

Regioselective α -arylation of coumarins and 2-pyridones with phenylhydrazines under transition-metal-free condition

Parul Chauhan,^a Makthala Ravi,^a Shikha Singh,^a Prashant Prajapati,^b Prem. P. Yadav*^a

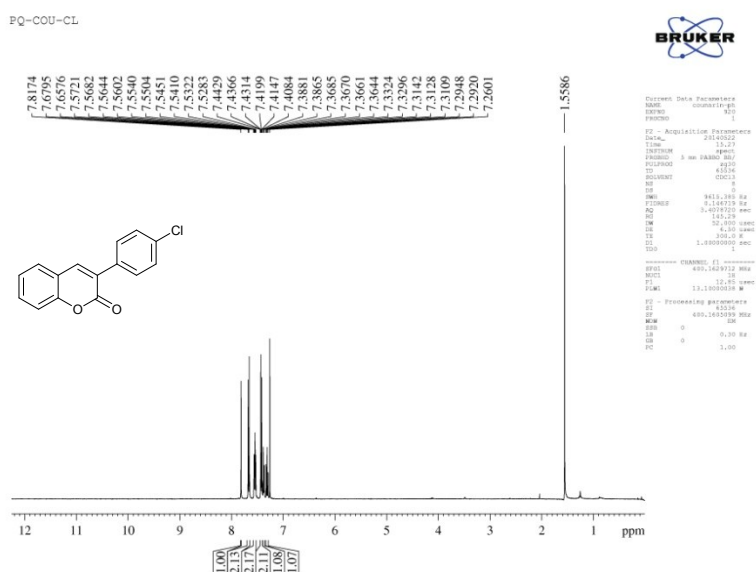
^a*Divisions of Medicinal and Process Chemistry, CSIR-Central Drug Research Institute, Lucknow- 226001, India.*

^b*National Institute of Pharmaceutical Education and Research, Raebareli, India-229010.*

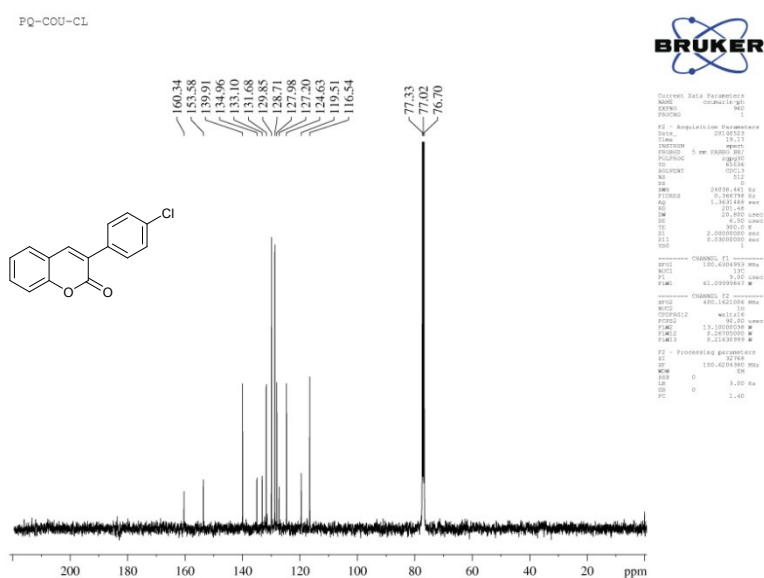
Table of Contents

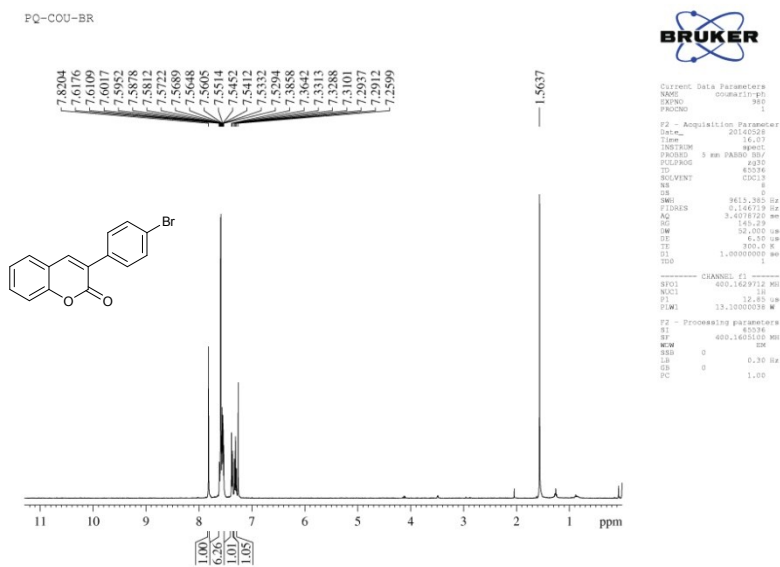
1. Copies of ^1H and ^{13}C NMR spectra	2-40
--	-------------

PQ-COU-CL

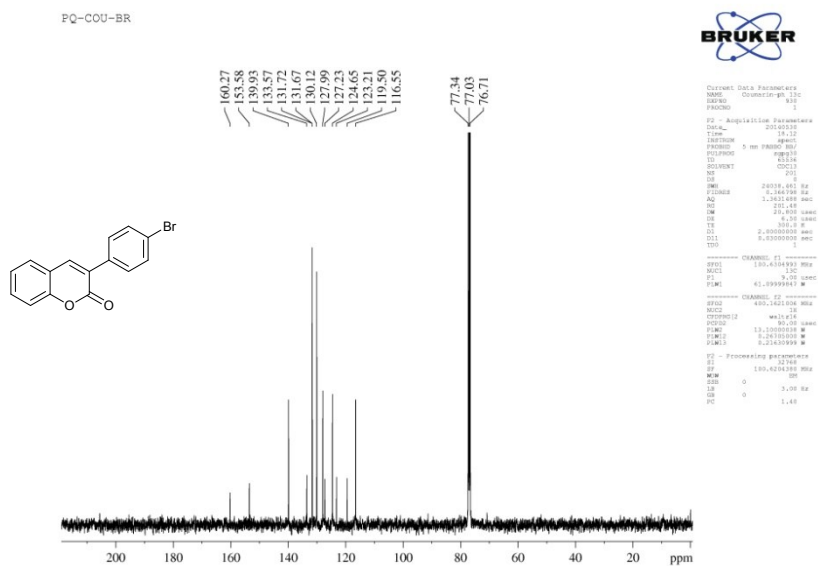
¹H NMR Spectra of (3a) (400 MHz, CDCl₃)

PQ-COU-CL

¹³C NMR Spectra of (3a) (100 MHz, CDCl₃)

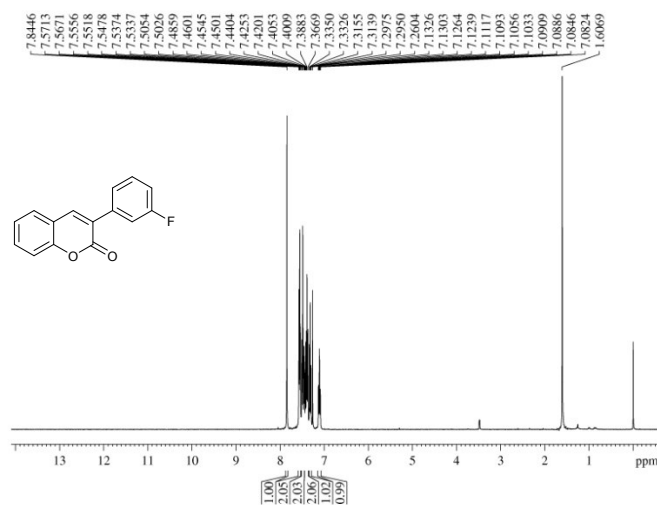


¹H NMR Spectra of **(3b)** (400 MHz, CDCl₃)



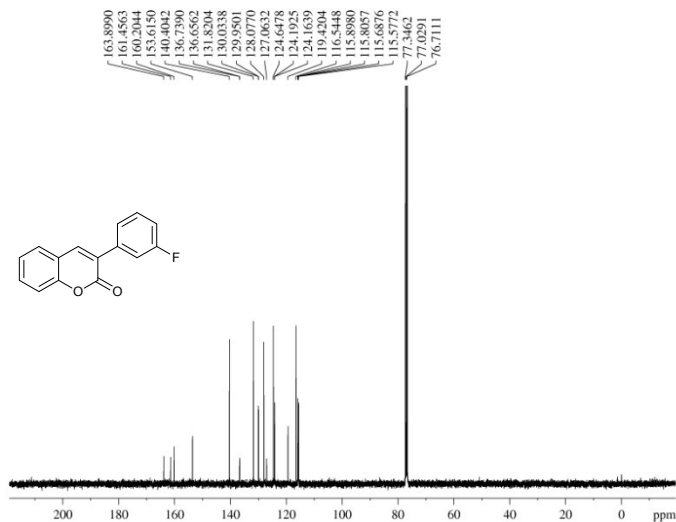
¹³C NMR Spectra of **(3b)** (100 MHz, CDCl₃)

PQ-COU-3F

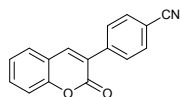


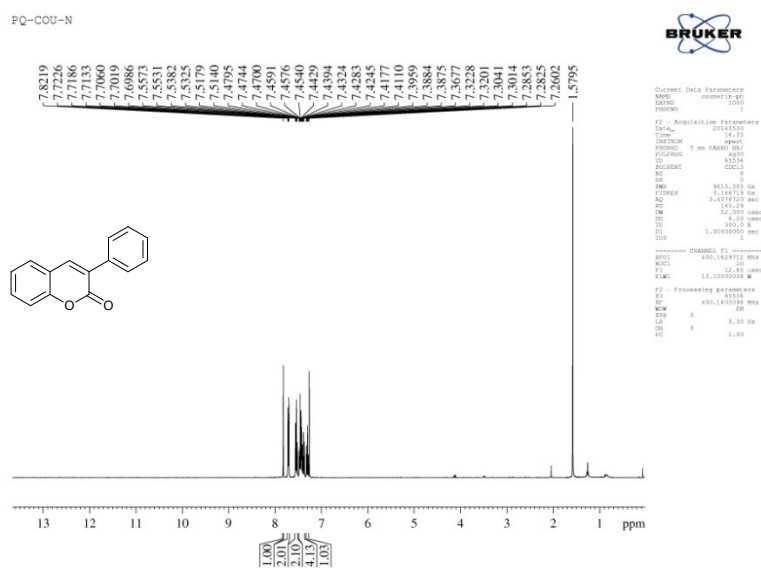
¹H NMR Spectra of (**3d**) (400 MHz, CDCl₃)

PQ-COU-3F

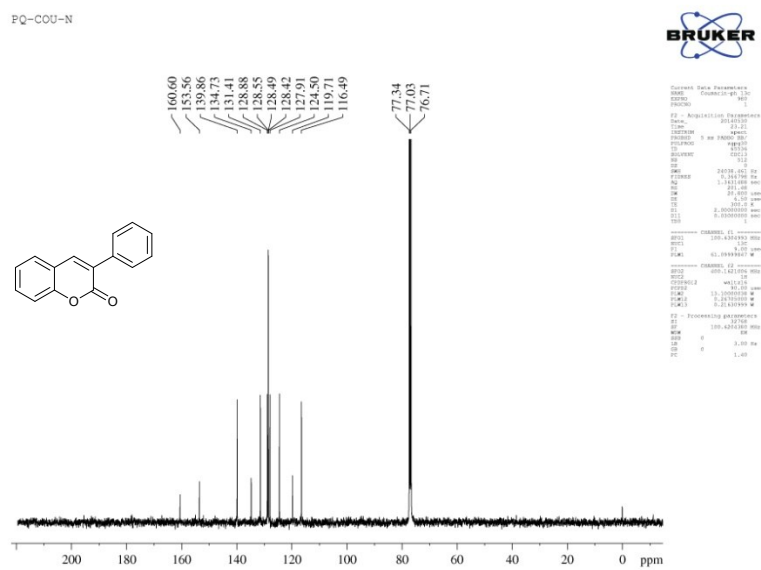


¹³C NMR Spectra of (**3d**) (100 MHz, CDCl₃)

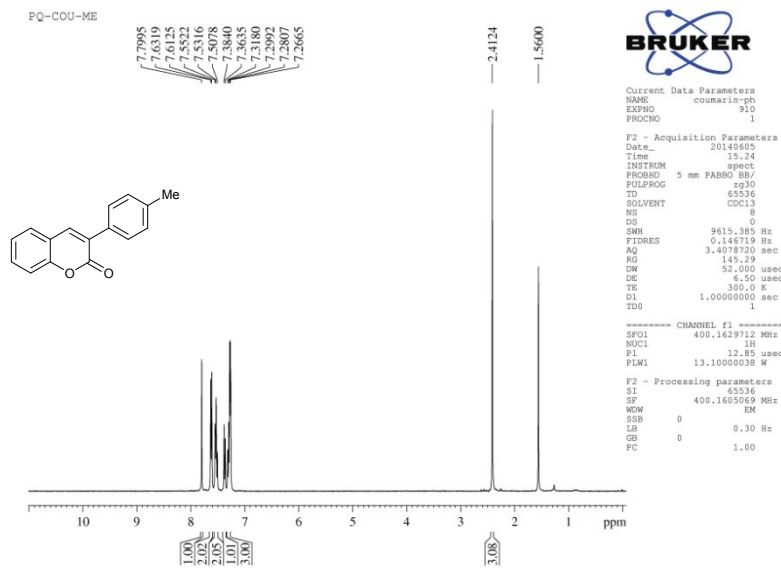




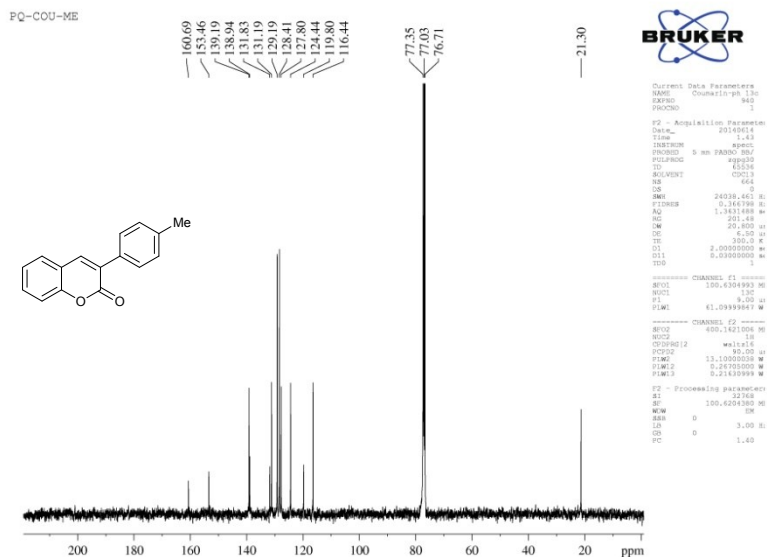
¹H NMR Spectra of (**3f**) (400 MHz, CDCl₃)



¹³C NMR Spectra of (**3f**) (100 MHz, CDCl₃)

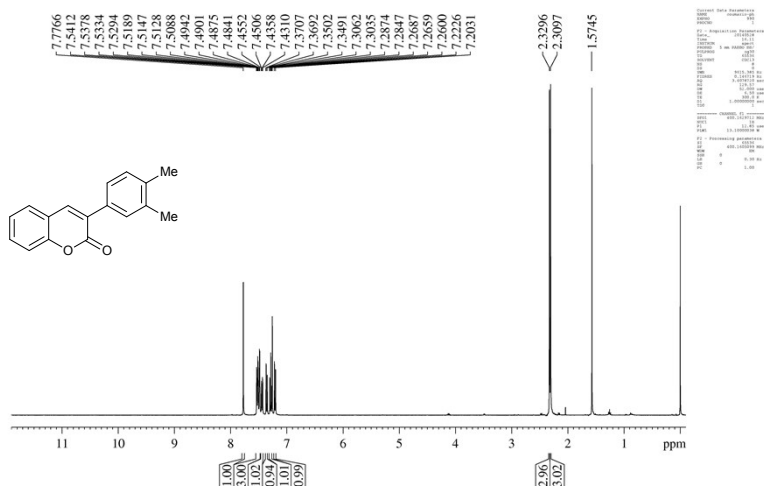


¹H NMR Spectra of (**3g**) (400 MHz, CDCl₃)



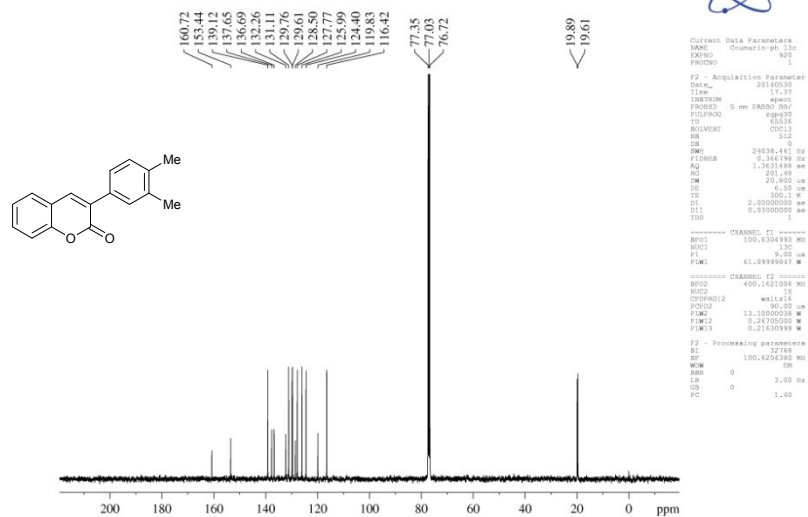
¹³C NMR Spectra of (**3g**) (100 MHz, CDCl₃)

PQ-COU-DIME

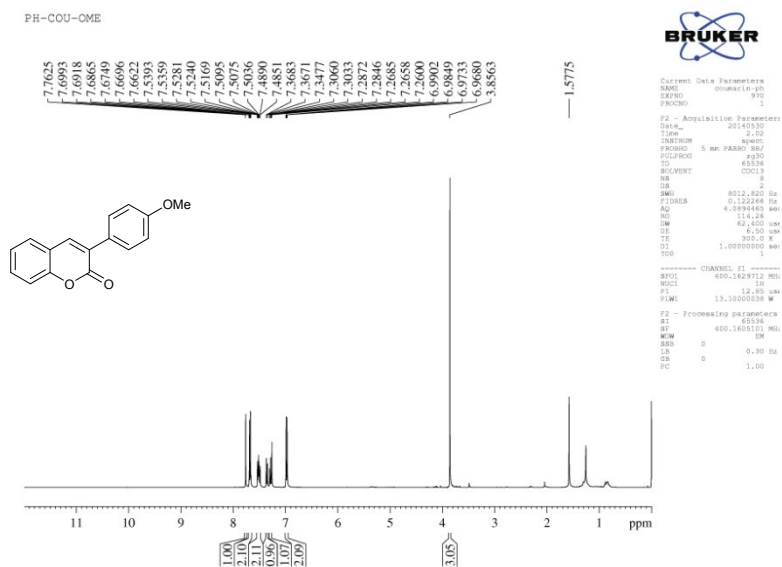


¹H NMR Spectra of (**3h**) (400 MHz, CDCl₃)

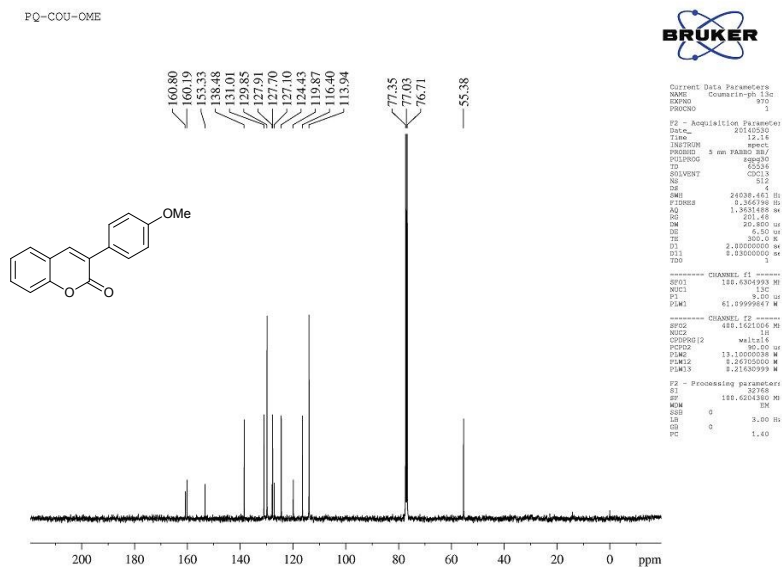
PQ-COU-DIME



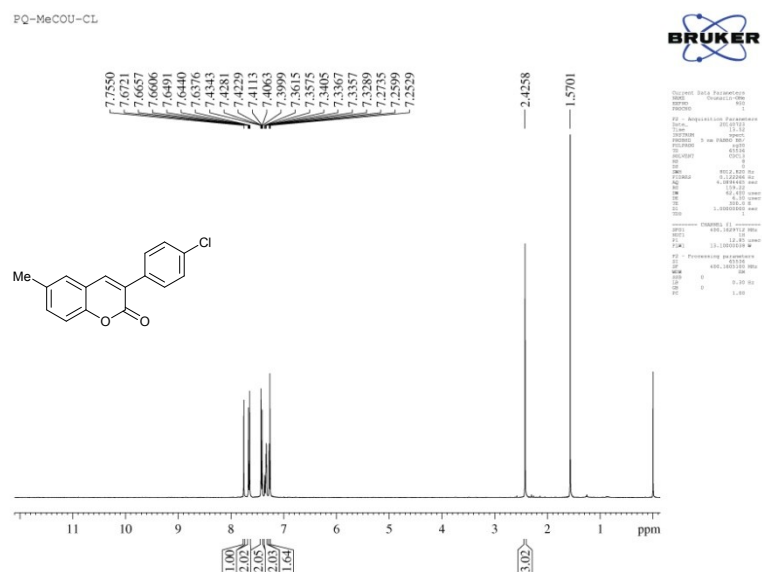
¹³C NMR Spectra of (**3h**) (100 MHz, CDCl₃)



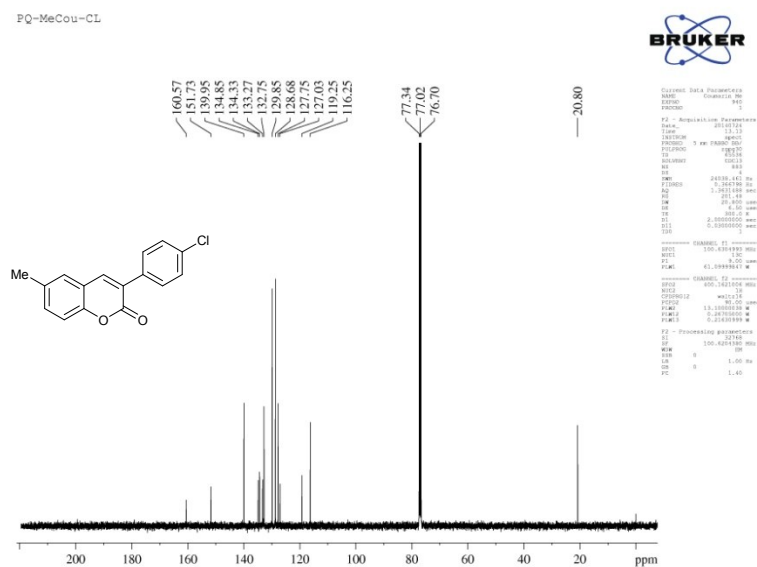
¹H NMR Spectra of (3i) (400 MHz, CDCl₃)



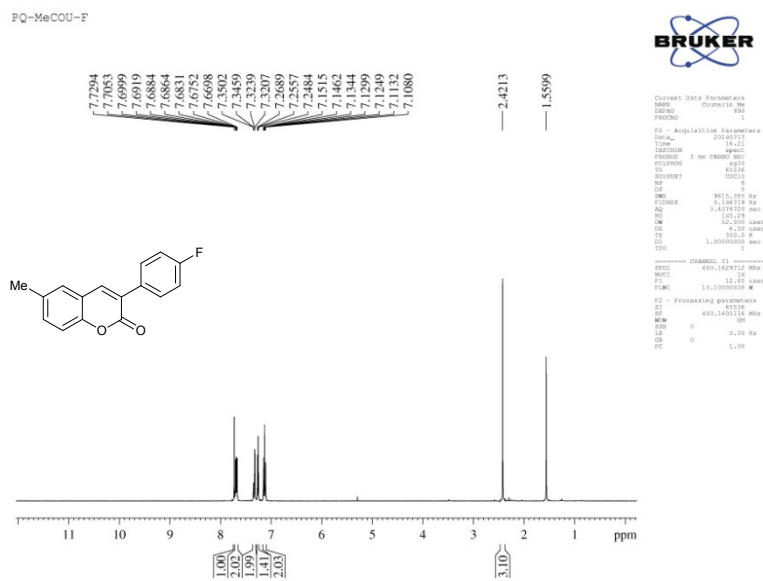
¹³C NMR Spectra of (3i) (100 MHz, CDCl₃)



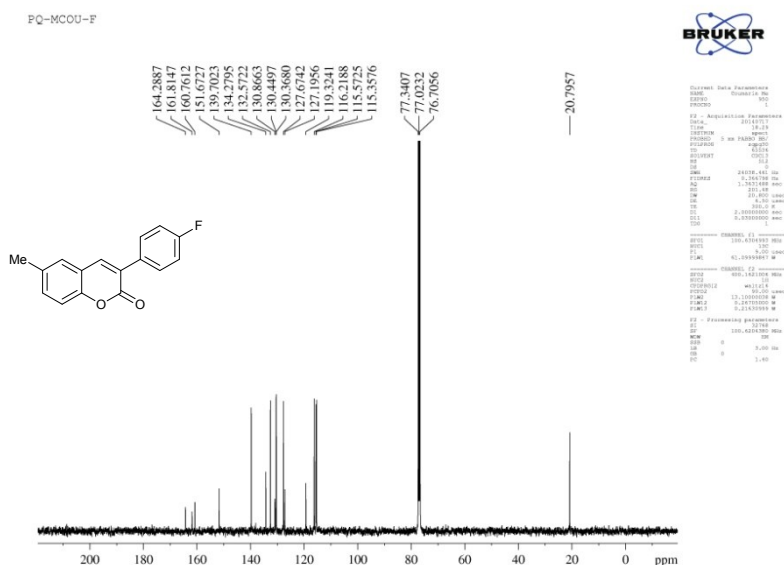
¹H NMR Spectra of **(3j)** (400 MHz, CDCl₃)



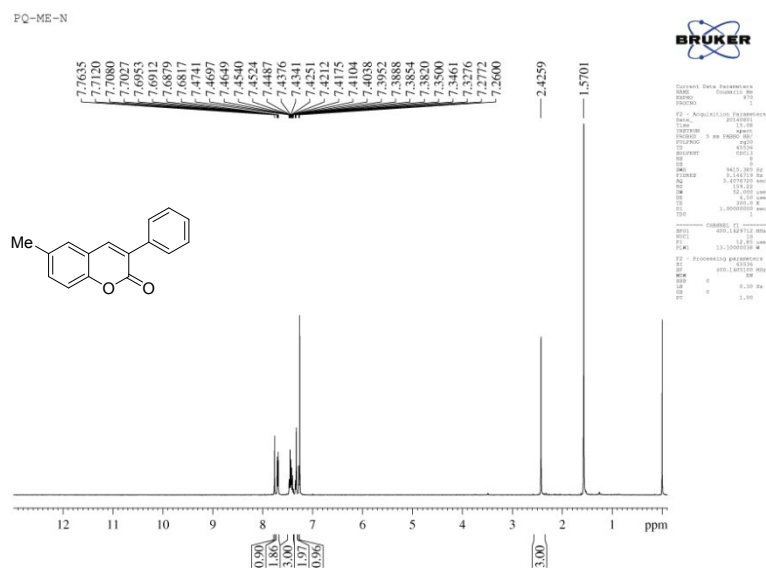
¹³C NMR Spectra of **(3j)** (100 MHz, CDCl₃)



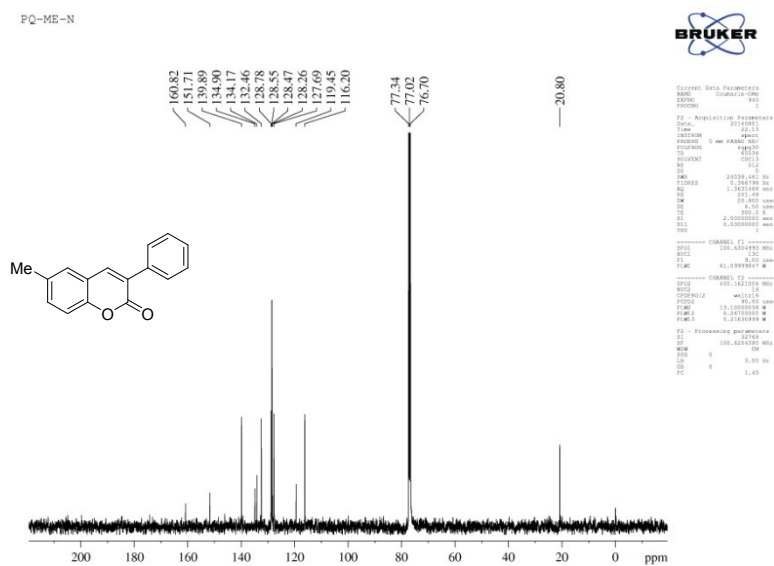
¹H NMR Spectra of (**3k**) (400 MHz, CDCl₃)



¹³C NMR Spectra of (**3k**) (100 MHz, CDCl₃)

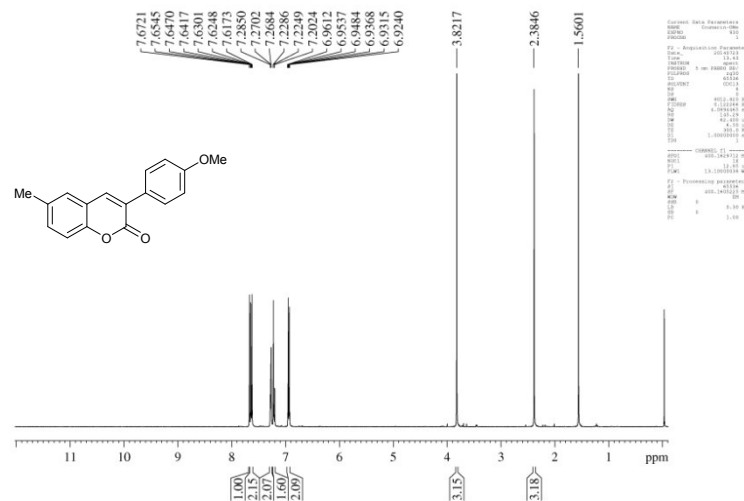


¹H NMR Spectra of (3I) (400 MHz, CDCl₃)



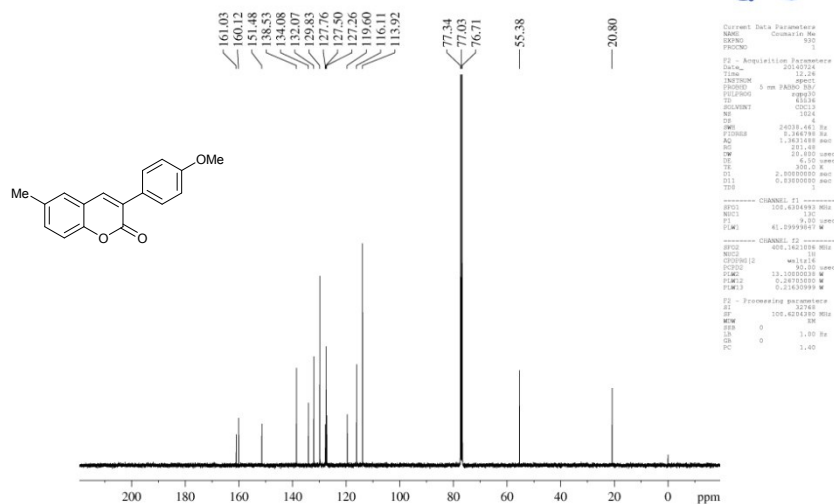
¹³C NMR Spectra of (3I) (100 MHz, CDCl₃)

PQ-MECON-OME



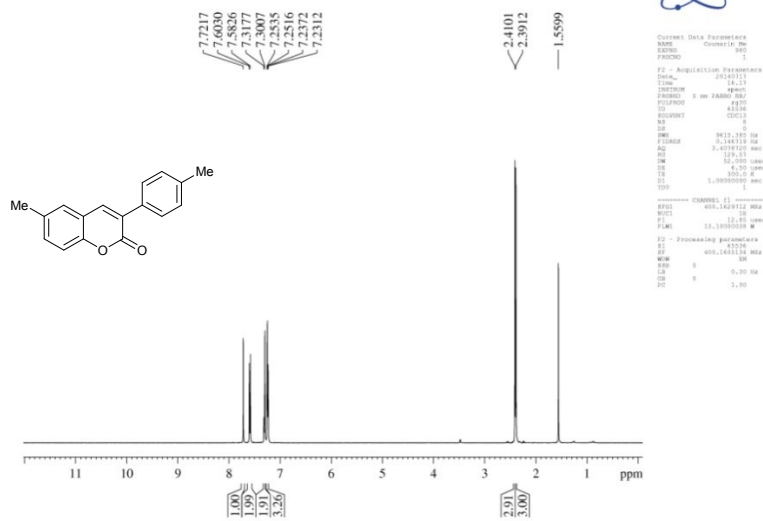
¹H NMR Spectra of **(3m)** (400 MHz, CDCl₃)

PQ-MECON-OME



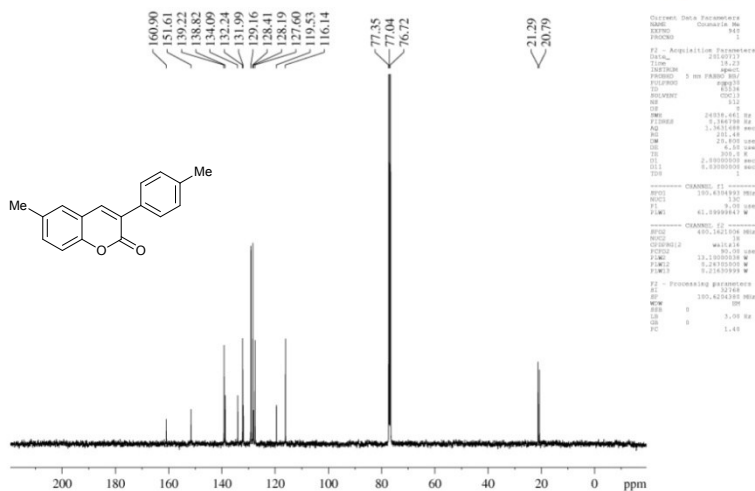
¹³C NMR Spectra of **(3m)** (100 MHz, CDCl₃)

PQ-MCOU-ME

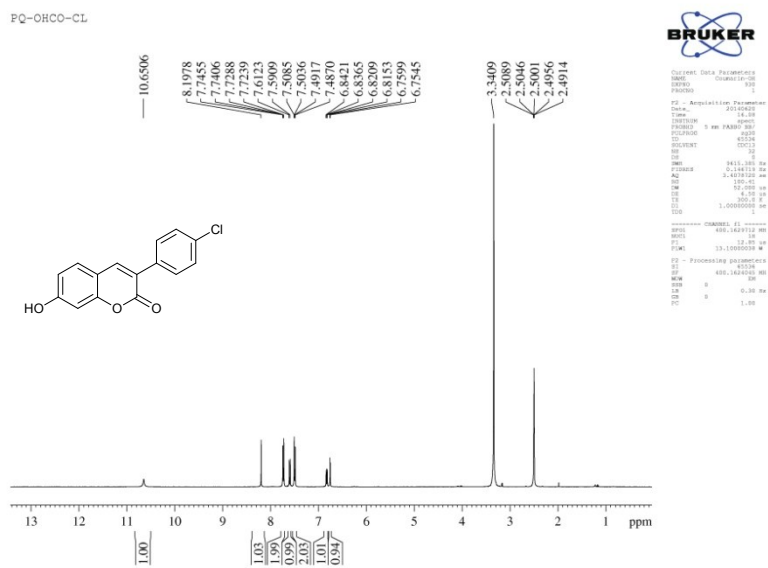


¹H NMR Spectra of (**3n**) (400 MHz, CDCl₃)

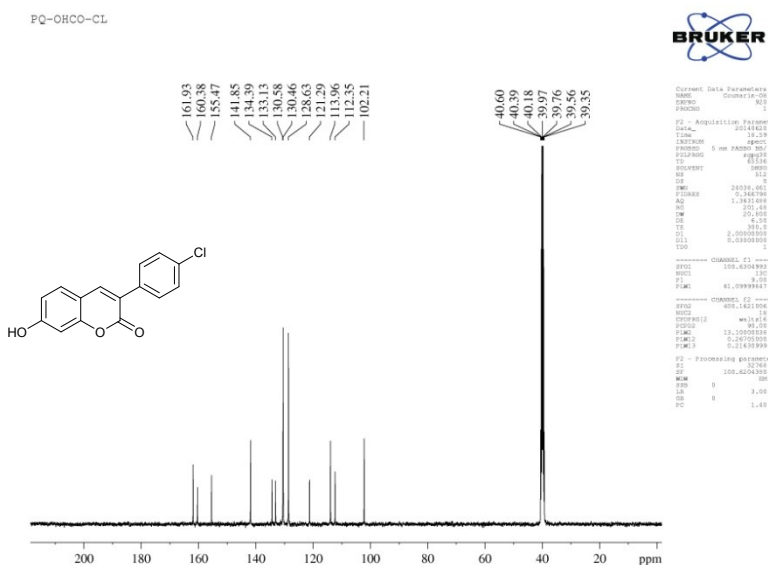
PQ-MCOU-ME



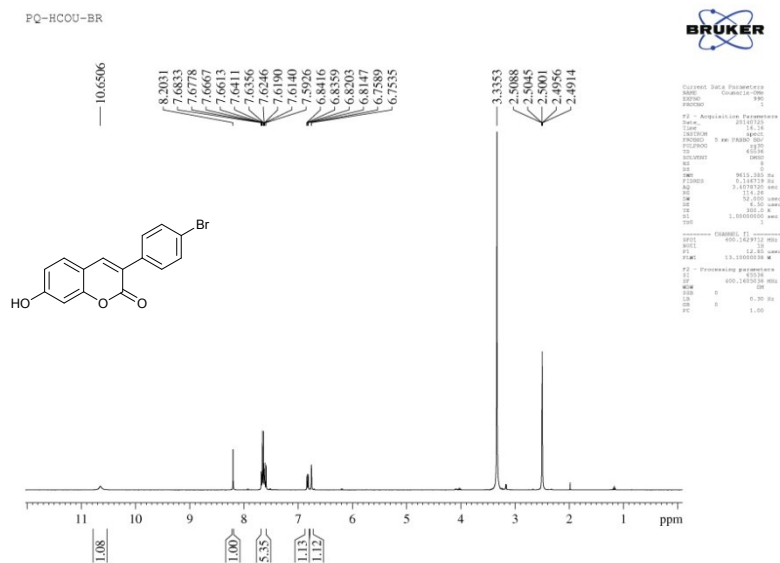
¹³C NMR Spectra of (**3n**) (100 MHz, CDCl₃)



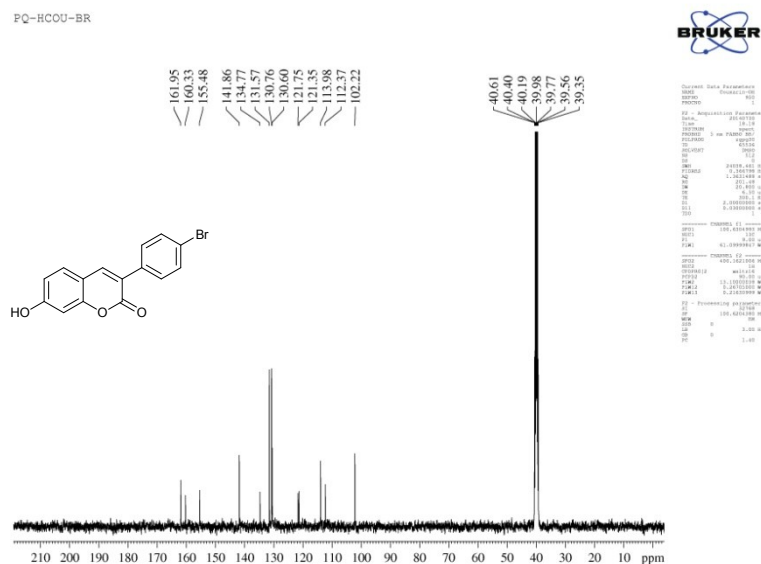
¹H NMR Spectra of (**3o**) (400 MHz, DMSO-*d*₆)



¹³C NMR Spectra of (**3o**) (100 MHz, DMSO-*d*₆)

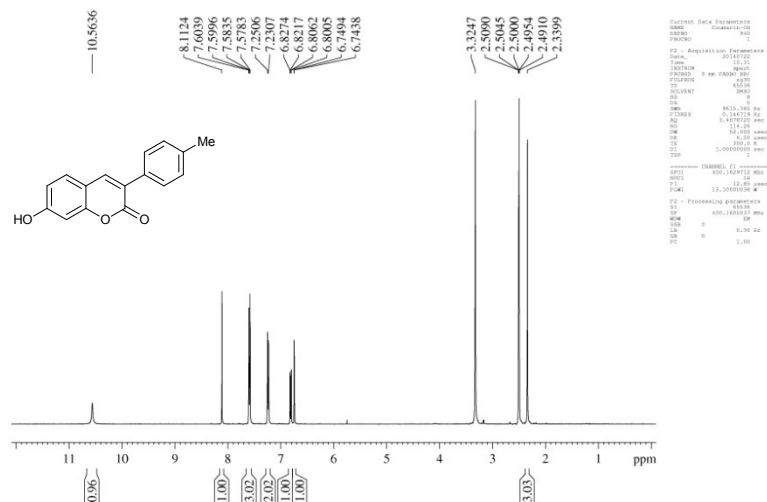


¹H NMR Spectra of (**3q**) (400 MHz, DMSO-*d*₆)



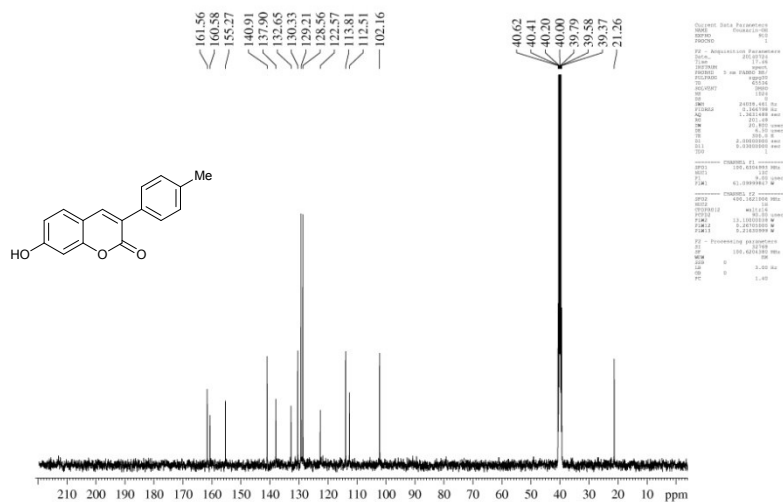
¹³C NMR Spectra of (**3q**) (100 MHz, DMSO-*d*₆)

PQ-HCOU-ME



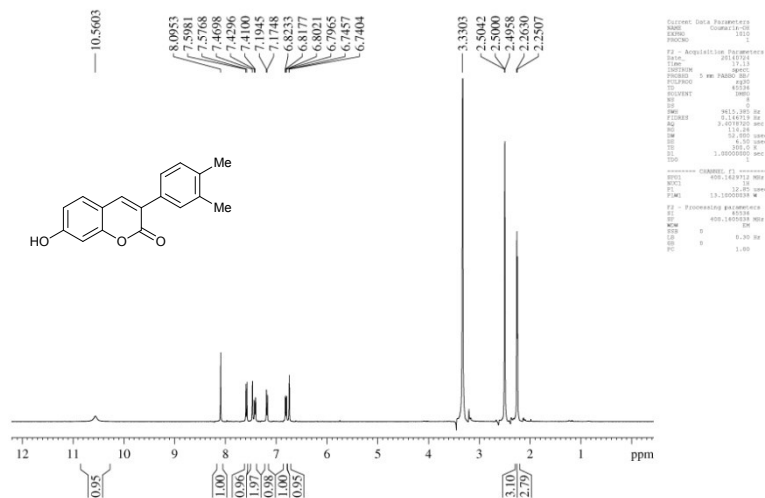
¹H NMR Spectra of (**3s**) (400 MHz, DMSO-*d*₆)

PQ-HCOU-ME



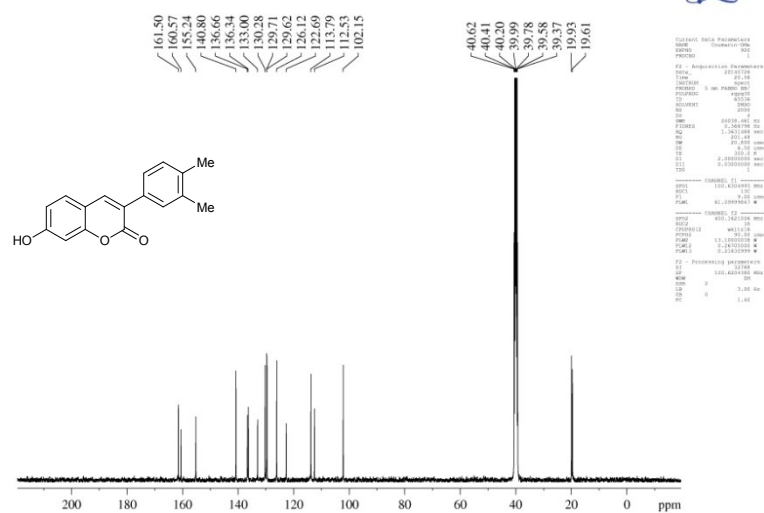
¹³C NMR Spectra of (**3s**) (100 MHz, DMSO-*d*₆)

PQ-HCOU-DIME



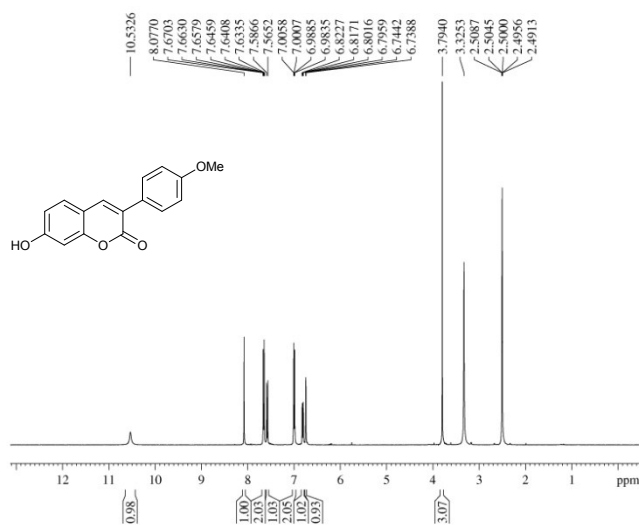
¹H NMR Spectra of (**3t**) (400 MHz, DMSO-*d*₆)

PQ-HCOU-DIME



¹³C NMR Spectra of (**3t**) (100 MHz, DMSO-*d*₆)

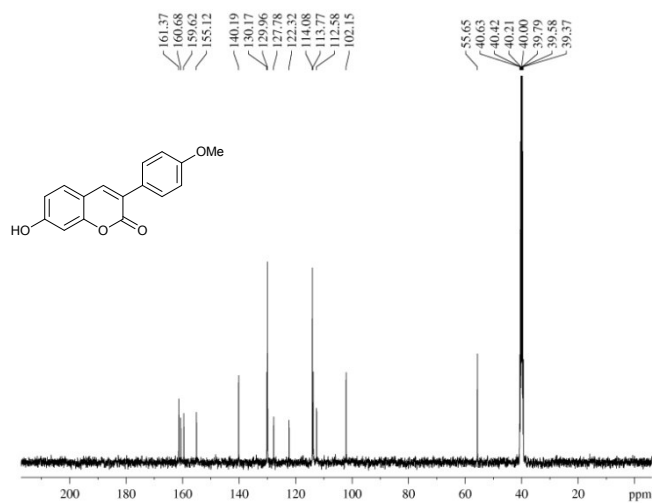
PQ-HCOU-OMe



Current Data Parameters
NAME: Coumarin-3u
EXPNO: 1
PROCNO: 1
F2 - Acquisition Parameters
Date_ : 20140124
Time: 12.11
INSTRUM: spect
PROBHD: 5 mm PABBO BBO
PULPROG: zgpg30
SOLVENT: DMSO
NS: 6
DS: 4
SWH: 9411.180 Hz
FIDRES: 0.146111 Hz
AQ: 3.4787120 sec
RG: 327.50
WDW: EM
SSB: 0
LB: 30.00 Hz
GB: 0
PC: 1.80000000 sec
===== CHANNEL f1 =====
NUC1: 1H
P1: 12.00
PL1: 0.00 dB
F1(M): 500.1360910 MHz
===== CHANNEL f2 =====
NAME: Coumarin-3u
EXPNO: 1
PROCNO: 1
F2 - Acquisition Parameters
Date_ : 20140124
Time: 12.11
INSTRUM: spect
PROBHD: 5 mm PABBO BBO
PULPROG: zgpg30
SOLVENT: DMSO
NS: 6
DS: 4
SWH: 9411.180 Hz
FIDRES: 0.146111 Hz
AQ: 3.4787120 sec
RG: 327.50
WDW: EM
SSB: 0
LB: 30.00 Hz
GB: 0
PC: 1.80000000 sec
===== CHANNEL f1 =====
NUC1: 1H
P1: 12.00
PL1: 0.00 dB
F1(M): 500.1360910 MHz
===== CHANNEL f2 =====
NAME: Coumarin-3u
EXPNO: 1
PROCNO: 1
F2 - Acquisition Parameters
Date_ : 20140124
Time: 12.11
INSTRUM: spect
PROBHD: 5 mm PABBO BBO
PULPROG: zgpg30
SOLVENT: DMSO
NS: 6
DS: 4
SWH: 9411.180 Hz
FIDRES: 0.146111 Hz
AQ: 3.4787120 sec
RG: 327.50
WDW: EM
SSB: 0
LB: 30.00 Hz
GB: 0
PC: 1.80000000 sec

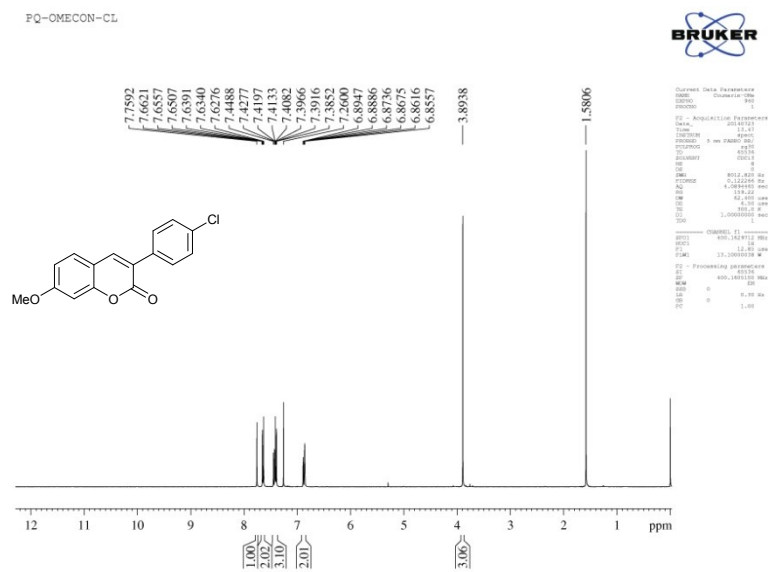
¹H NMR Spectra of (**3u**) (400 MHz, DMSO-*d*₆)

PQ-HCOU-OMe

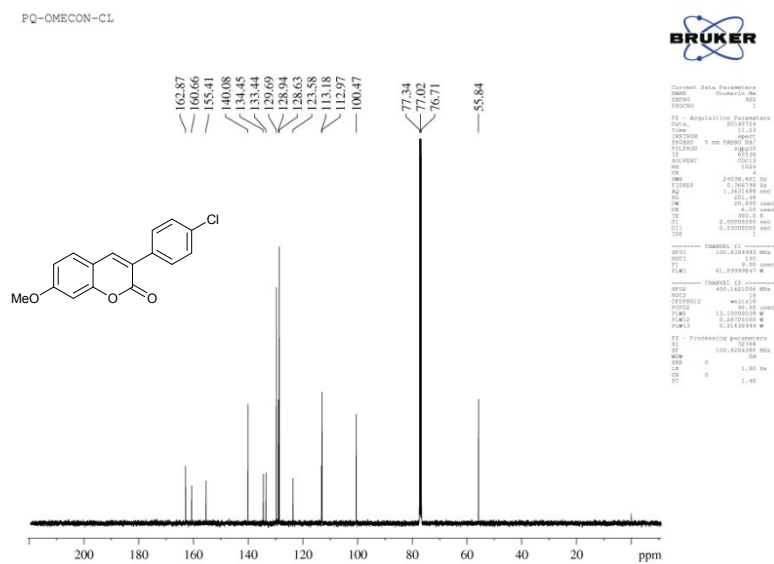


Current Data Parameters
NAME: Coumarin-3u
EXPNO: 1
PROCNO: 1
F2 - Acquisition Parameters
Date_ : 20140124
Time: 12.11
INSTRUM: spect
PROBHD: 5 mm PABBO BBO
PULPROG: zgpg30
SOLVENT: DMSO
NS: 6
DS: 4
SWH: 20018.467 Hz
FIDRES: 0.146111 Hz
AQ: 3.4787120 sec
RG: 327.50
WDW: EM
SSB: 0
LB: 30.00 Hz
GB: 0
PC: 1.80000000 sec
===== CHANNEL f1 =====
NUC1: 13C
P1: 9.00
PL1: 0.00 dB
F1(M): 100.6261890 MHz
===== CHANNEL f2 =====
NAME: Coumarin-3u
EXPNO: 1
PROCNO: 1
F2 - Acquisition Parameters
Date_ : 20140124
Time: 12.11
INSTRUM: spect
PROBHD: 5 mm PABBO BBO
PULPROG: zgpg30
SOLVENT: DMSO
NS: 6
DS: 4
SWH: 20018.467 Hz
FIDRES: 0.146111 Hz
AQ: 3.4787120 sec
RG: 327.50
WDW: EM
SSB: 0
LB: 30.00 Hz
GB: 0
PC: 1.80000000 sec

¹³C NMR Spectra of (**3u**) (100 MHz, DMSO-*d*₆)

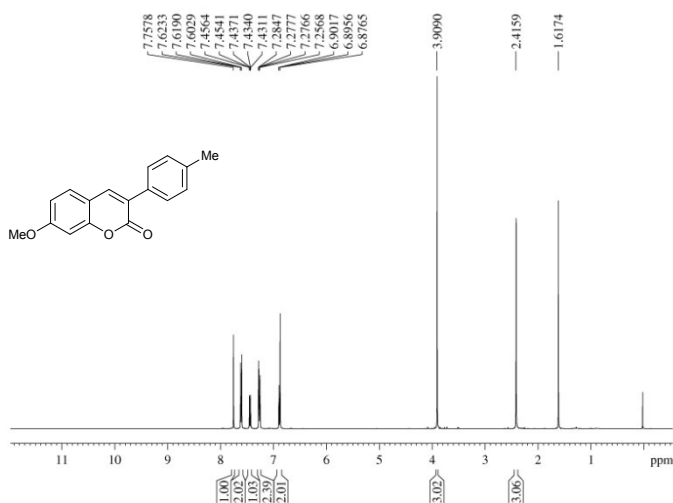


¹H NMR Spectra of (**3v**) (400 MHz, CDCl₃)



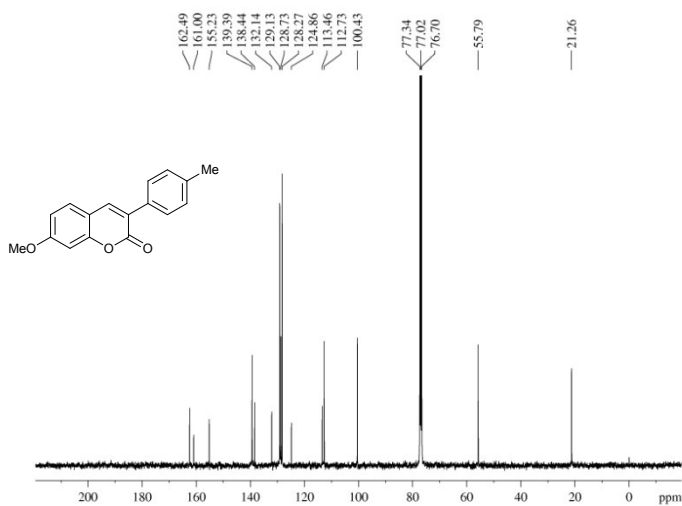
¹³C NMR Spectra of (**3v**) (400 MHz, CDCl₃)

PQ-OMECOU-ME



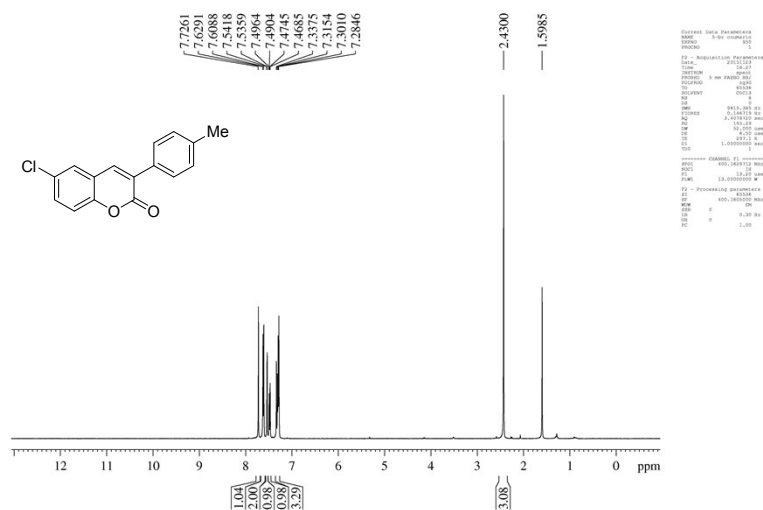
¹H NMR Spectra of (**3w**) (400 MHz, CDCl₃)

PQ-OMECOU-ME



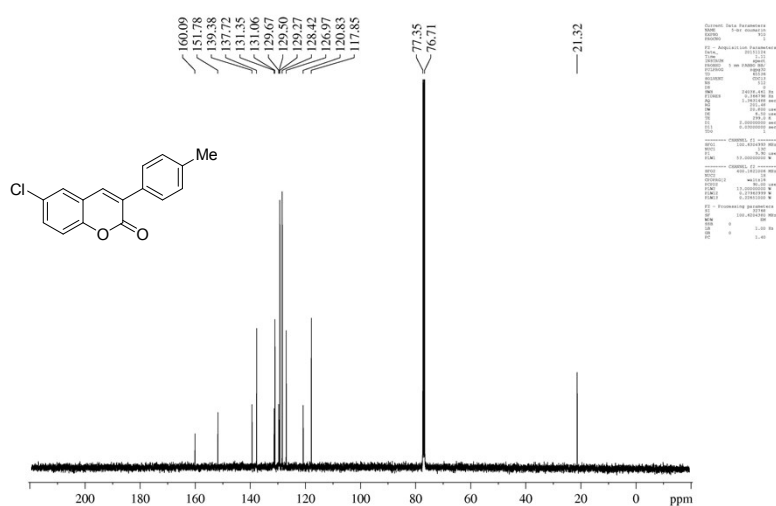
¹³C NMR Spectra of (**3w**) (400 MHz, CDCl₃)

PQ-5CL-ME

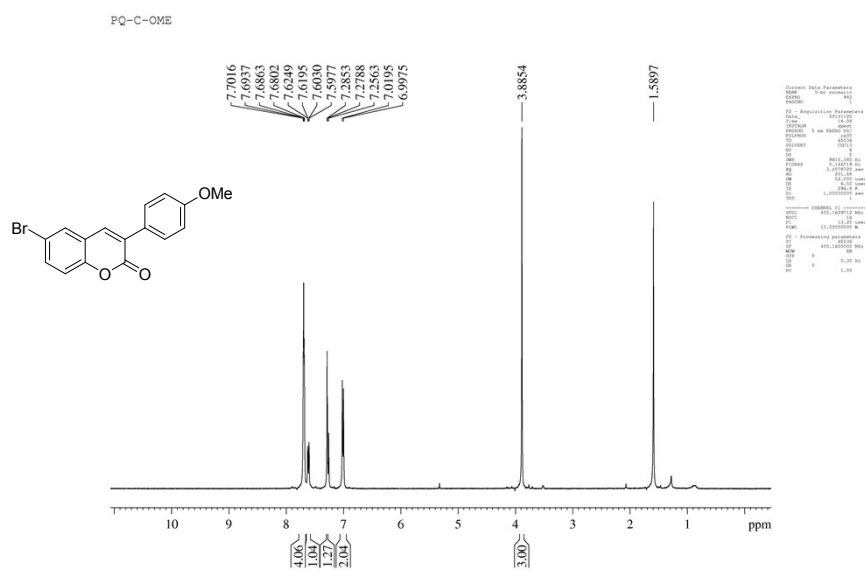


¹H NMR Spectra of (**3y**) (400 MHz, CDCl₃)

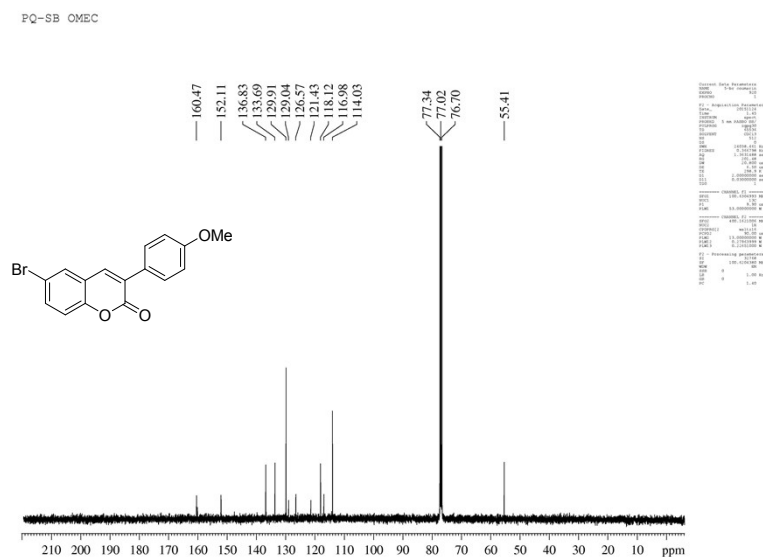
PQ-5CL-MEC



¹³C NMR Spectra of (**3y**) (400 MHz, CDCl₃)

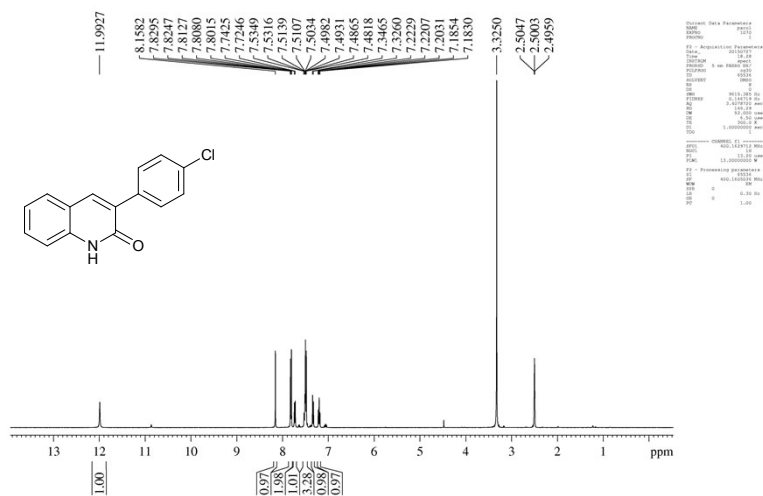


¹H NMR Spectra of (**3z**) (400 MHz, CDCl₃)



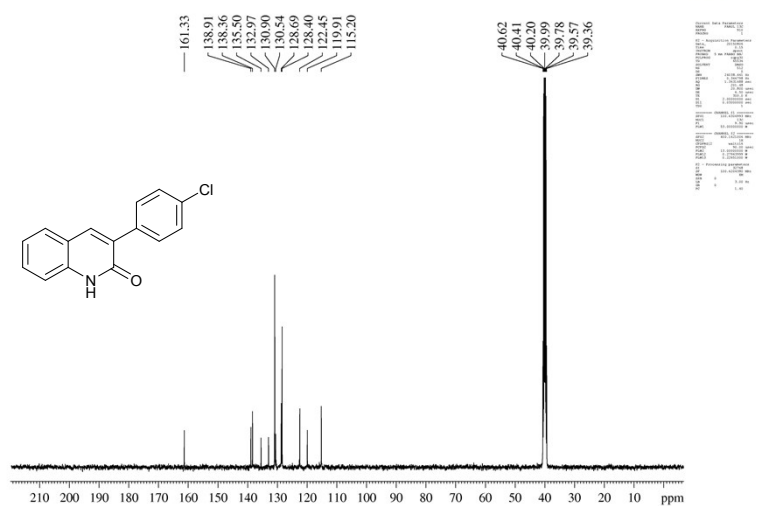
¹³C NMR Spectra of (**3z**) (400 MHz, CDCl₃)

AZ-CL

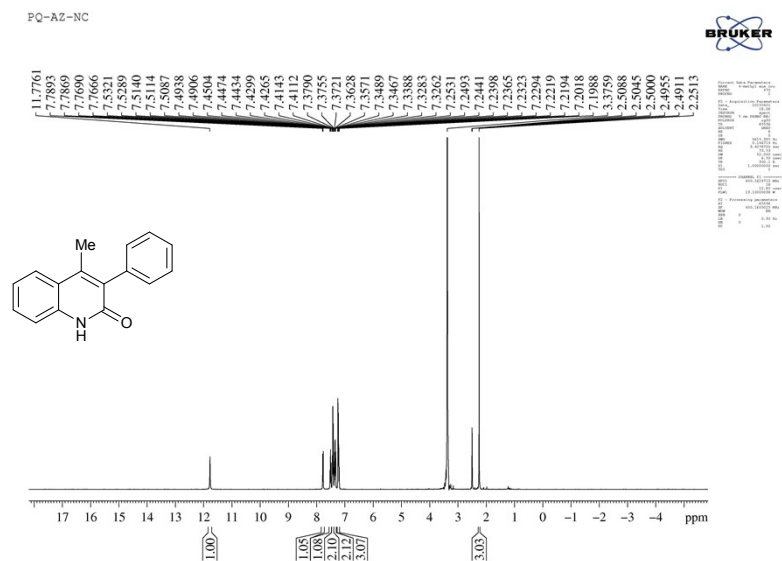


¹H NMR Spectra of **(3za) (400 MHz, DMSO-*d*₆)**

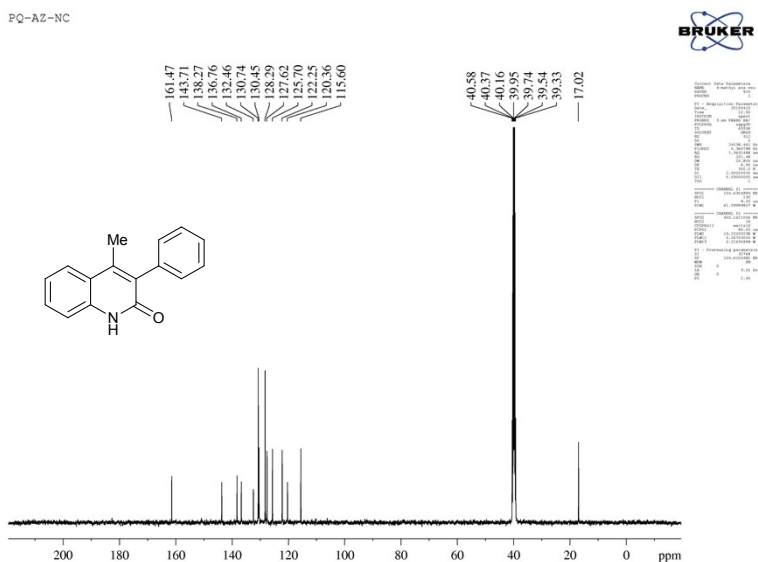
AZ-U



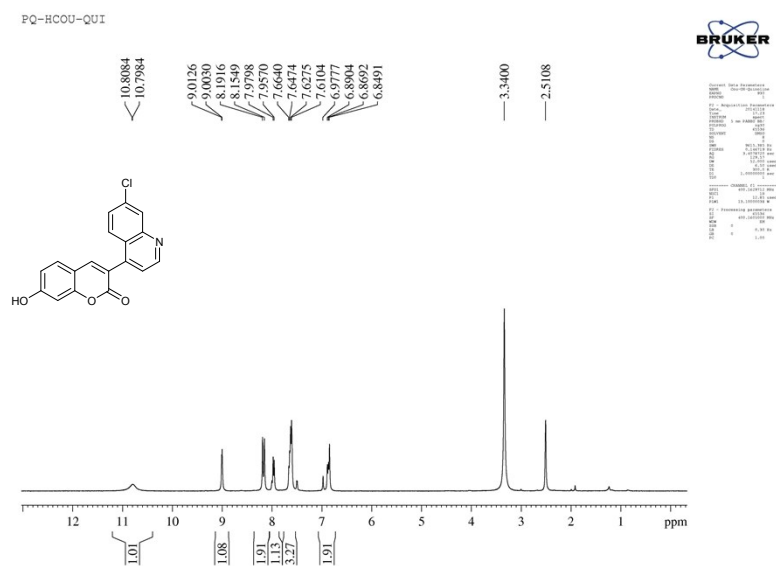
¹³C NMR Spectra of **(3za) (100 MHz, DMSO-*d*₆)**



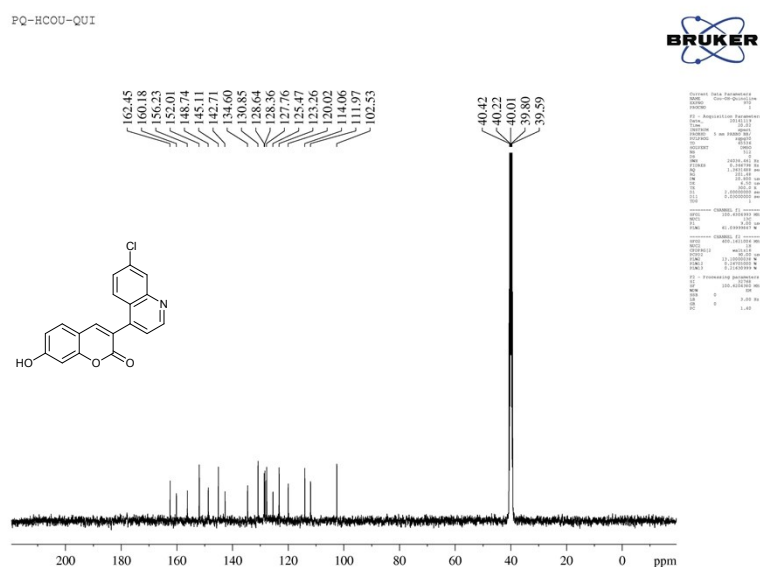
¹H NMR Spectra of (**3zb**) (400 MHz, DMSO- *d*₆)



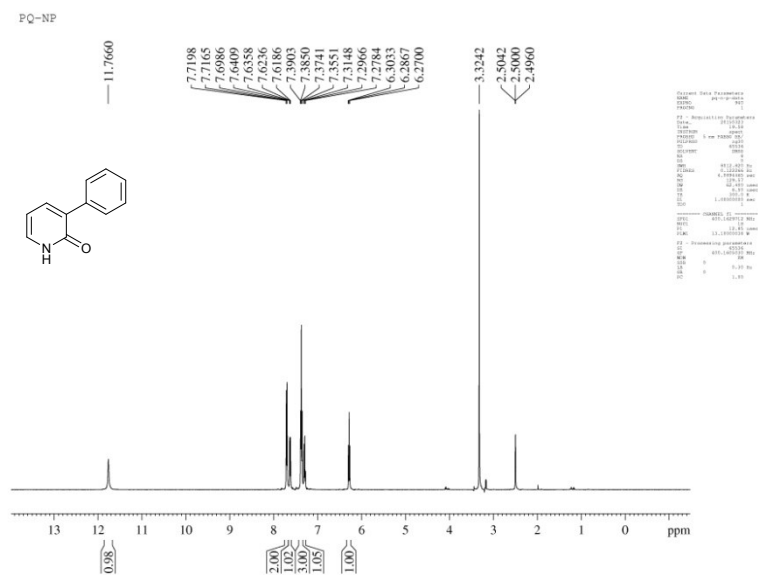
¹³C NMR Spectra of (**3zb**) (100 MHz, DMSO- *d*₆)



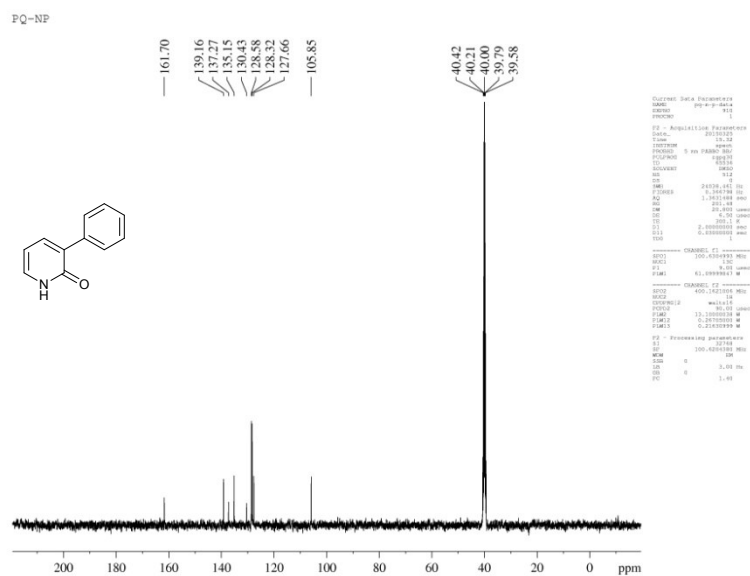
¹H NMR Spectra of (4) (400 MHz, DMSO- *d*₆)



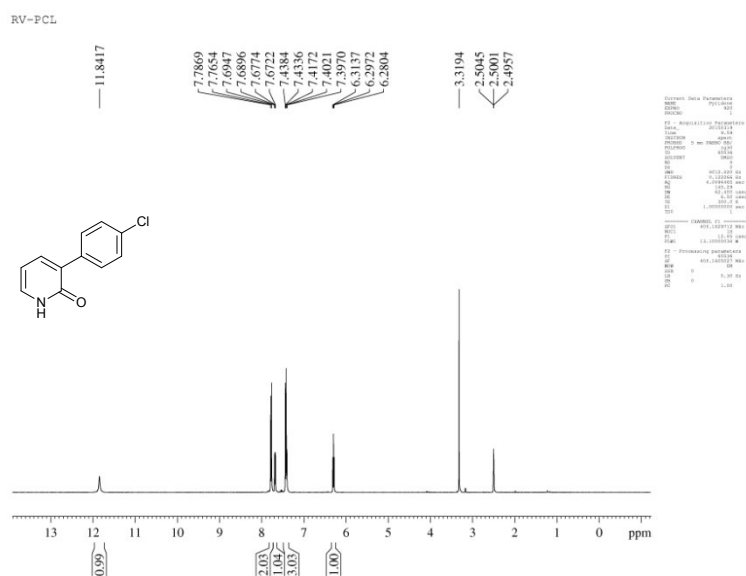
¹³C NMR Spectra of (4) (400 MHz, DMSO- *d*₆)



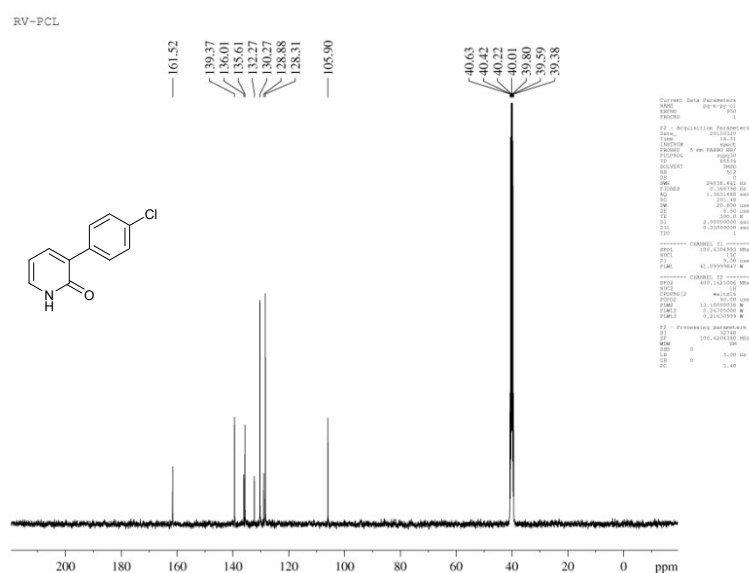
^1H NMR Spectra of (**6a**) (400 MHz, DMSO- d_6)



^{13}C NMR Spectra of (**6a**) (100 MHz, DMSO- d_6)

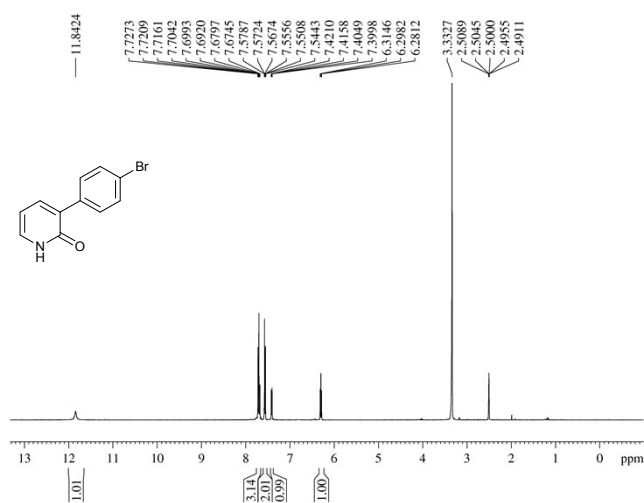


¹H NMR Spectra of (**6b**) (400 MHz, DMSO- *d*₆)



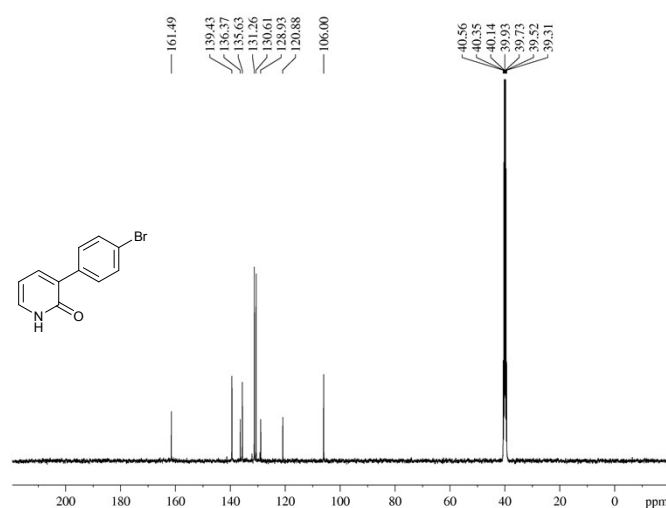
¹³C NMR Spectra of (**6b**) (100 MHz, DMSO- *d*₆)

PY-BR



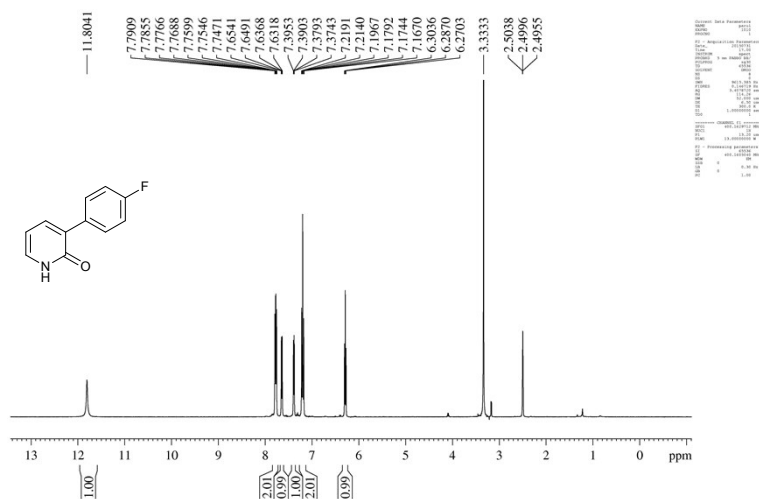
¹H NMR Spectra of (6c) (400 MHz, DMSO-*d*₆)

PY-BR



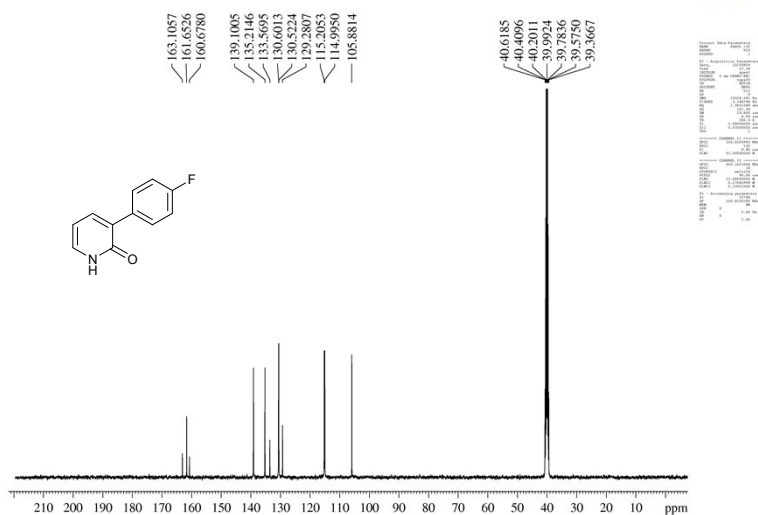
¹³C NMR Spectra of (6c) (100 MHz, DMSO-*d*₆)

PY-F

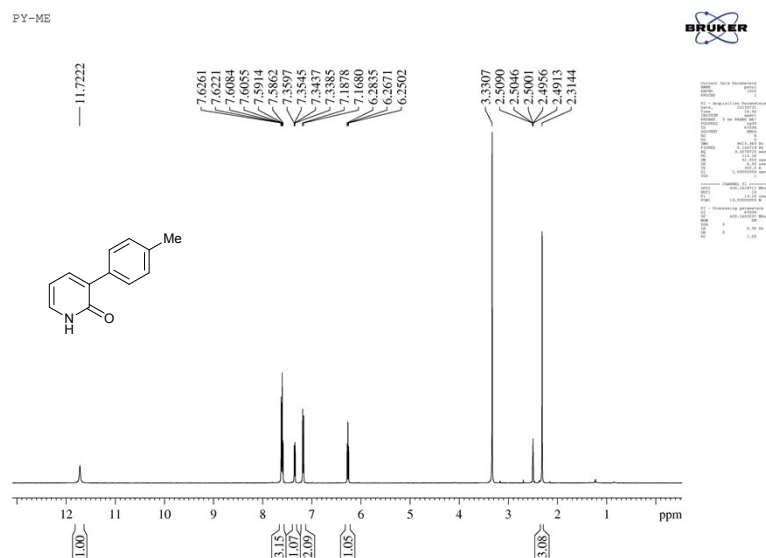


¹H NMR Spectra of (**6d**) (400 MHz, DMSO- *d*₆)

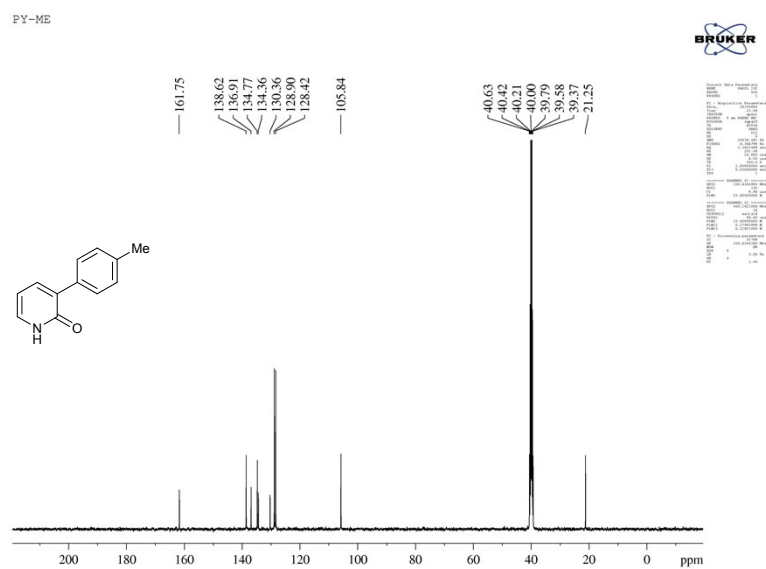
PY-F



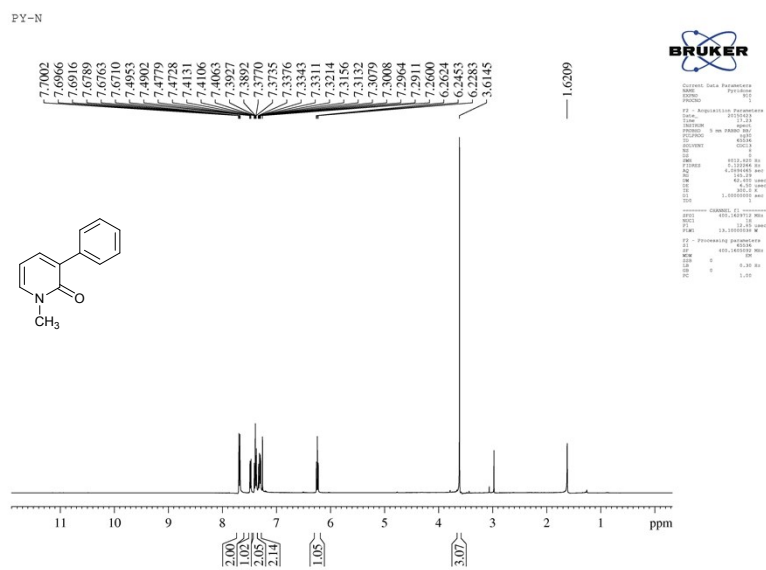
¹³C NMR Spectra of (**6d**) (100 MHz, DMSO- *d*₆)



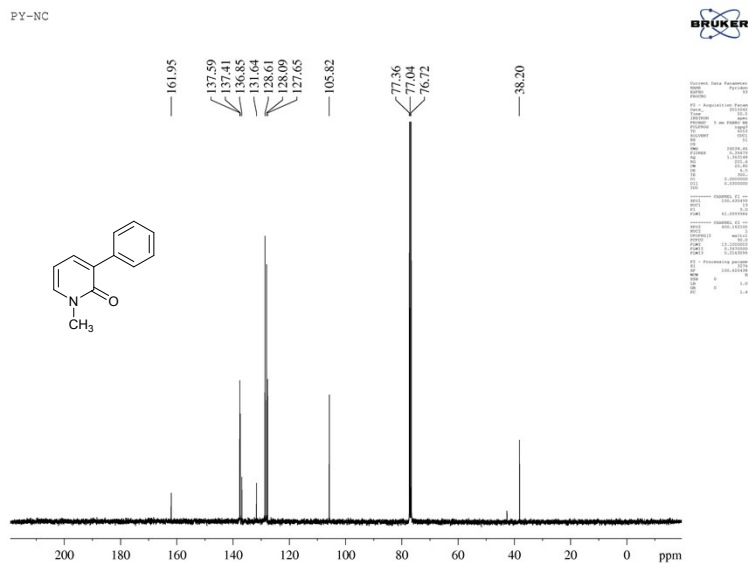
¹H NMR Spectra of (**6e**) (400 MHz, DMSO- *d*₆)

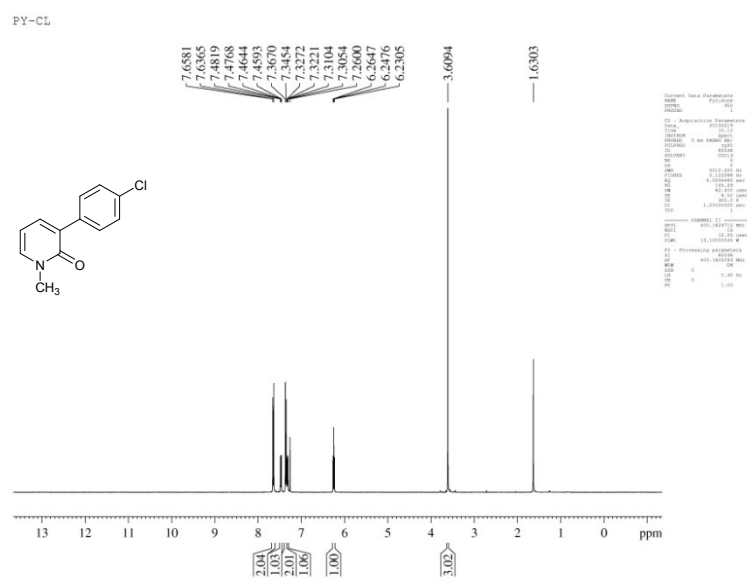


¹³C NMR Spectra of (**6e**) (100 MHz, DMSO- *d*₆)

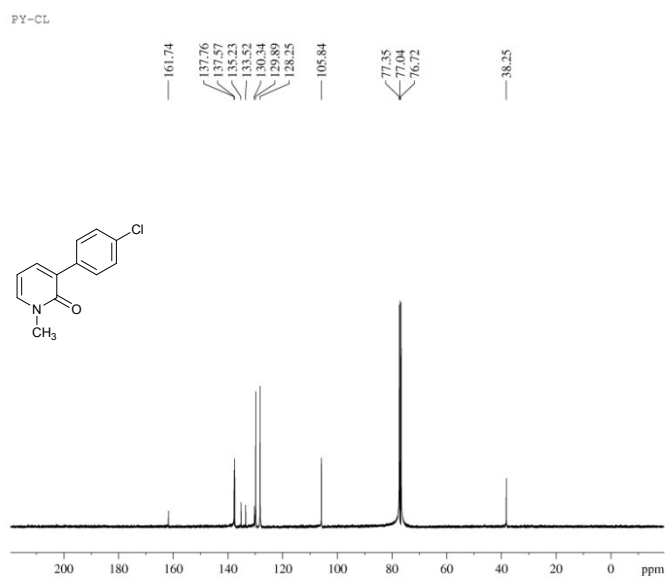


^1H NMR Spectra of (**6f**) (400 MHz, CDCl_3)



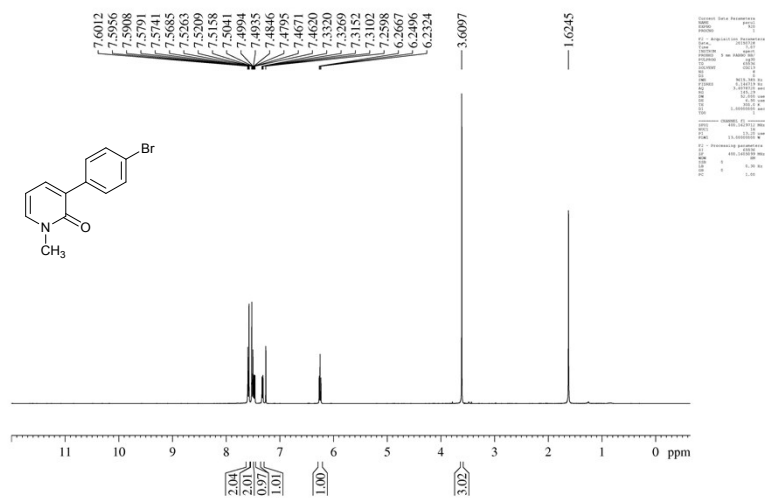


¹H NMR Spectra of (6g) (400 MHz, CDCl₃)



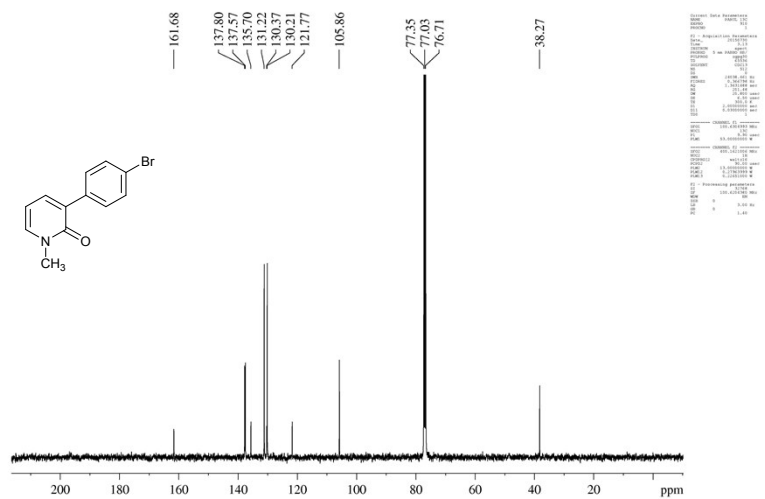
¹³C NMR Spectra of (6g) (100 MHz, CDCl₃)

PY-1BR



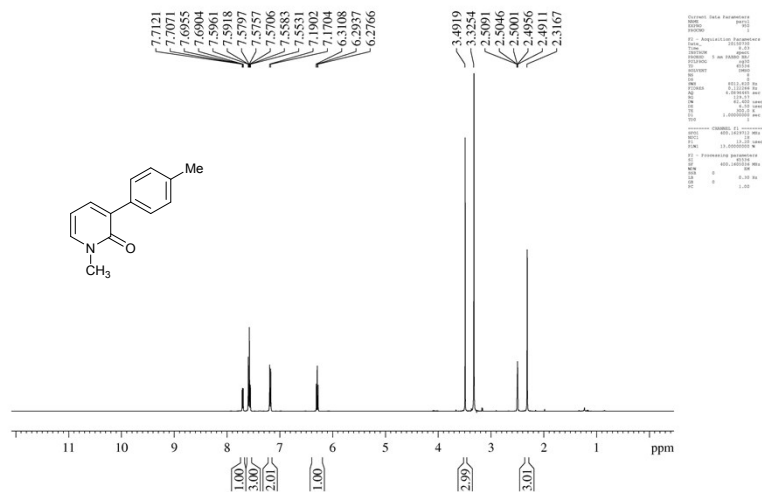
¹H NMR Spectra of (6h) (400 MHz, CDCl₃)

PY-1BR



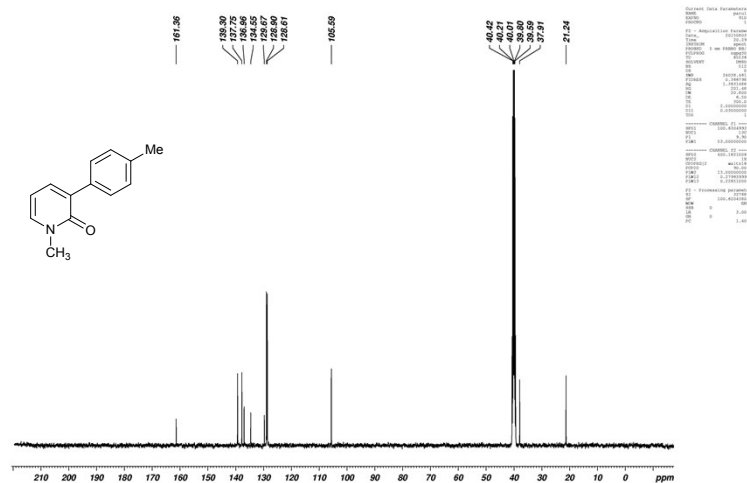
¹³C NMR Spectra of (6h) (100 MHz, CDCl₃)

PY-ME

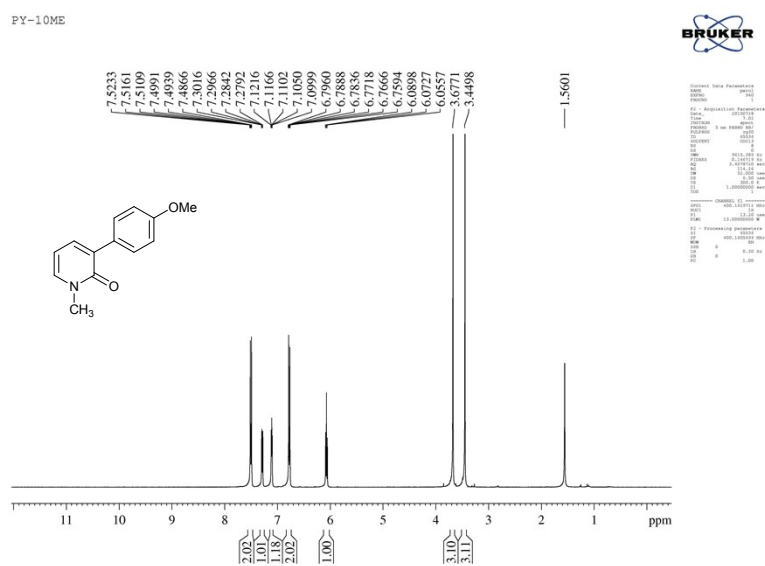


¹H NMR Spectra of (6i) (400 MHz, DMSO-*d*₆)

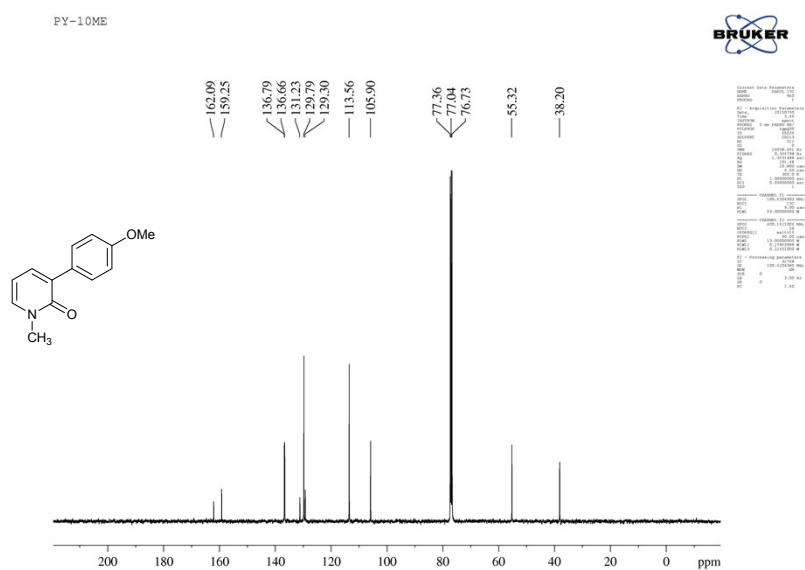
PY-1ME



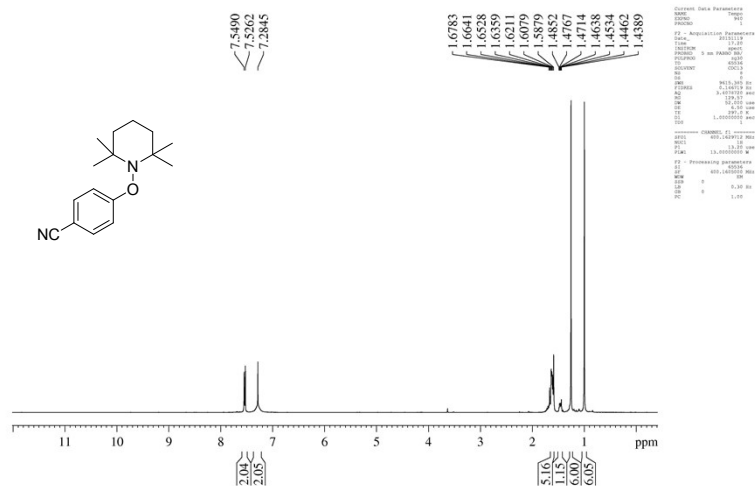
¹³C NMR Spectra of (6i) (100 MHz, DMSO-*d*₆)



¹H NMR Spectra of (**6j**) (400 MHz, CDCl₃)

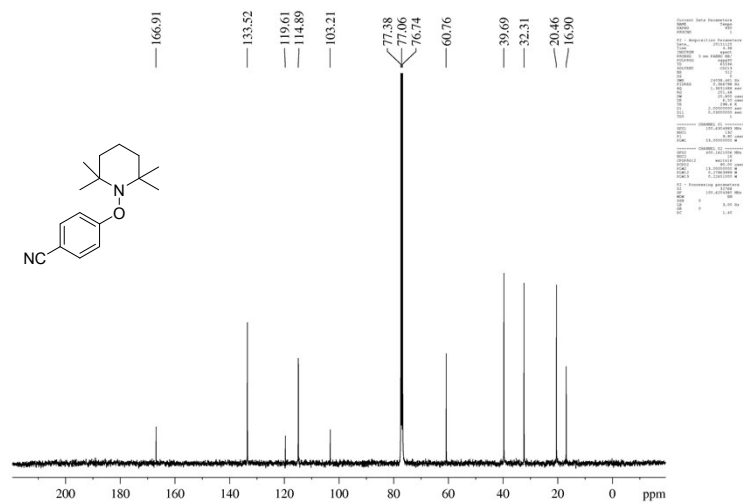


PQ-CV-TE



¹H NMR Spectra of (7) (400 MHz, CDCl₃)

PQ-CN IM



¹³C NMR Spectra of (7) (100 MHz, CDCl₃)