

**Copper(II) Carboxylate Promoted Intramolecular Carboamination of Alkenes for
the Synthesis of Polycyclic Lactams**

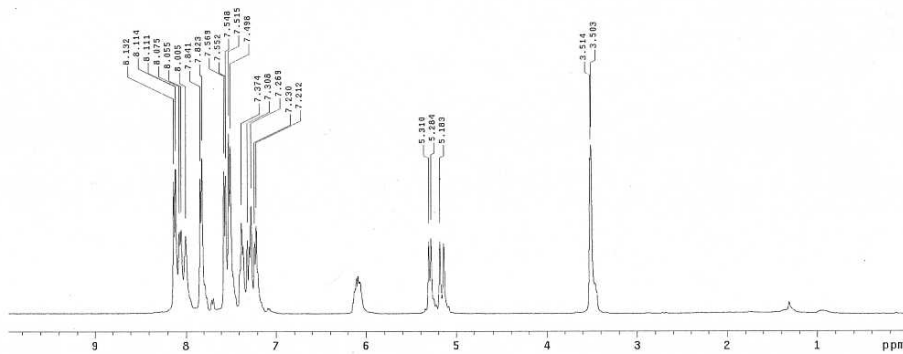
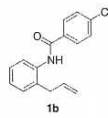
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Department of Chemistry, University at Buffalo,
The State University of New York, Buffalo, New York 14260
schemler@buffalo.edu

Supporting Information 2: ^1H and ^{13}C NMR Data for Substrate and Product

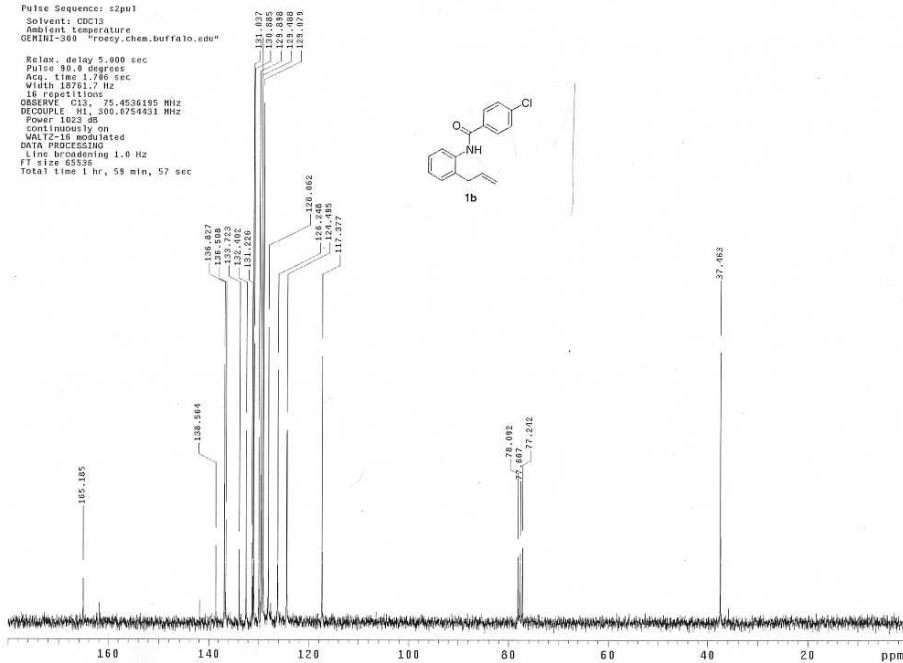
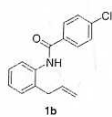
STANDARD 1H OBSERVE

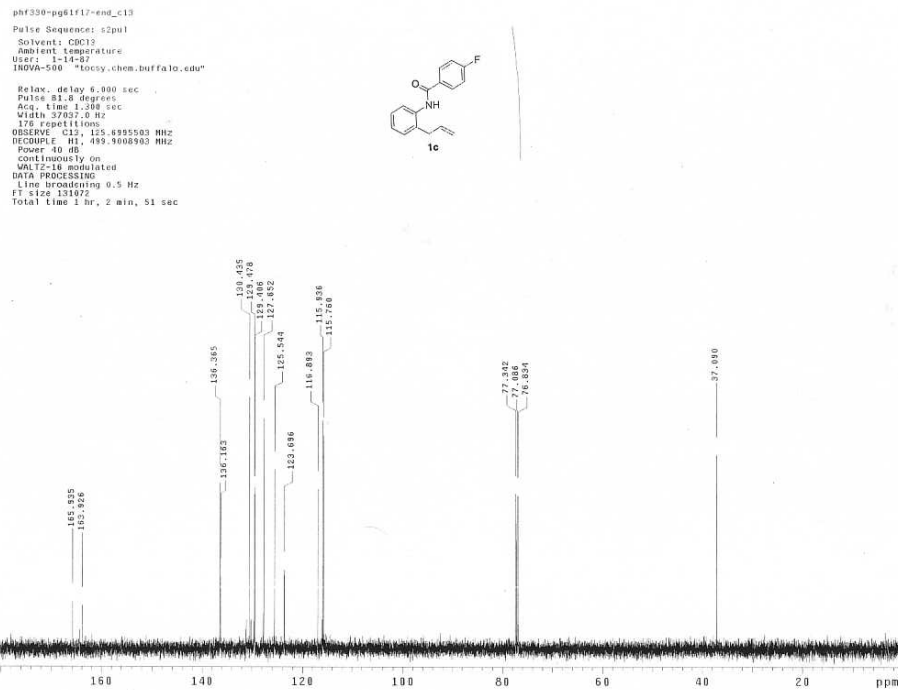
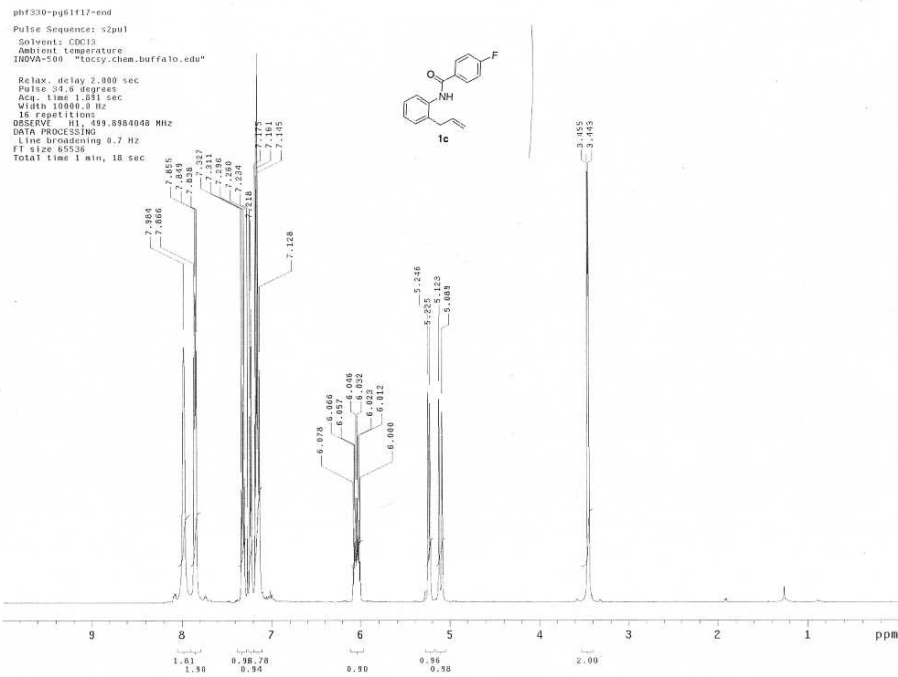
Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient temperature
 INOVA-400 "cozy.chem.buffalo.edu"
 Relax. delay 1.000 sec
 Pulse 45.5 degrees
 Acq. time 1.800 sec
 Width 6200.6 Hz
 16 Repetitions
 OBSERVE F1: 393.9388918 MHz
 DATA PROCESSING
 Line broadening 0.3 Hz
 FT size 32768
 Total time 0 min, 44 sec

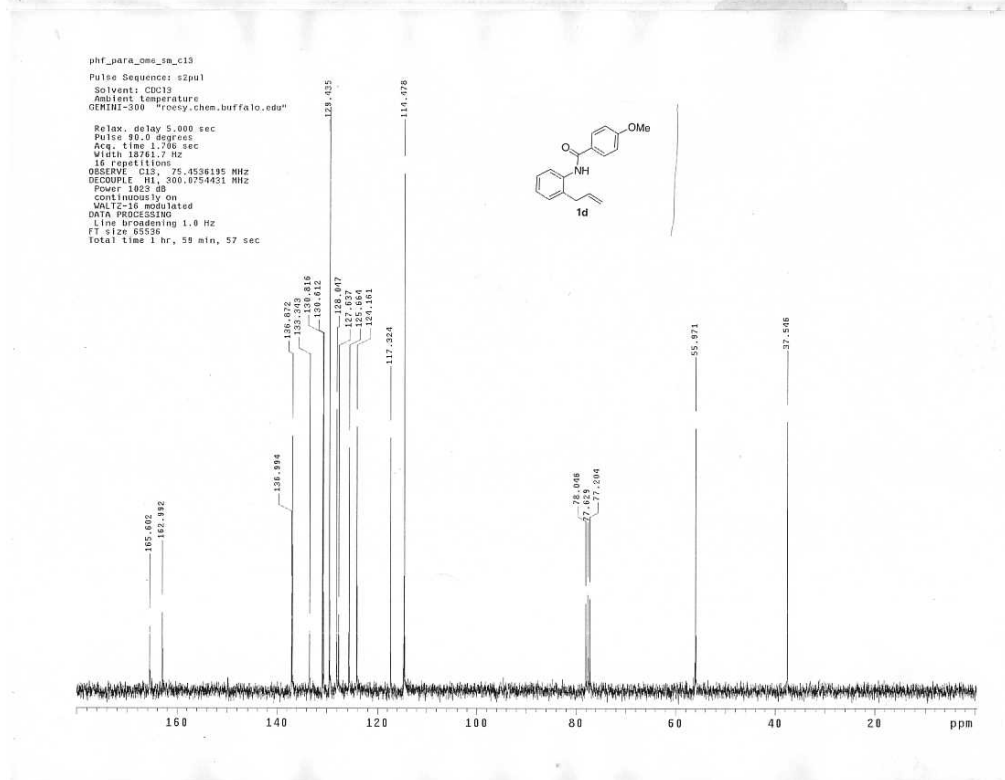
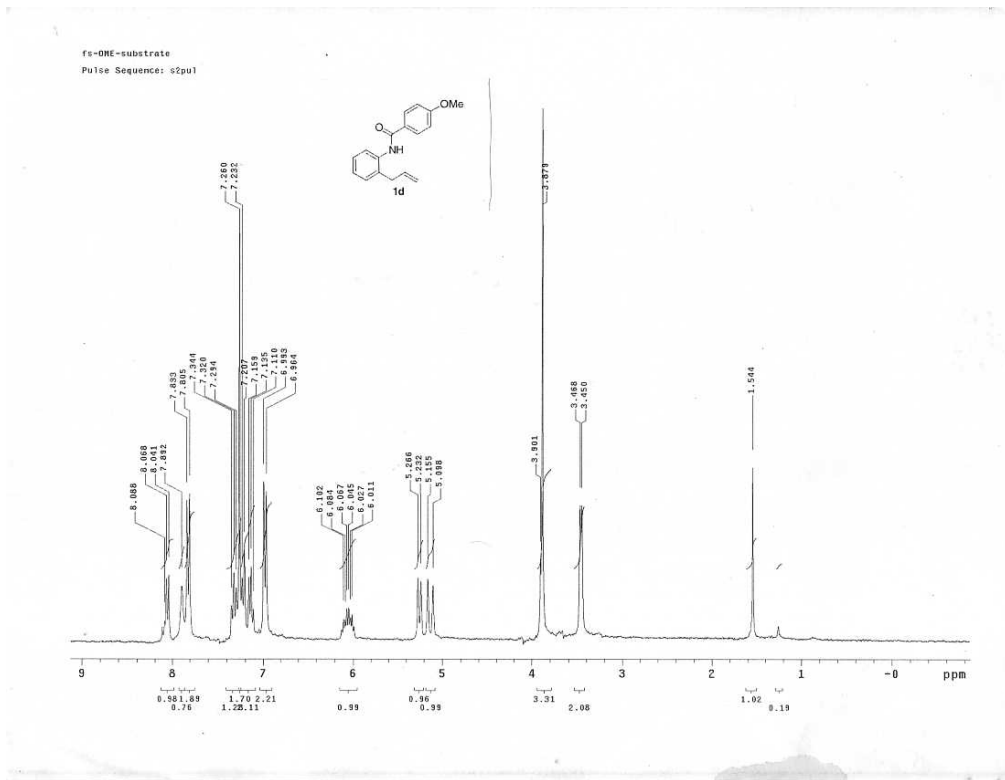


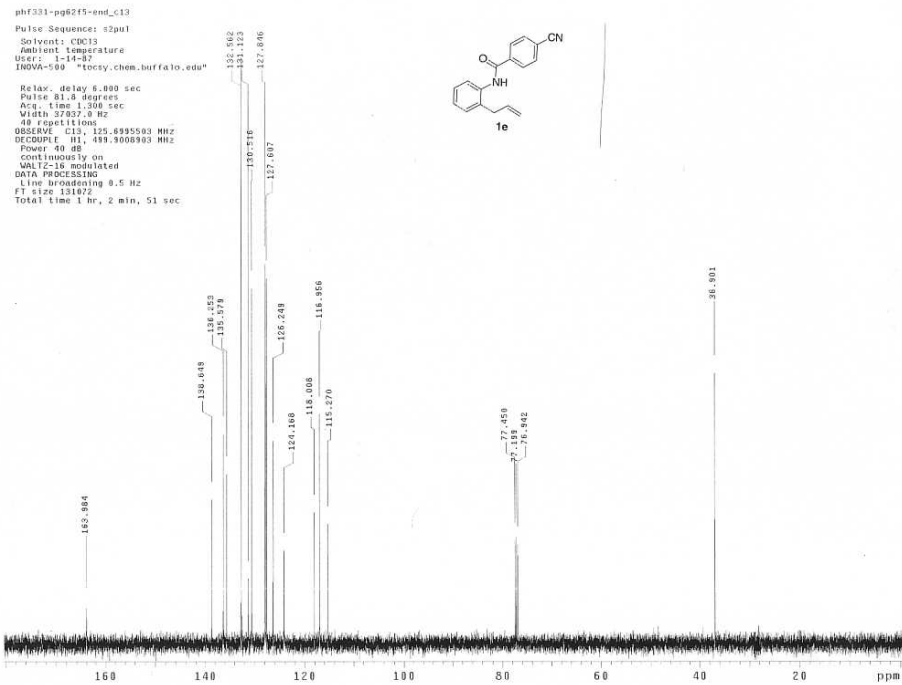
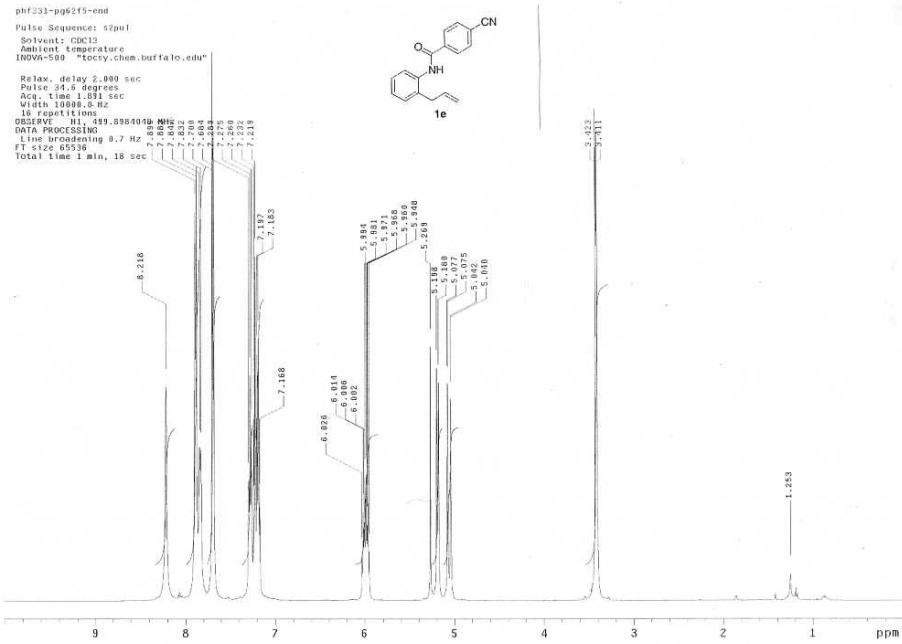
phf_para_c1_sm_c13

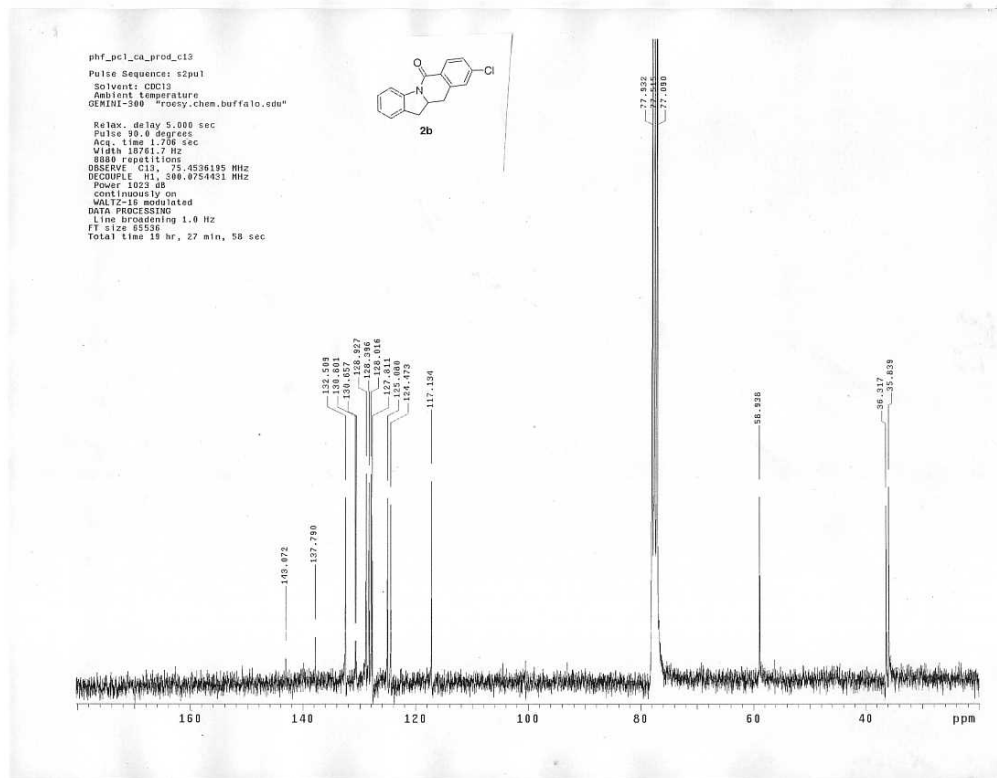
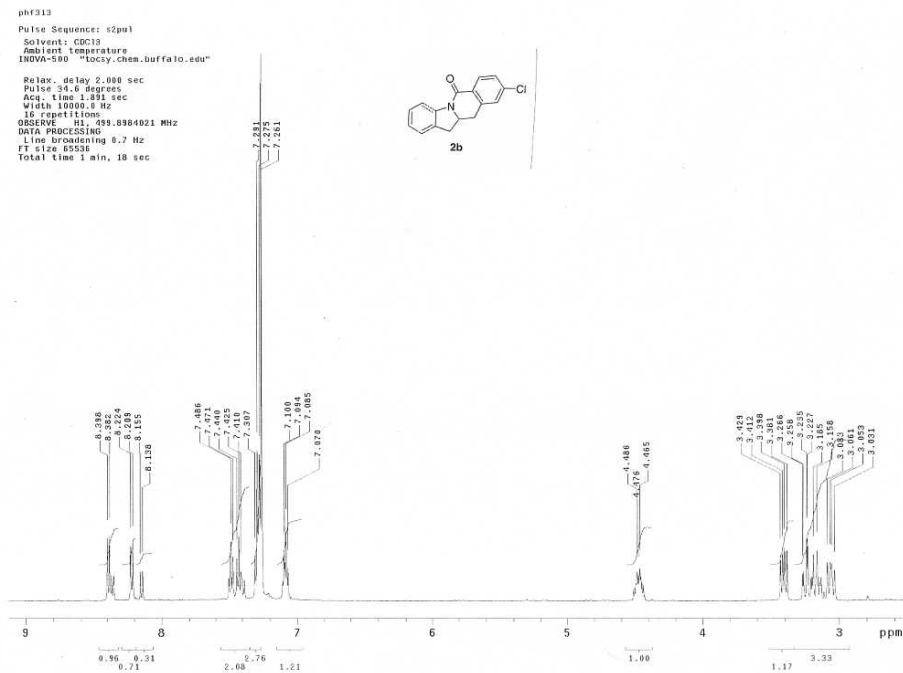
Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient temperature
 GEMINI-300 "cozy.chem.buffalo.edu"
 Relax. delay 5.000 sec
 Pulse 90.0 degrees
 Acq. time 1.280 sec
 Width 10761.7 Hz
 16 Repetitions
 OBSERVE C13: 75.4536195 MHz
 DECOUPLE H1: 300.6754431 MHz
 Power 1023 dB
 Continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 1 hr, 58 min, 57 sec



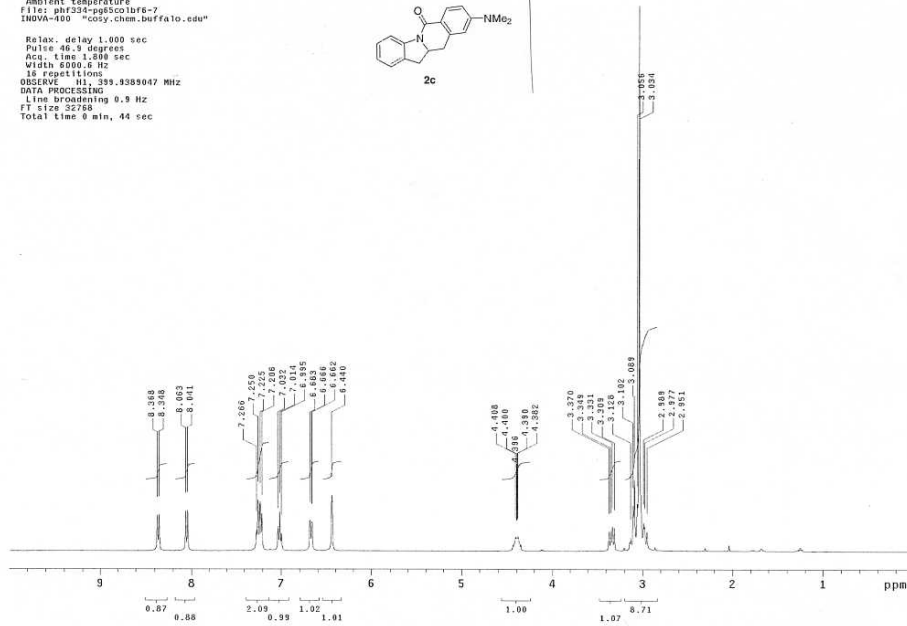
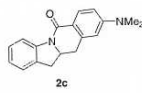




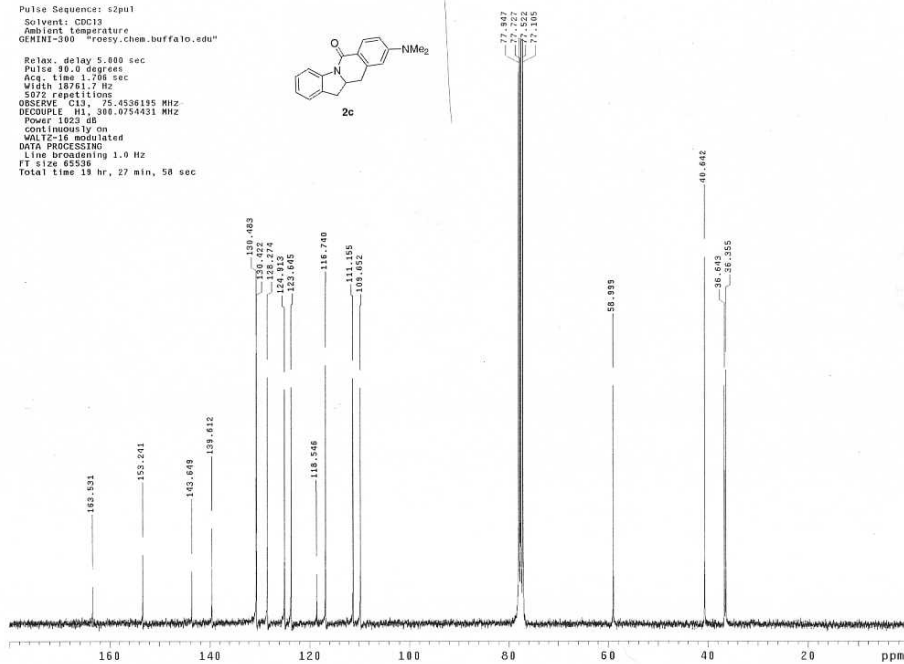
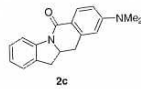


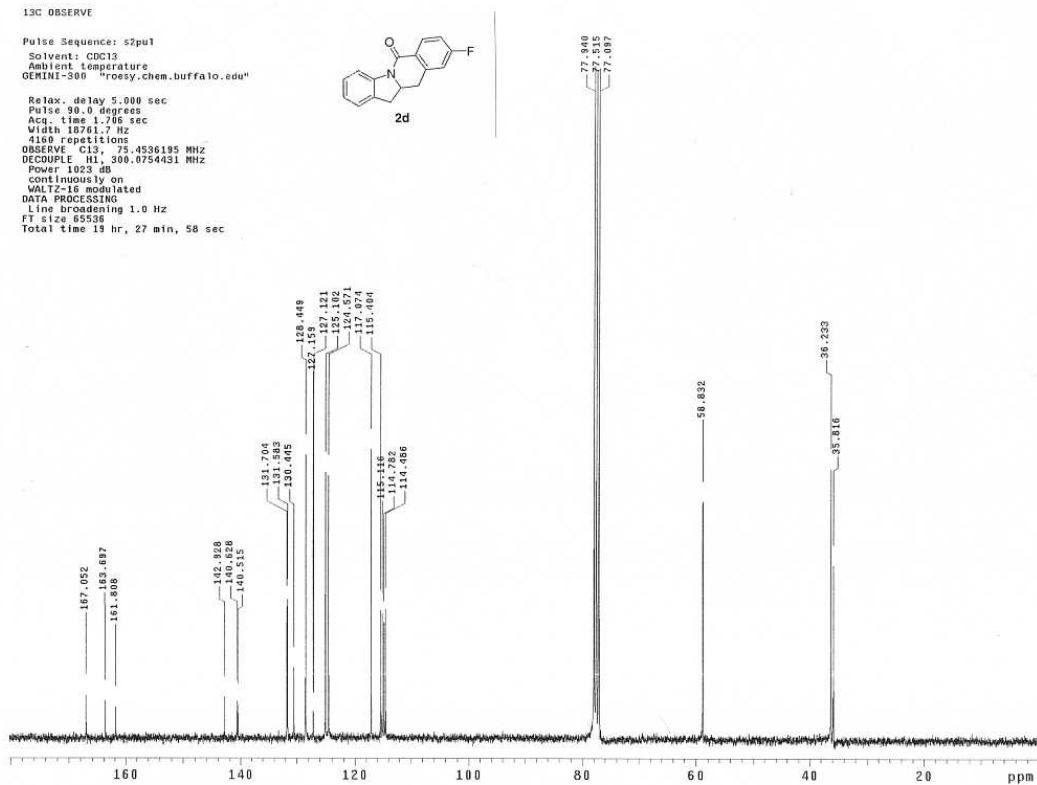
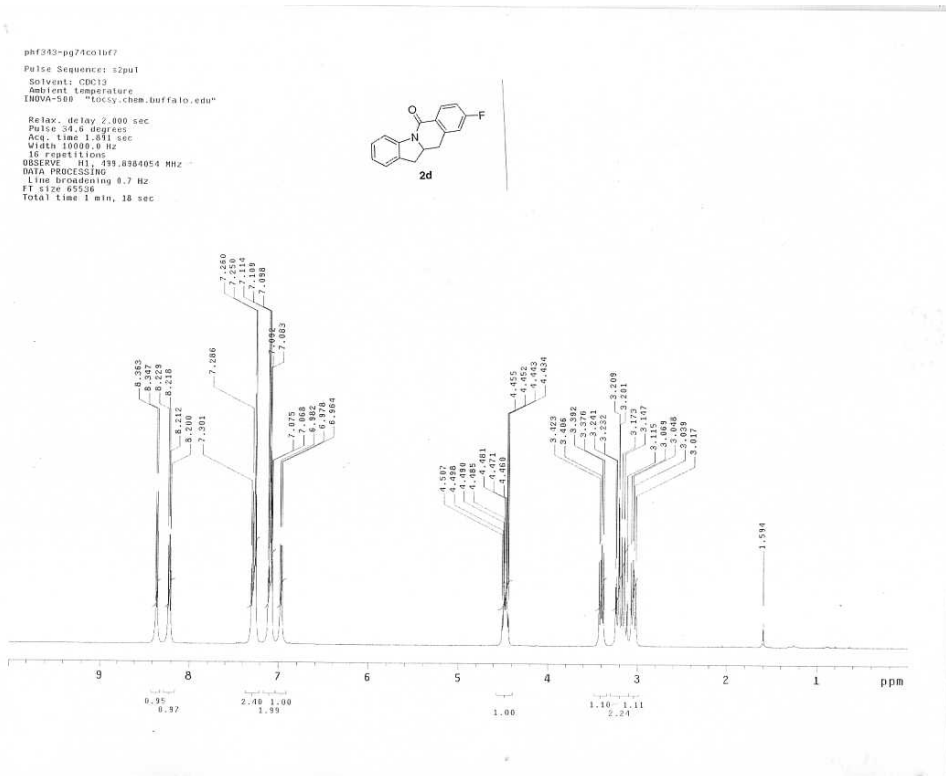


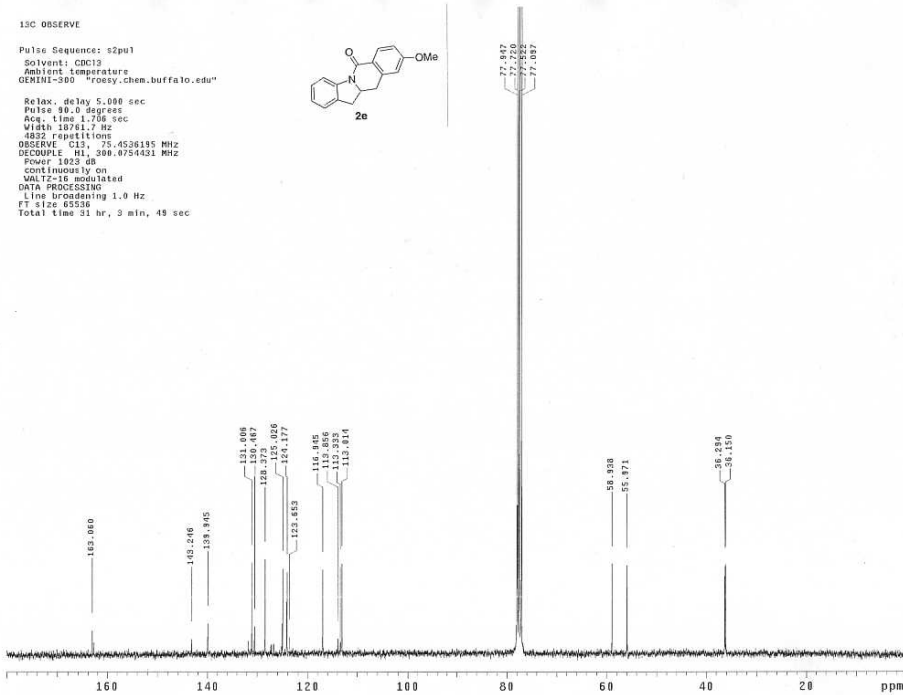
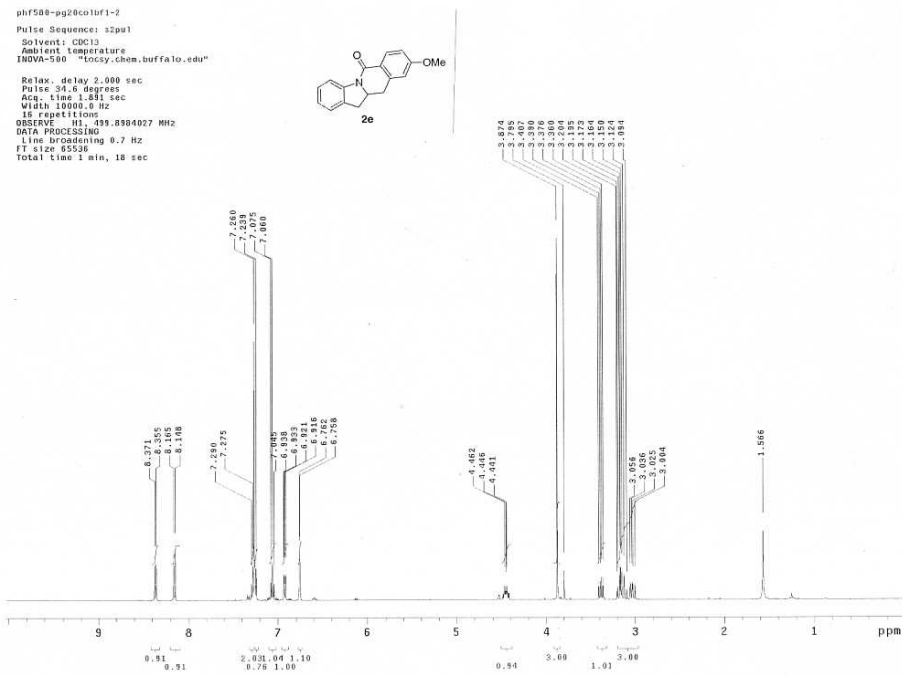
phf334-pg5colbf6-7
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 Solvent: CDCl3
 Ambient temperature
 File: phf334-pg5colbf6-7
 INOVA-400 *cosy.chem.buffalo.edu*
 Relax. delay 1.000 sec
 Pulse 48.9 degrees
 Acq. time 1.808 sec
 Width 8000.8 Hz
 18 repetitions
 OBSERVE H1, 399.9389047 MHz
 DATA PROCESSING
 Line broadening 0.9 Hz
 FT size 52758
 Total time 9 min, 44 sec

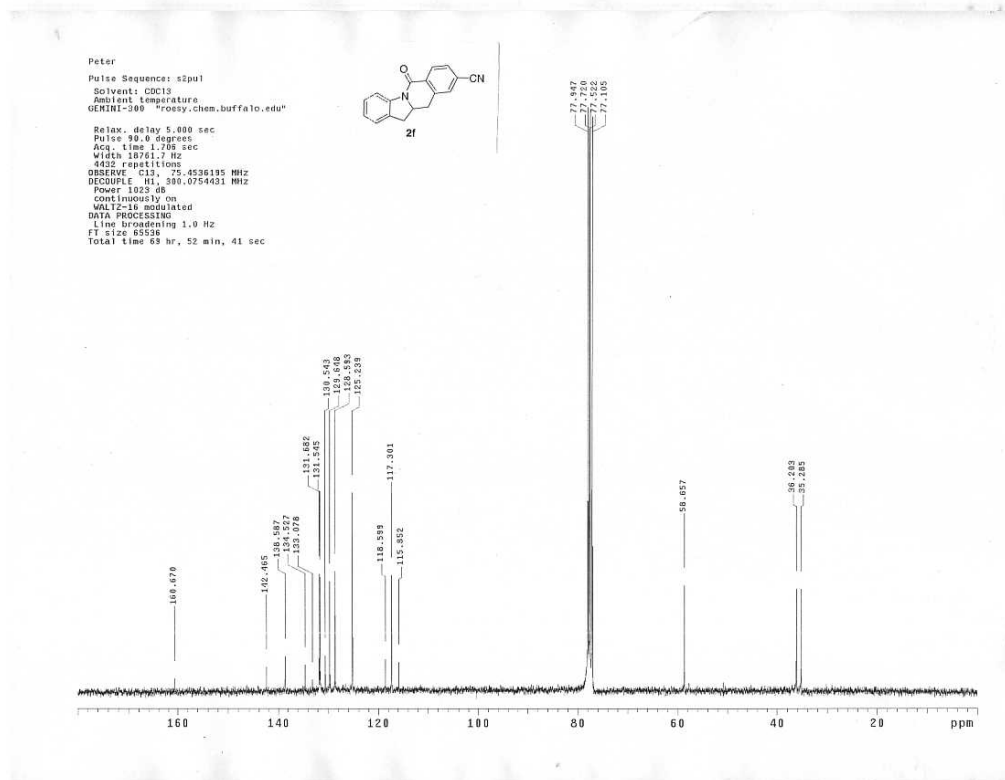
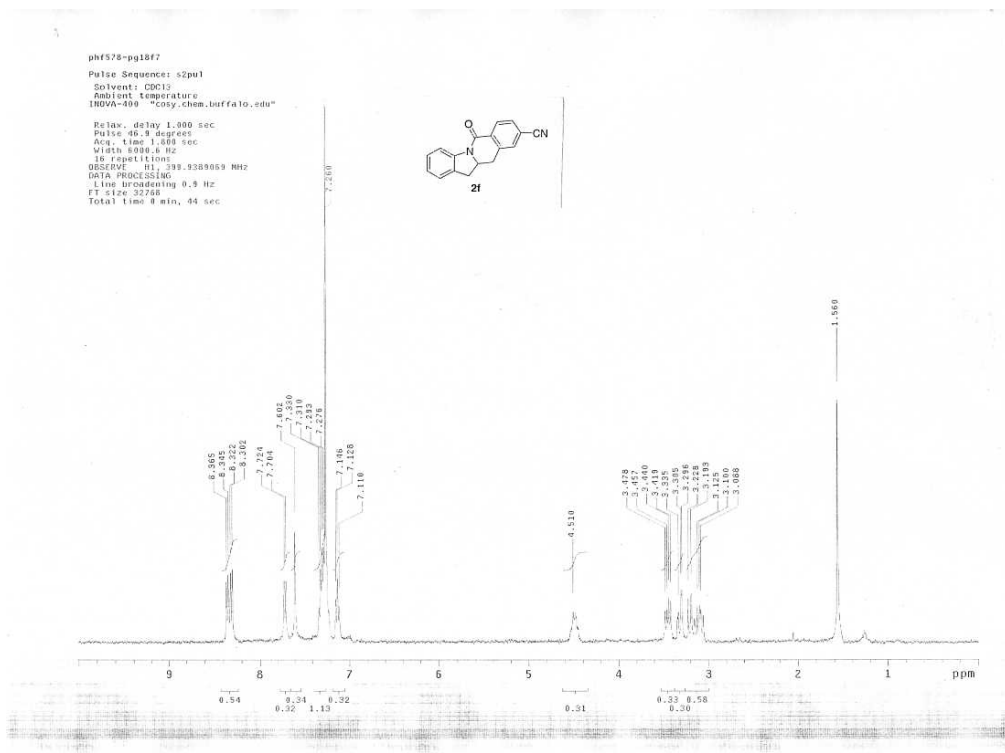


phf334-pg5colbf6-9
 Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient temperature
 GEMINI-300 *roesy.chem.buffalo.edu*
 Relax. delay 5.000 sec
 Pulse 98.0 degrees
 Acq. time 1.706 sec
 Width 18761.7 Hz
 3072 repetitions
 OBSERVE C13, 75.4538195 MHz
 DECOUPLE H1, 398.975933 MHz
 Power 1023 dB
 Continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 45538
 Total time 19 hr, 27 min, 50 sec

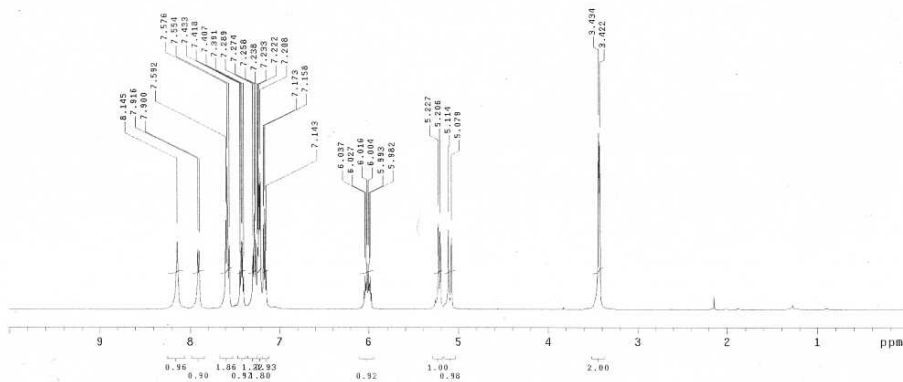




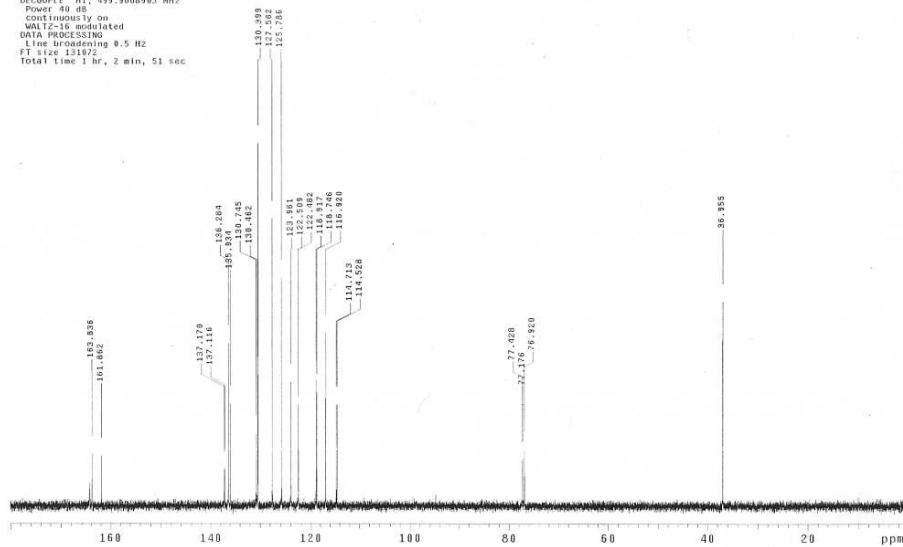




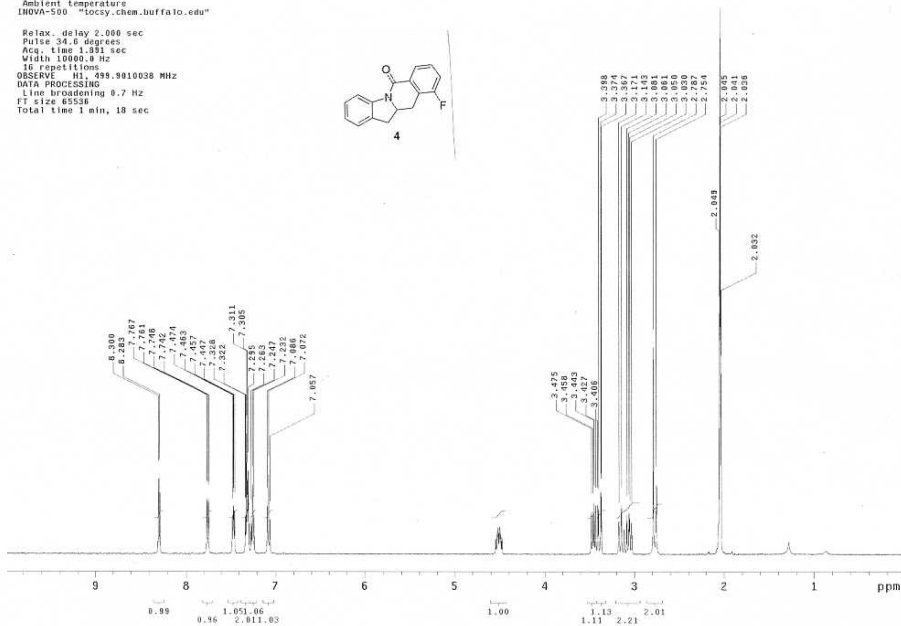
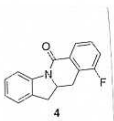
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 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 INOVA-500 "kcsy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 24.6 degrees
 Acq. time 1.051 sec
 Width 19008.0 Hz
 16 repetitions
 OBSERVE H1, 499.8984058 MHz
 DATA PROCESSING
 Line broadening 8.7 Hz
 FT size 65536
 Total time 1 min, 18 sec



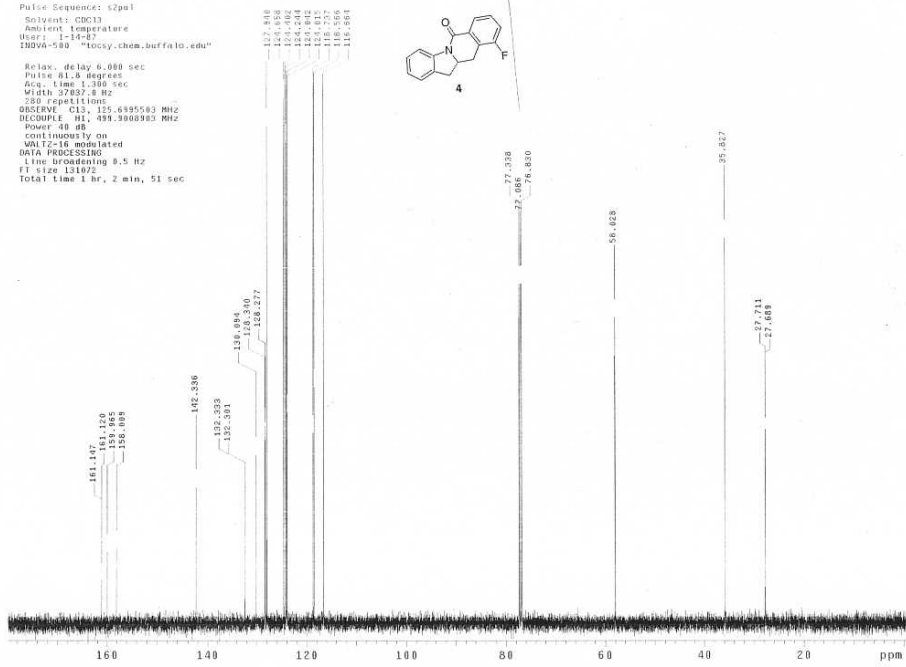
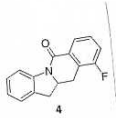
phf374-pg10576-37_c13
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 User: j-14-07
 INOVA-500 "kcsy.chem.buffalo.edu"
 Relax. delay 8.000 sec
 Pulse 61.8 degrees
 Acq. time 1.200 sec
 Width 37037.0 Hz
 64 repetitions
 OBSERVE C13, 125.6995503 MHz
 DECOUPLE H1, 499.9008903 MHz
 Power 40 dB
 continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 131872
 Total time 1 hr, 2 min, 51 sec



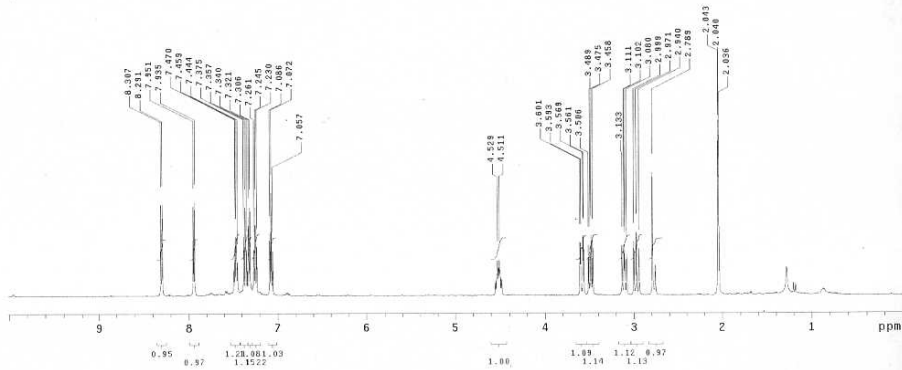
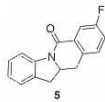
phf_meta_f_ca_prod2
 Pulse Sequence: s2pul
 Solvent: Acetone
 Ambient temperature
 INOVA-500 "tccy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 3.0 degrees
 Acq. time 1.891 sec
 Width 10000.0 Hz
 16 repetitions
 OBSERVE HI, 999.9910038 MHz
 DATA PROCESSING
 Line broadening 0.7 Hz
 FT size 65536
 Total time 1 min, 18 sec



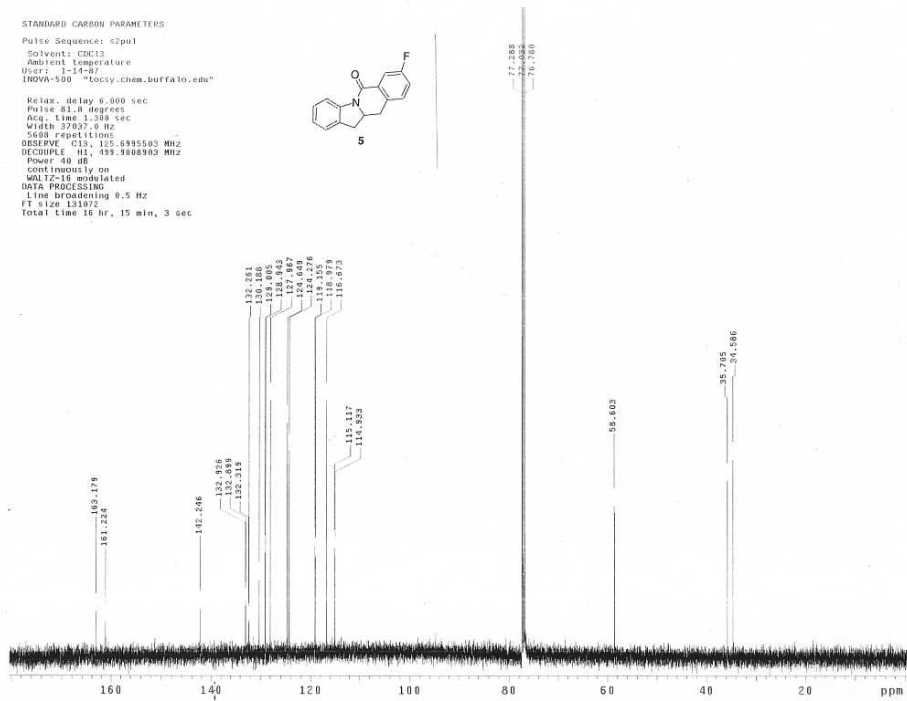
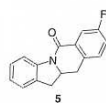
phf391-pg2125-49_c13
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient temperature
 USAF: 1-14-87
 INOVA-500 "tccy.chem.buffalo.edu"
 Relax. delay 6.000 sec
 Pulse 61.8 degrees
 Acq. time 1.300 sec
 Width 37487.8 Hz
 280 repetitions
 OBSERVE CH, 151.6195503 MHz
 DECOUPLE HI, 499.9908903 MHz
 Power 40 dB
 continuously on
 VMT2-18 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 131072
 Total time 1 hr, 2 min, 51 sec



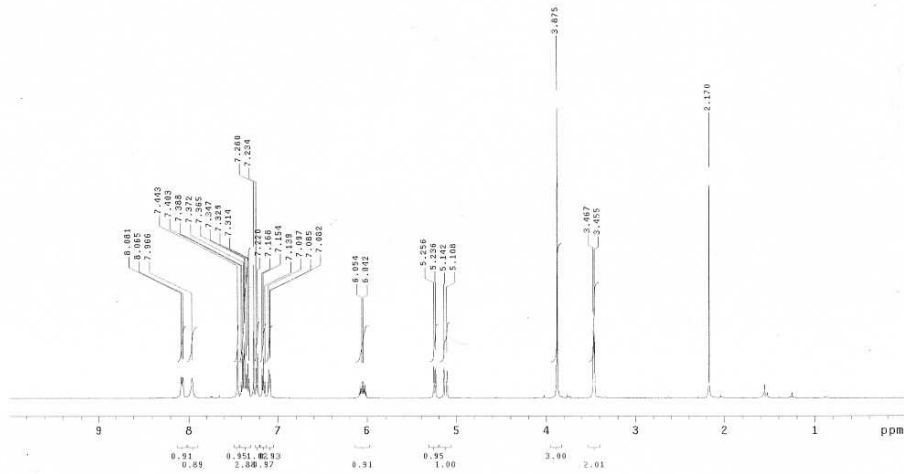
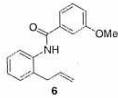
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 Pulse Sequence: s2pul
 Solvent: Acetone
 Ambient Temperature
 INOVA-500 "tocsy.chem.buffalo.edu"
 Relax: delay 2.000 sec
 Pulse: 20.6 degrees
 Acq. Time: 1.951 sec
 Width: 10000.0 Hz
 16 repetitions
 OBSERVE: H1, 499.9010038 MHz
 DATA PROCESSING
 Line broadening: 0.7 Hz
 FT size: 65536
 Total Time: 1 min, 18 sec



STANDARD CARBON PARAMETERS
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 User: j-14-87
 INOVA-500 "tocsy.chem.buffalo.edu"
 Relax: delay 6.000 sec
 Pulse: 81.8 degrees
 Acq. Time: 1.308 sec
 Width: 37007.0 Hz
 5688 repetitions
 OBSERVE: C13, 125.6395503 MHz
 DECOUPLE: H1, 499.9008903 MHz
 Power: 40 dB
 continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening: 0.5 Hz
 FT size: 131072
 Total Time: 16 hr, 15 min, 3 sec

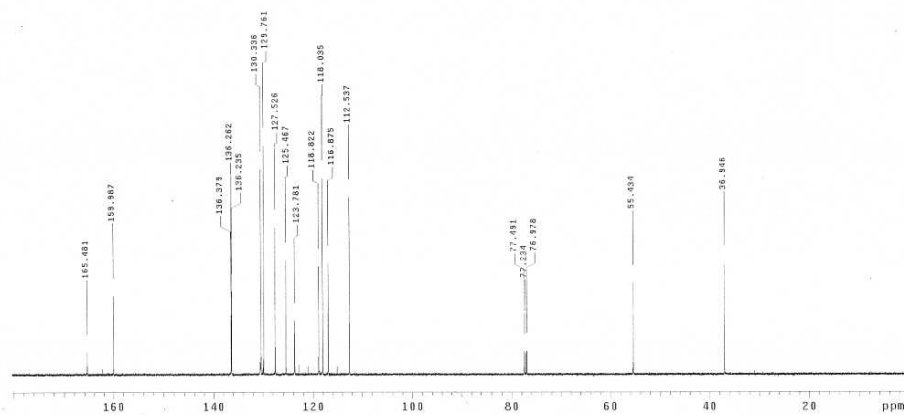
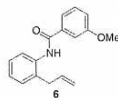


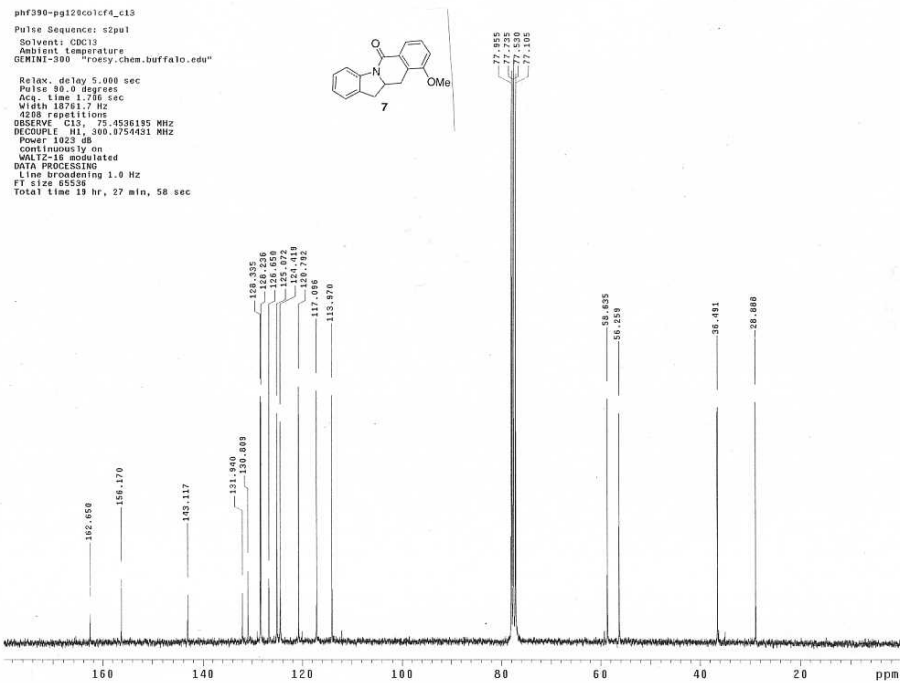
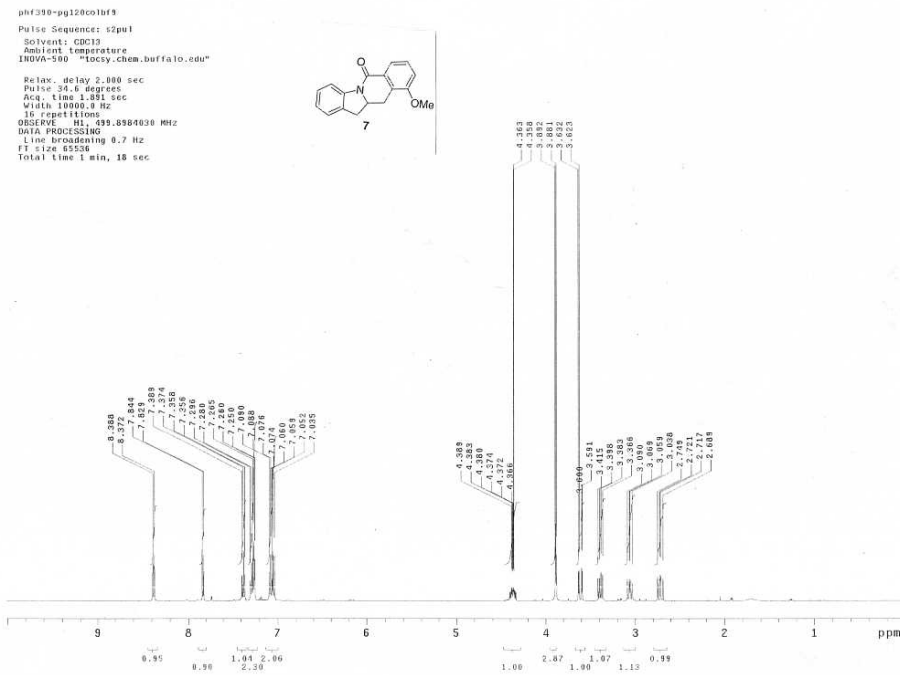
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 Solvent: CDCl3
 Ambient Temperature
 INOVA-500 "tocsy.chem.buffalo.edu"
 Relax_delay 2.000 sec
 Pulse 34.8 degree
 Acq. Time 1.091 sec
 Width 18100.0 Hz
 16 repetitions
 OBSERVE F1 499.898458 MHz
 DATA PROCESSING
 Line Broadening 0.7 Hz
 FT Size 65528
 Total Time 1 min, 18 sec

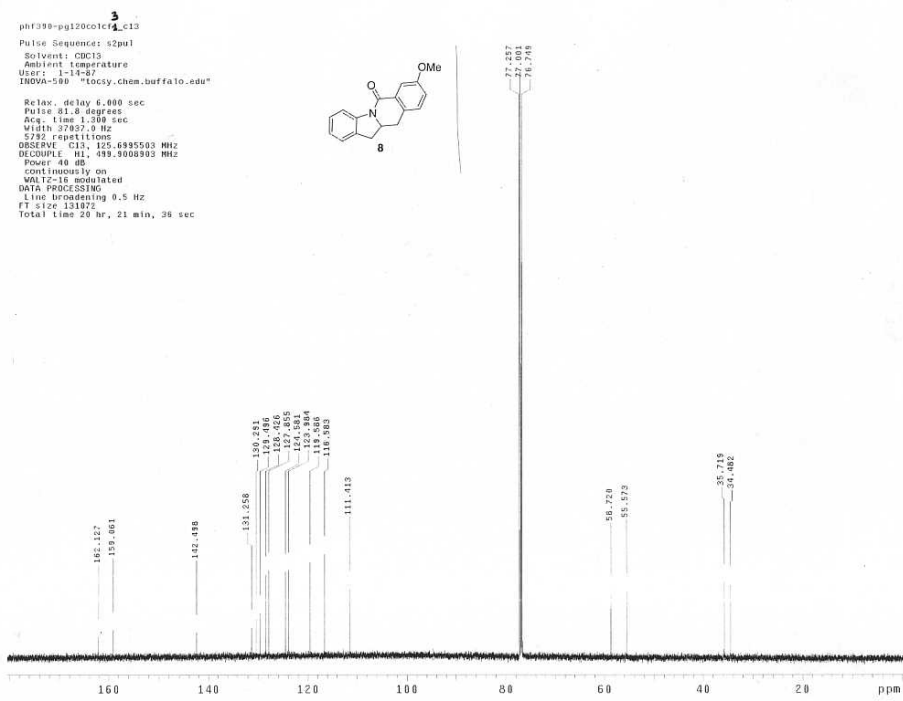
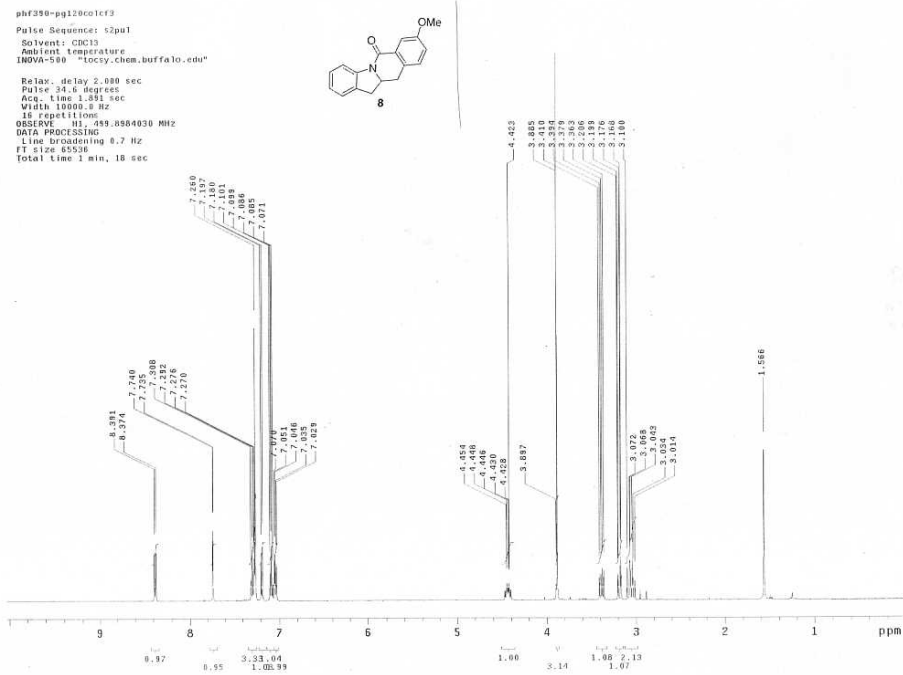


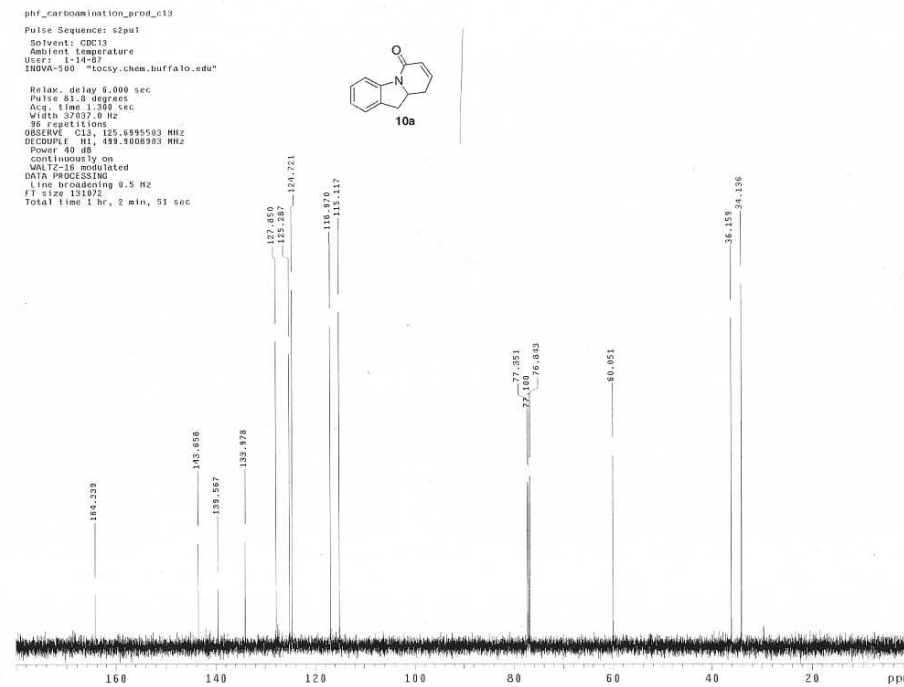
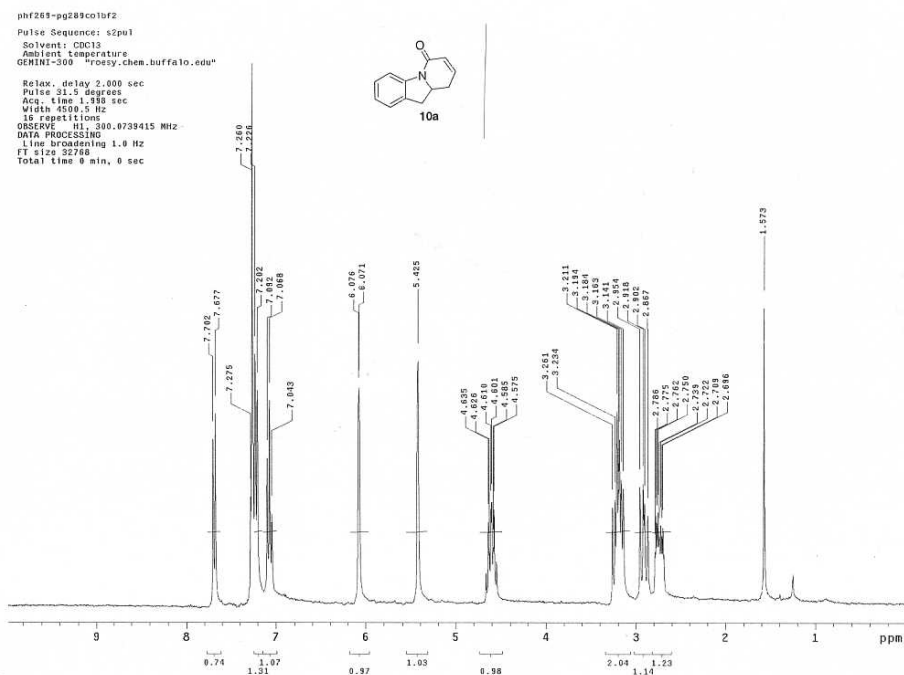
STANDARD CARBON PARAMETERS
 Pulse Sequence: zgpg30
 Solvent: CDCl3
 Ambient Temperature
 User: 1-11-97
 INOVA-500 "tocsy.chem.buffalo.edu"

Relax_delay 5.000 sec
 Pulse 91.3 degree
 Acq. Time 1.300 sec
 Width 27437.4 Hz
 254 repetitions
 OBSERVE G13 125.6995063 MHz
 DECPMPC H1 499.9089963 MHz
 Power 40 dB
 Continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line Broadening 0.5 Hz
 FT Size 121872
 Total Time 1 hr, 2 min, 51 sec

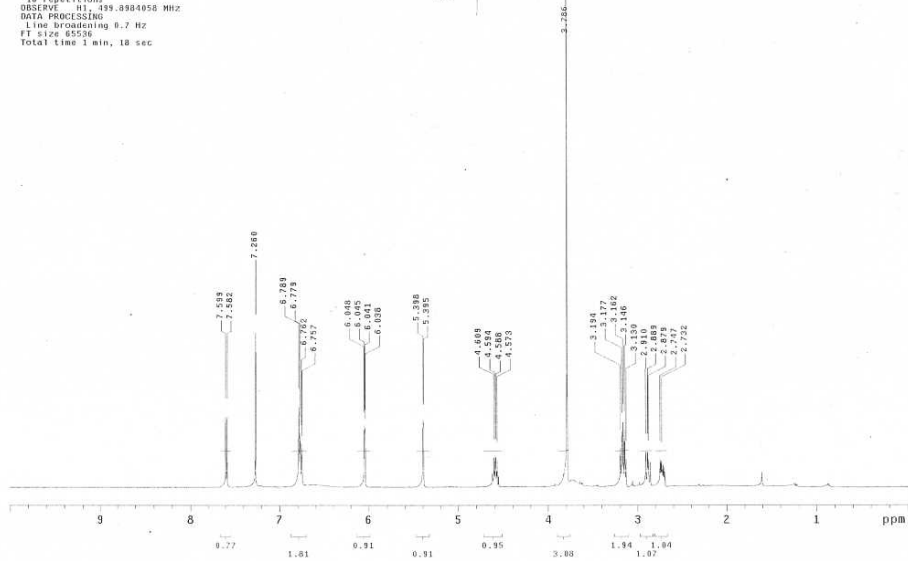
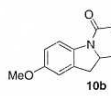




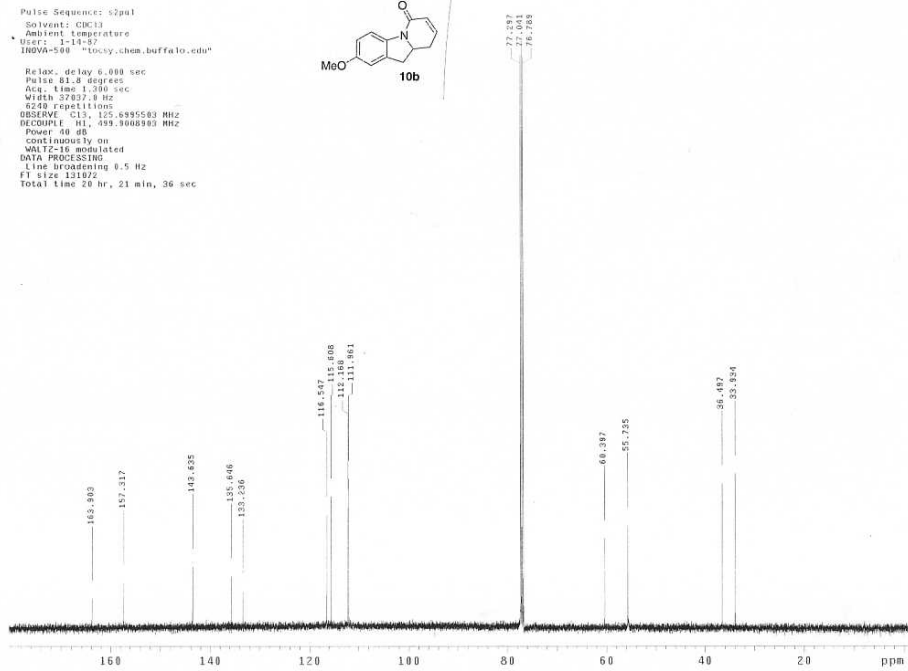
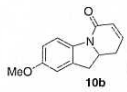




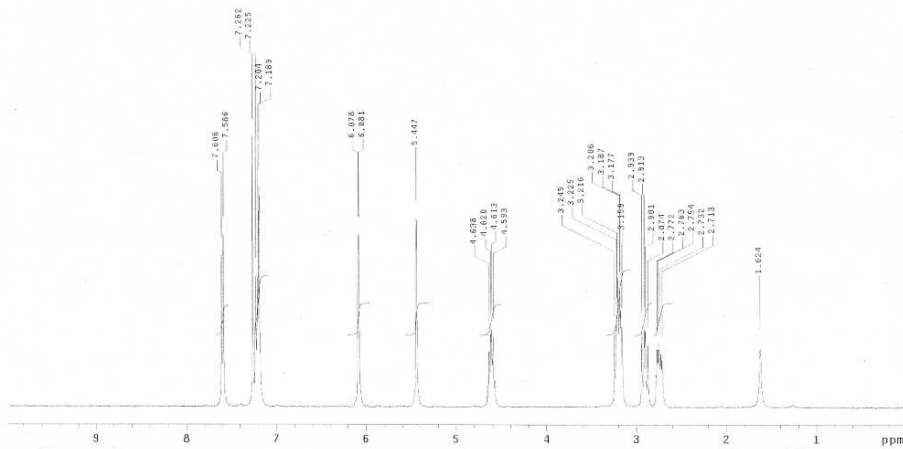
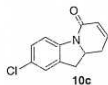
phf256-pg0717-8
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 INOVA-500 "tccy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 24.0 degrees
 Acq. time 1.891 sec
 Width 10000.0 Hz
 16 repetitions
 OBSERVE H1 499.8984058 MHz
 DATA PROCESSING
 Line broadening 0.7 Hz
 FT size 65536
 Total time 1 min, 18 sec



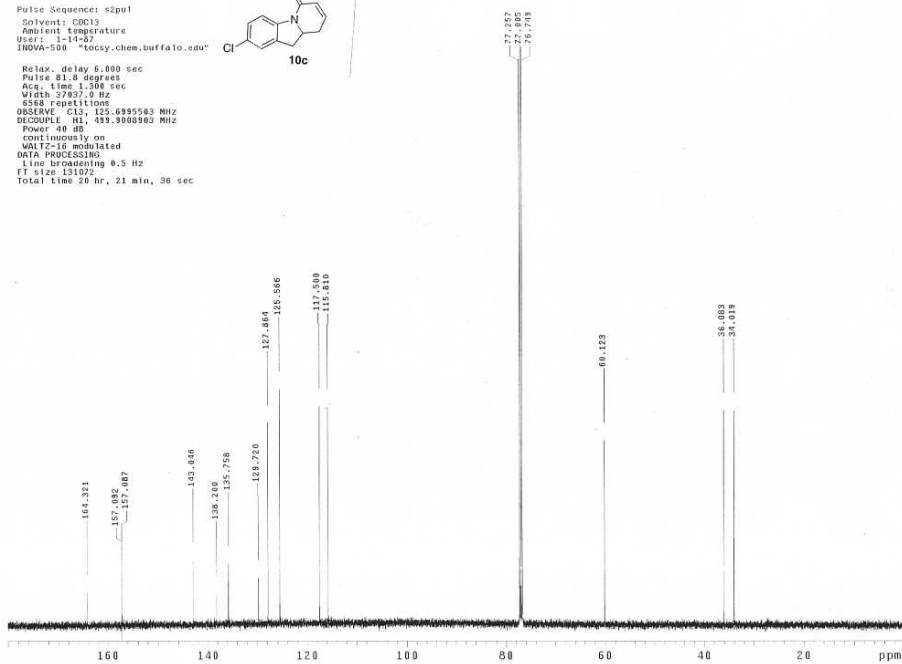
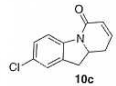
phf256-pg0717-8
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 User: j-18-87
 INOVA-500 "tccy.chem.buffalo.edu"
 Relax. delay 6.000 sec
 Pulse 81.8 degrees
 Acq. time 1.300 sec
 Width 37807.0 Hz
 8248 repetitions
 OBSERVE C13 125.6955583 MHz
 DECOUPLE H1 499.8984983 MHz
 Power 48 dB
 continuously on
 MALTZ-16 modulator
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 131972
 Total time 20 hr, 21 min, 36 sec

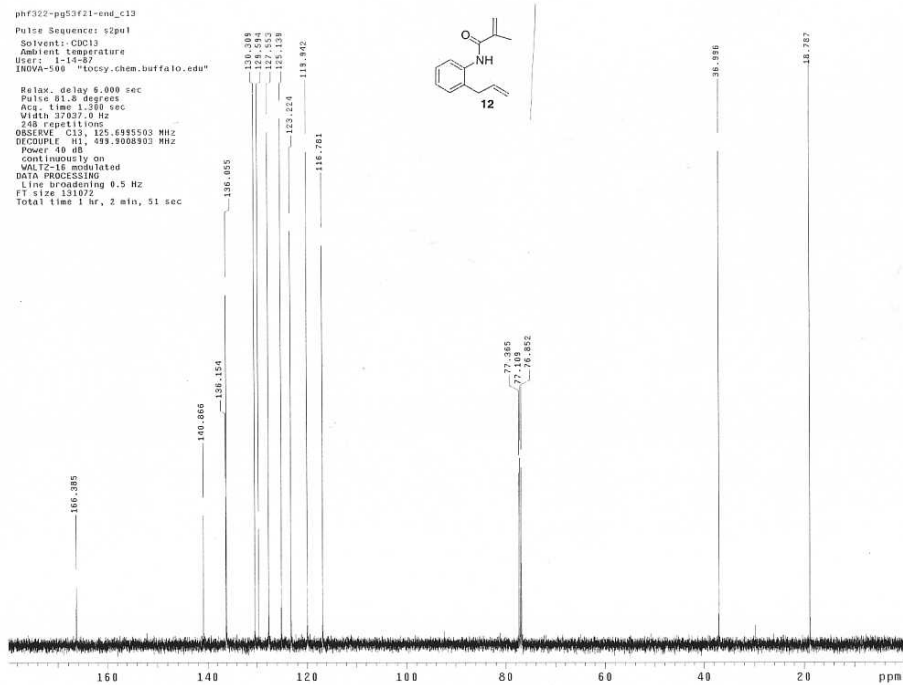
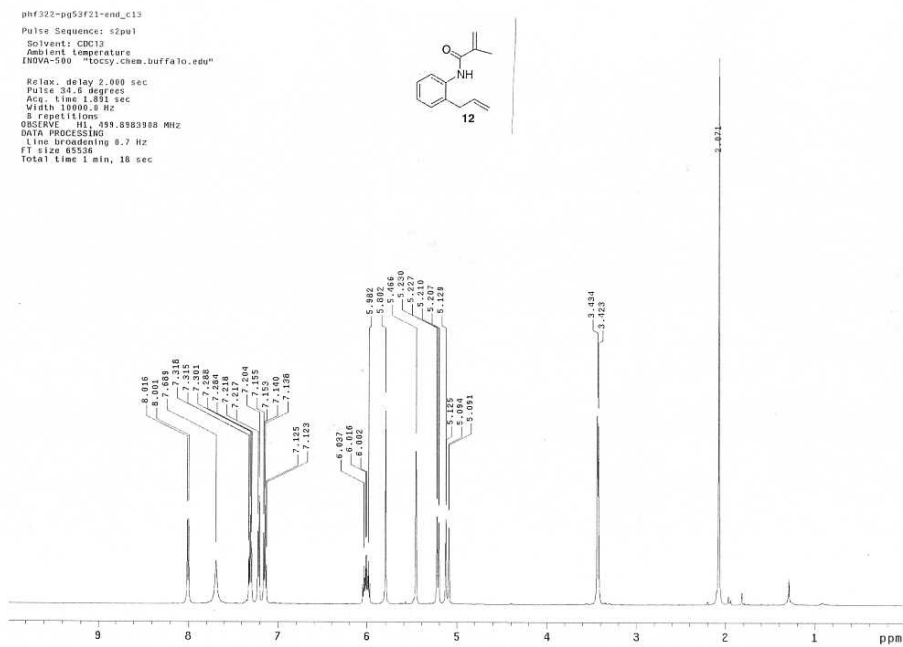


ph576-pg16f1-2
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 Solvent: CDCl3
 Ambient temperature
 INOVA-500 "ccsy.chem.buffalo.edu"
 Relax. delay 1.000 sec
 Pulse 46.9 degrees
 Acq. time 1.500 sec
 Width 6000.0 Hz
 IG repetition
 OBSERVE_H1 499.8381684 MHz
 DATA PROCESSING
 Line broadening 0.3 Hz
 FT size 32768
 Total time 0 min, 44 sec



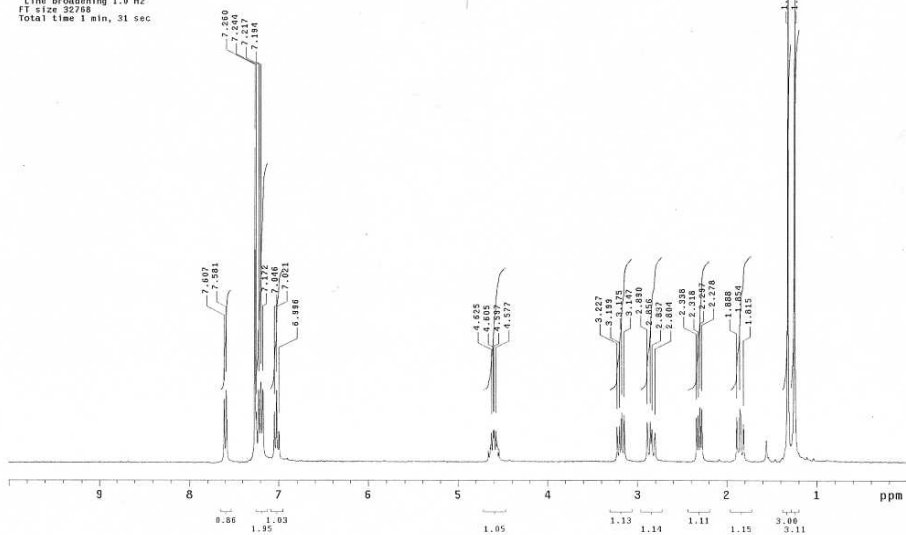
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 Solvent: CDCl3
 Ambient temperature
 User: j-14-87
 INOVA-500 "ccsy.chem.buffalo.edu"
 Relax. delay 0.800 sec
 Pulse 81.8 degrees
 Acq. time 1.500 sec
 Width 57807.0 Hz
 8568 repetitions
 OBSERVE_C13 125.6995583 MHz
 DECOUPLE_H1 499.8008903 MHz
 Power 40 dB
 continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 131072
 Total time 20 hr, 21 min, 36 sec





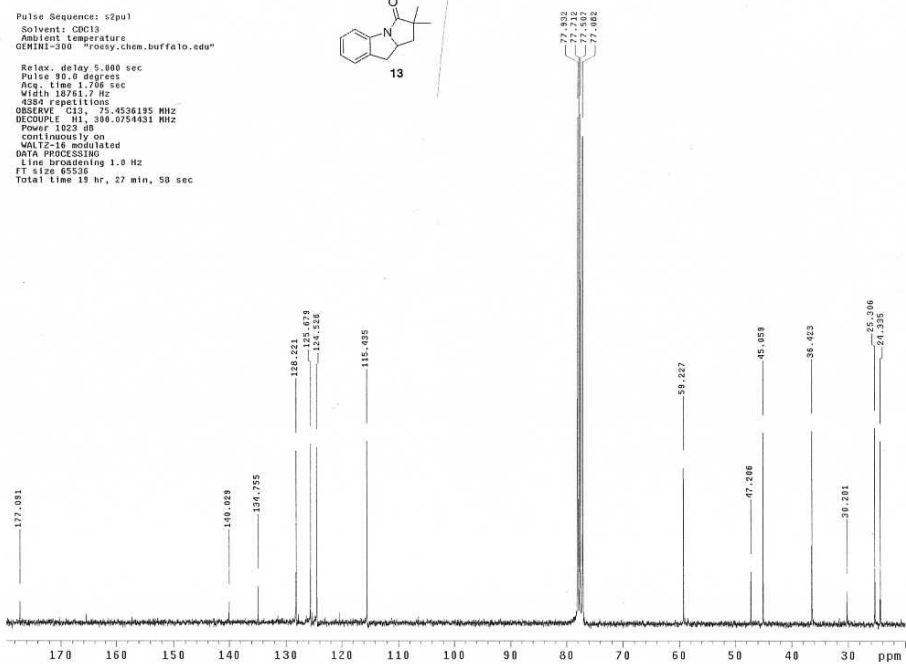
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 Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient Temperature
 QMNH-300 rosys.chem.buffalo.edu*

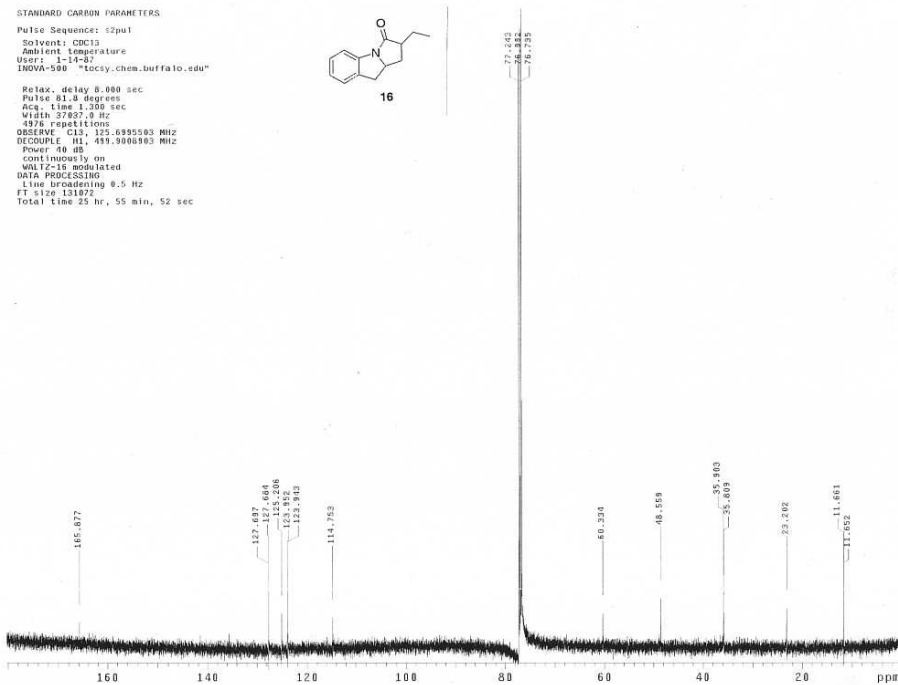
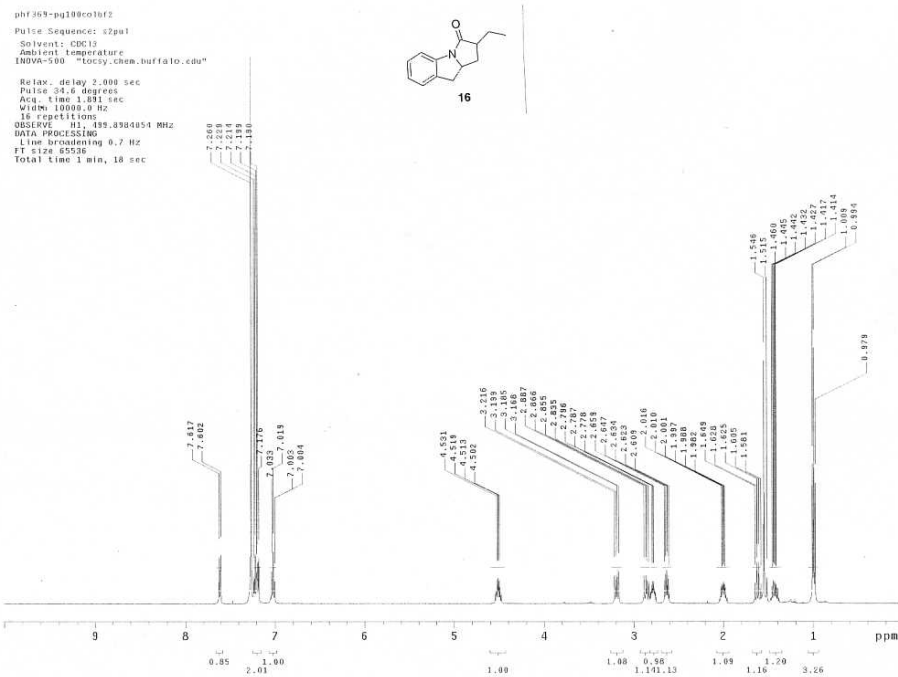
Relax. delay 1.800 sec
 Pulse 31.5 degrees
 Acq. time 1.950 sec
 Width 4500.5 Hz
 16 repetitions
 OBSERVE H1 300.0739432 MHz
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 32768
 Total time 1 min, 31 sec



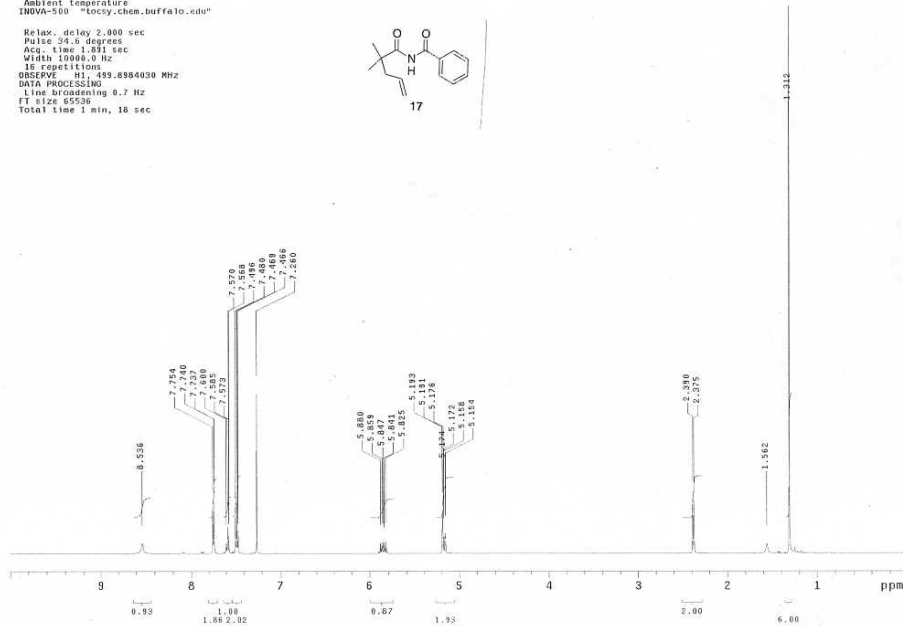
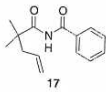
13C OBSERVE
 Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient Temperature
 QMNH-300 rosys.chem.buffalo.edu*

Relax. delay 5.000 sec
 Pulse 90.0 degrees
 Acq. time 1.700 sec
 Width 18761.7 Hz
 4384 repetitions
 OBSERVE C13 75.4536195 MHz
 DECOUPLE H1 300.0754431 MHz
 Power 1023 db
 continuously on
 MULTIZ-16 modulated
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 19 hr, 27 min, 58 sec

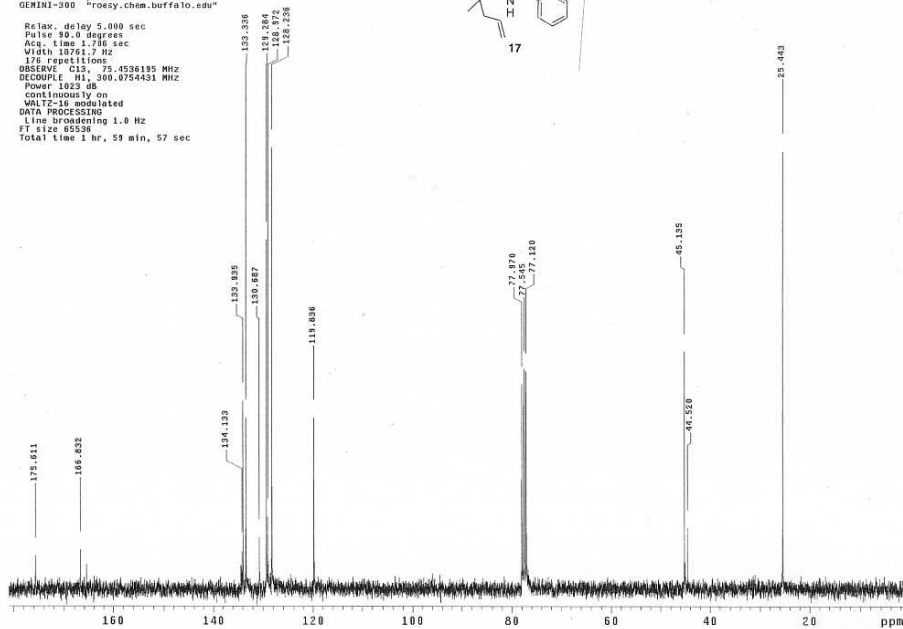
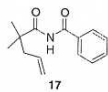


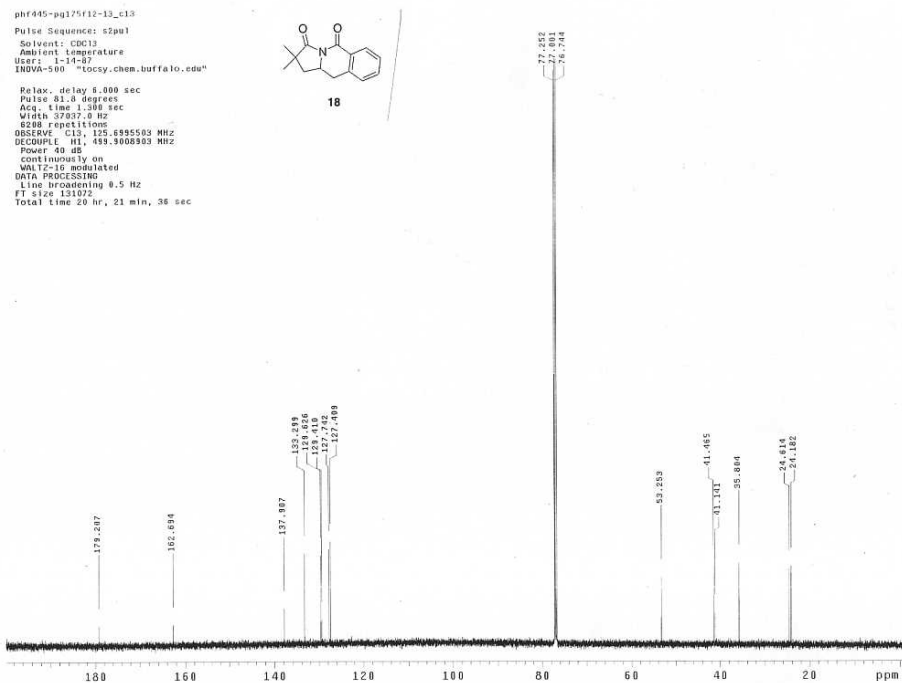
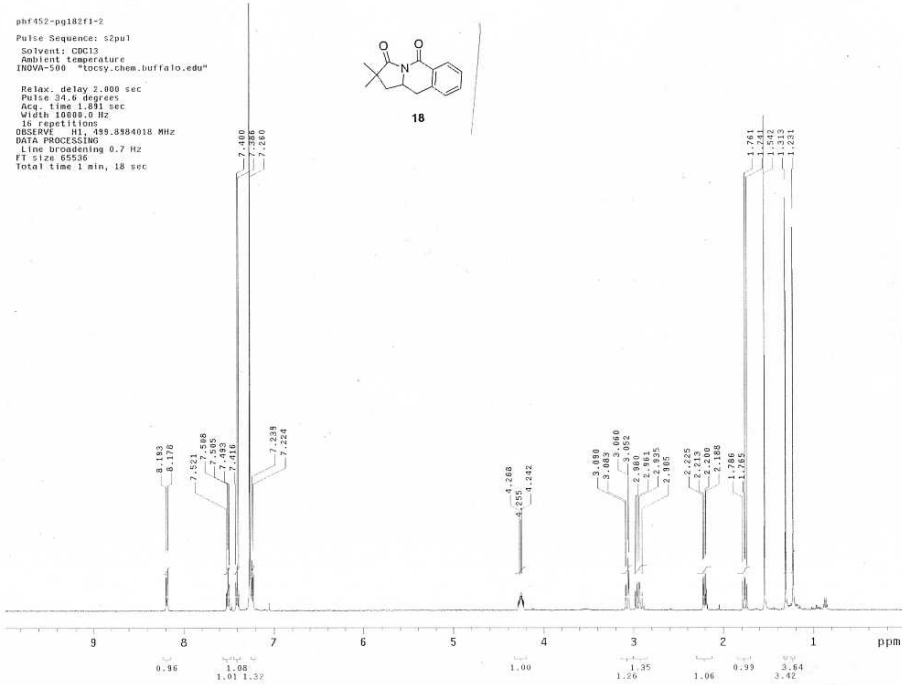


phf443-pg173f32-36
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 INOVA-300 "roesy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 34.0 degrees
 Acq. time 1.891 sec
 Width 10000.0 Hz
 IS repetitions
 OBSERVE H1, 499.8984030 MHz
 DATA PROCESSING
 Line broadening 6.7 Hz
 FT size 65536
 Total time 1 min, 18 sec

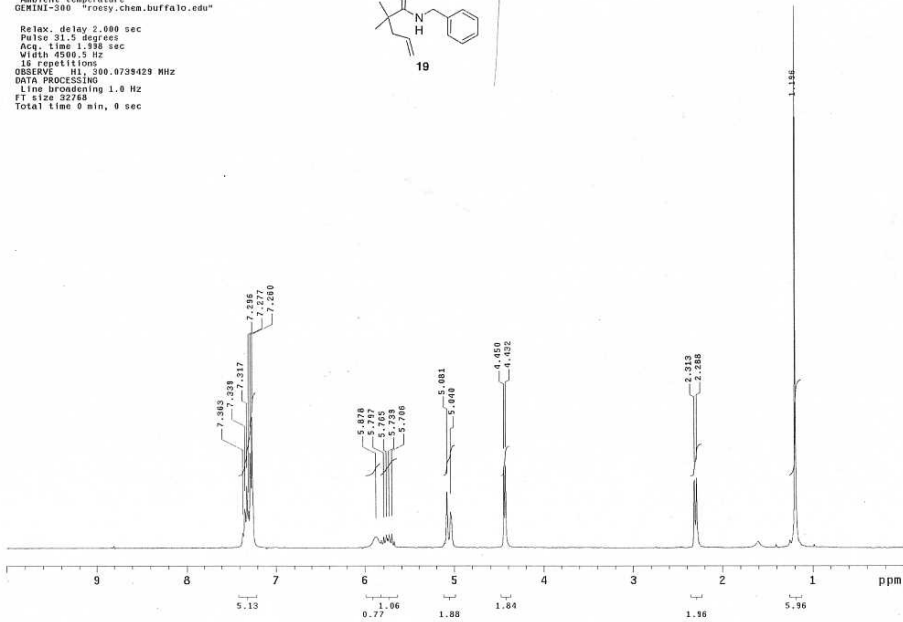
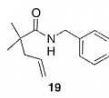


phf449-pg173f49-65_c13
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 GEMINI-300 "roesy.chem.buffalo.edu"
 Relax. delay 5.000 sec
 Pulse 90.0 degrees
 Acq. time 1.716 sec
 Width 18761.7 Hz
 IS repetitions
 OBSERVE C13, 75.4536195 MHz
 DECOUPLE H1, 400.0754431 MHz
 Power 1023 dB
 continuously on
 MALTZ-16 modulated
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 1 hr, 59 min, 57 sec

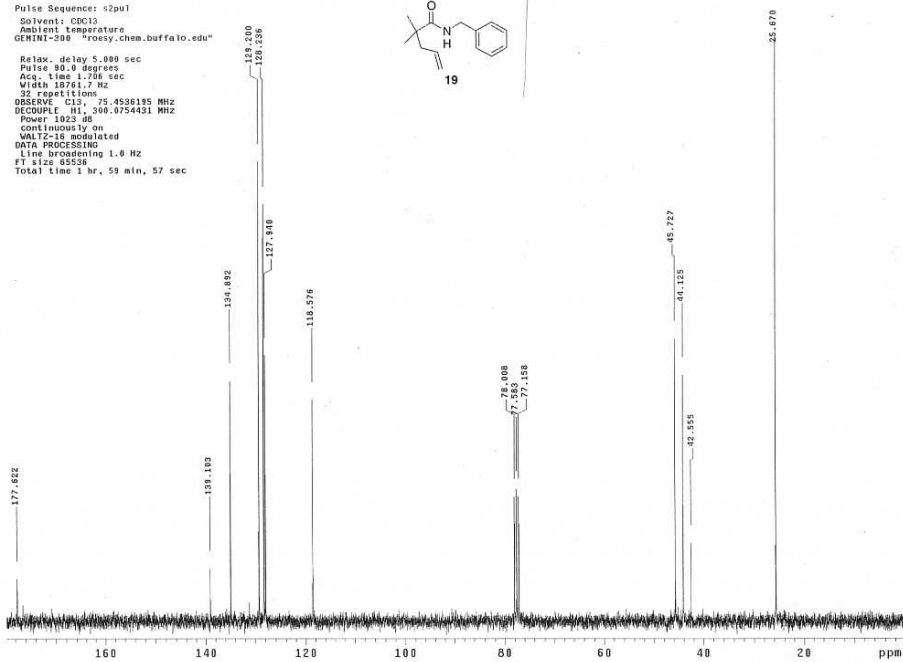
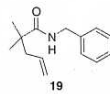




mystery
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 GEMINI-300 "roesy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 31.5 degrees
 Acq. time 1.938 sec
 Width 4590.5 Hz
 18 repetitions
 OBSERVE H1, 300.0739429 MHz
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 32768
 Total time 0 min, 0 sec

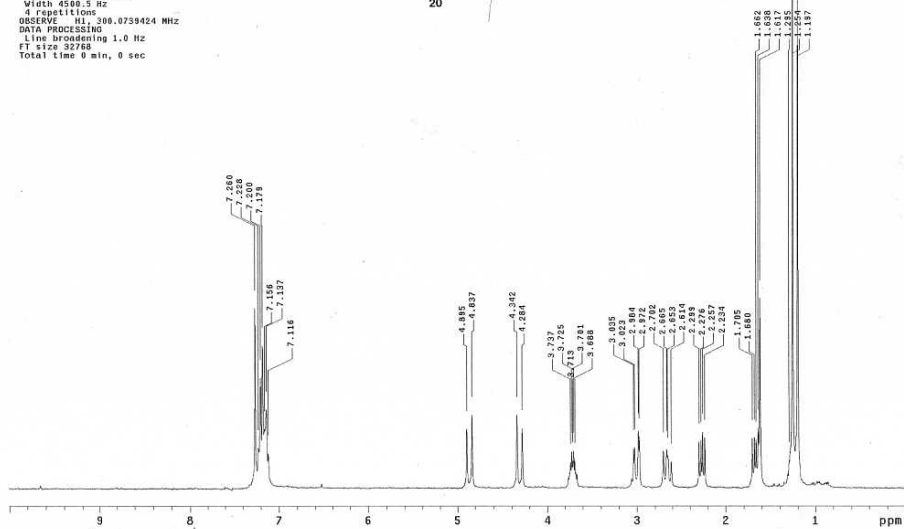
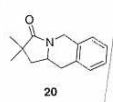


phf458-pg189f8-18_c13
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 GEMINI-300 "roesy.chem.buffalo.edu"
 Relax. delay 5.000 sec
 Pulse 90.0 degrees
 Acq. time 1.758 sec
 Width 18761.7 Hz
 32 repetitions
 OBSERVE C13, 75.4526195 MHz
 DECOUPLE H1, 300.0754431 MHz
 Power 1023 dB
 continuously on
 MALTZ-10 modulated
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 85536
 Total time 1 hr, 59 min, 57 sec



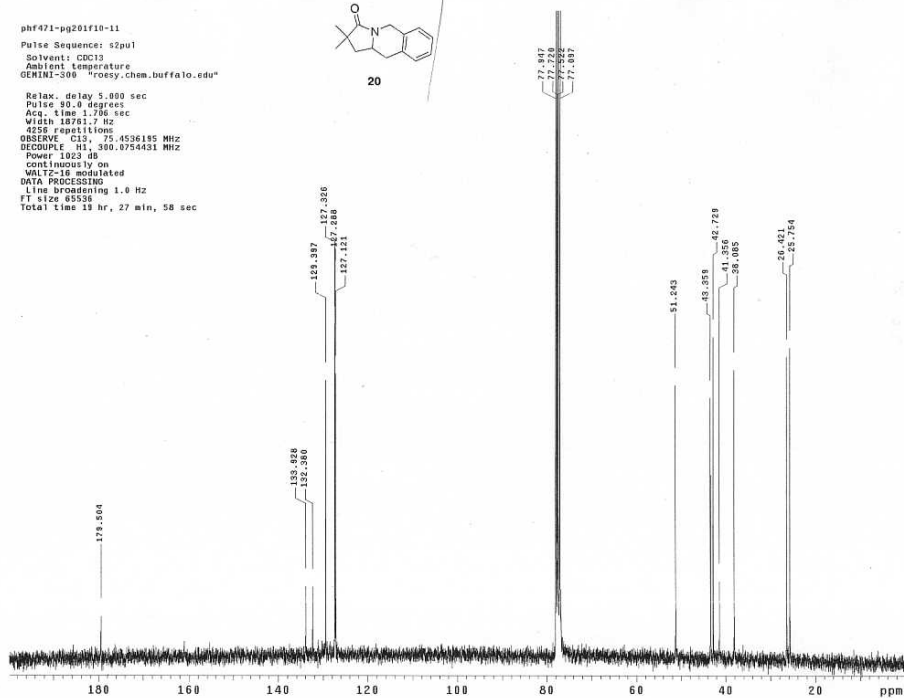
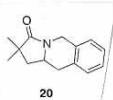
STANDARD 1H OBSERVE

Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 GEMINI-300 "roesy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 31.5 degrees
 Acq. time 1.938 sec
 Width 4500.5 Hz
 4 Repetitions
 OBSERVE H1: 300.0739424 MHz
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 32768
 Total time 0 min, 0 sec



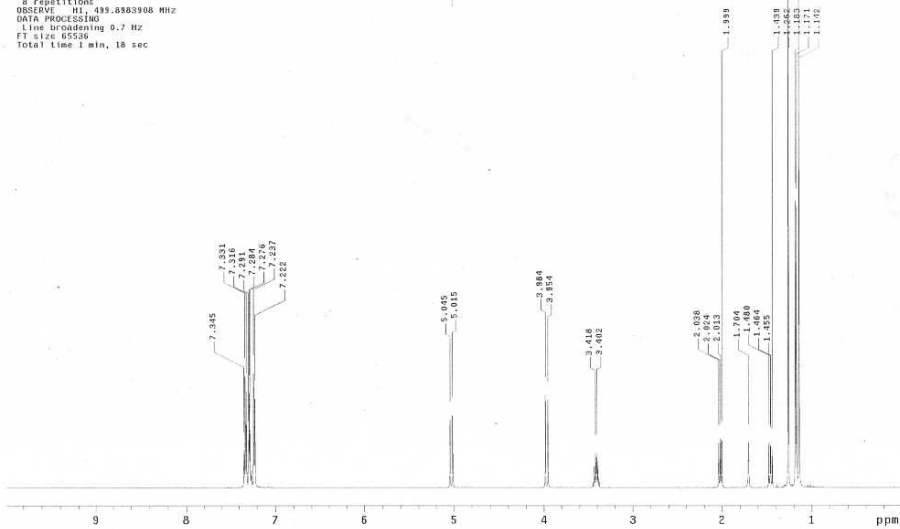
phf471-pg201f10-11

Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 GEMINI-300 "roesy.chem.buffalo.edu"
 Relax. delay 5.000 sec
 Pulse 90.0 degrees
 Acq. time 1.746 sec
 Width 18761.7 Hz
 2556 Repetitions
 OBSERVE C13: 75.4536195 MHz
 DECOUPLE H1: 300.0739431 MHz
 Power 1023 dB
 continuously on
 MALTZ-16 modulated
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 85528
 Total time 19 hr, 27 min, 58 sec



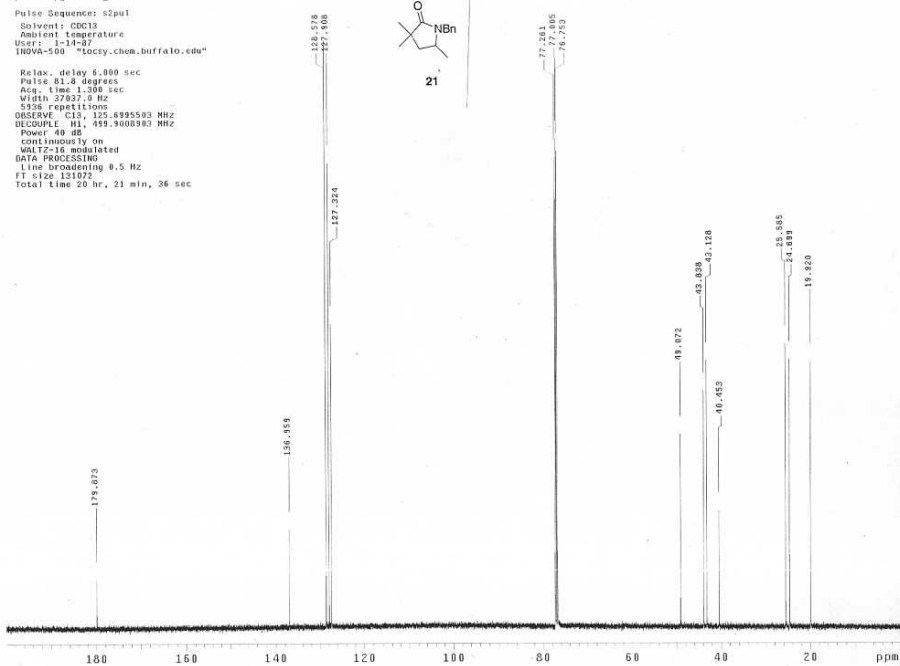
STANDARD PROTON PARAMETERS
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 INOVA-500 *tscy.chem.buffalo.edu*

Relax. delay 2.000 sec
 Pulse 21.0 degrees
 Acq. time 1.691 sec
 Width 19999.0 Hz
 8 repetitions
 OBSERVE H1, 499.8363908 MHz
 DATA PROCESSING
 Line broadening 0.7 Hz
 FT size 65536
 Total time 1 min, 18 sec

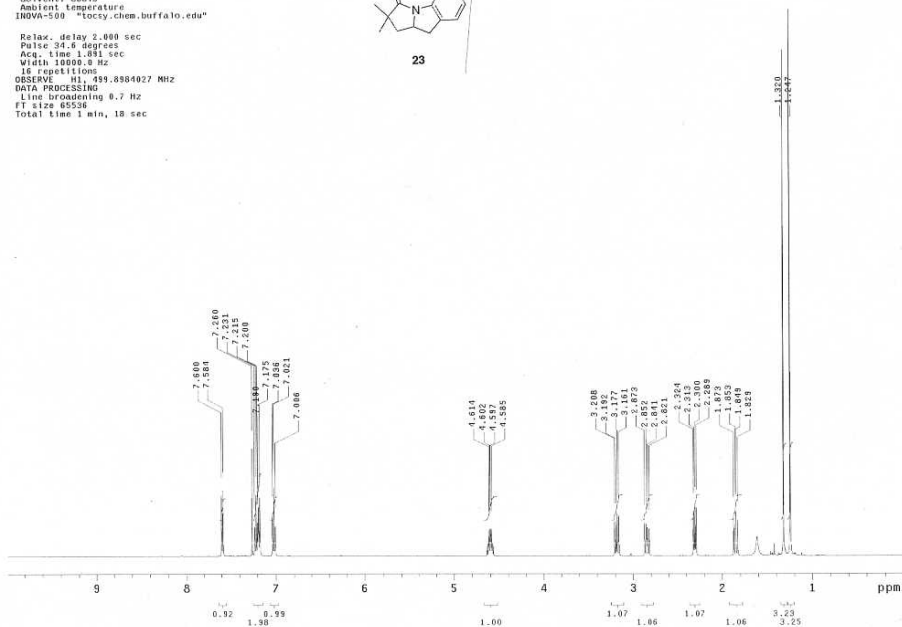
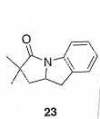


phf471-pg201f8-s_c13
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 User: i-14-87
 INOVA-500 *tscy.chem.buffalo.edu*

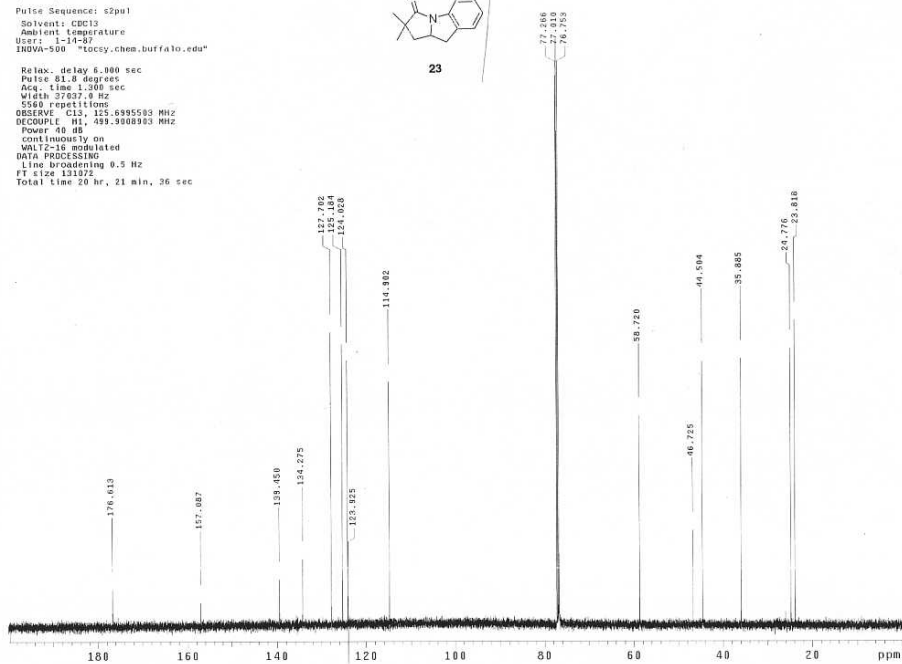
Relax. delay 6.000 sec
 Pulse 81.0 degrees
 Acq. time 1.300 sec
 Width 37927.0 Hz
 5328 repetitions
 OBSERVE C13, 125.8955503 MHz
 DECOUPLE H1, 499.9008903 MHz
 Power 40 dB
 continuously on
 MALTZ-18 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 13192
 Total time 20 hr, 21 min, 36 sec



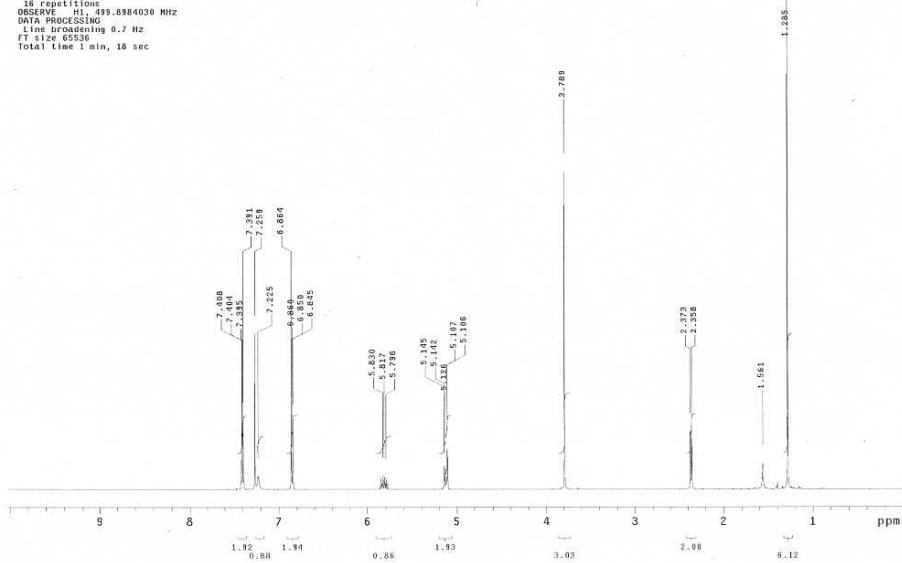
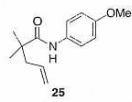
ph518-pg278c1c1
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 INOVA-500 "tccy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 24.4 degrees
 Acq. time 1.031 sec
 Width 10000.0 Hz
 16 repetitions
 OBSERVE H1, 499.8564027 MHz
 DATA PROCESSING
 Line broadening 0.7 Hz
 FT size 65536
 Total time 1 min, 18 sec



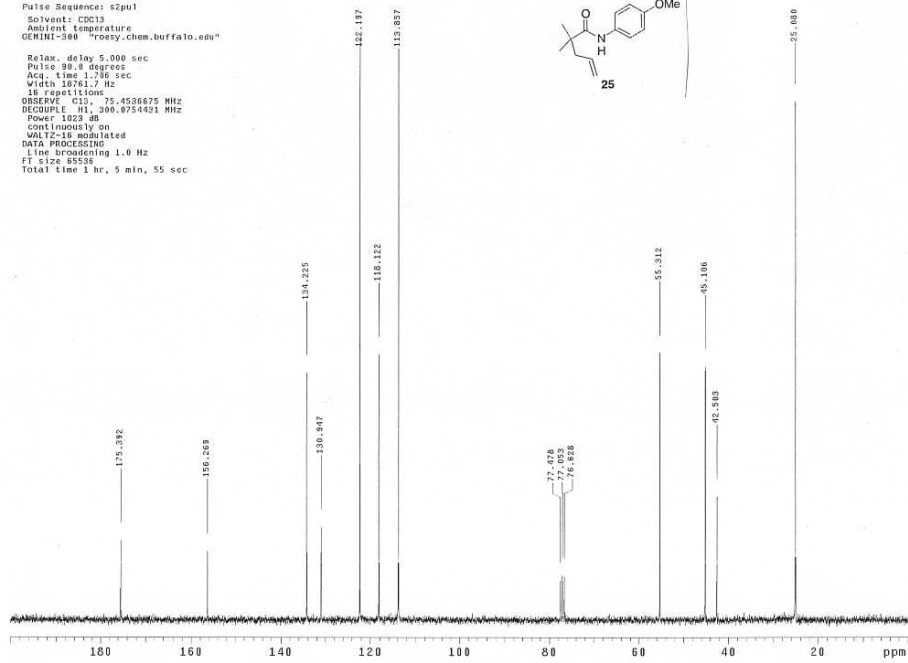
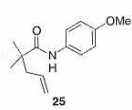
ph518-pg278c1c1_c13
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 User: j-14-87
 INOVA-500 "tccy.chem.buffalo.edu"
 Relax. delay 0.000 sec
 Pulse 81.0 degrees
 Acq. time 1.300 sec
 Width 37007.0 Hz
 5560 repetitions
 OBSERVE C13, 125.695503 MHz
 DECOUPLE H1, 499.990893 MHz
 Power 40 dB
 continuously on
 MLT2-16 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 131172
 Total time 20 hr, 21 min, 36 sec



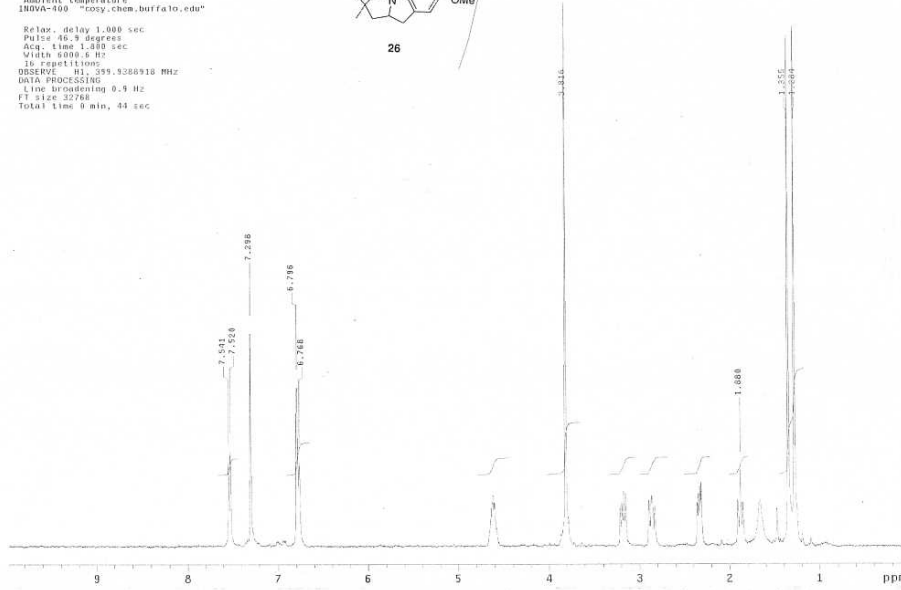
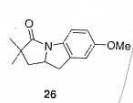
phf561-pg24f17-end
 Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient temperature
 INOVA-500 "roesy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 24.8 degrees
 Acq. time 1.891 sec
 Width 11800.0 Hz
 18 repetitions
 OBSERVE H1, 499.8584030 MHz
 DATA PROCESSING
 Line broadening 0.7 Hz
 FT size 65536
 Total time 1 min, 16 sec



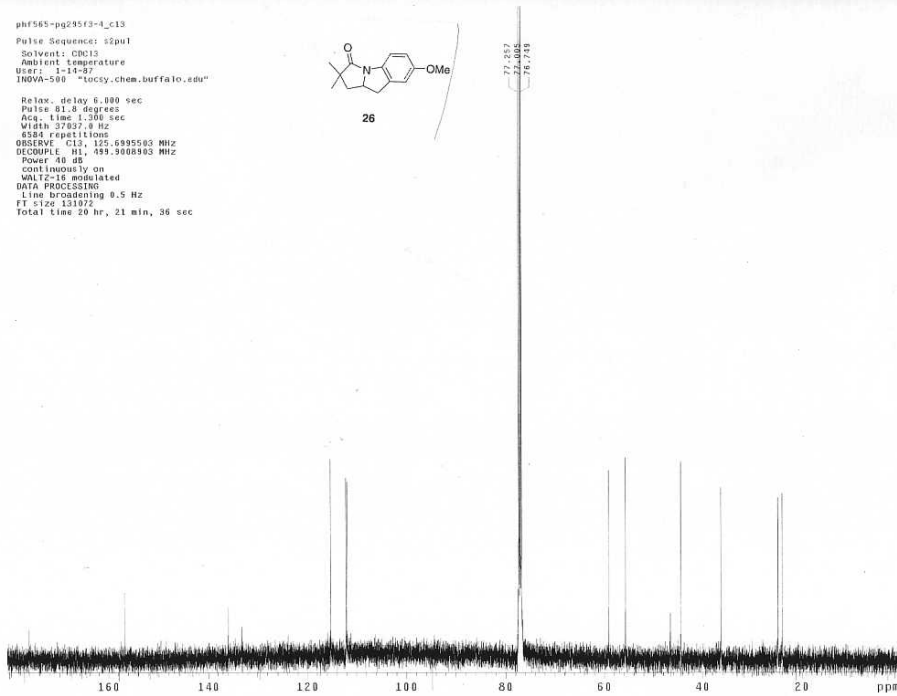
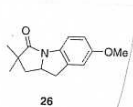
phf561-pg24f17-end_c13
 Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient temperature
 GEMINI-300 "roesy.chem.buffalo.edu"
 Relax. delay 5.000 sec
 Pulse 98.0 degrees
 Acq. time 1.796 sec
 Width 18761.7 Hz
 18 repetitions
 OBSERVE C13, 75.4536675 MHz
 DECOUPLE H1, 300.8754431 MHz
 Power 1023 dB
 Continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 1.0 Hz
 FT size 65536
 Total time 1 hr, 5 min, 55 sec



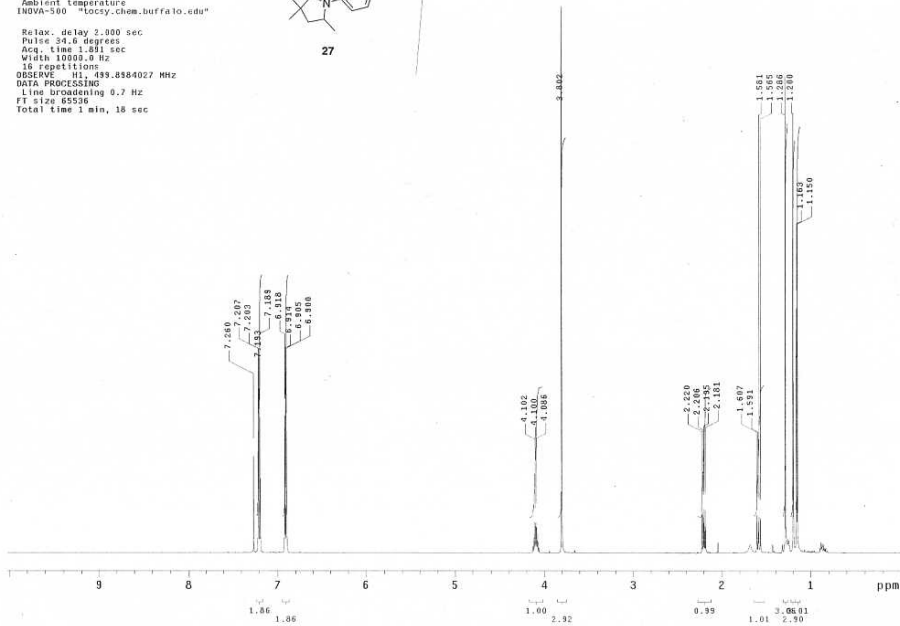
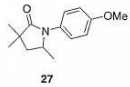
phf565-pg295f1-2
 Pulse Sequence: zgpg30
 Solvent: CDCl3
 Ambient temperature
 INOVA-500 "tocsy.chem.buffalo.edu"
 Relax. delay 1.000 sec
 Pulse 46.3 degrees
 Acq. time 1.480 sec
 Width 6000.6 Hz
 16 repetitions
 OBSERVE H1, 399.5288918 MHz
 DATA PROCESSING
 Line broadening 0.4 Hz
 FI size 32768
 Total time 9 min, 44 sec



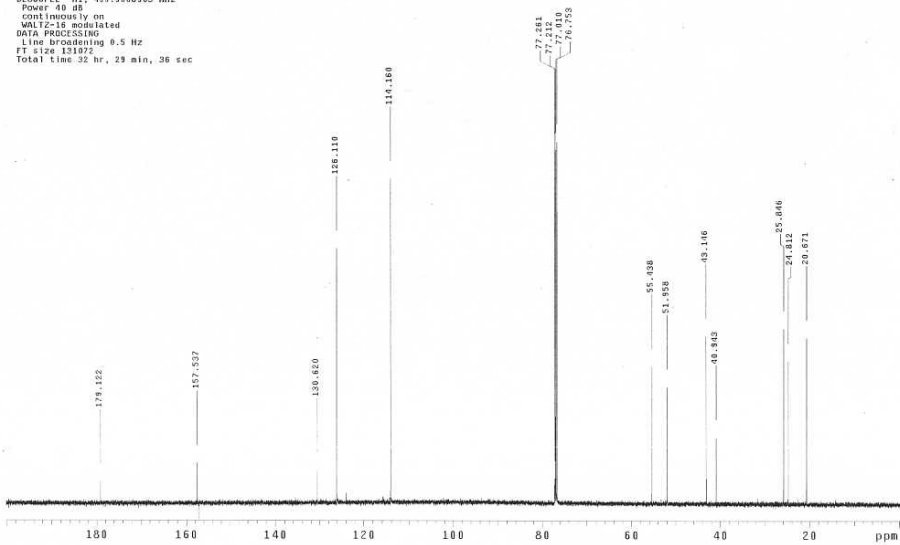
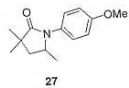
phf565-pg295f3-1-C13
 Pulse Sequence: zgpg30
 Solvent: CDCl3
 Ambient temperature
 Invt: 1-18-97
 INOVA-500 "tocsy.chem.buffalo.edu"
 Relax. delay 6.000 sec
 Pulse 81.8 degrees
 Acq. time 1.300 sec
 Width 37837.8 Hz
 6384 repetitions
 OBSERVE C13, 125.6995583 MHz
 DECOUPLE H1, 399.5089583 MHz
 Power 48 dB
 continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FI size 131072
 Total time 20 hr, 21 min, 36 sec

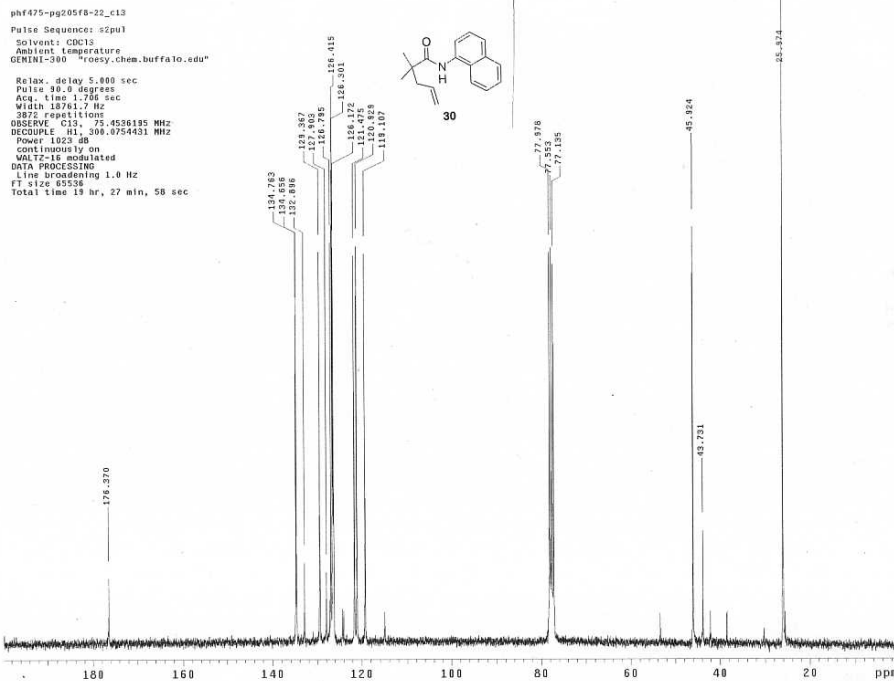
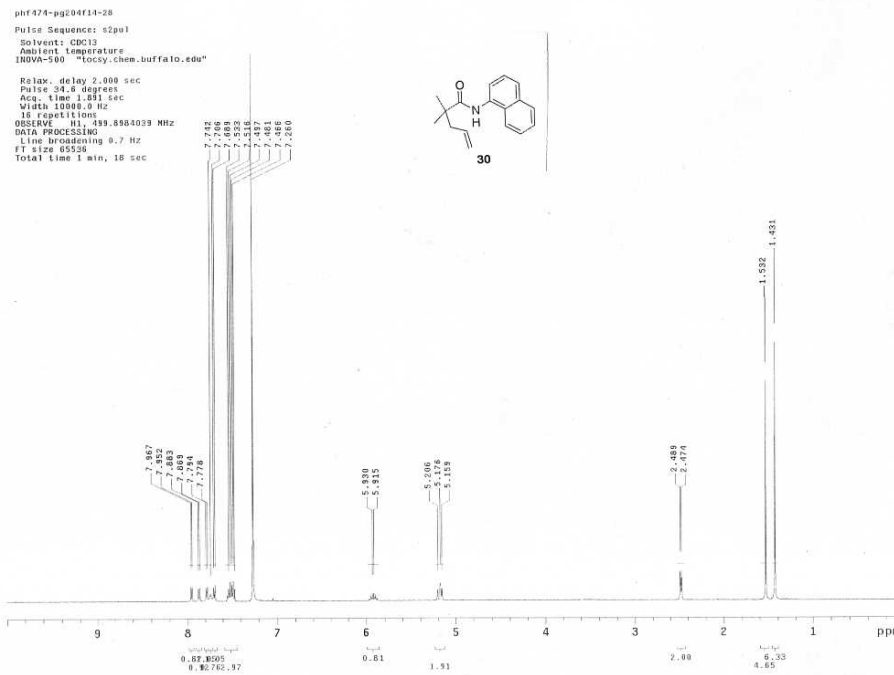


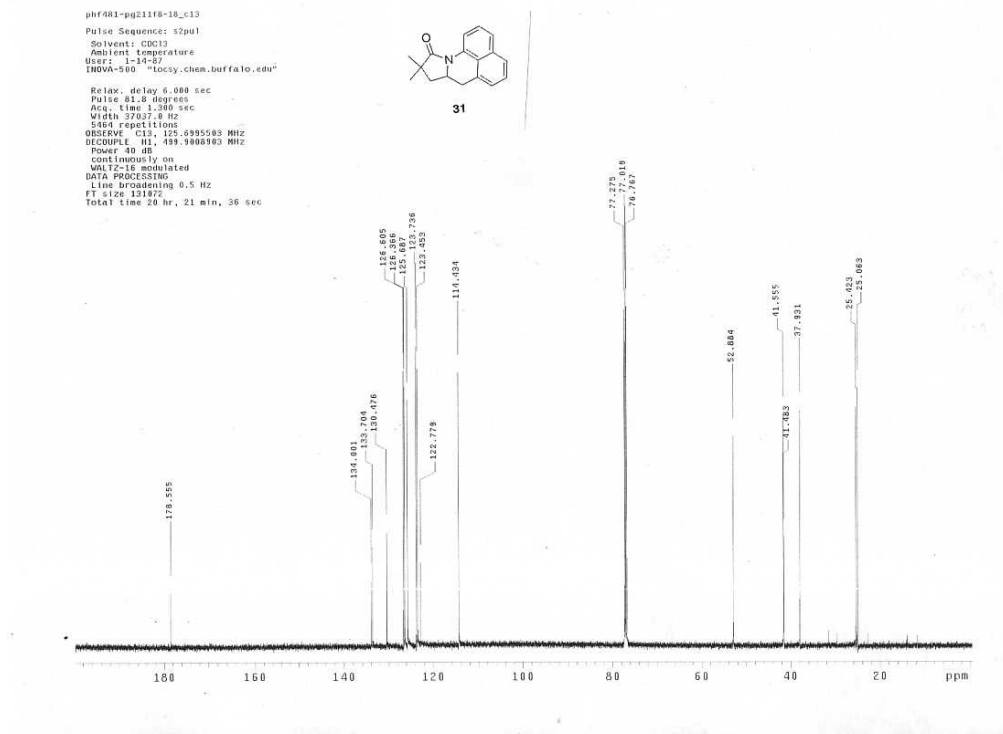
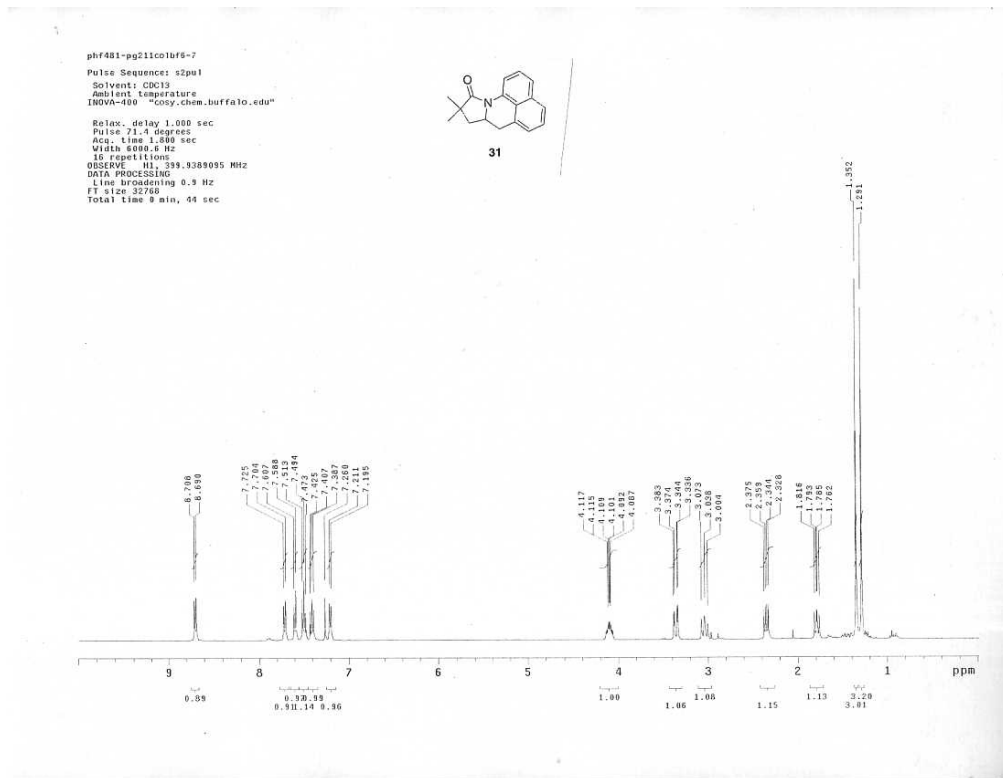
phf583-pg23c0bf1_c13
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 INOVA-300 "tccy.chm.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 24.6 degrees
 Acq. time 1.691 sec
 Width 10000.0 Hz
 18 repetitions
 OBSERVE H1, 499.8384027 MHz
 DATA PROCESSING
 Line broadening 0.7 Hz
 FT size 65536
 Total time 1 min, 18 sec

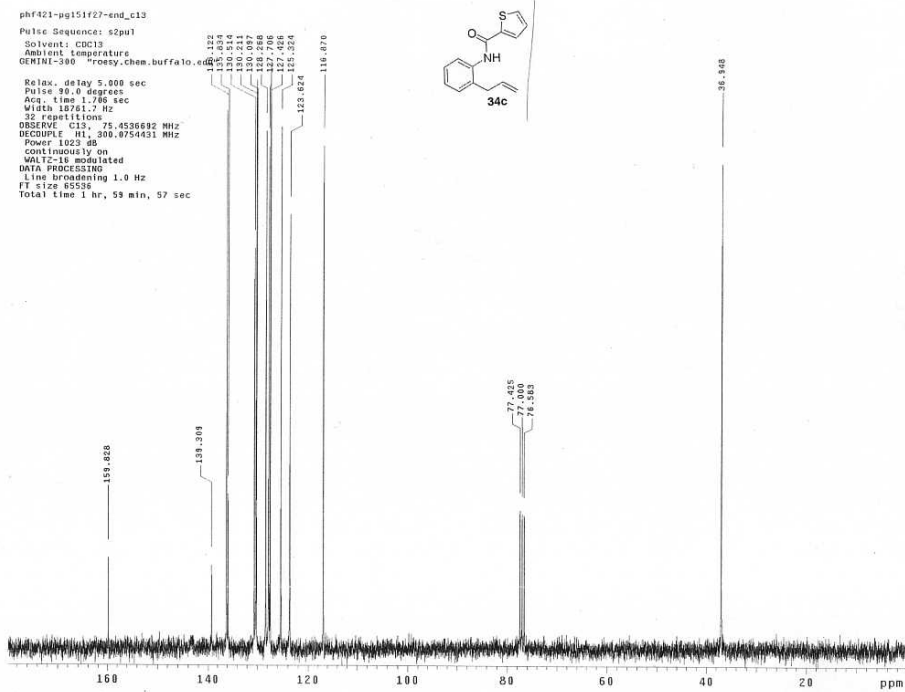
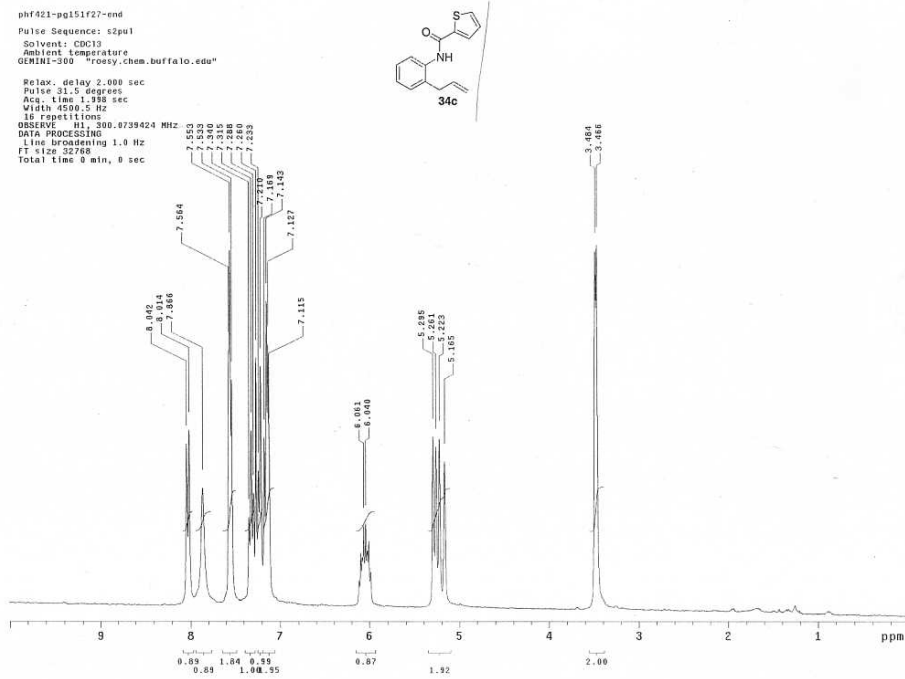


STANDARD CARBON PARAMETERS
 Pulse Sequence: s2pul
 Solvent: CDCl3
 Ambient Temperature
 User: j-14-87
 INOVA-300 "tccy.chm.buffalo.edu"
 Relax. delay 6.000 sec
 Pulse 81.8 degrees
 Acq. time 1.300 sec
 Width 27927.0 Hz
 8778 repetitions
 OBSERVE C13, 125.6395503 MHz
 DECOUPLE H1, 499.9808903 MHz
 Power 48 dB
 continuous on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 131972
 Total time 32 hr, 29 min, 36 sec

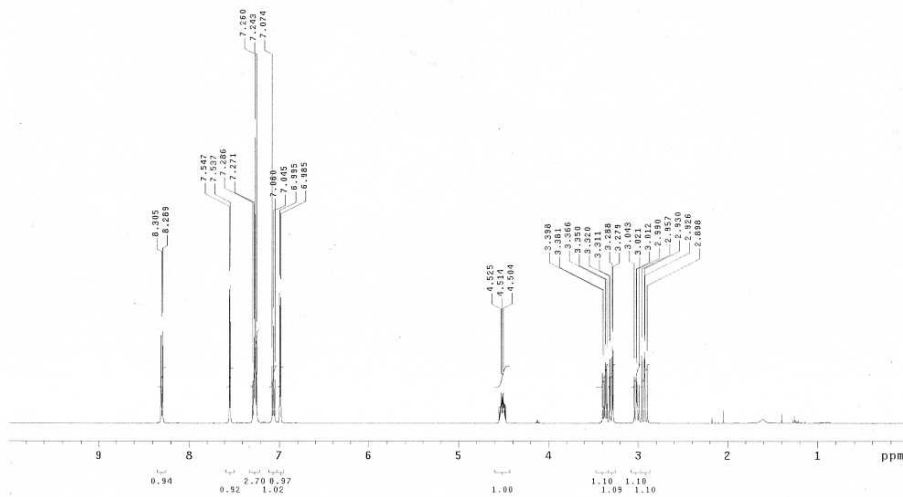
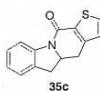








phf424-pg154colbf7-8
 Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient Temperature
 INOVA-500 "tocsy.chem.buffalo.edu"
 Relax. delay 2.000 sec
 Pulse 24.6 degrees
 Acq. time 1.891 sec
 Width 10000.0 Hz
 IS repetitions
 OBSERVE H1, 499.8984030 MHz
 DATA PROCESSING
 Line broadening 0.7 Hz
 FT size 85536
 Total time 1 min, 15 sec



phf424-pg124colbf7-8_c13
 Pulse Sequence: s2pu1
 Solvent: CDCl3
 Ambient Temperature
 Users: 1-11-87
 INOVA-500 "tocsy.chem.buffalo.edu"
 Relax. delay 6.000 sec
 Pulse 81.0 degrees
 Acq. time 1.360 sec
 Width 37007.0 Hz
 6128 repetitions
 OBSERVE C13, 125.6685503 MHz
 DECOUPLE H1, 499.9008903 MHz
 Power 40 dB
 continuously on
 WALTZ-16 modulated
 DATA PROCESSING
 Line broadening 0.5 Hz
 FT size 131022
 Total time 20 hr, 21 min, 36 sec

