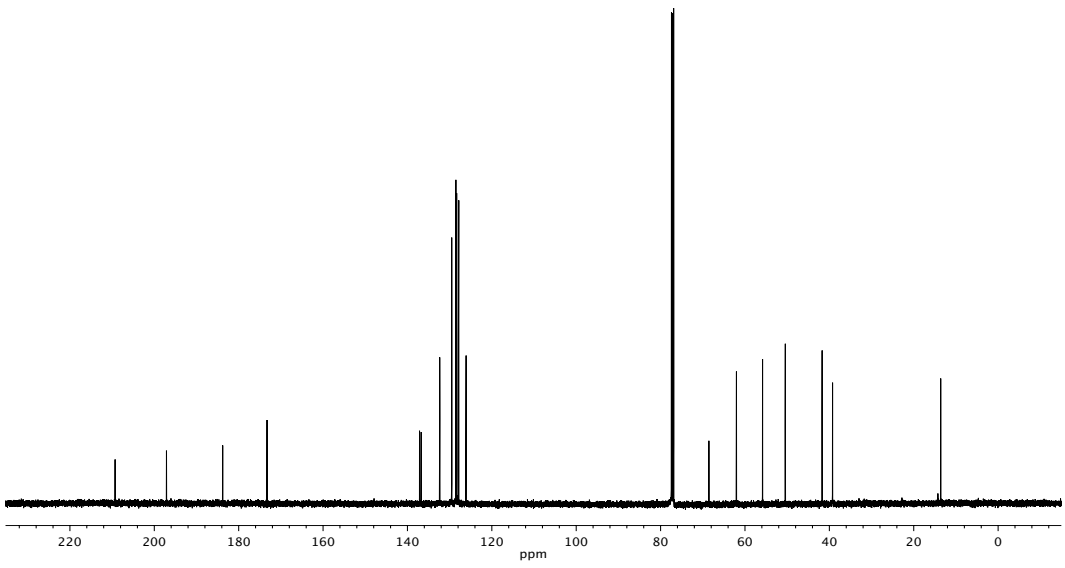


Figure A6.99 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **116**.

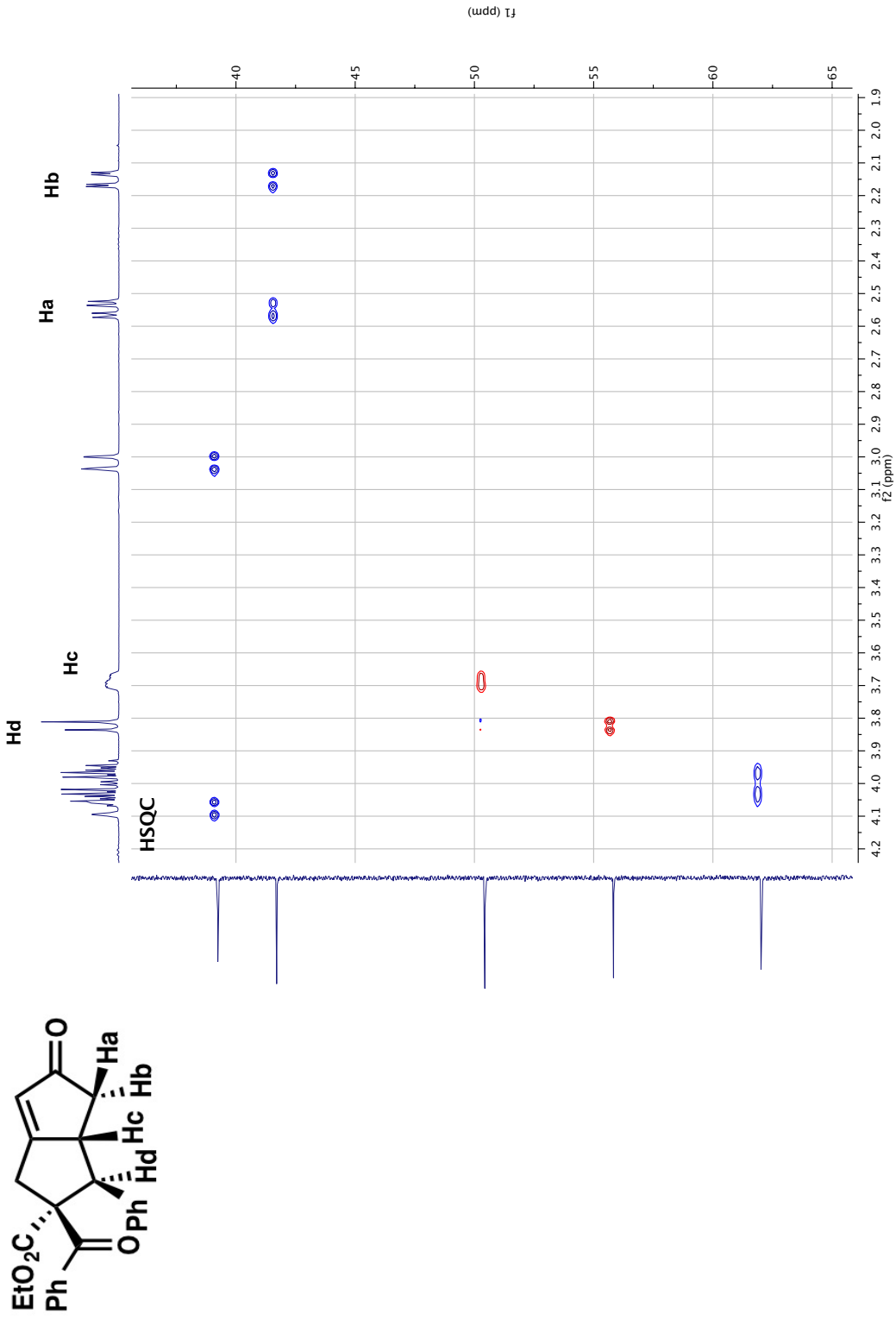


Figure A6.100 HSQC NMR (500 MHz, $CDCl_3$) of compound 11**6**.

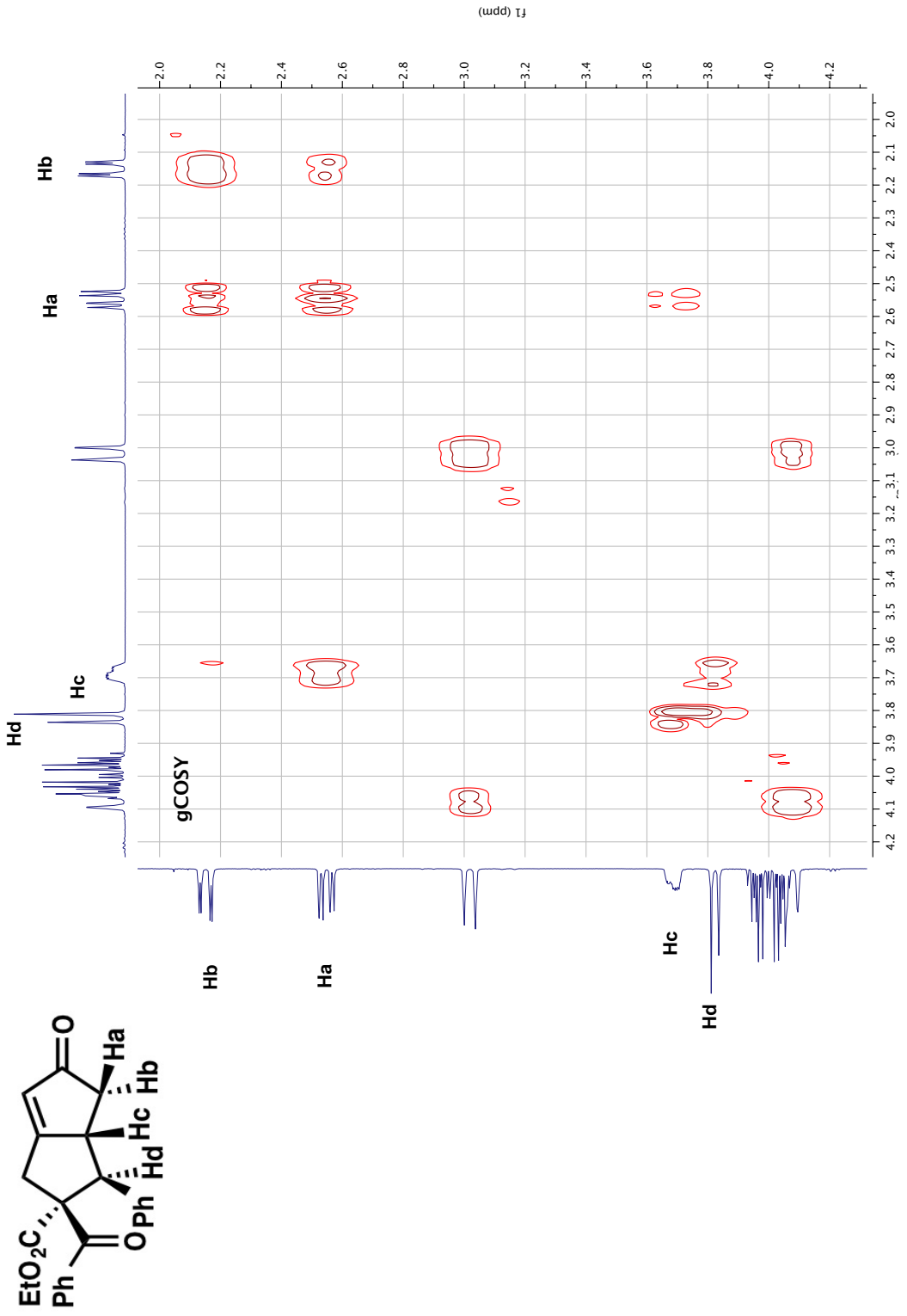


Figure A6.101 gCOSY NMR (500 MHz, $CDCl_3$) of compound 11**6**.

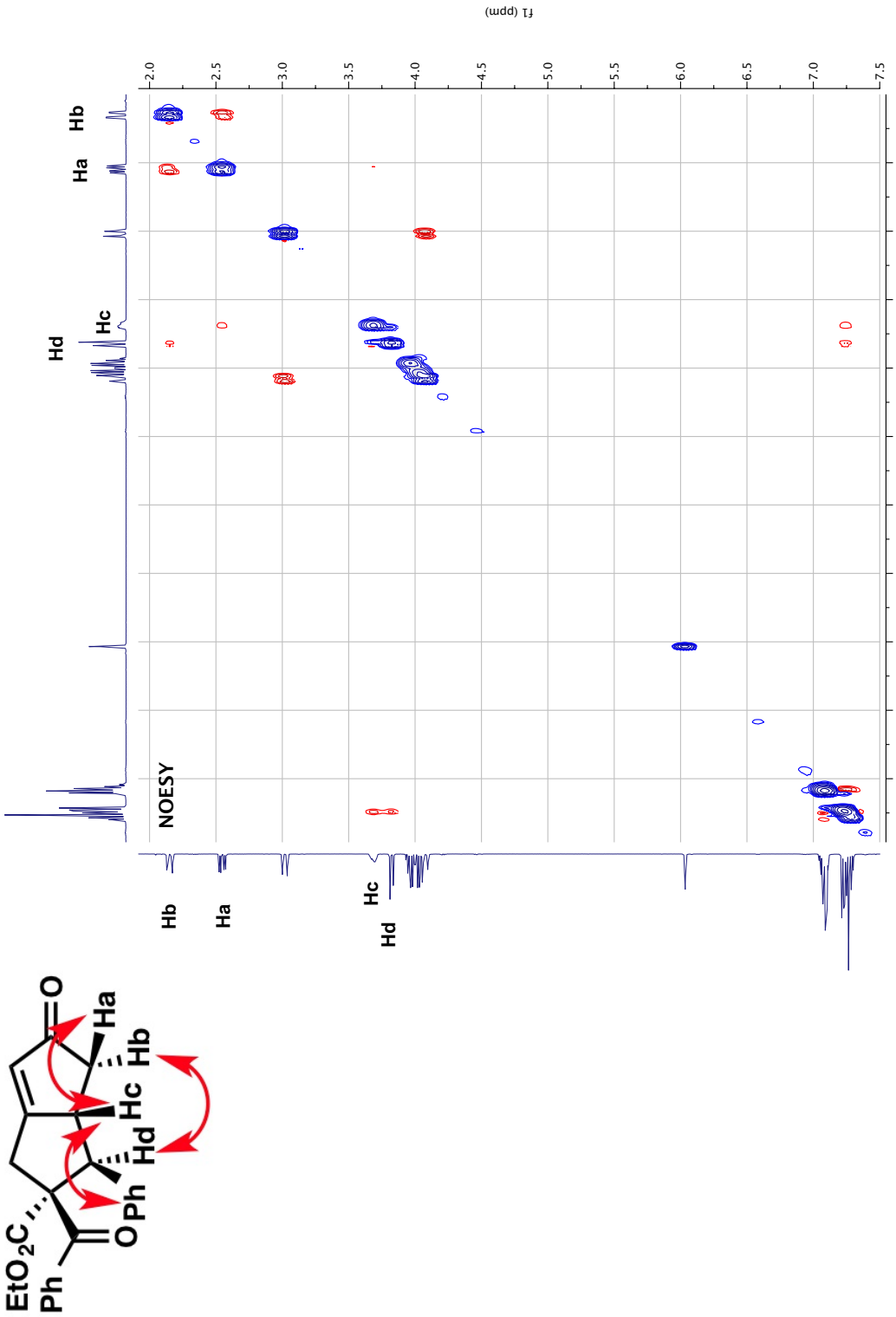


Figure A6.102 NOESY NMR (500 MHz, $CDCl_3$) of compound 11**6**.

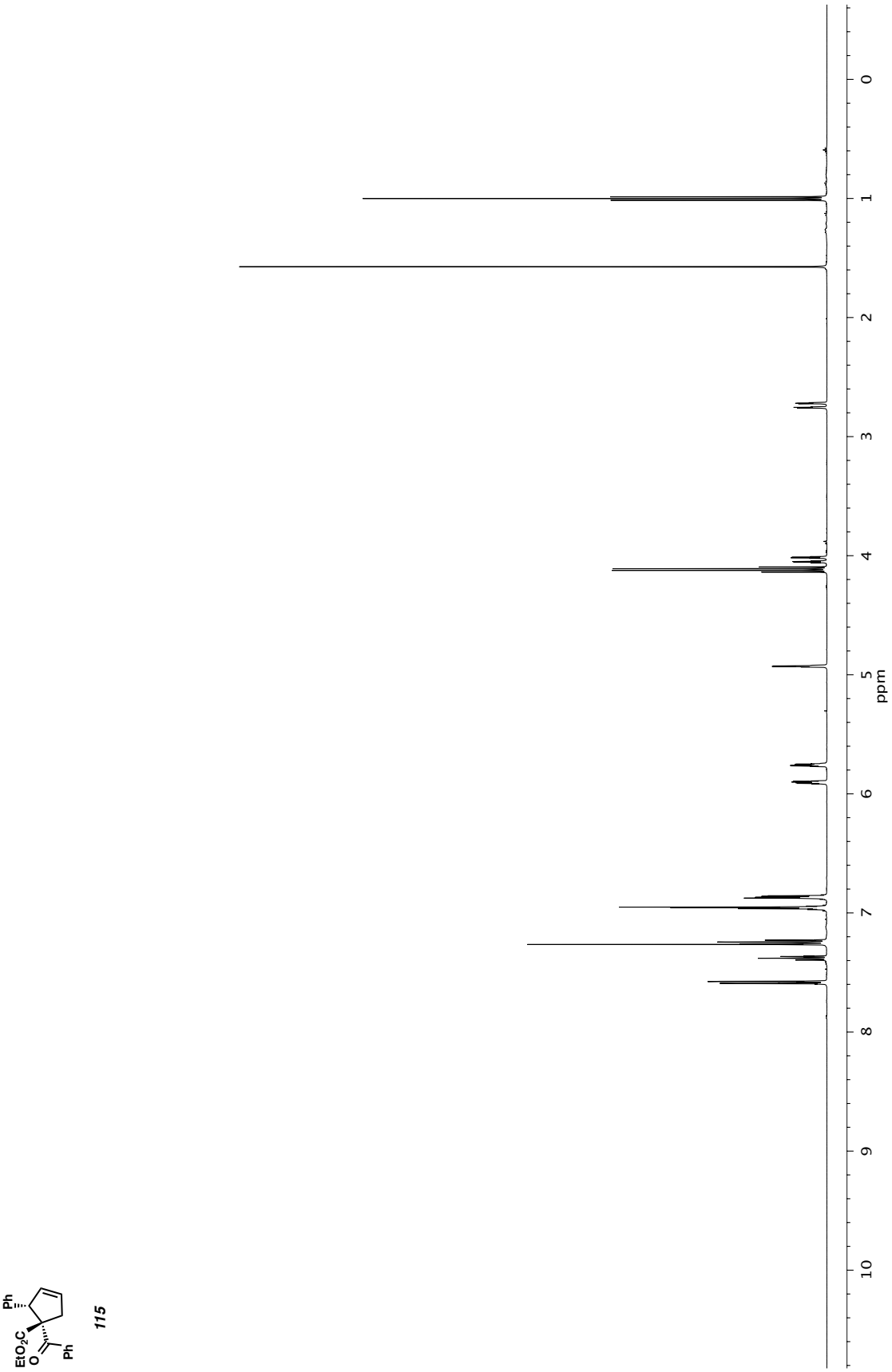


Figure A6.103 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **115**.

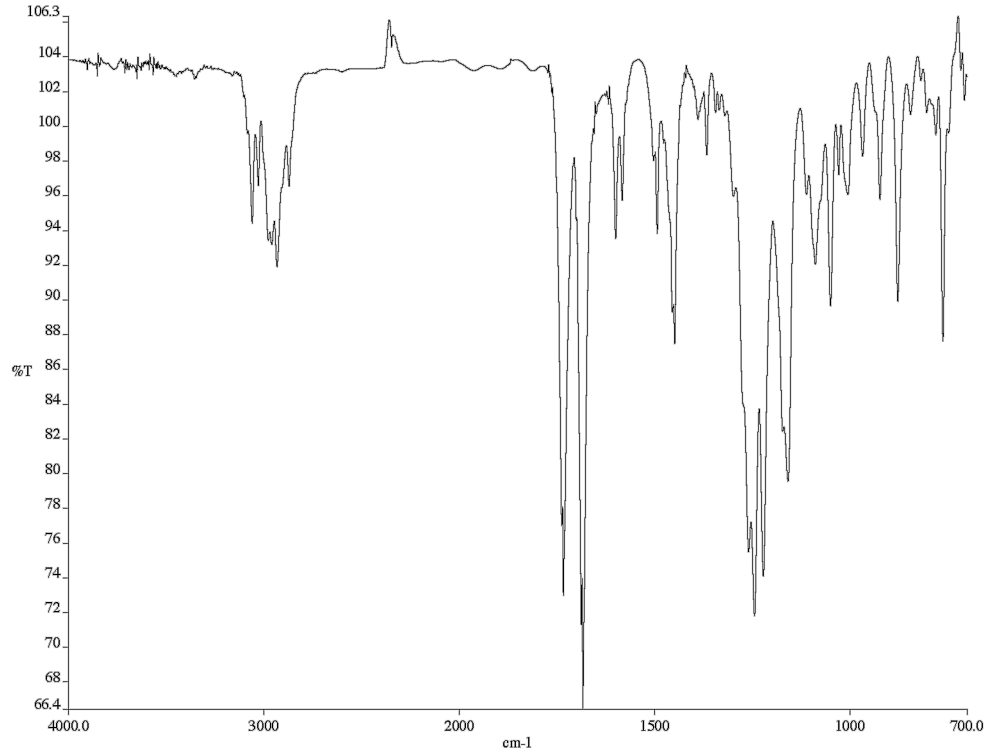


Figure A6.104 Infrared spectrum (thin film/NaCl) of compound **115**.

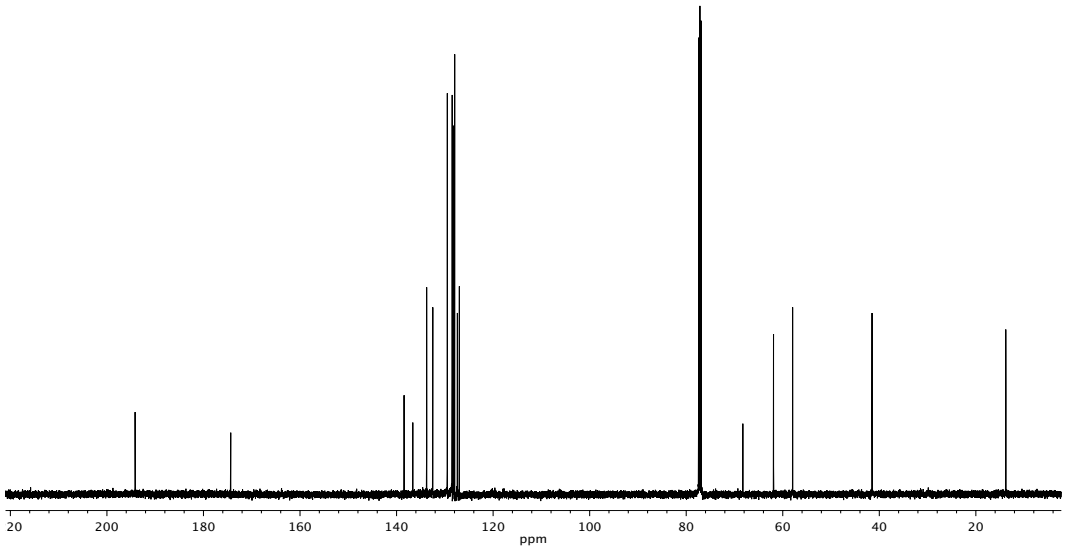


Figure A6.105 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **115**.

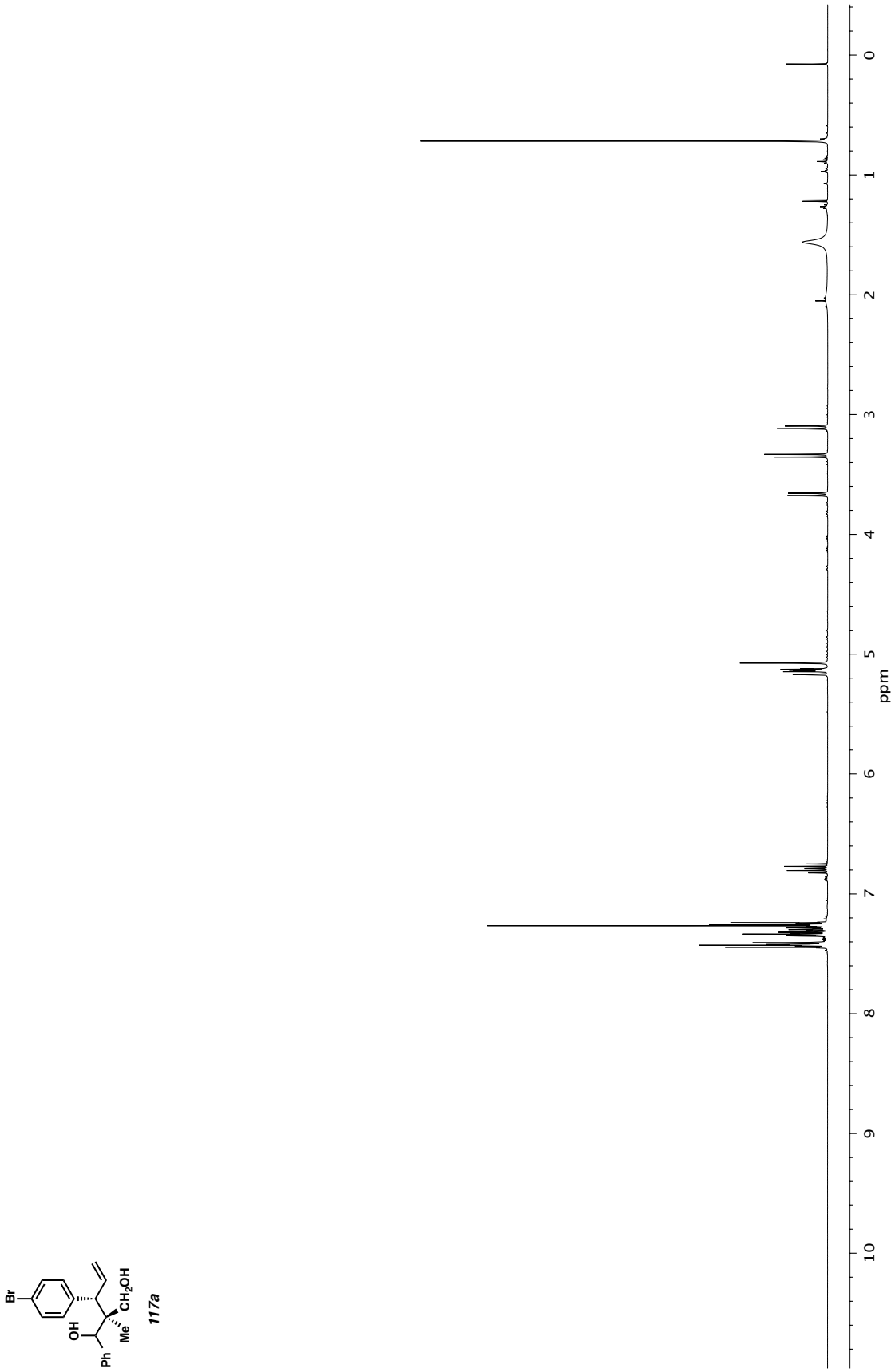


Figure A6.106 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **117a**.

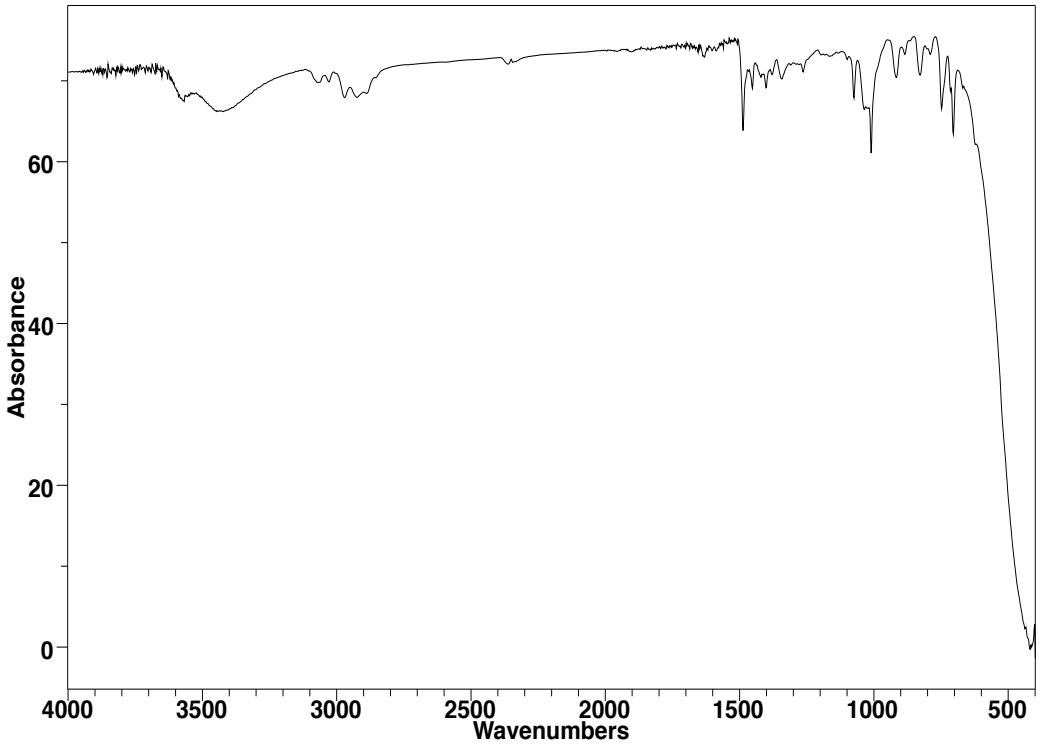


Figure A6.107 Infrared spectrum (thin film/NaCl) of compound **117a**.

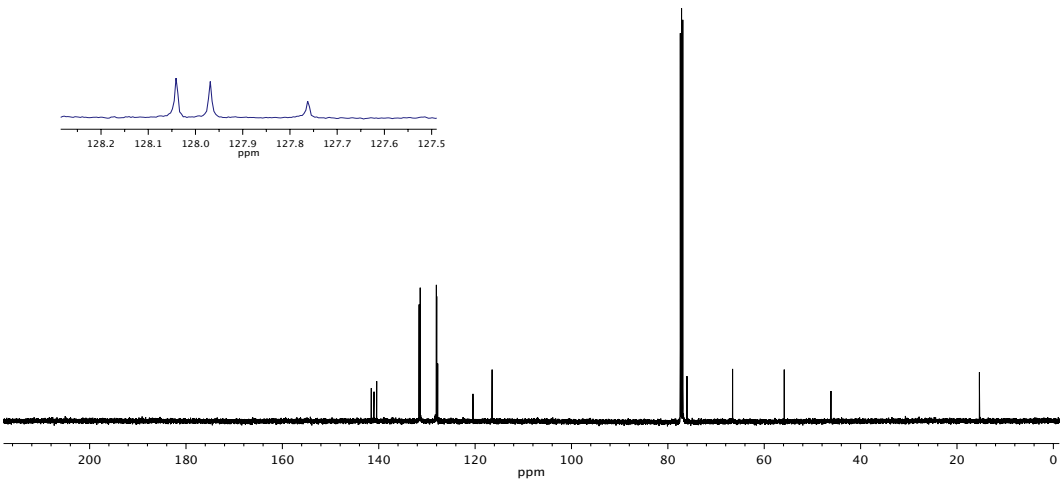
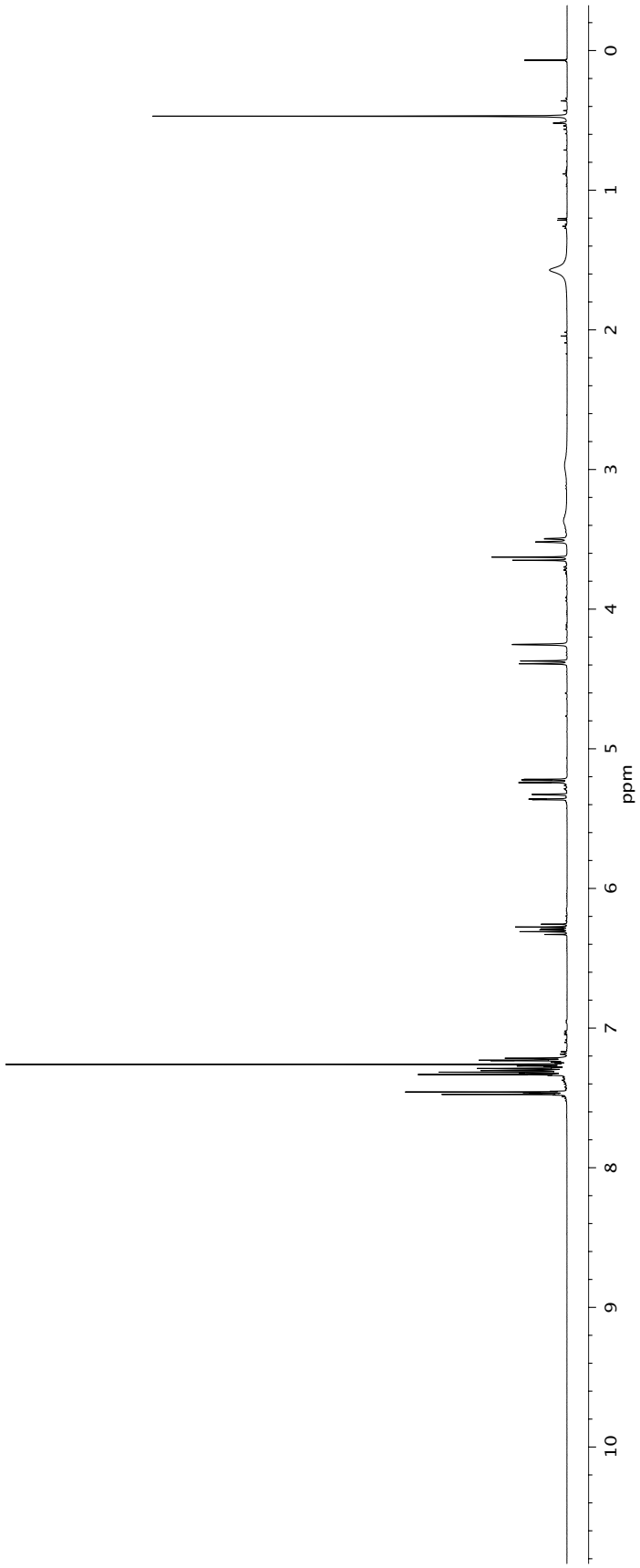


Figure A6.108 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **117a**.



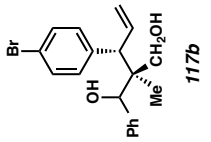


Figure A6.109 ^{1}H NMR (500 MHz, $CDCl_3$) of compound **117b**.

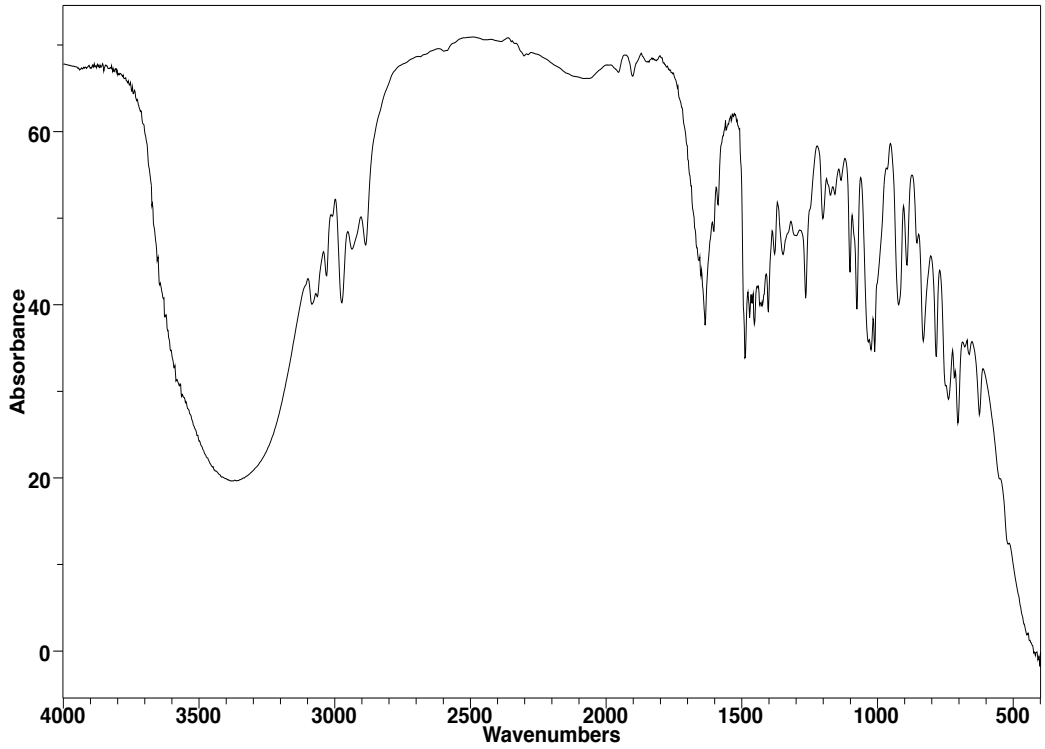


Figure A6.110 Infrared spectrum (thin film/NaCl) of compound **117b**.

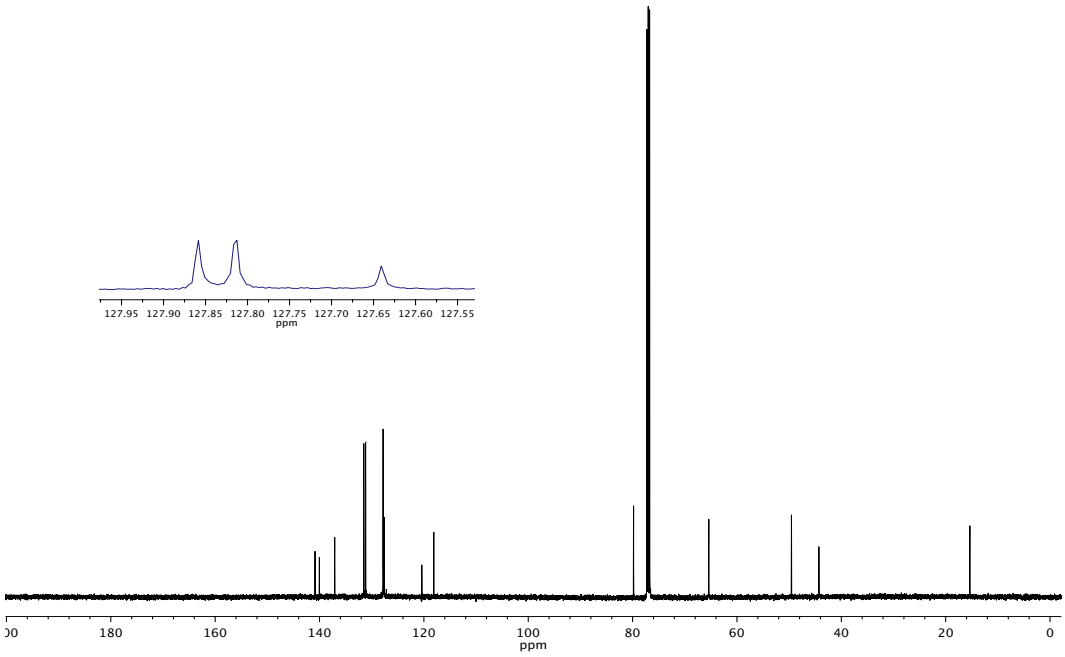


Figure A6.111 ^{13}C NMR (125 MHz, $CDCl_3$) of compound **117b**.