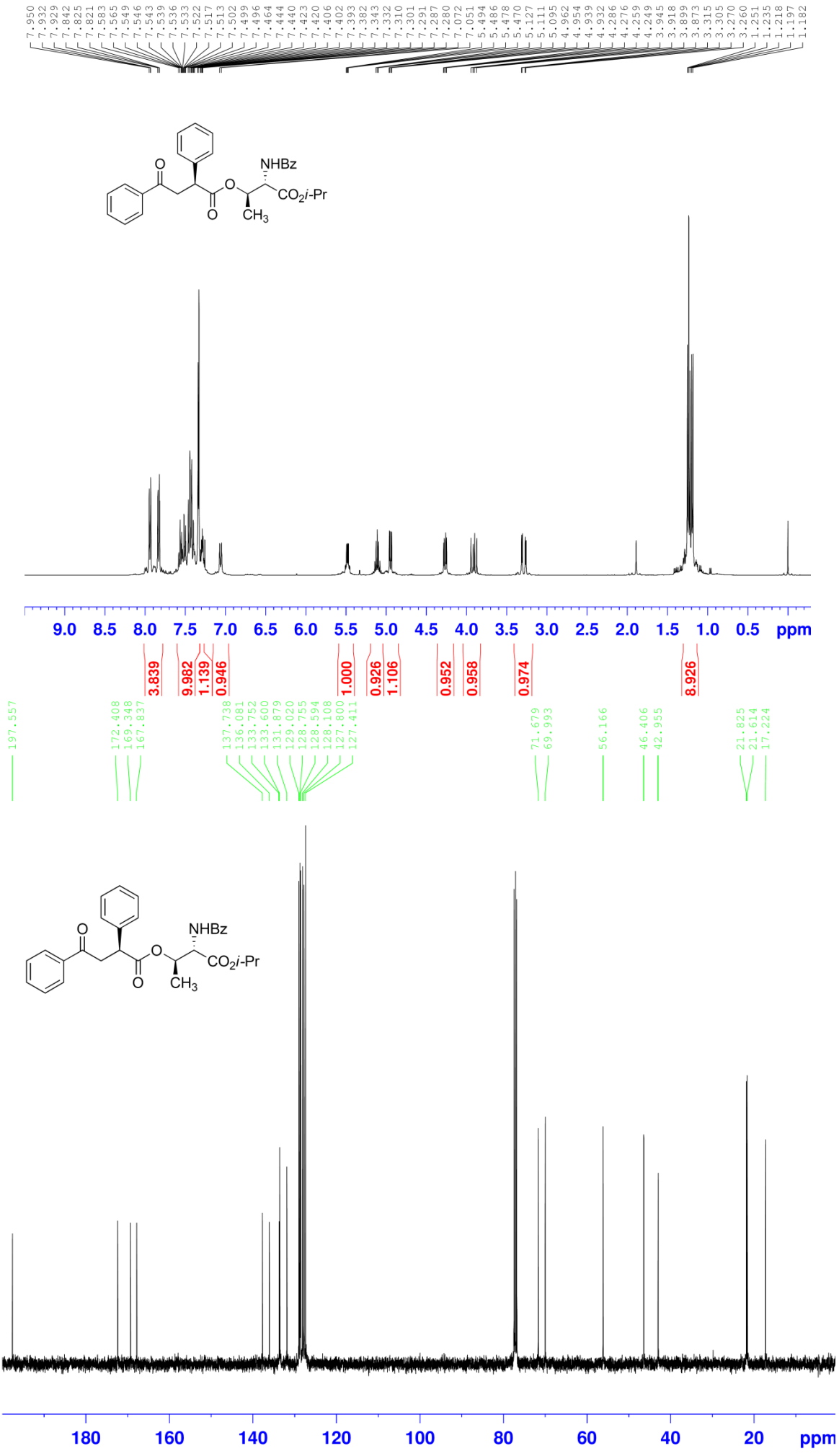
Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

Supplemental Information

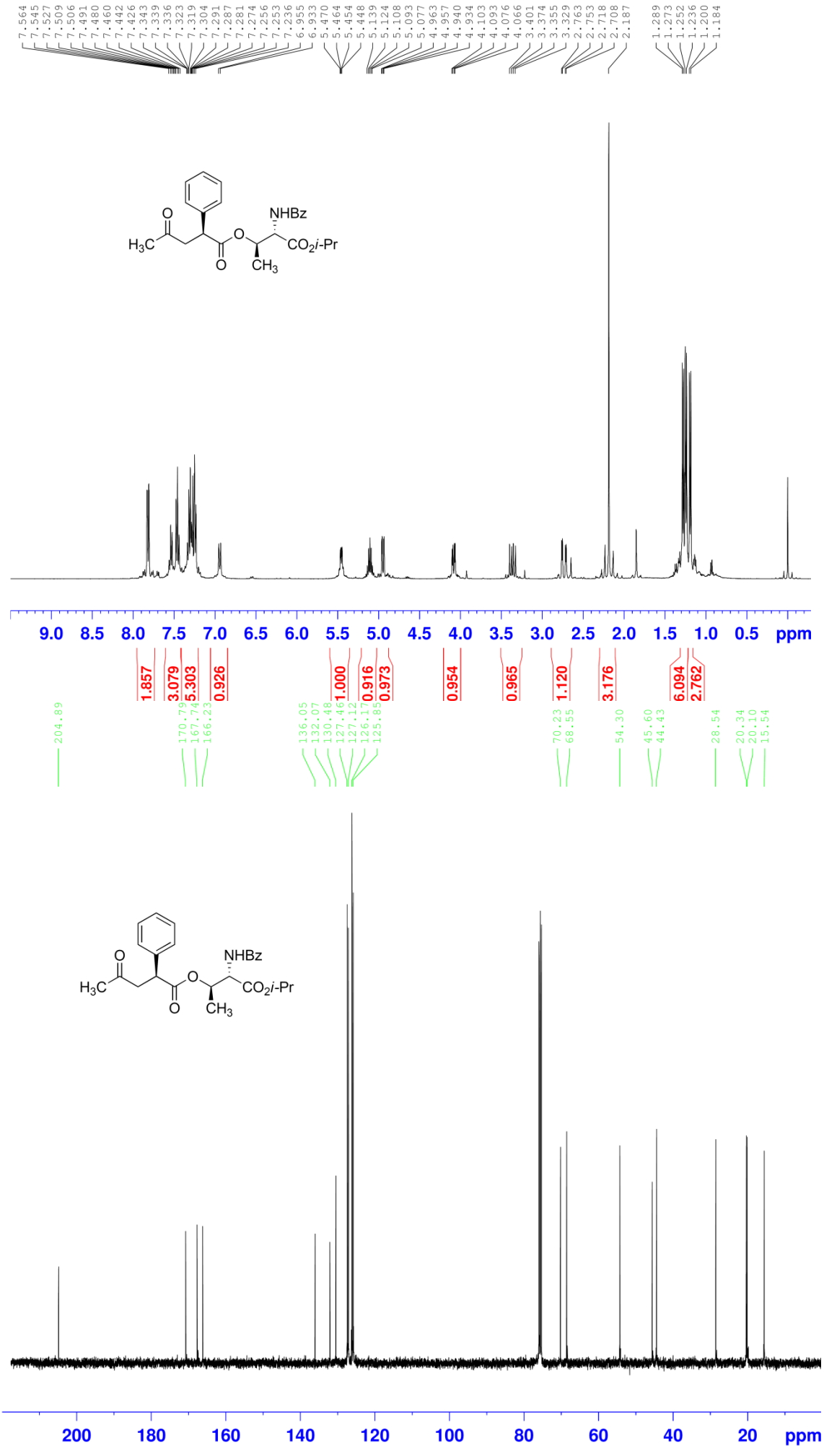
An Access to Highly Enantioenriched cis-3,5-Disubstituted γ-Lactones from α-Bromoacetate and Silyl Enol Ether

Contents

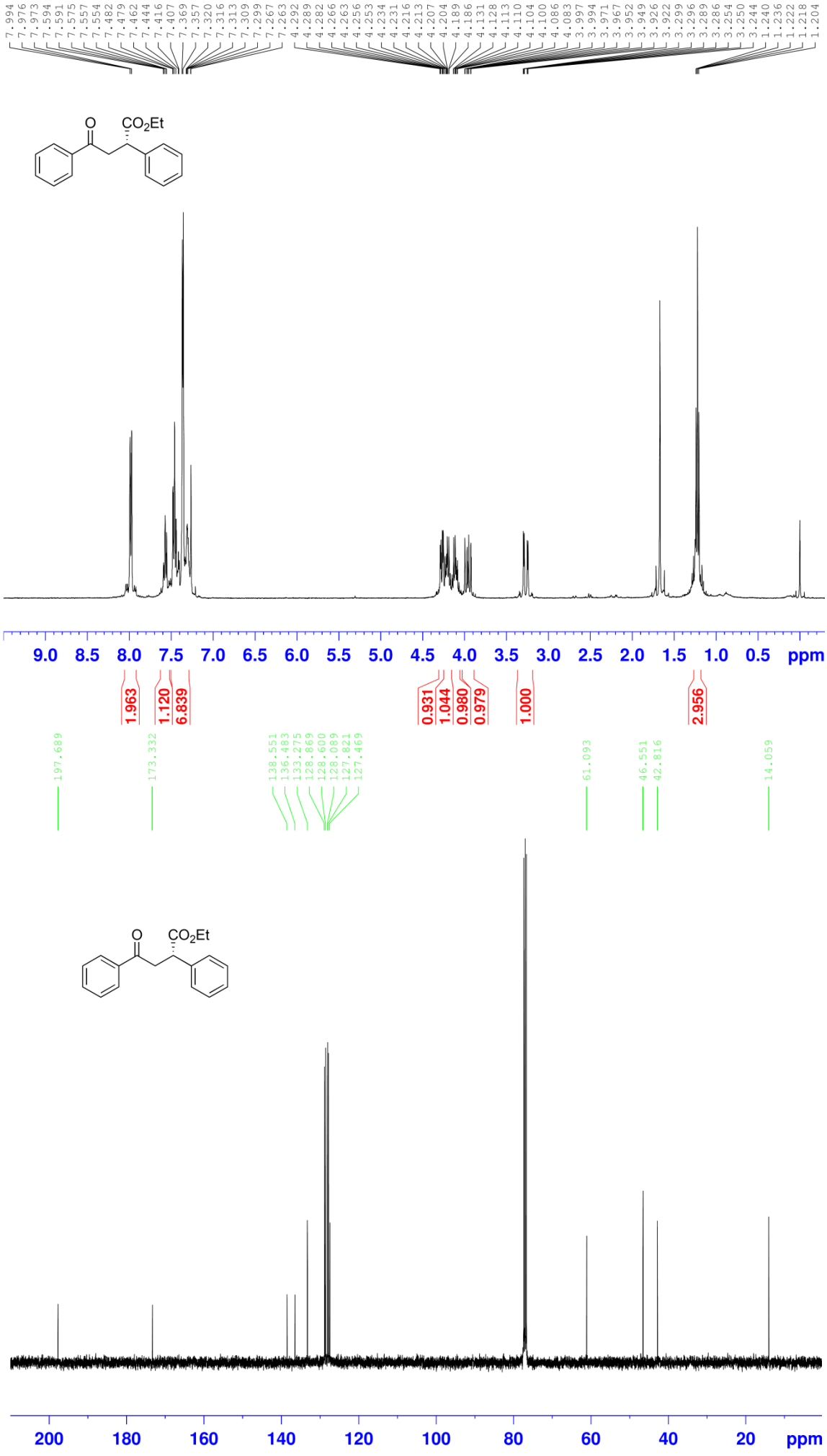
N-Benzoyl-*O*-(2,4-diphenyl-4-oxobutanoyl)-*L*-threonine Isopropyl Ester (**2a**)



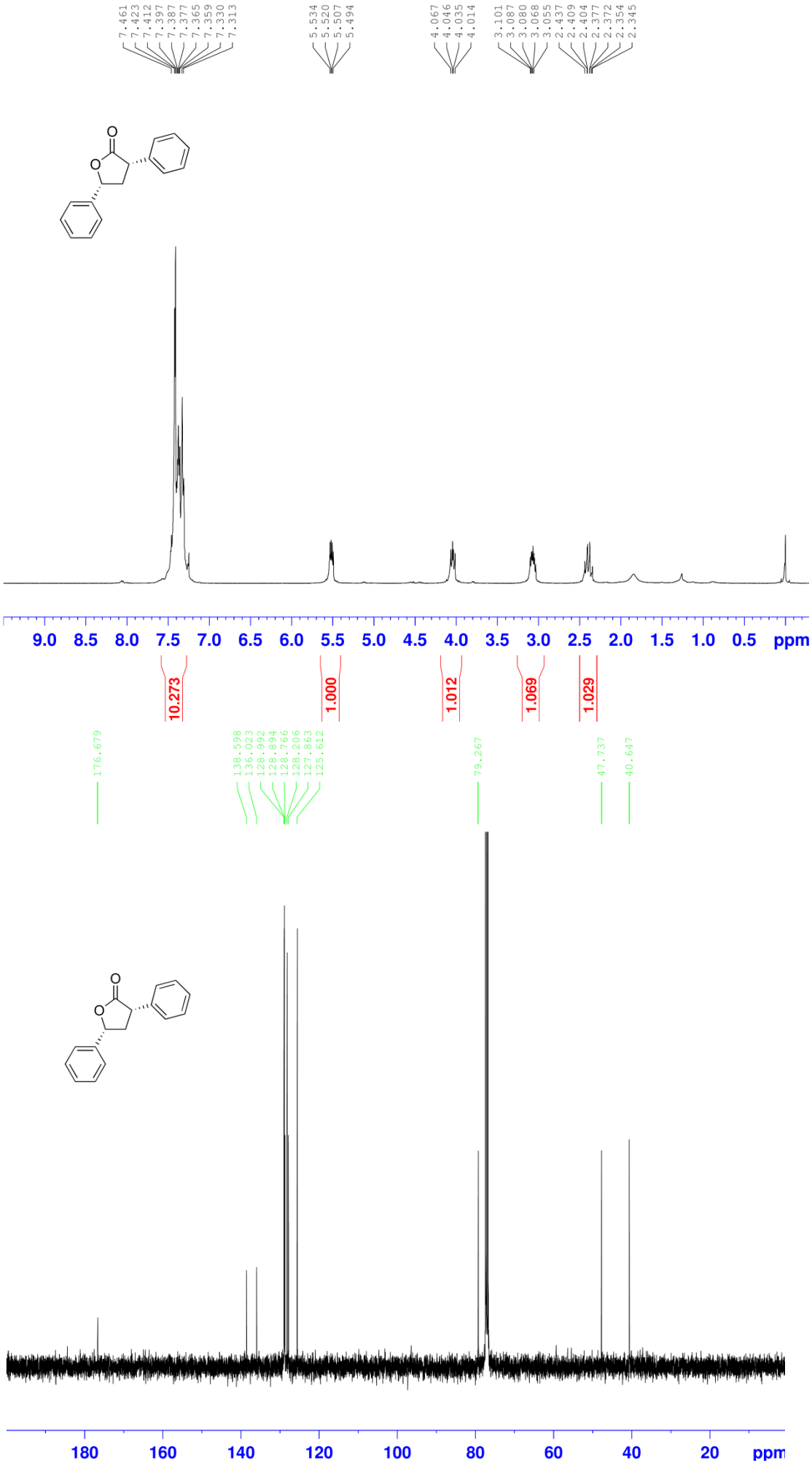
N-Benzoyl-*O*-(4-Methyl-4-oxo-2-phenylbutanoyl)-*L*-threonine Isopropyl Ester (**2b**)



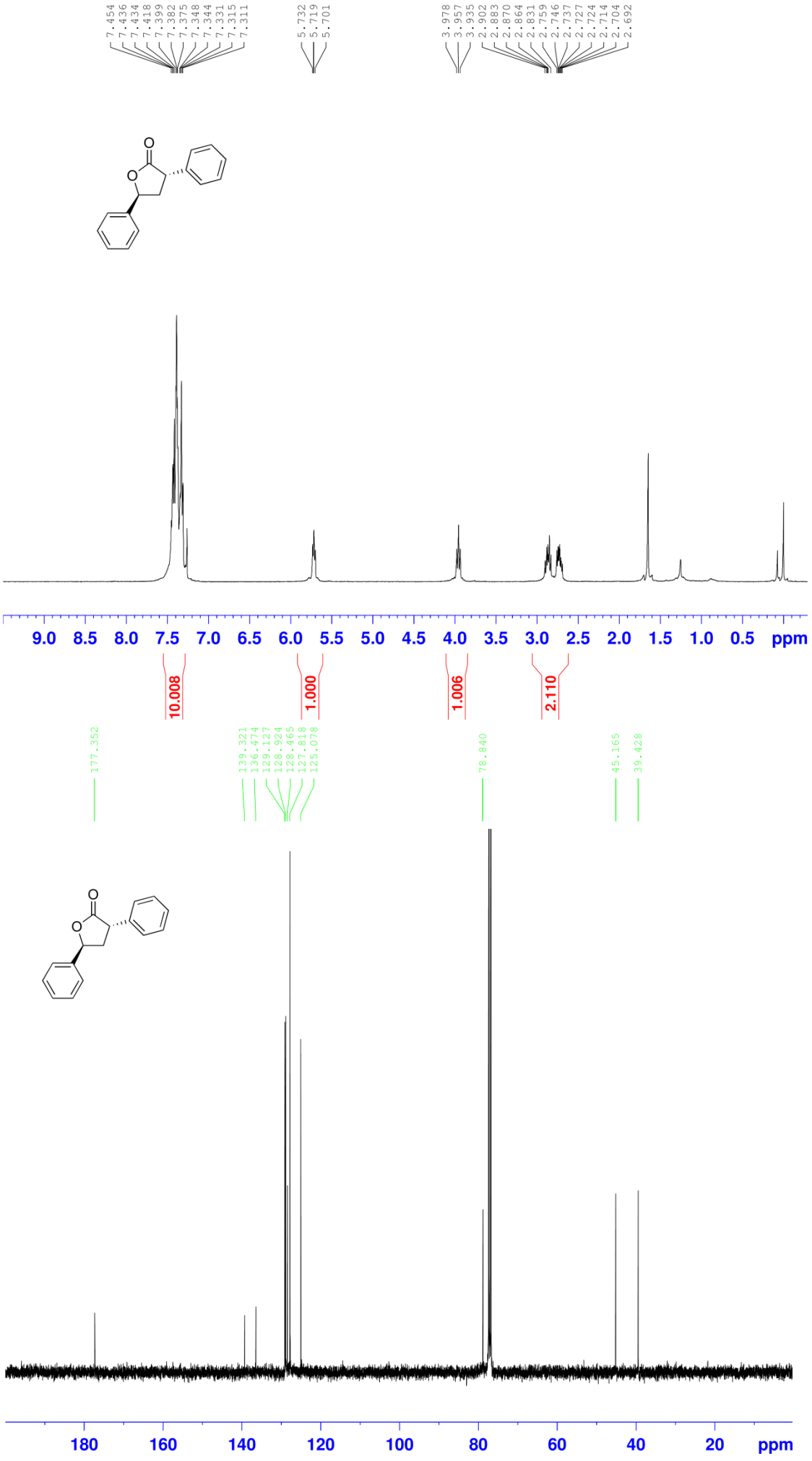
Ethyl 4-oxo-2,4-diphenylbutanoate (**3**)



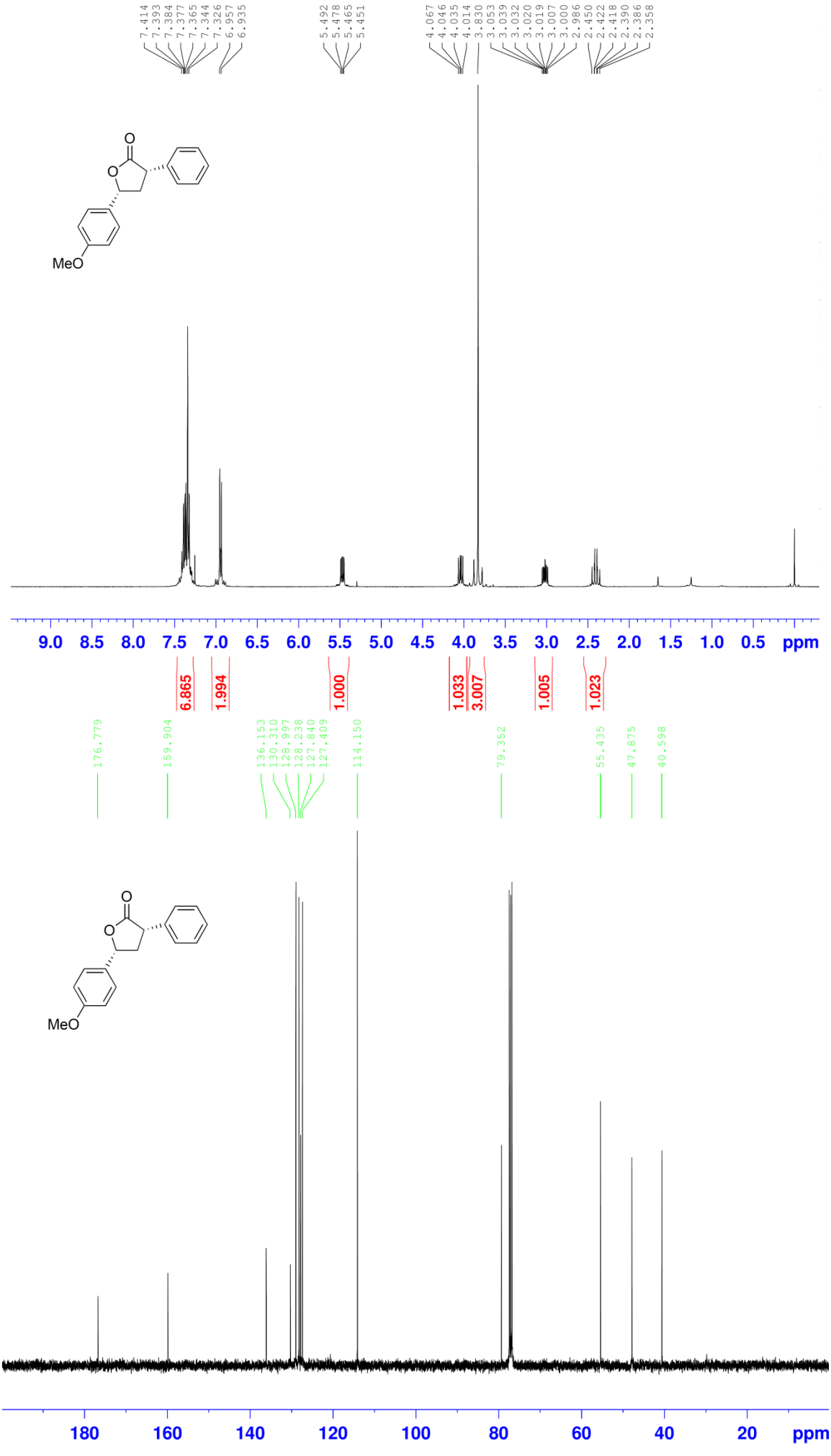
cis-3,5-Diphenyldihydrofuran-2(*3H*)-one (*cis*-**4a**)



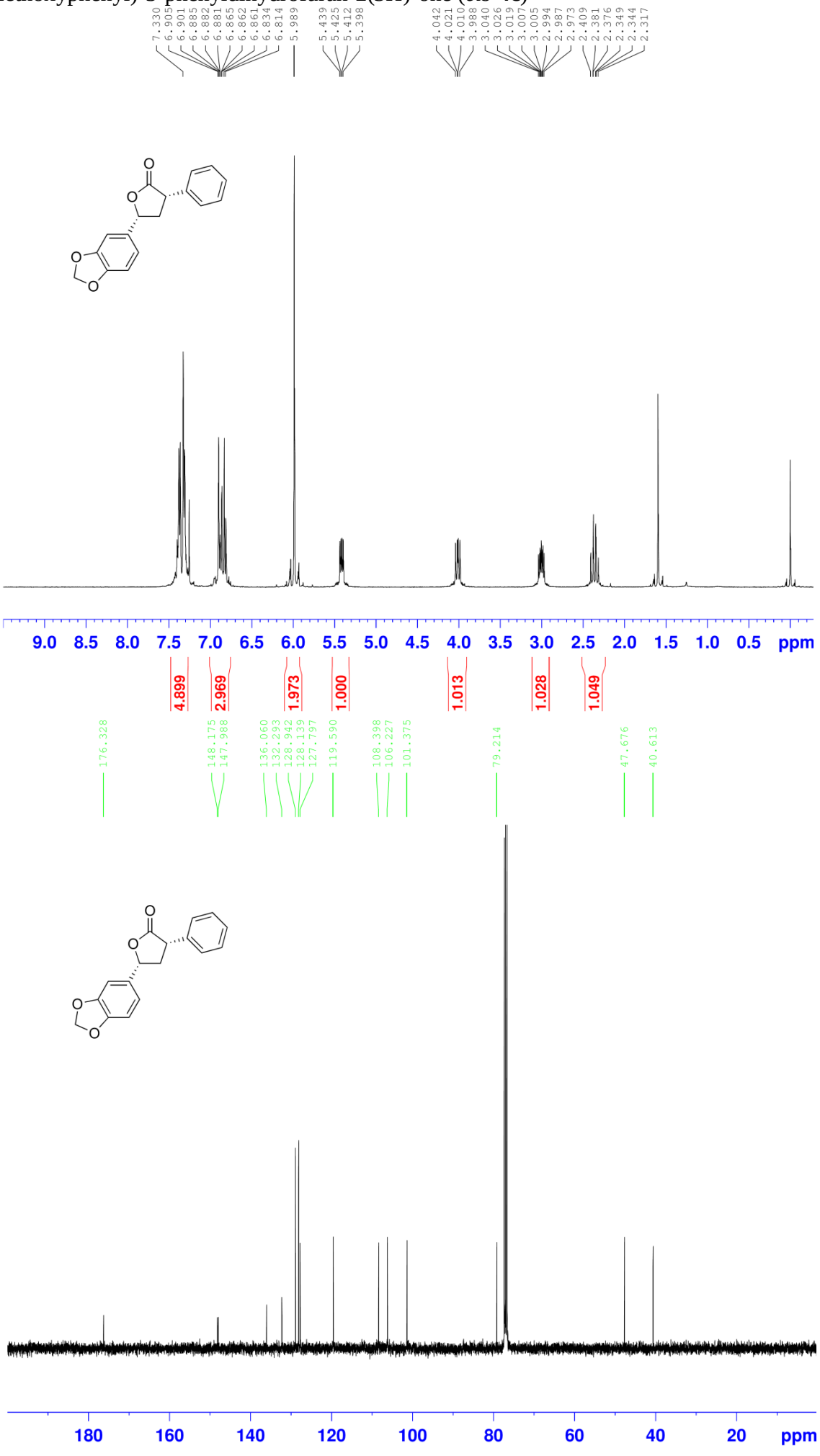
trans-3,5-Diphenyldihydrofuran-2(*3H*)-one (*trans*-**4a**)



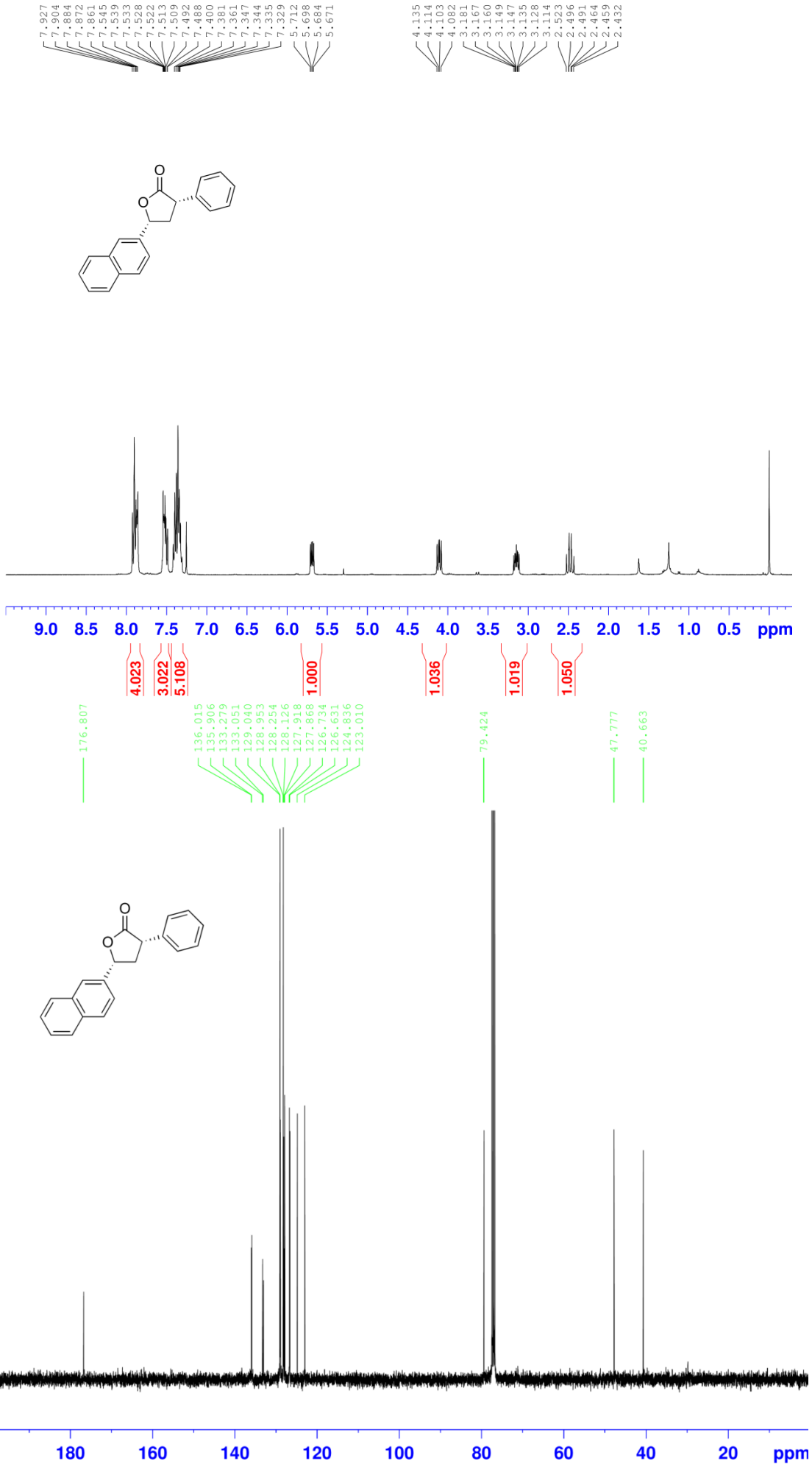
cis-5-(4-Methoxyphenyl)-3-phenyldihydrofuran-2(*3H*)-one (*cis*-**4b**)



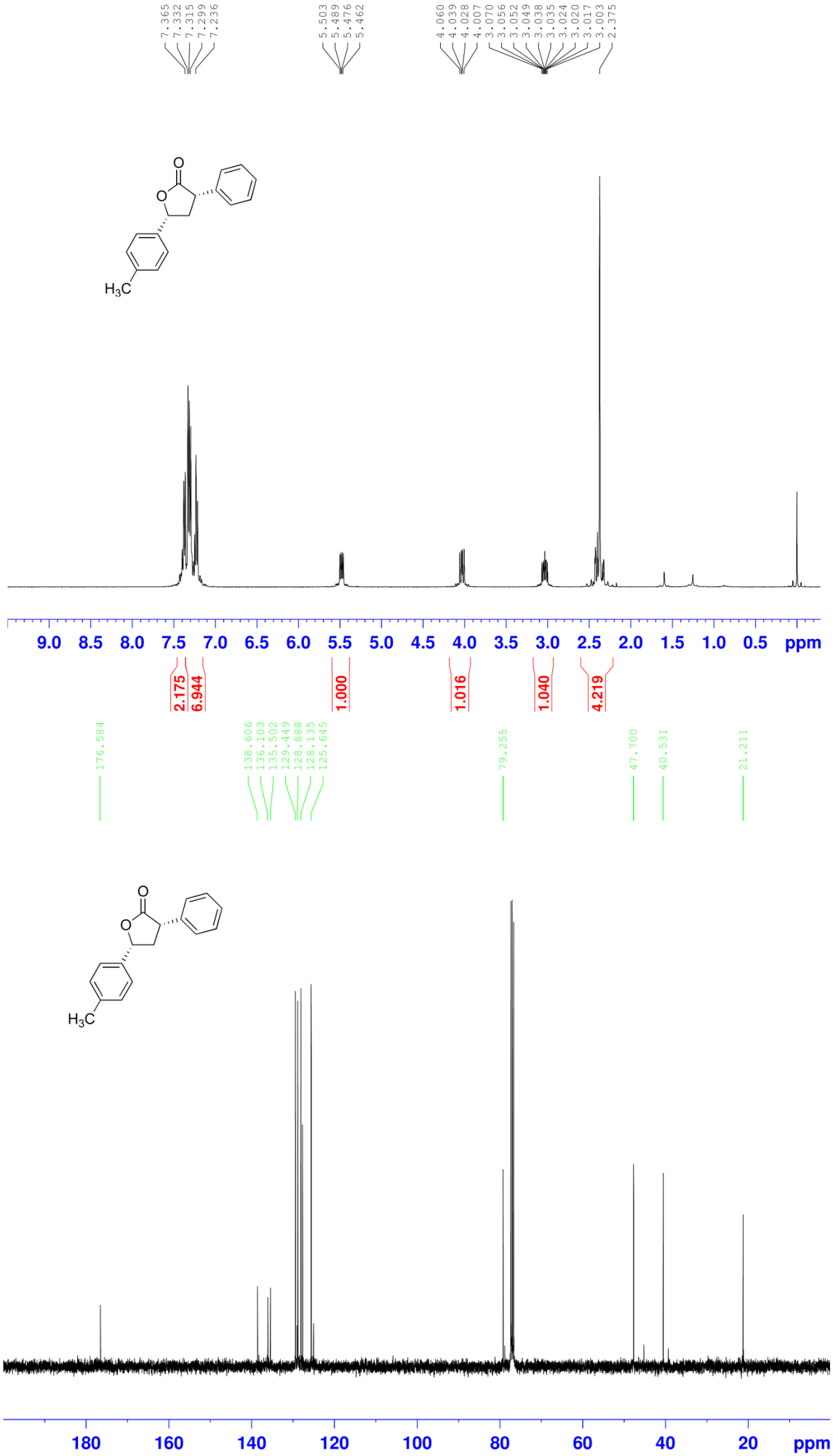
cis-5-(4-Methoxyphenyl)-3-phenyldihydrofuran-2(*3H*)-one (*cis*-**4c**)



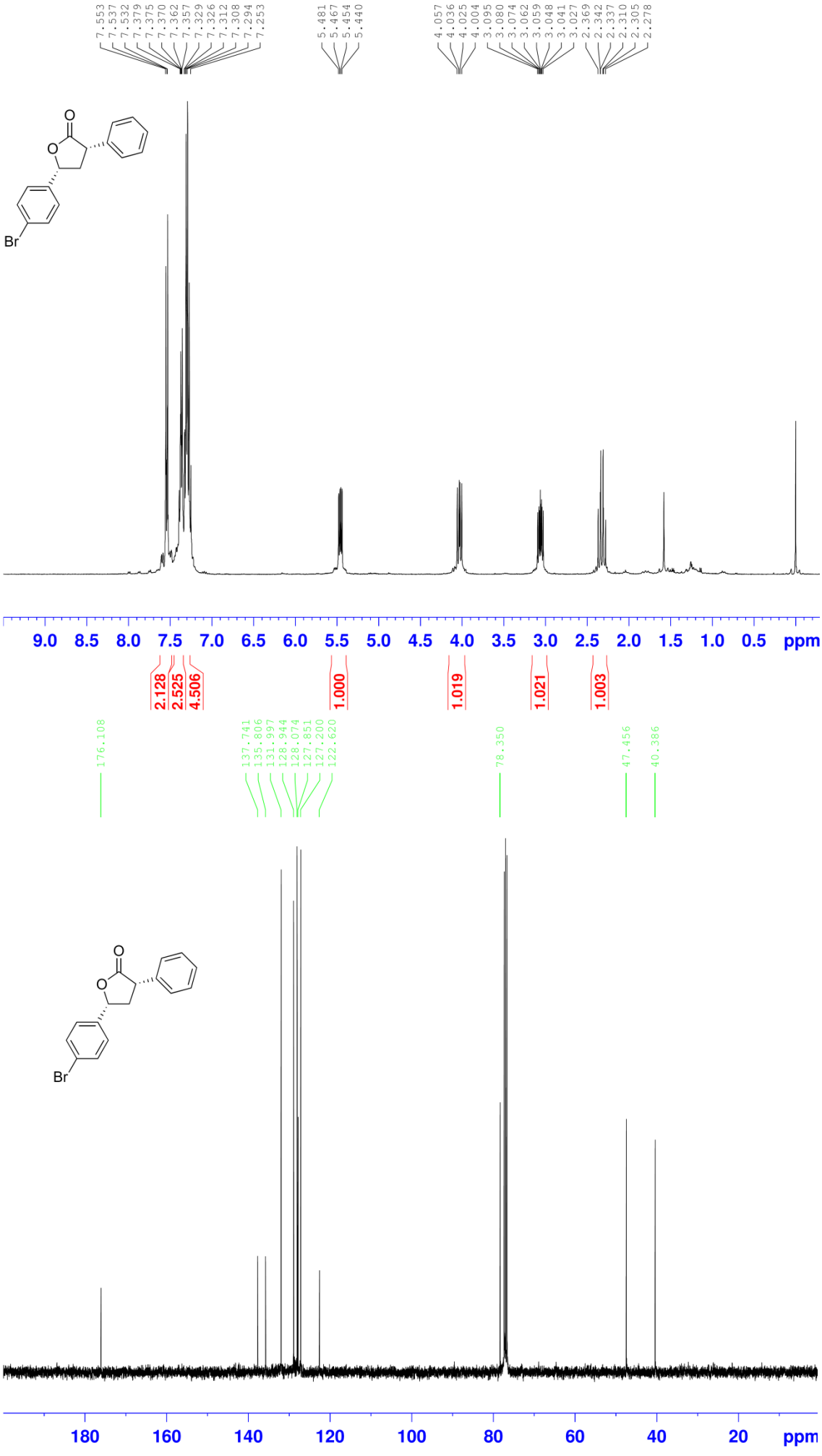
cis-5-(2-Naphthyl)-3-phenyldihydrofuran-2(*3H*)-one (*cis*-**4d**)



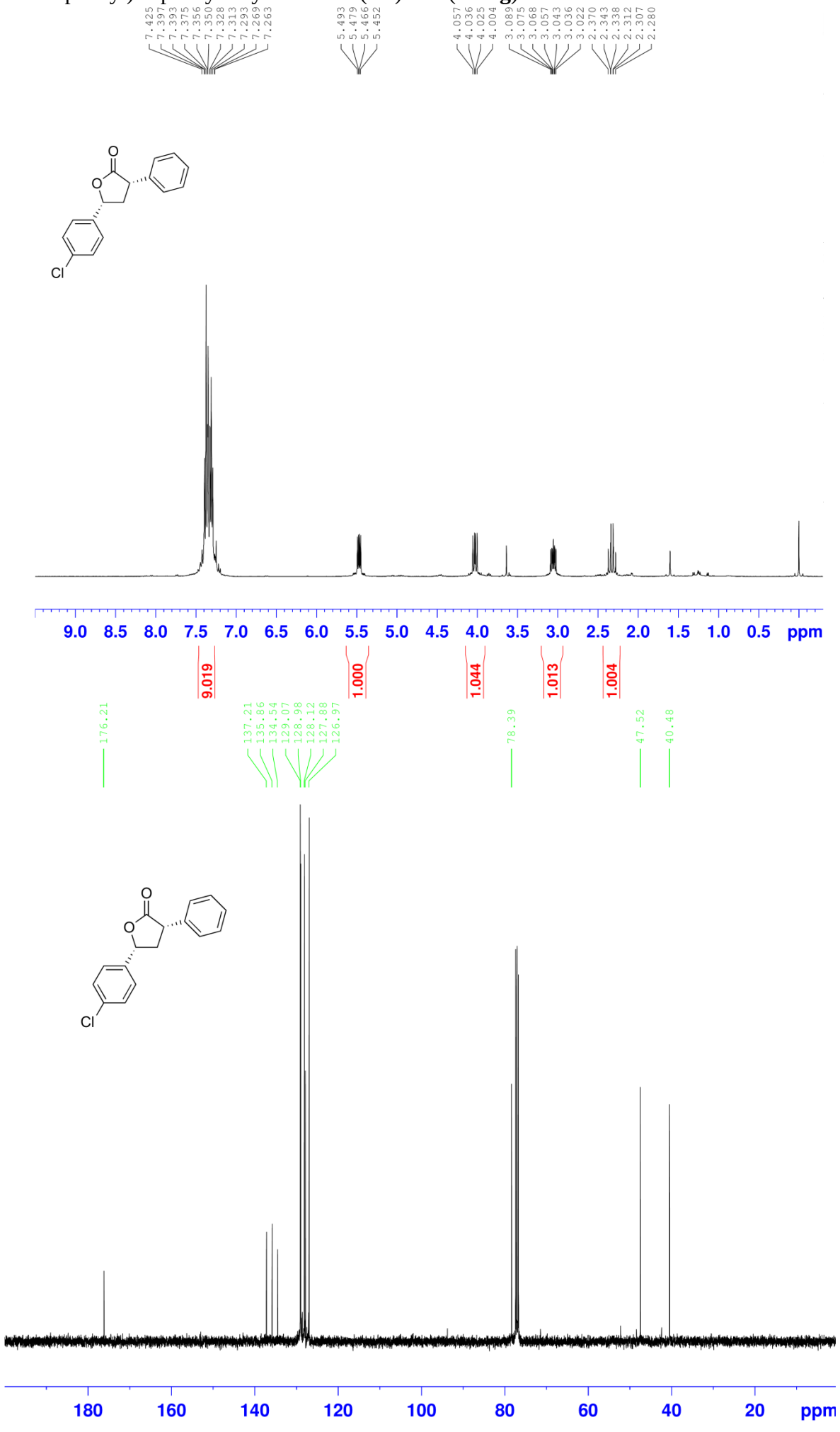
cis-5-(4-Methylphenyl)-3-phenyldihydrofuran-2(*3H*)-one (*cis*-**4e**)



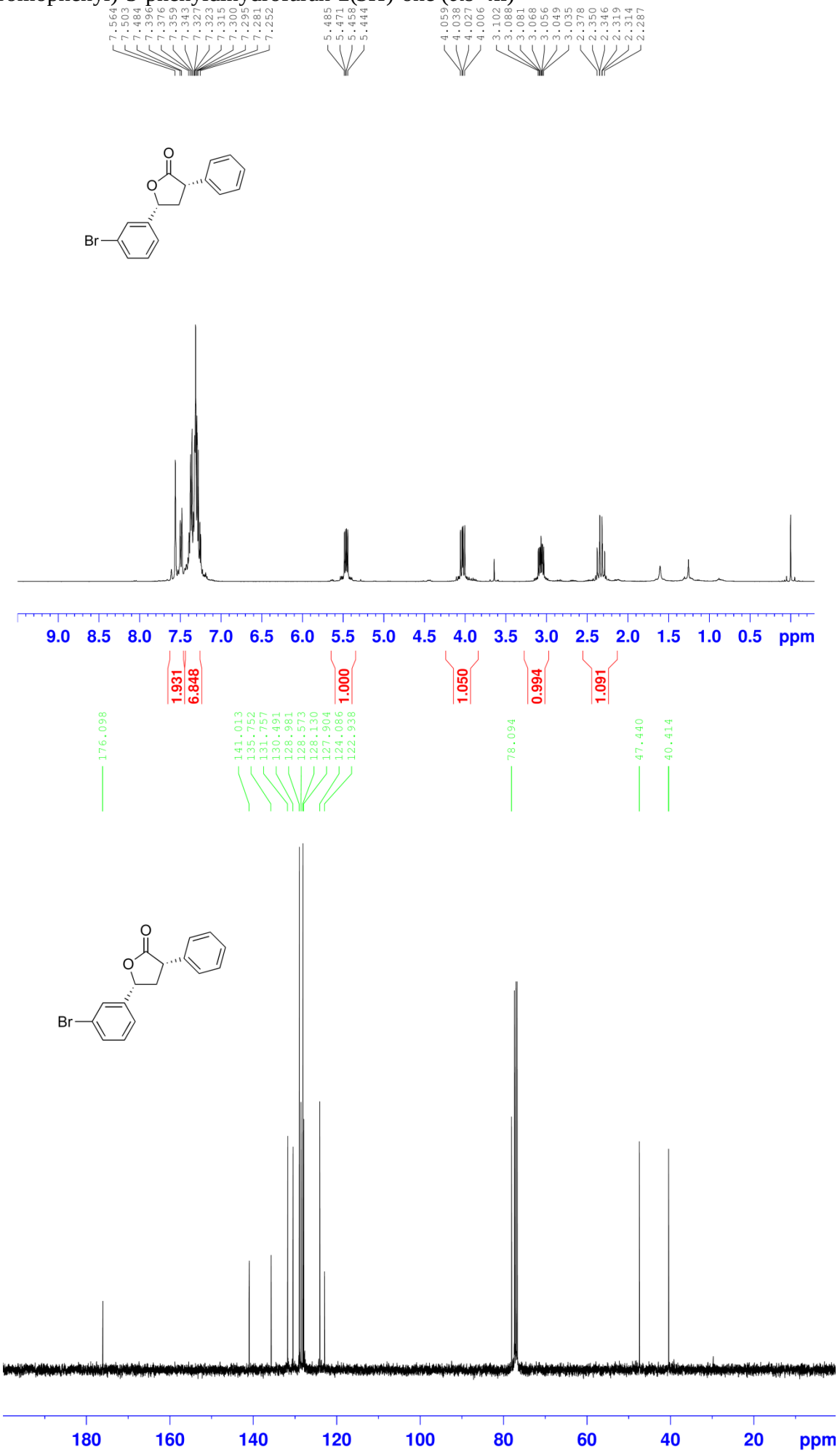
cis-5-(4-Bromophenyl)-3-phenyldihydrofuran-2(*3H*)-one (*cis*-**4f**)



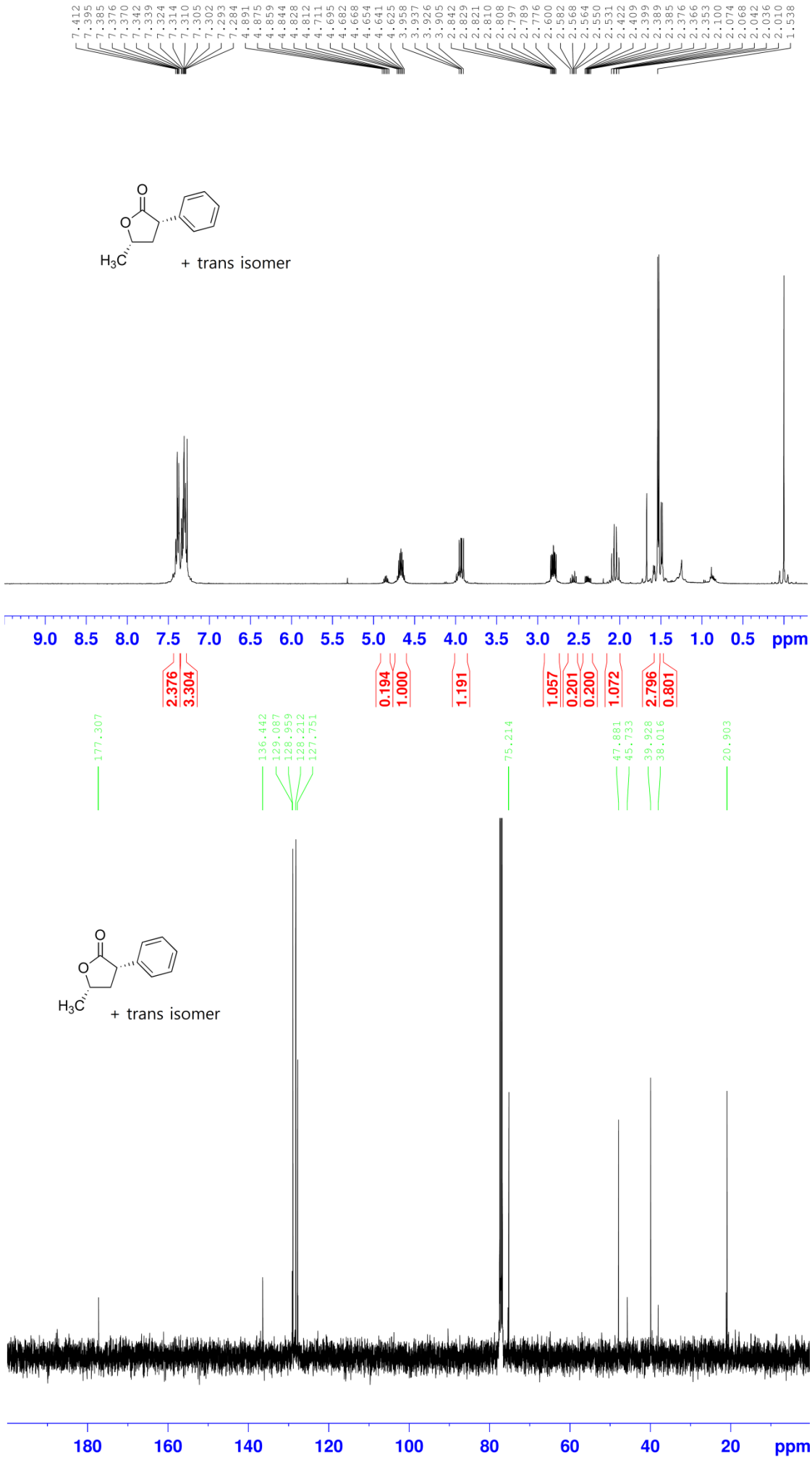
cis-5-(4-Chlorophenyl)-3-phenyldihydrofuran-2(*3H*)-one (*cis*-**4g**)



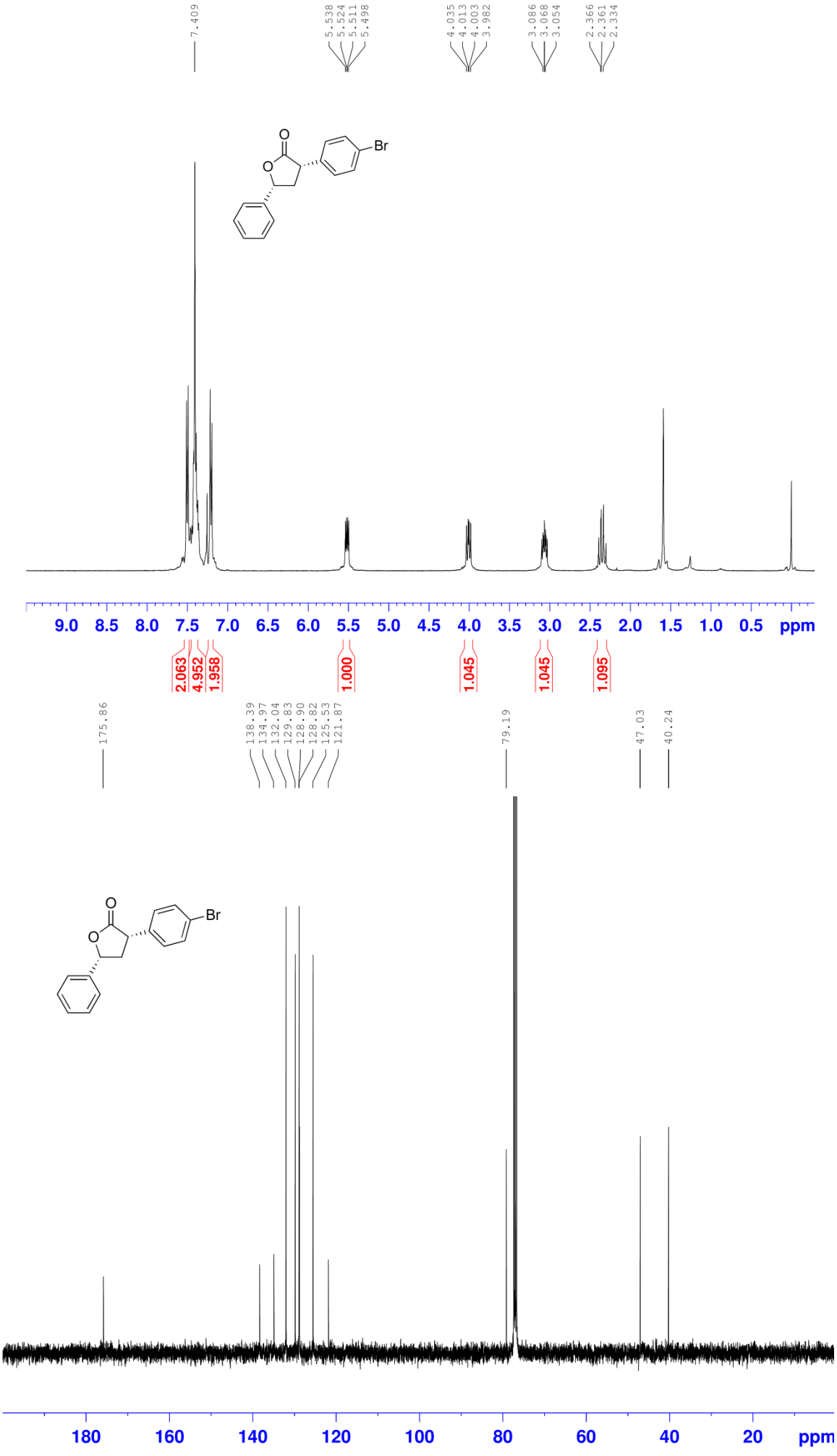
cis-5-(3-Bromophenyl)-3-phenyldihydrofuran-2(*3H*)-one (*cis*-**4h**)



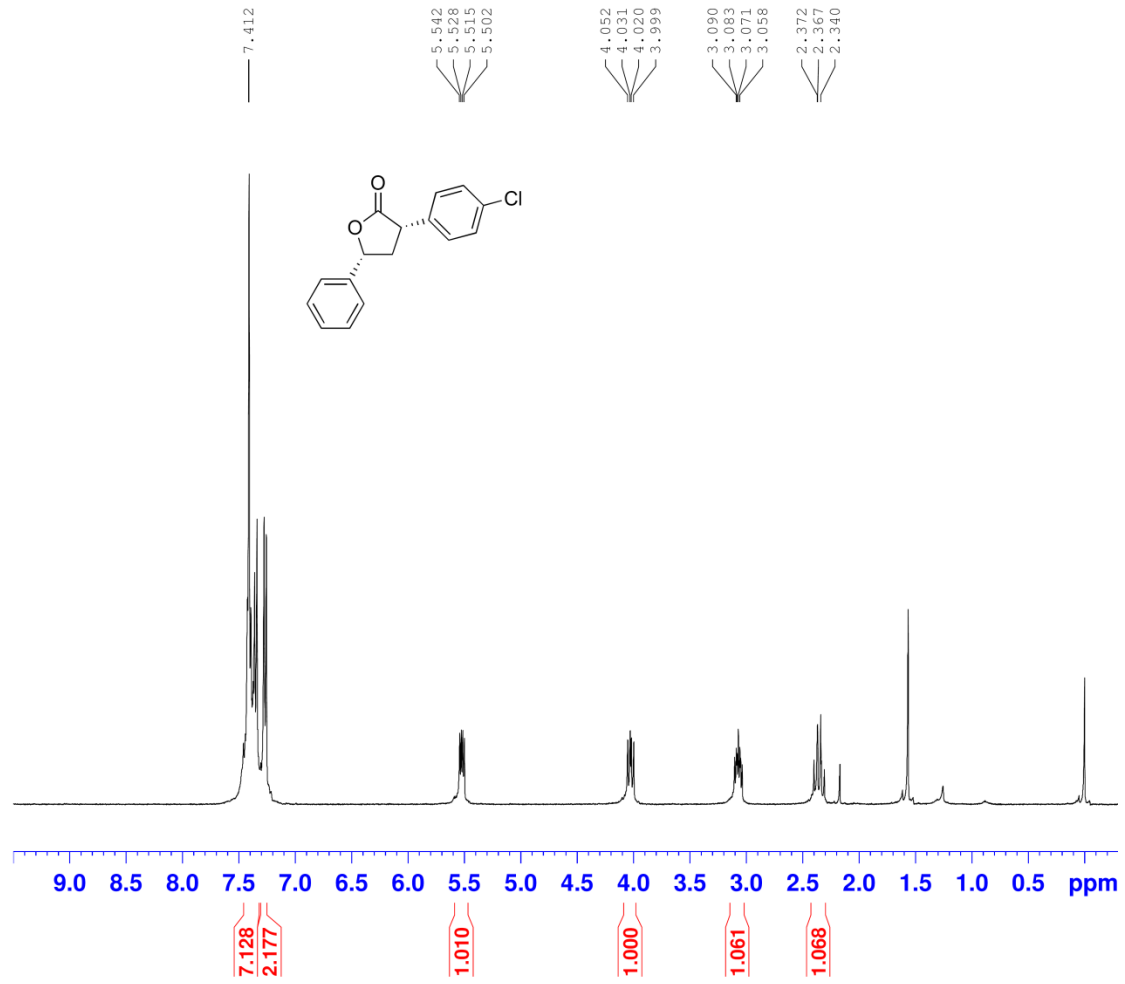
cis-5-Methyl-3-phenyldihydrofuran-2(*3H*)-one (*cis*-**4i**)

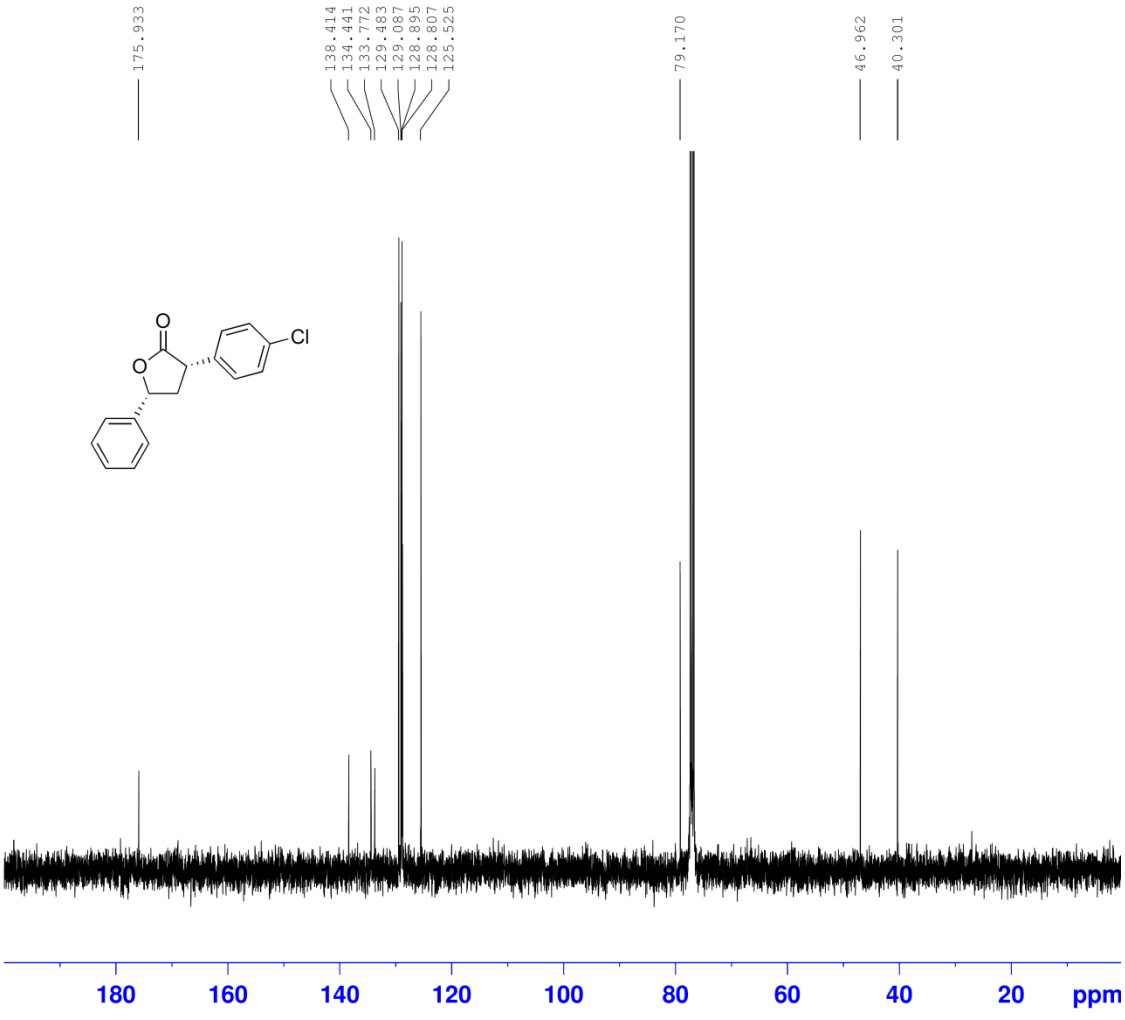


cis-3-(4-Bromophenyl)-5-phenyldihydrofuran-2(*3H*)-one (*cis*-**4j**)

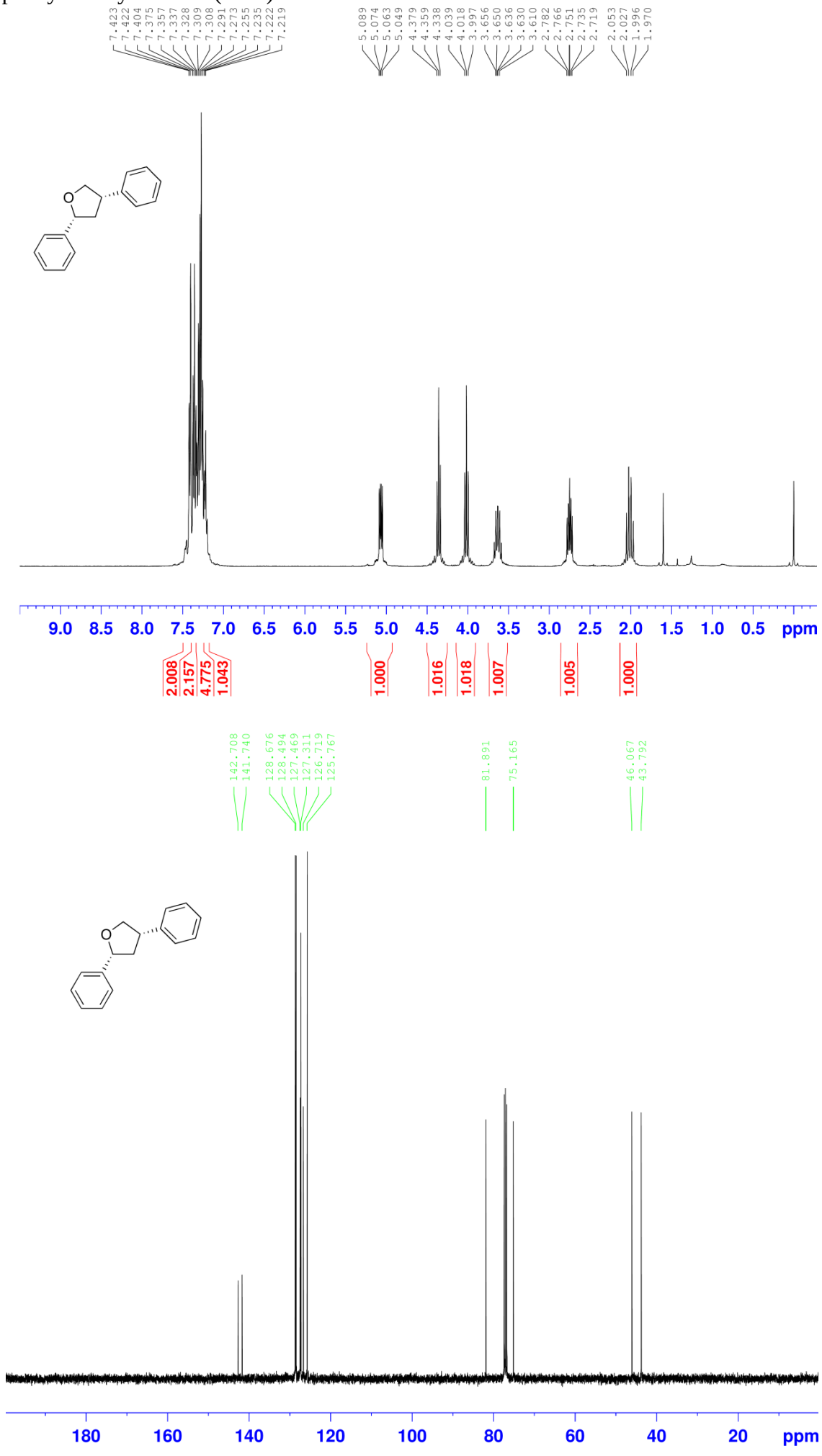


cis-3-(4-Chlorophenyl)-5-phenyldihydrofuran-2(*3H*)-one (*cis*-**4k**)

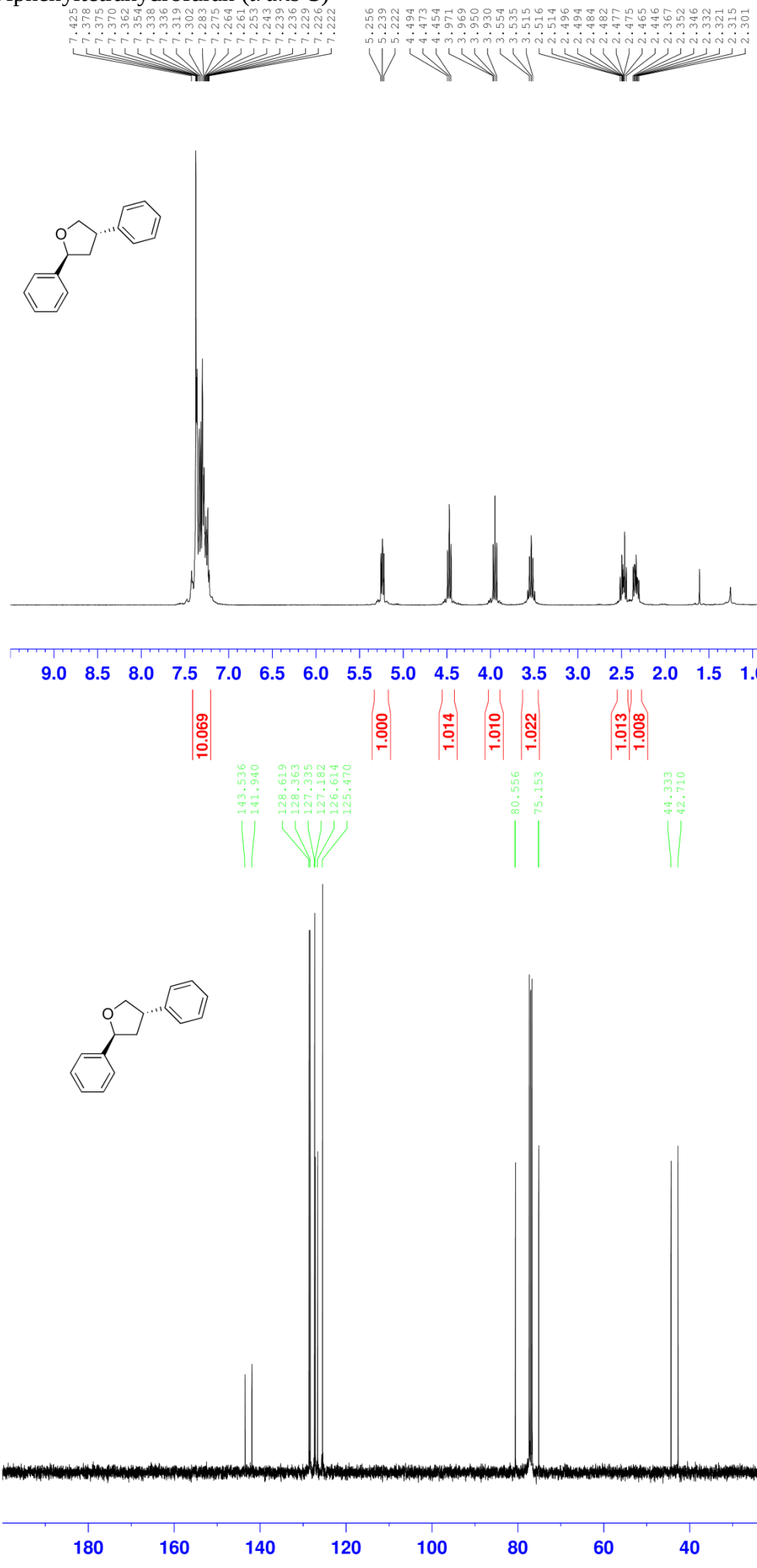




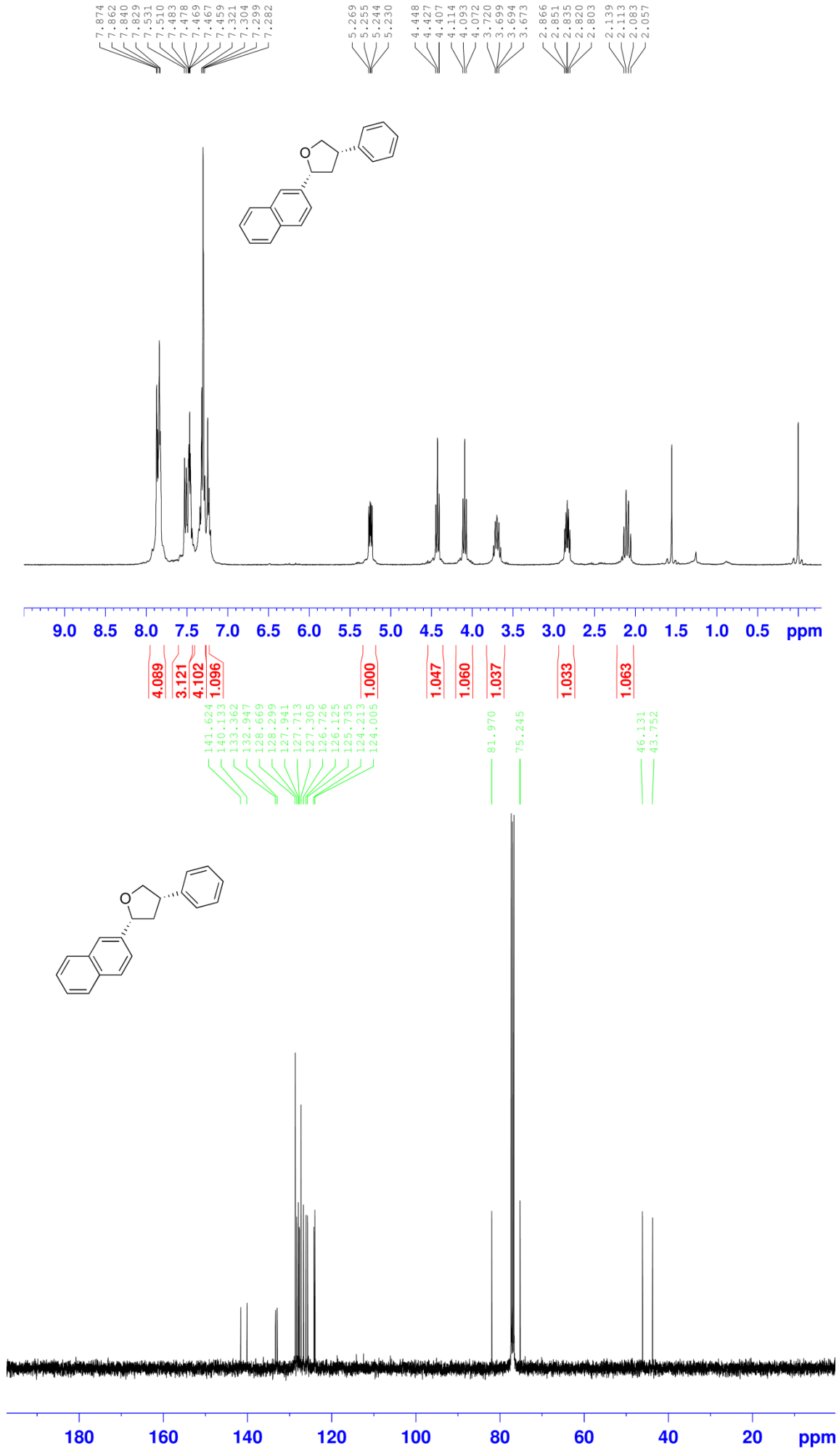
cis-2,4-Diphenyltetrahydrofuran (*cis*-**5**)



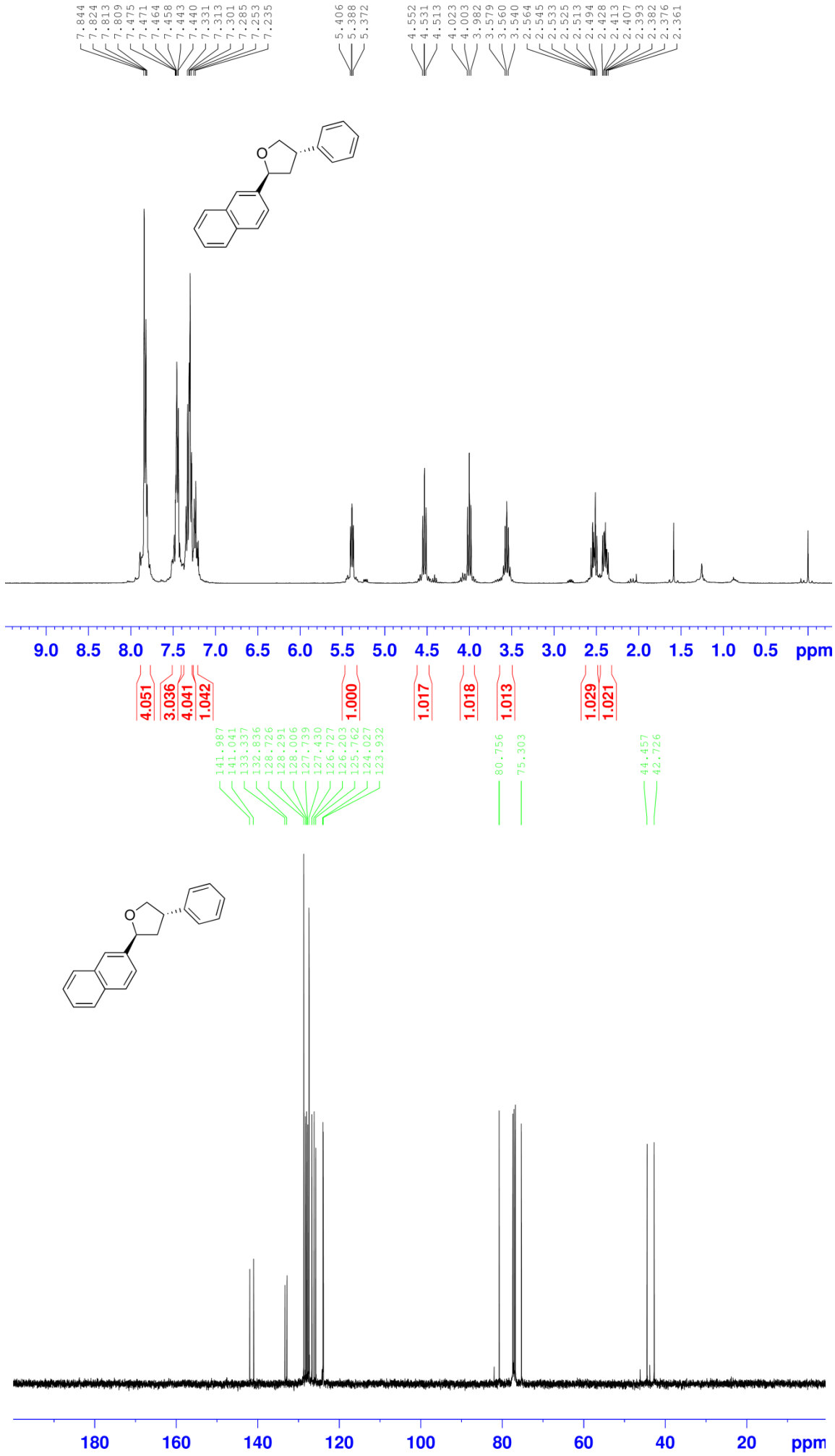
trans-2,4-Diphenyltetrahydrofuran (*trans*-**5**)



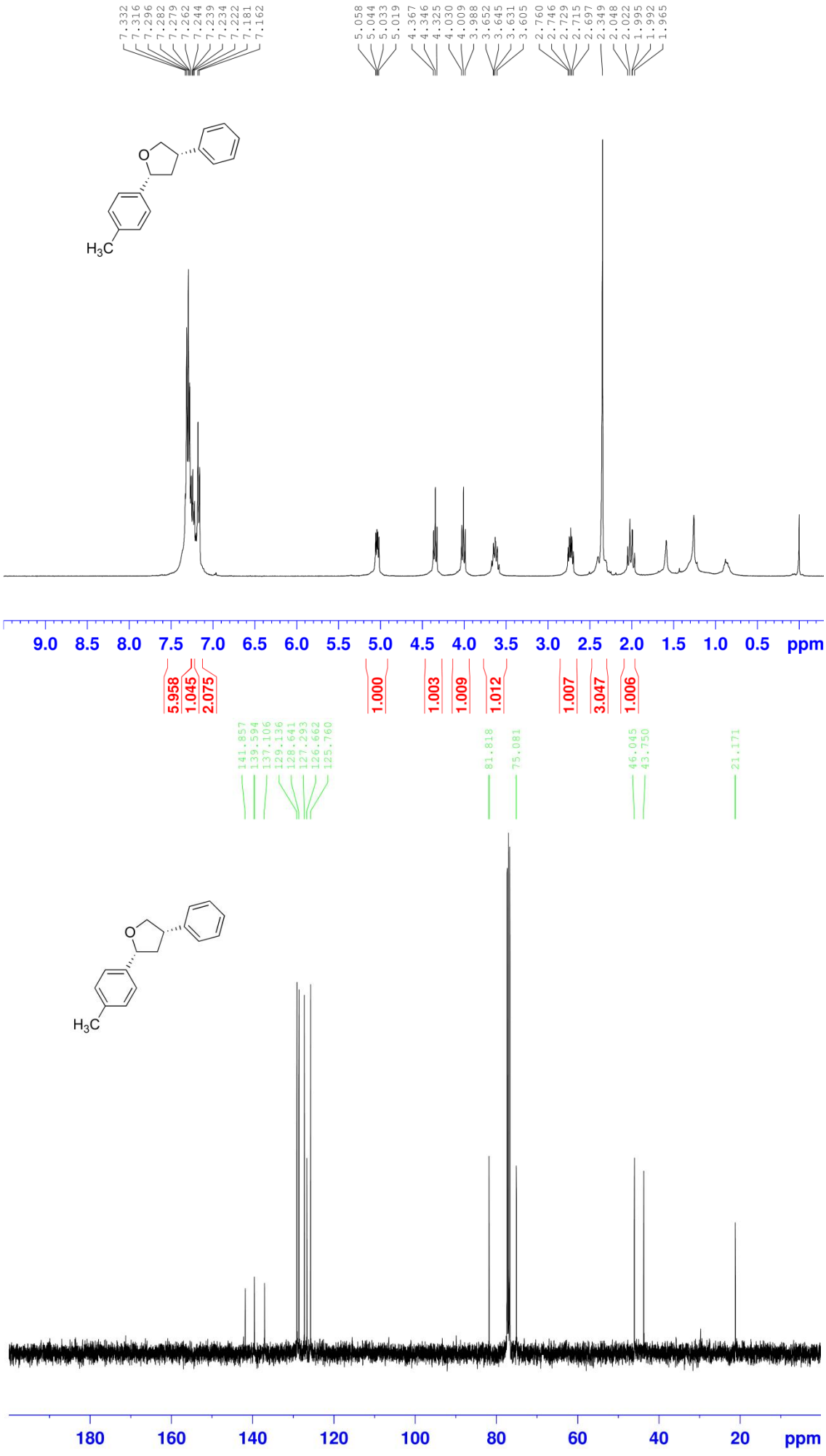
cis-2-(2-Naphthyl)-4-phenyltetrahydrofuran (*cis*-**6**)



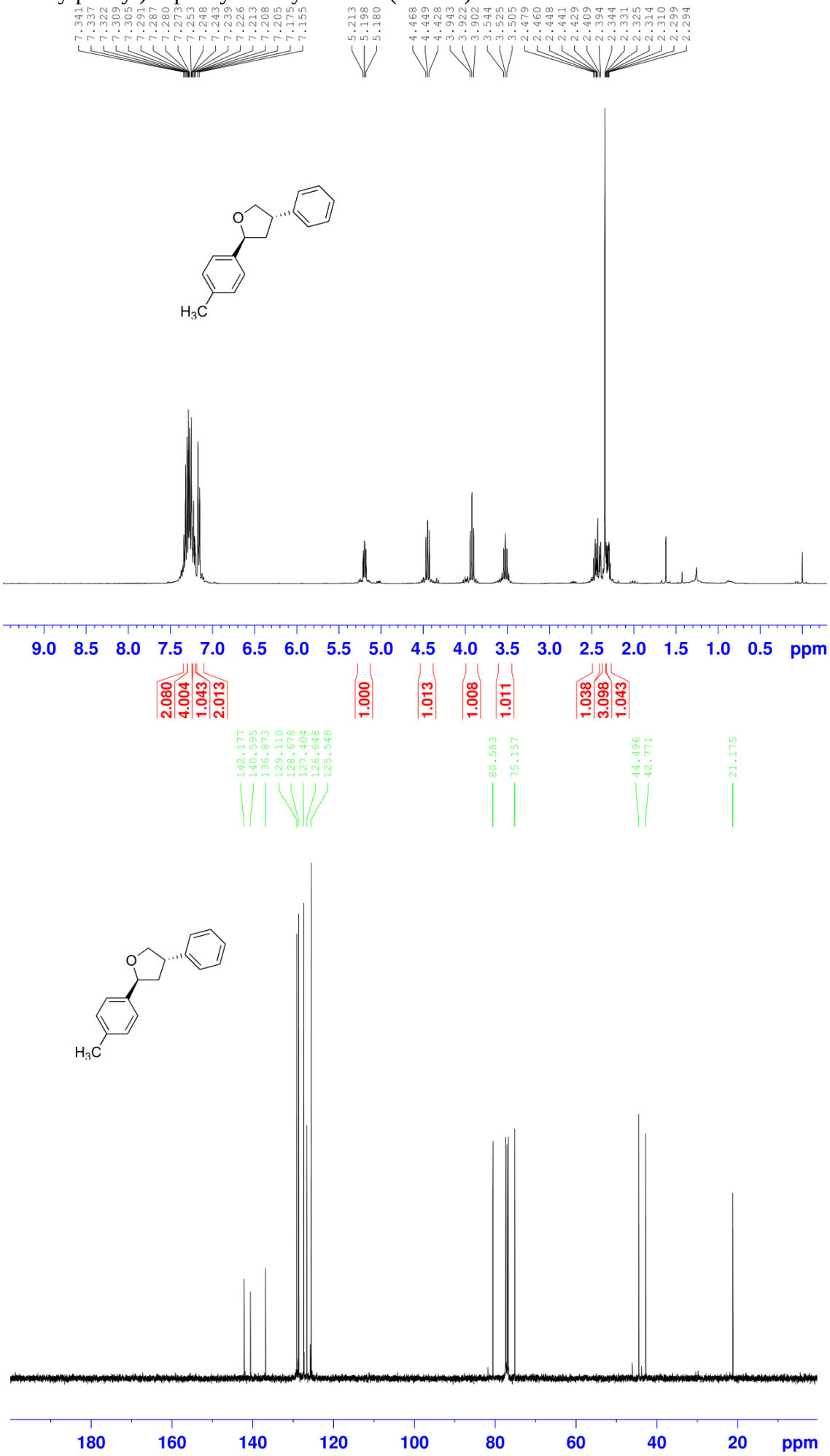
trans-2-(2-Naphthyl)-4-phenyltetrahydrofuran (*trans*-**6**)



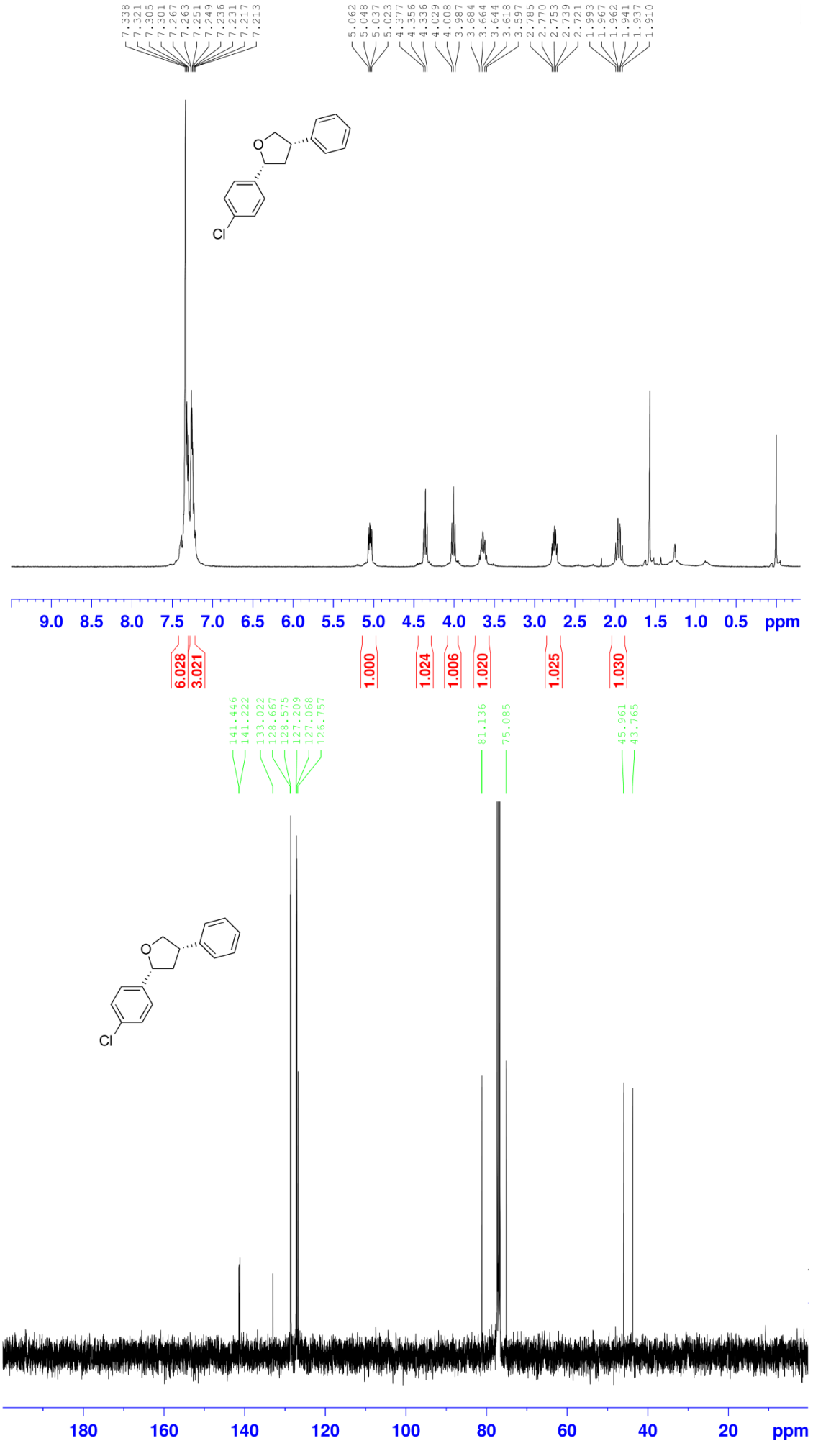
cis-2-(4-Methylphenyl)-4-phenyltetrahydrofuran (*cis*-**7**)



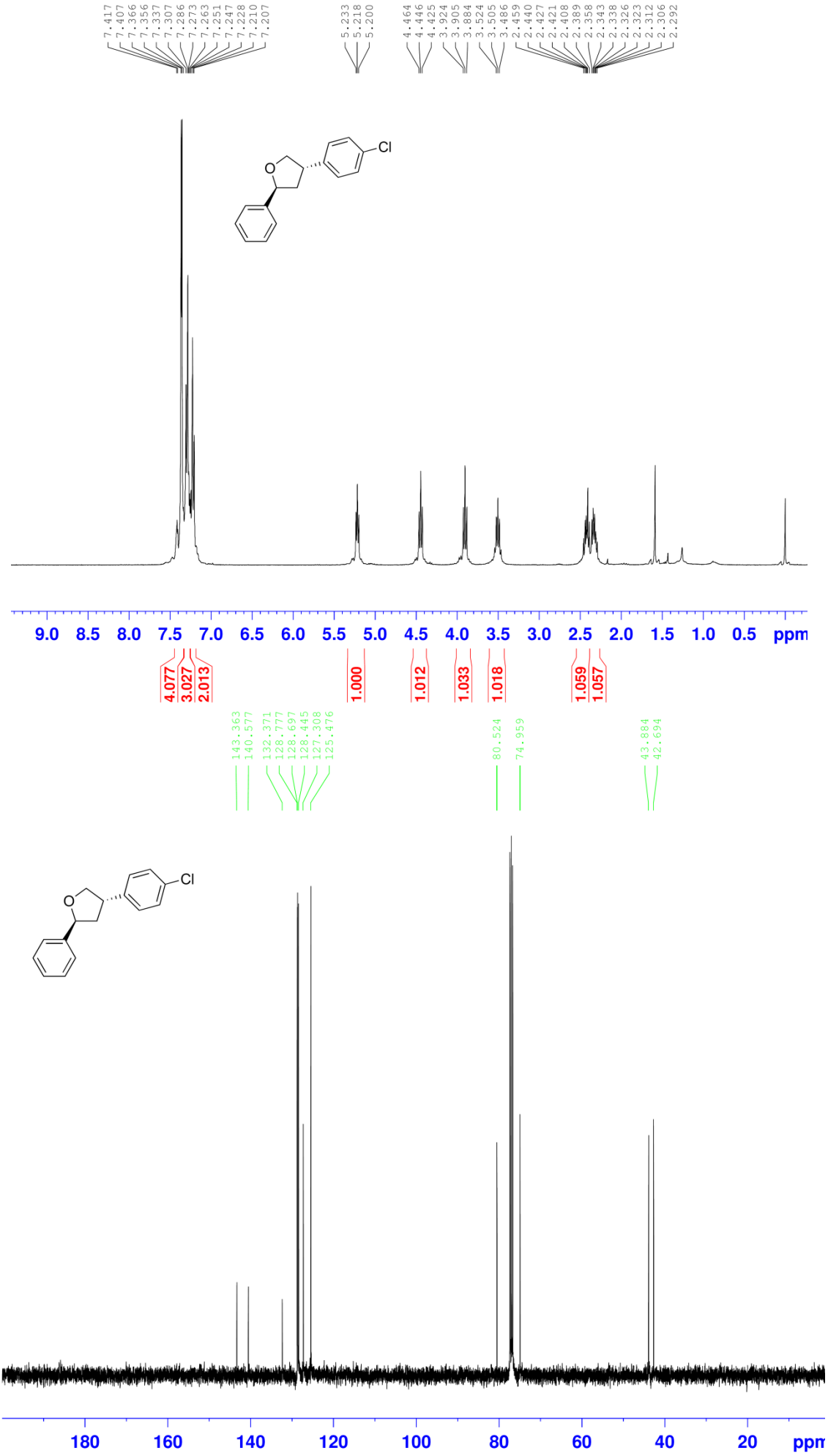
trans-2-(4-Methylphenyl)-4-phenyltetrahydrofuran (*trans*-**7**)



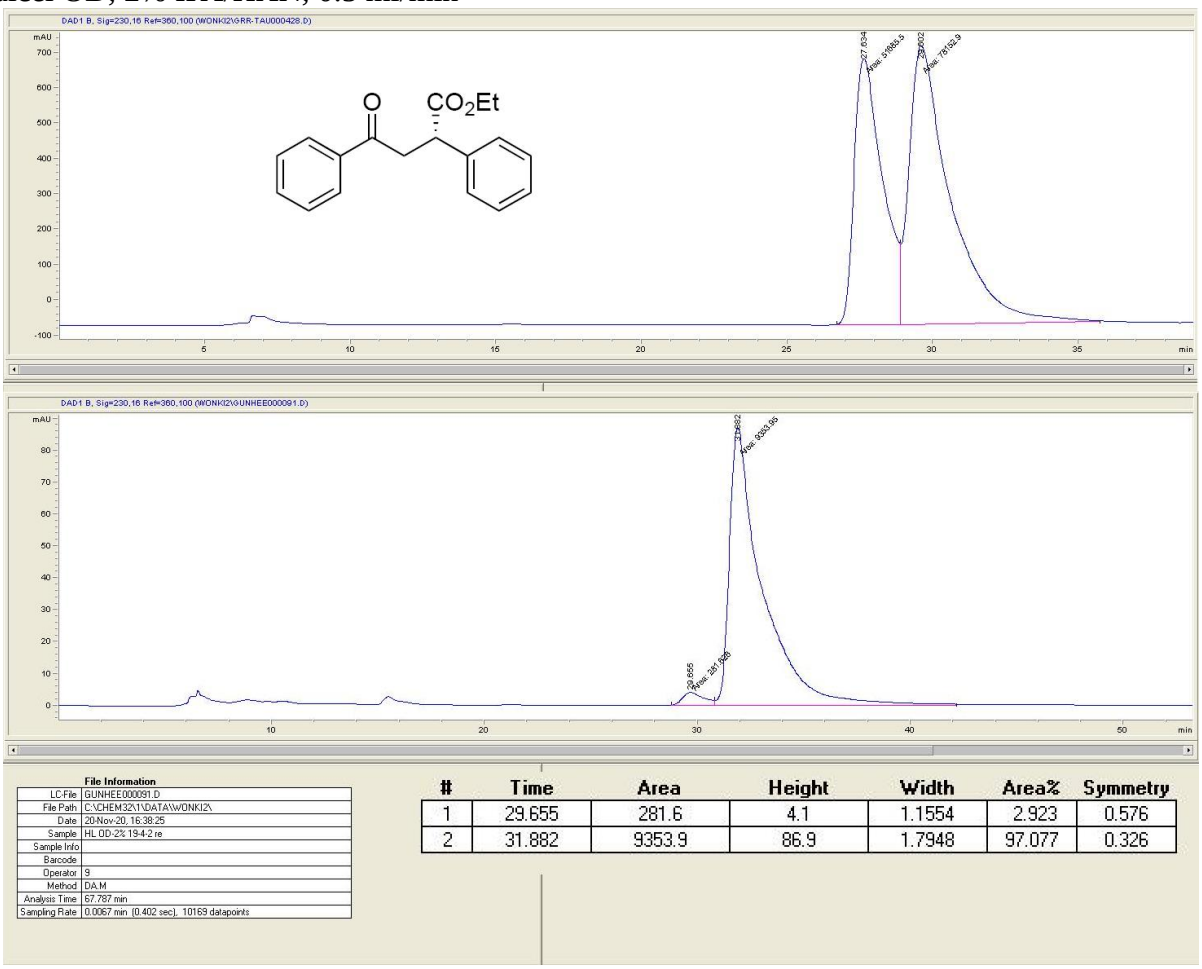
cis-2-(4-Chlorophenyl)-4-phenyltetrahydrofuran (*cis*-**8**)



trans-4-(4-Chlorophenyl)-2-phenyltetrahydrofuran (*trans*-**9**)



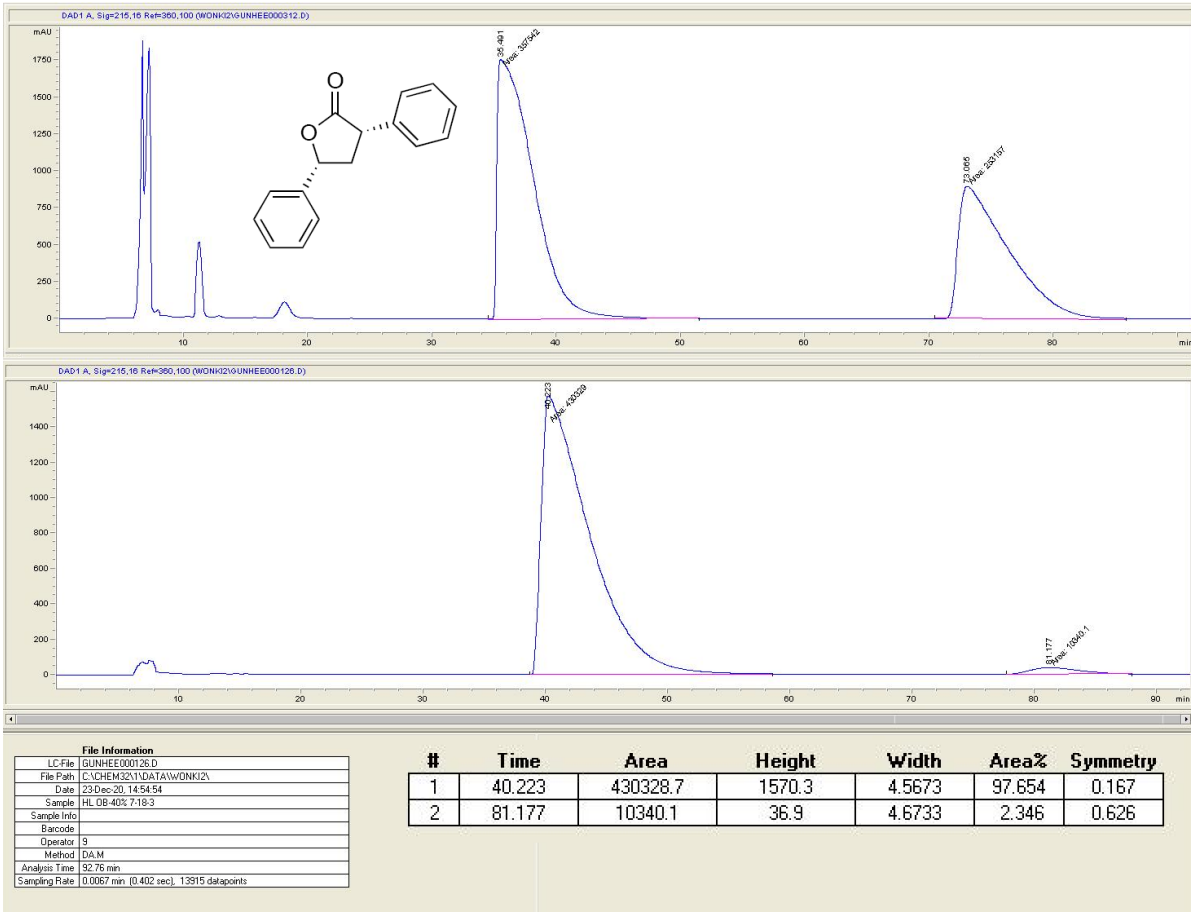
3: Chiralcel OD, 2% IPA/HXN, 0.5 ml/min



File Information	
LC-File	GUNHEE000091.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	20-Nov-20, 16:38:25
Sample	HL OD-2% 19-4-2 re
Sample Info	
Barcode	
Operator	9
Method	DA.M
Analysis Time	67.787 min
Sampling Rate	0.0067 min (0.402 sec), 10169 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	29.655	281.6	4.1	1.1554	2.923	0.576
2	31.882	9353.9	86.9	1.7948	97.077	0.326

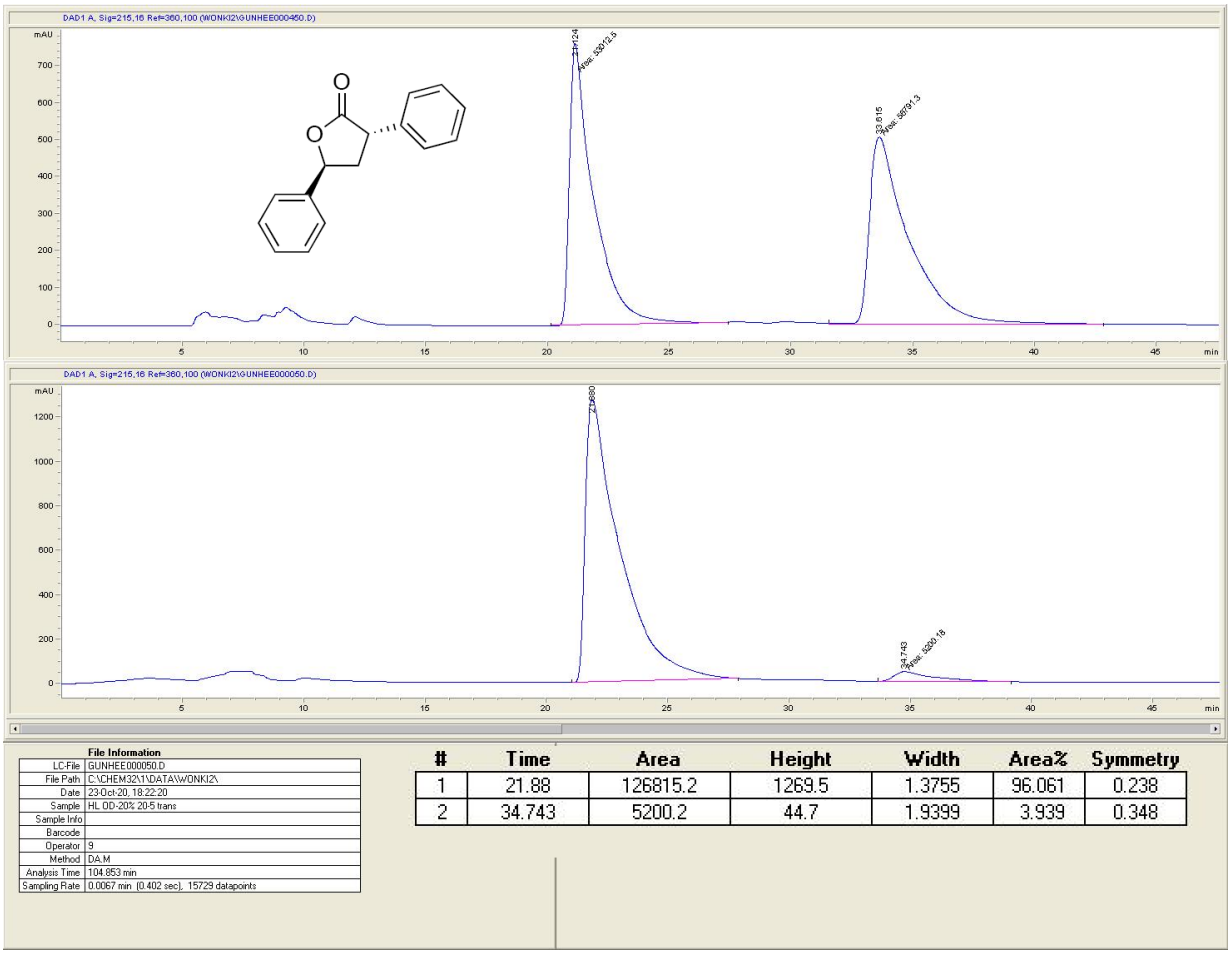
cis-**4a**: Chiralcel OB-H, 40% IPA/HXN, 0.5 ml/min



File Information	
LC-File	GUNHEE000126.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	23-Dec-20, 14:54:54
Sample	HL OB-40% 7-18-3
Sample Info	
Barcode	
Operator	9
Method	DA.M
Analysis Time	92.76 min
Sampling Rate	0.0067 min (0.402 sec), 13915 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	40.223	430328.7	1570.3	4.5673	97.654	0.167
2	81.177	10340.1	36.9	4.6733	2.346	0.626

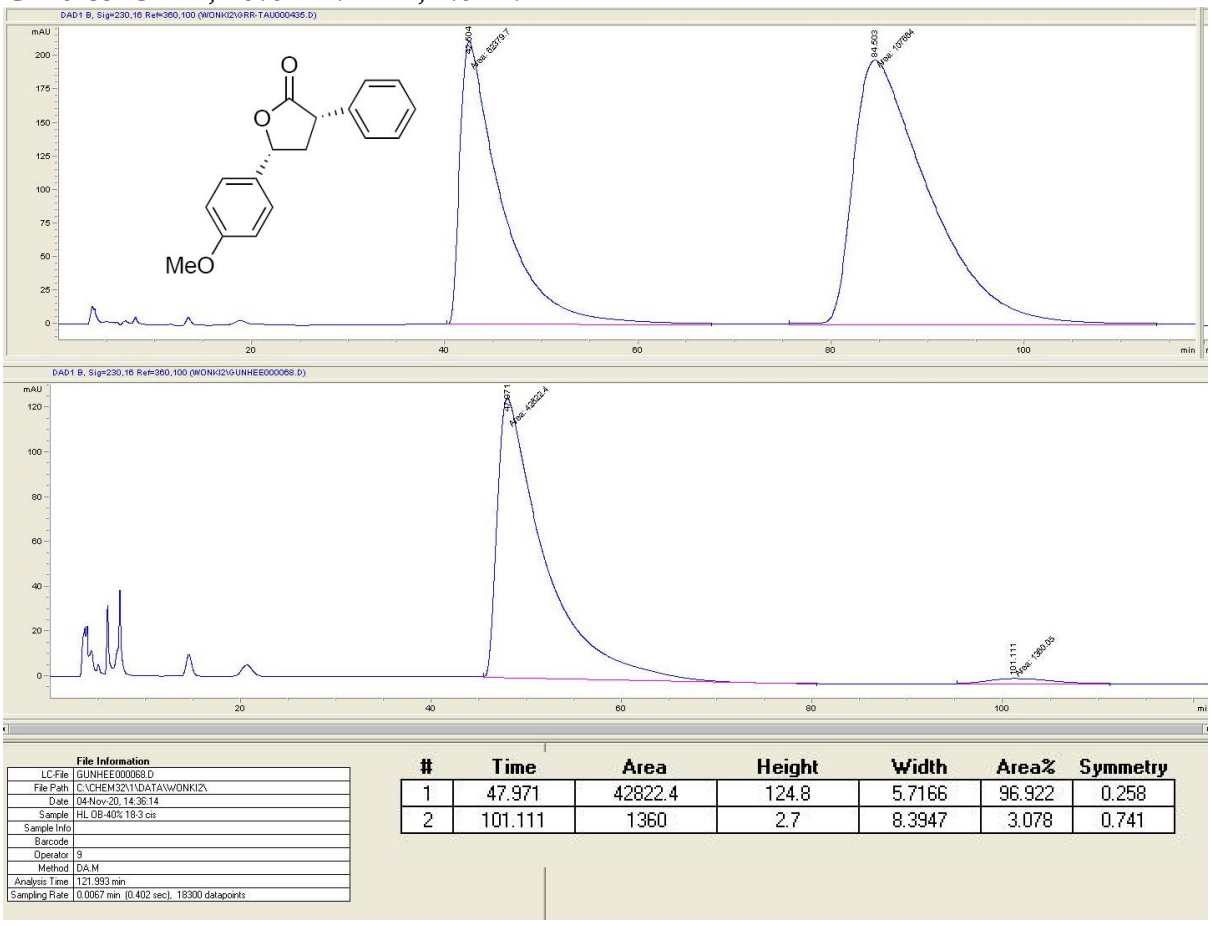
trans-**4a**: Chiralcel OD, 20% IPA/HXN, 0.5 ml/min



File Information	
LC-File	GUNHEE000050.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	23-Oct-20, 18:22:20
Sample	HL OD-20% 20-5 trans
Sample Info	
Barcode	
Operator	9
Method	DA.M
Analysis Time	104.853 min
Sampling Rate	0.0067 min (0.402 sec), 15729 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	21.88	126815.2	1269.5	1.3755	96.061	0.238
2	34.743	5200.2	44.7	1.9399	3.939	0.348

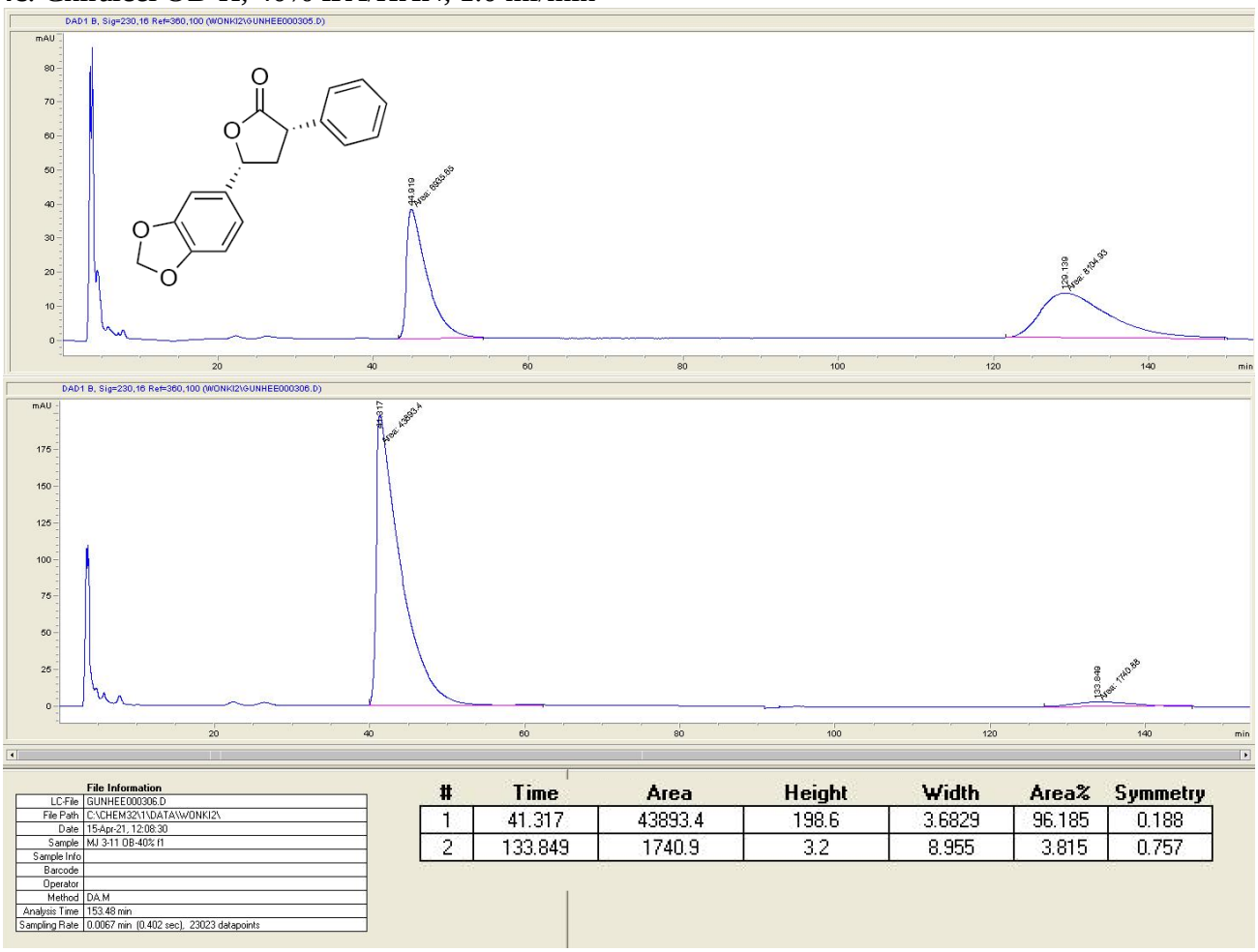
cis-**4b**: Chiralcel OB-H, 40% IPA/HXN, 1.0 ml/min



File Information	
LC-File	GUNHEE000068.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	04-Nov-20, 14:36:14
Sample	HL OB-40% 18-3 cis
Sample Info	
Barcode	
Operator	9
Method	DA.M
Analysis Time	121.993 min
Sampling Rate	0.0067 min (0.402 sec), 18300 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	47.971	42822.4	124.8	5.7166	96.922	0.258
2	101.111	1360	2.7	8.3947	3.078	0.741

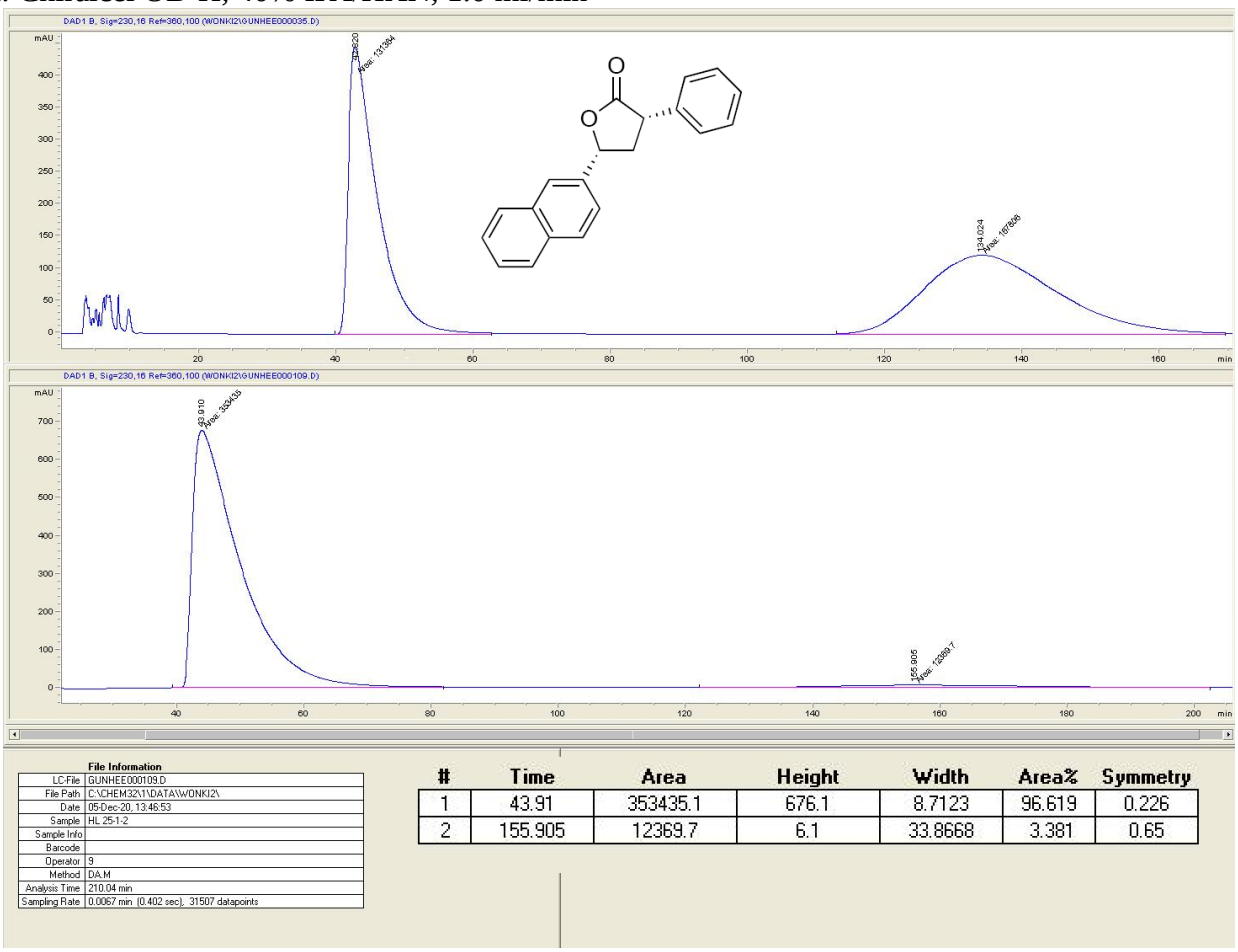
cis-**4c**: Chiralcel OB-H, 40% IPA/HXN, 1.0 ml/min



File Information	
LC-File	GUNHEE000306.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	15-Apr-21, 12:08:30
Sample	MJ 3-11 OB-40% i1
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	153.48 min
Sampling Rate	0.0067 min (0.402 sec), 23023 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	41.317	43893.4	198.6	3.6829	96.185	0.188
2	133.849	1740.9	3.2	8.955	3.815	0.757

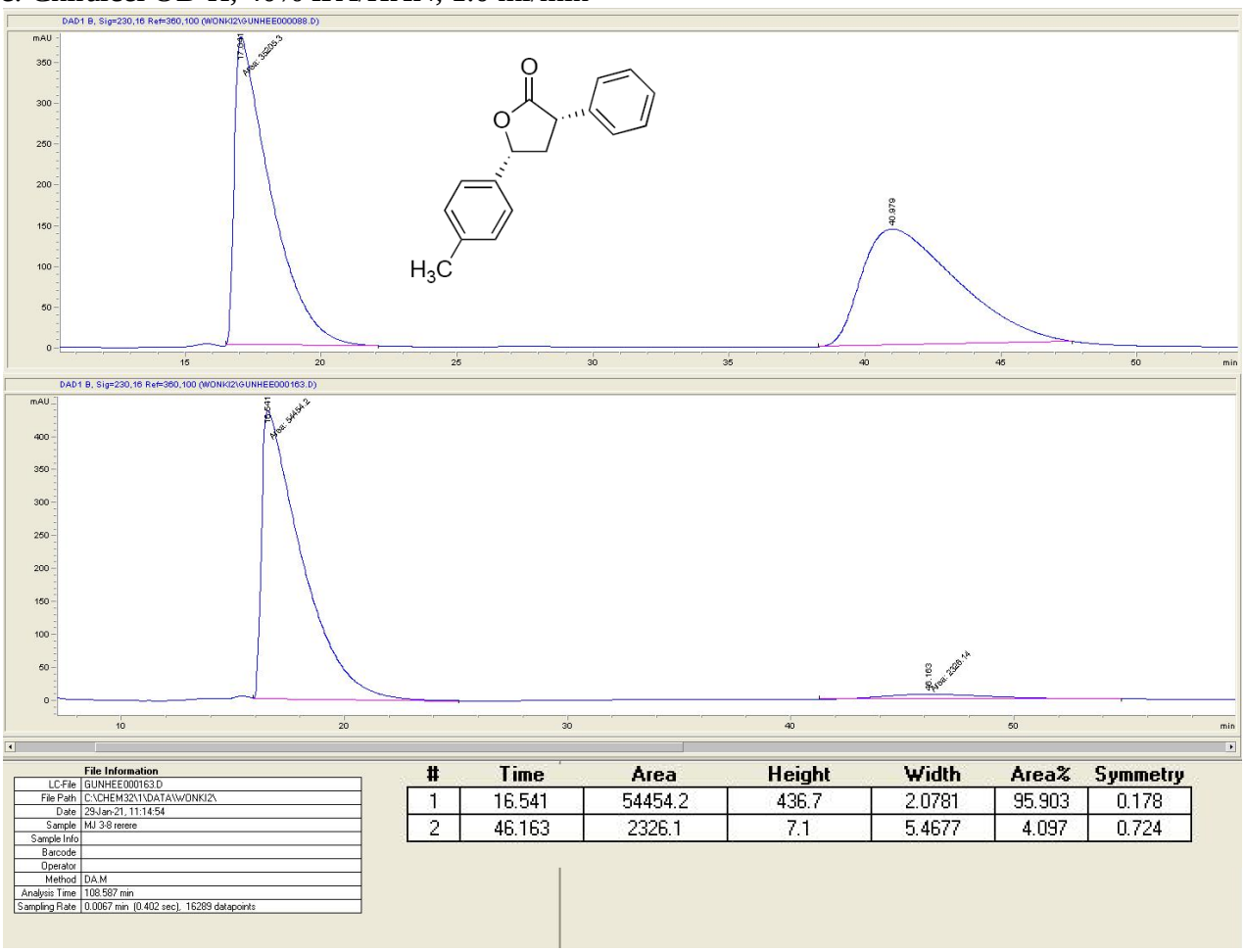
cis-**4d**: Chiralcel OB-H, 40% IPA/HXN, 1.0 ml/min



File Information	
LC-File	GUNHEE000109.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	05-Dec-20, 13:46:53
Sample	HL 25-1-2
Sample Info	
Barcode	
Operator	9
Method	DA.M
Analysis Time	210.04 min
Sampling Rate	0.0067 min (0.402 sec), 31507 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	43.91	353435.1	676.1	8.7123	96.619	0.226
2	155.905	12369.7	6.1	33.8668	3.381	0.65

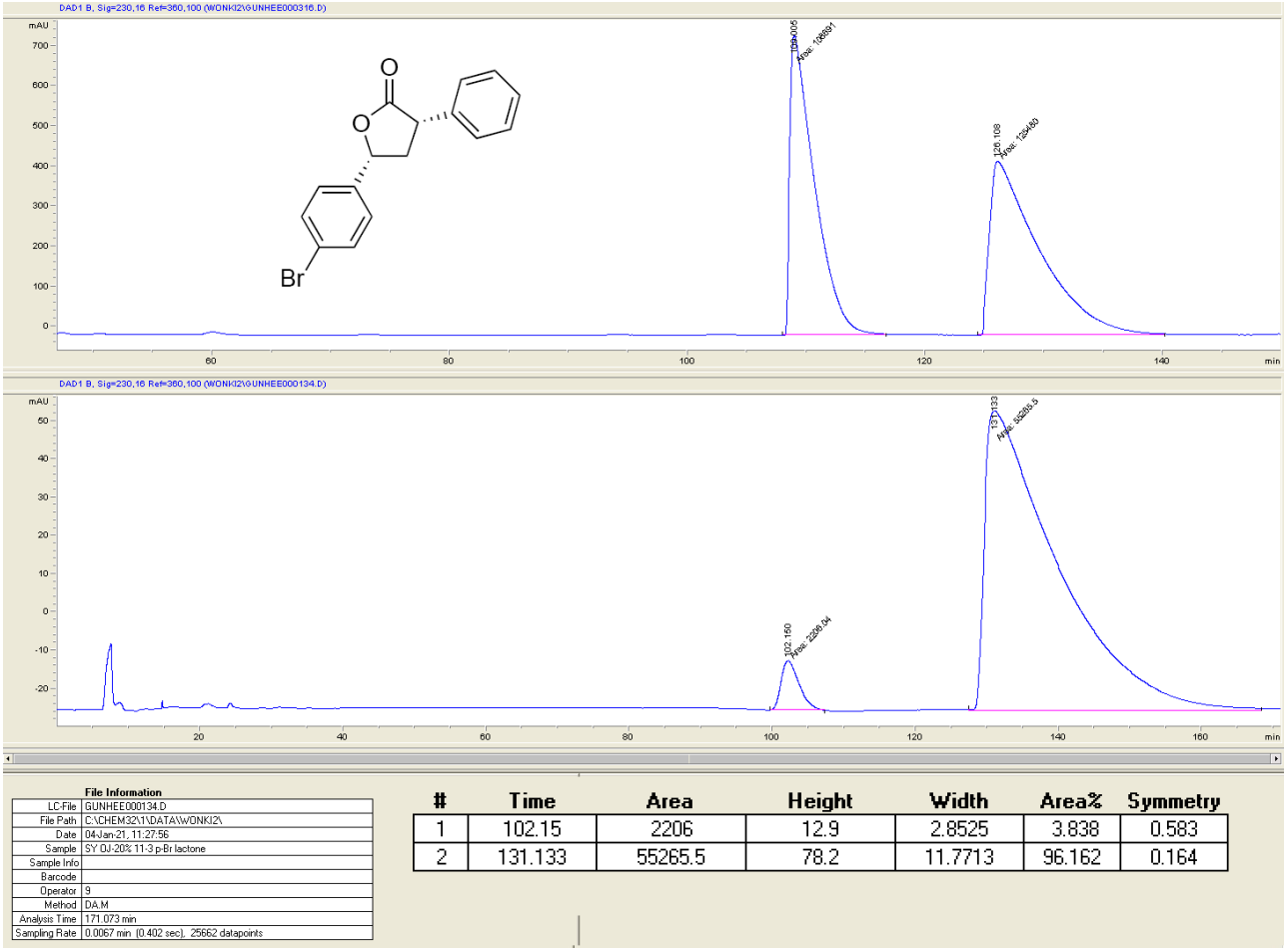
cis-**4e**: Chiralcel OB-H, 40% IPA/HXN, 1.0 ml/min



File Information	
LC-File	GUNHEE000163.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	29-Jan-21, 11:14:54
Sample	MJ 3-8 rerere
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	108.587 min
Sampling Rate	0.0067 min (0.402 sec), 16289 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	16.541	54454.2	436.7	2.0781	95.903	0.178
2	46.163	2326.1	7.1	5.4677	4.097	0.724

cis-**4f**: Chiralcel OJ-H, 20% IPA/HXN, 1.0 ml/min



File Information	
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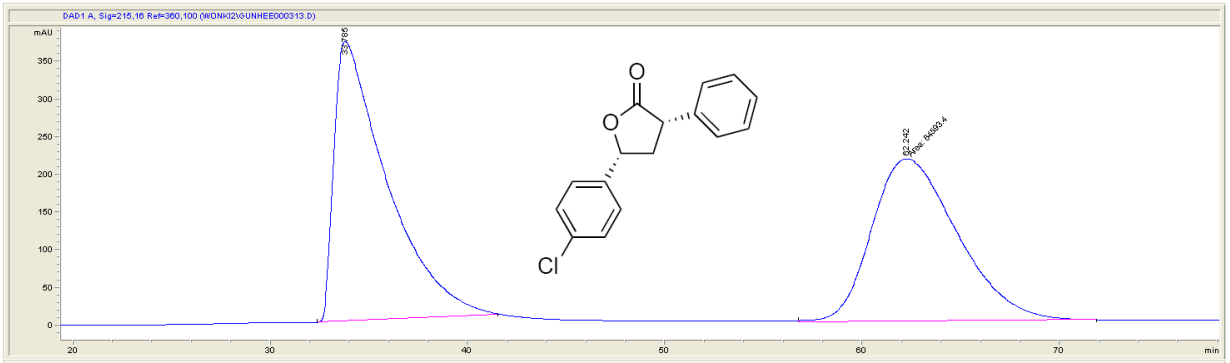
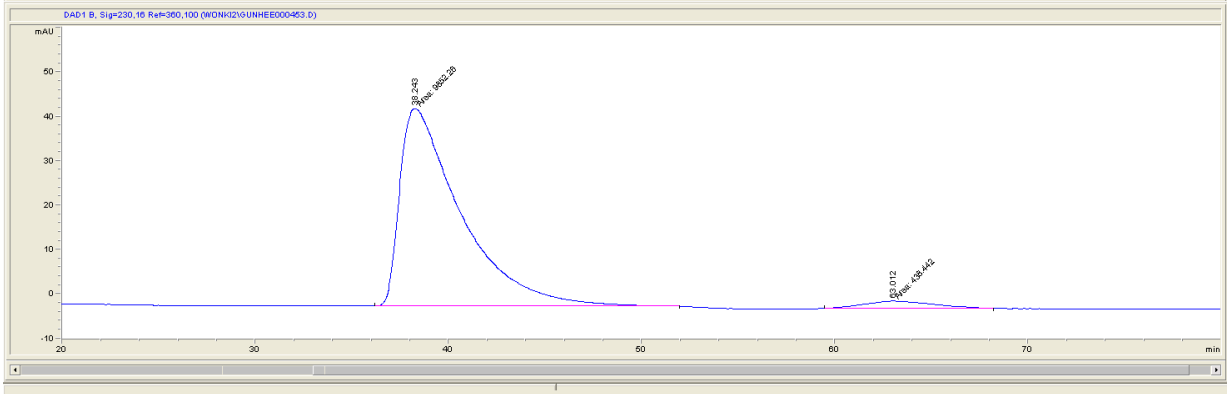
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	04-Jan-21, 11:27:56
Sample	SY OJ-20% 11-3 p-Br lactone
Sample Info	
Barcode	
Operator	9
Method	DA.M
Analysis Time	171.073 min
Sampling Rate	0.0067 min (0.402 sec), 25662 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	102.15	2206	12.9	2.8525	3.838	0.583
2	131.133	55265.5	78.2	11.7713	96.162	0.164

cis-**4g**: Chiralcel OB-H, 40% IPA/HXN, 1.0 ml/min



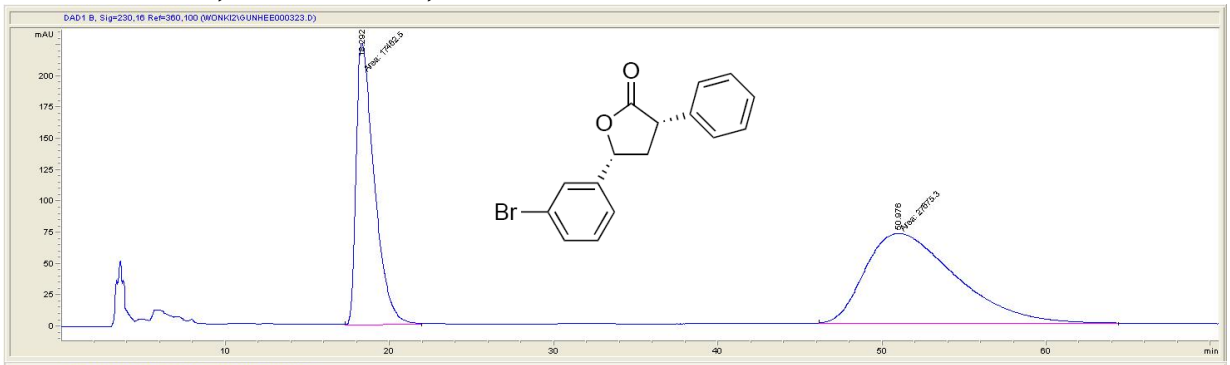


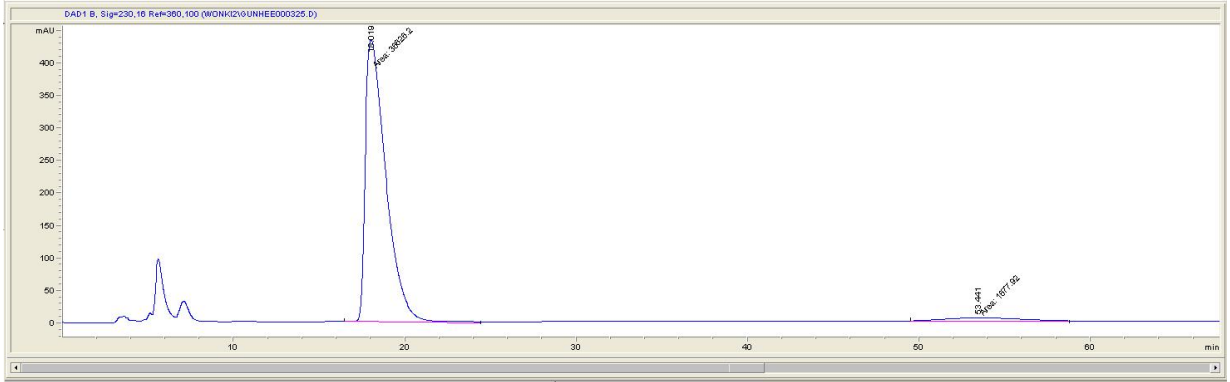
File Information

LC-File	GUNHEE000453.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	01-Jul-21, 17:20:14
Sample	SY OB-40% (I1) 16-2(2) p-Cl lactone
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	81.453 min
Sampling Rate	0.0067 min (0.402 sec), 12219 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	38.243	9852.3	44.6	3.6847	95.739	0.317
2	63.012	438.4	1.8	4.1703	4.261	0.828

cis-**4h**: Chiralcel OB-H, 40% IPA/HXN, 1.0 ml/min



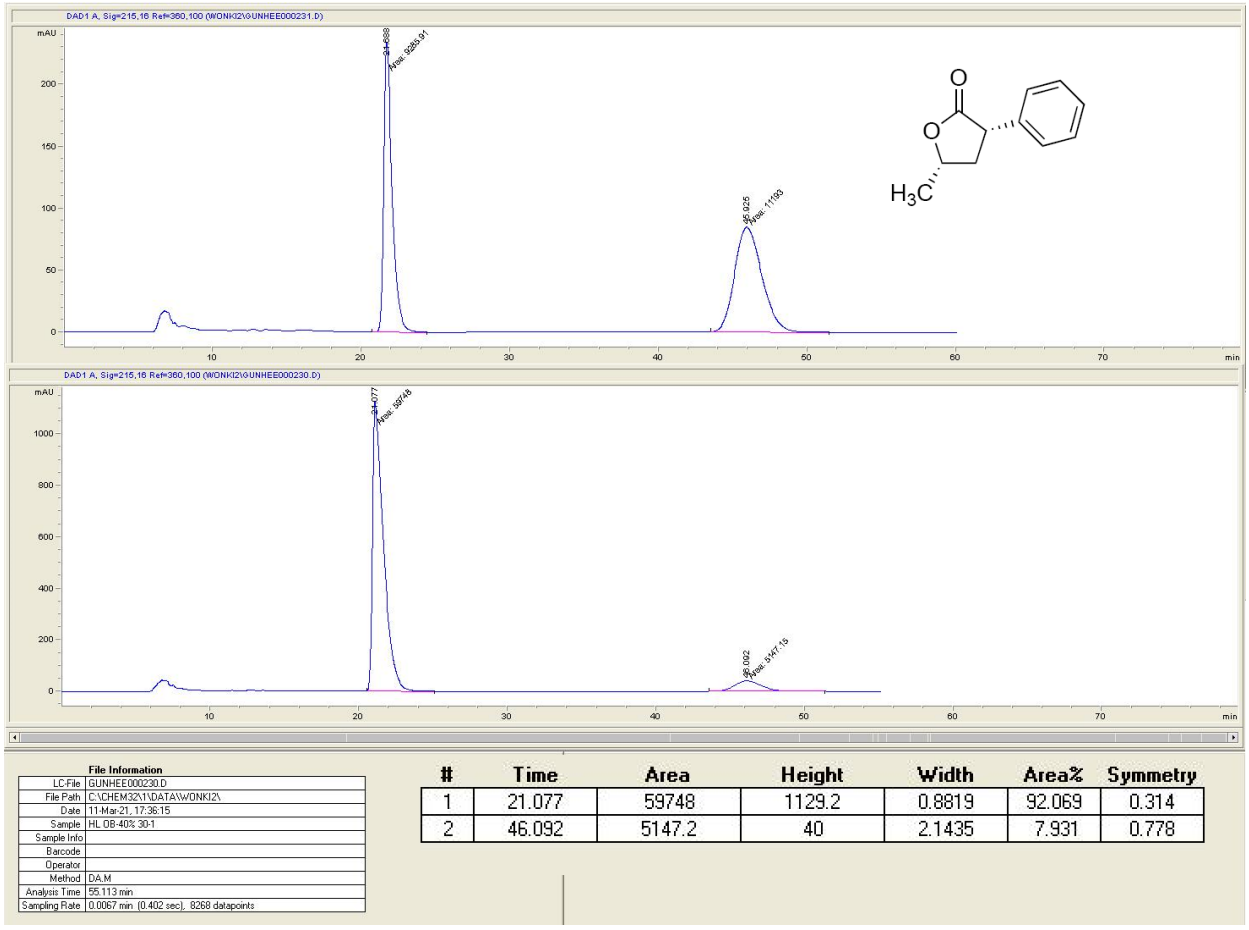


File Information

LC-File	GUNHEE000325.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	07-May-21, 11:27:20
Sample	HL OB-40%(I1) 45-1 p-Br
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	108.073 min
Sampling Rate	0.0067 min (0.402 sec), 16212 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	18.019	36626.2	434.5	1.4048	95.619	0.39
2	53.441	1677.9	5.1	5.4689	4.381	0.768

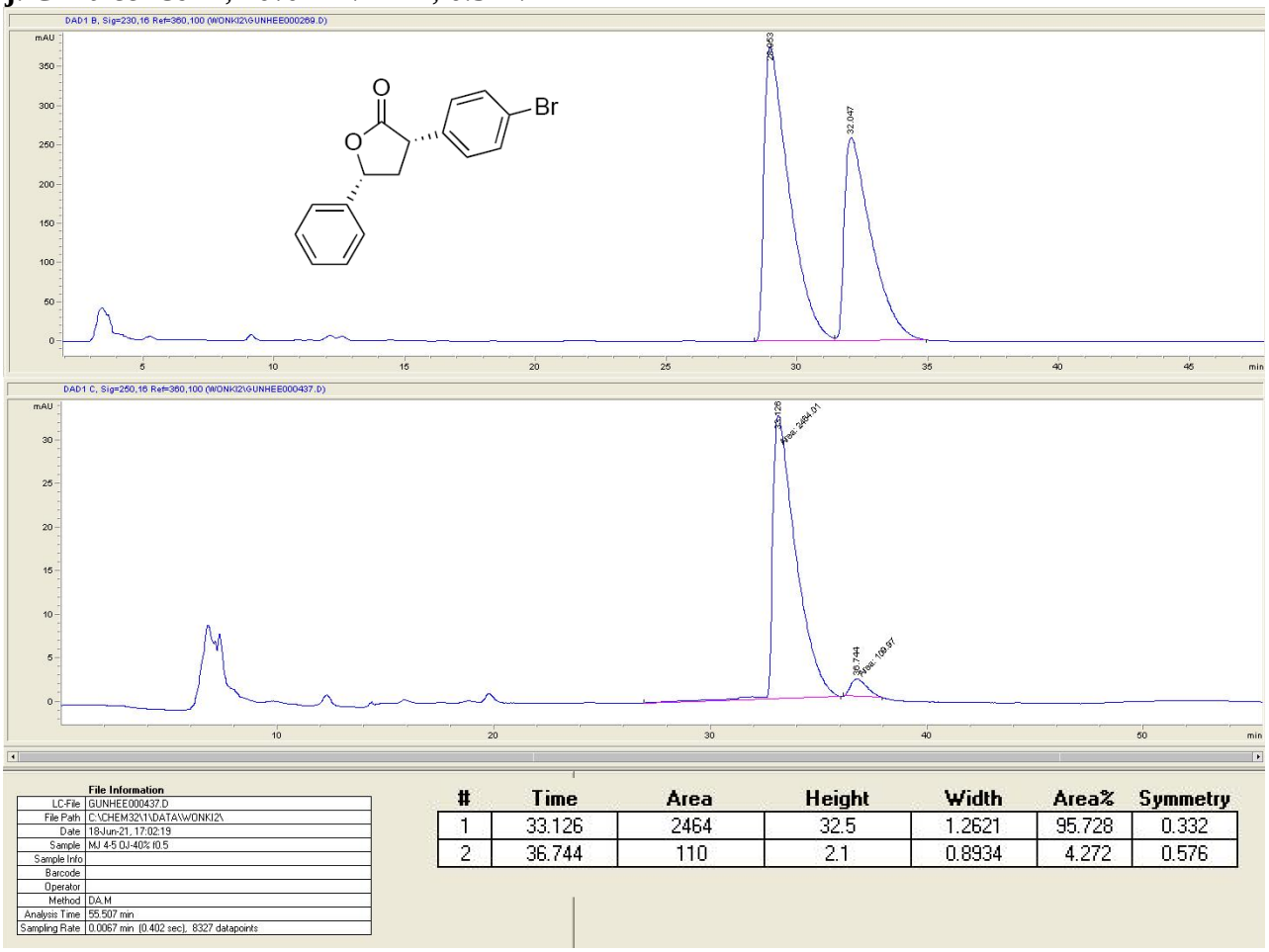
cis-**4i**: Chiralcel OB-H, 40% IPA/HXN, 0.5 ml/min



File Information	
LC-File	GUNHEE000230.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	11-Mar-21, 17:36:15
Sample	HL OB-40% 30-1
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	55.113 min
Sampling Rate	0.0067 min (0.402 sec), 8268 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	21.077	59748	1129.2	0.8819	92.069	0.314
2	46.092	5147.2	40	2.1435	7.931	0.778

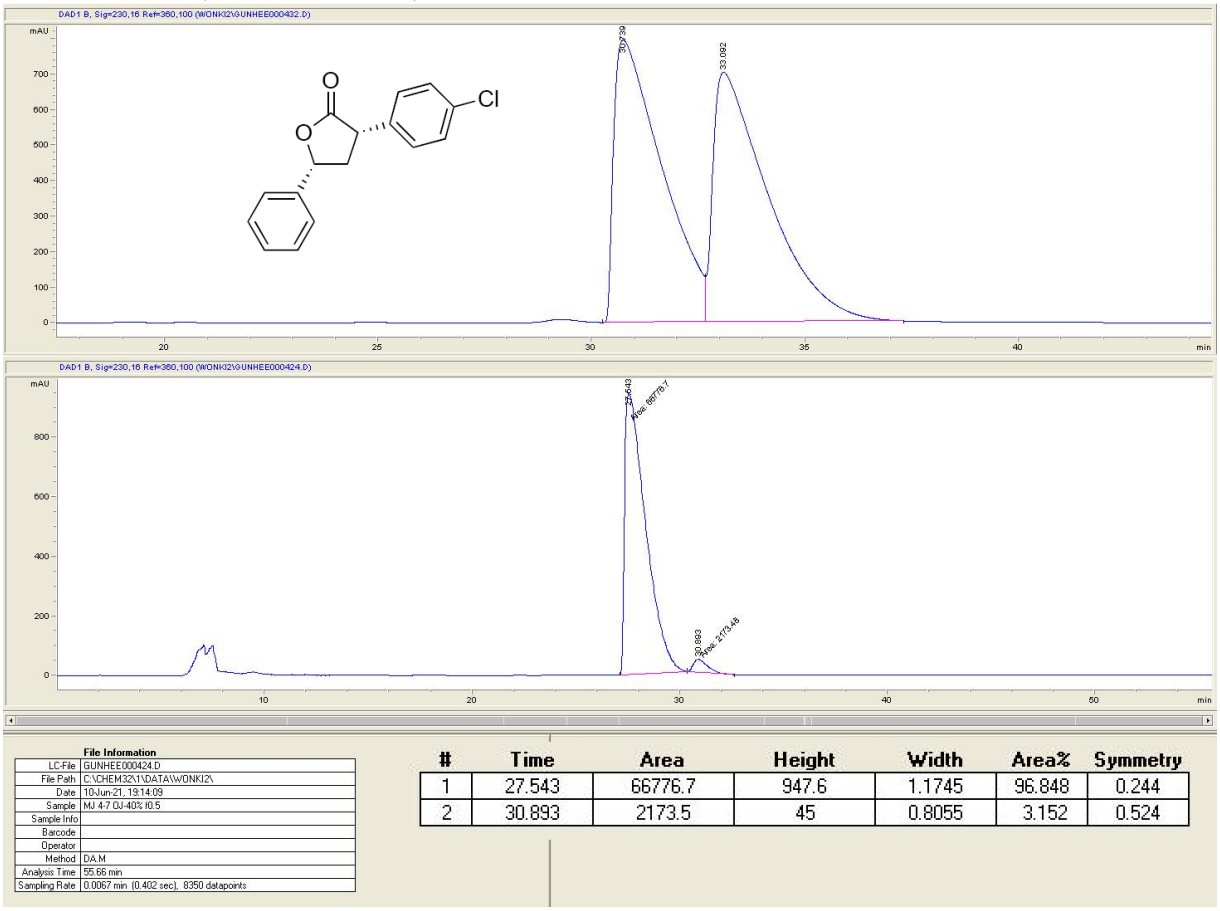
cis-**4j**: Chiralcel OJ-H, 40% IPA/HXN, 0.5ml/min



File Information	
LC-File	GUNHEE000437.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	18-Jun-21, 17:02:19
Sample	MJ 4-5 OJ-40% I0.5
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	55.507 min
Sampling Rate	0.0067 min (0.402 sec), 8327 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	33.126	2464	32.5	1.2621	95.728	0.332
2	36.744	110	2.1	0.8934	4.272	0.576

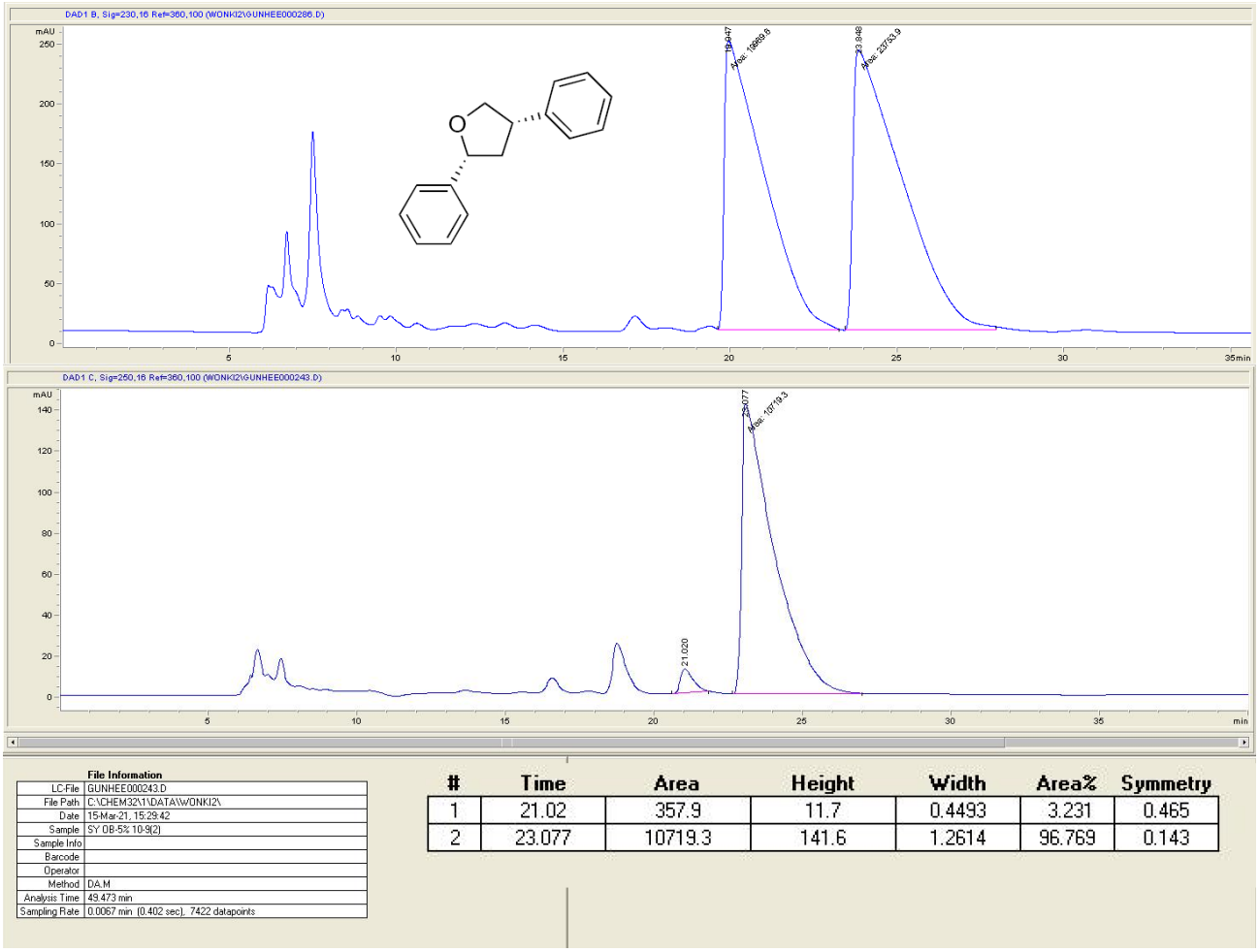
cis-**4k**: Chiralcel OJ-H, 40% IPA/HXN, 0.5ml/min



File Information	
LC-File	GUNHEE000424.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	10-Jun-21, 19:14:09
Sample	MJ 4-7 OJ-40% I0.5
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	55.66 min
Sampling Rate	0.0067 min (0.402 sec), 8350 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	27.543	66776.7	947.6	1.1745	96.848	0.244
2	30.893	2173.5	45	0.8055	3.152	0.524

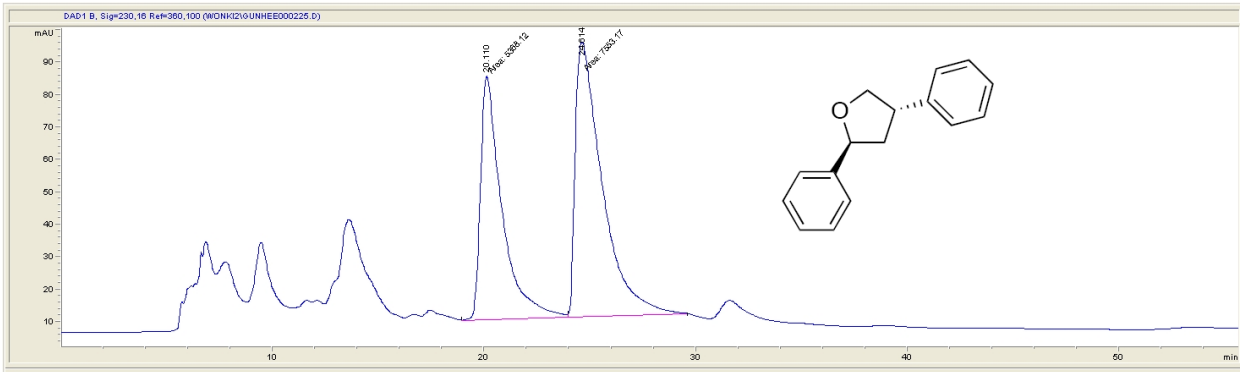
cis-**5**: Chiralcel OB-H, 5% IPA/HXN, 0.5ml/min

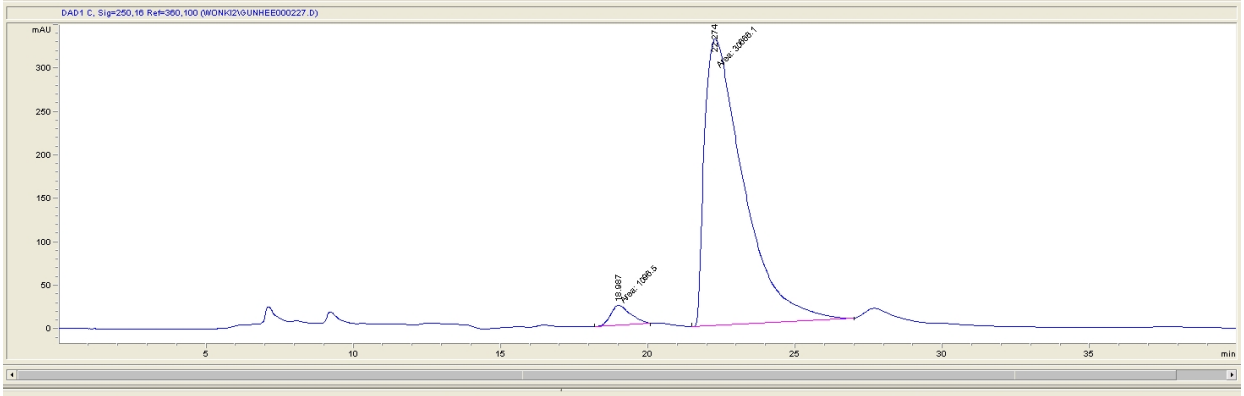


File Information	
LC-File	GUNHEE000243.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	15-Mar-21, 15:29:42
Sample	SY OB-5% 10-9(2)
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	49.473 min
Sampling Rate	0.0067 min (0.402 sec), 7422 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	21.02	357.9	11.7	0.4493	3.231	0.465
2	23.077	10719.3	141.6	1.2614	96.769	0.143

trans-**5**: Chiralcel OD, 2% IPA/HXN, 0.5ml/min

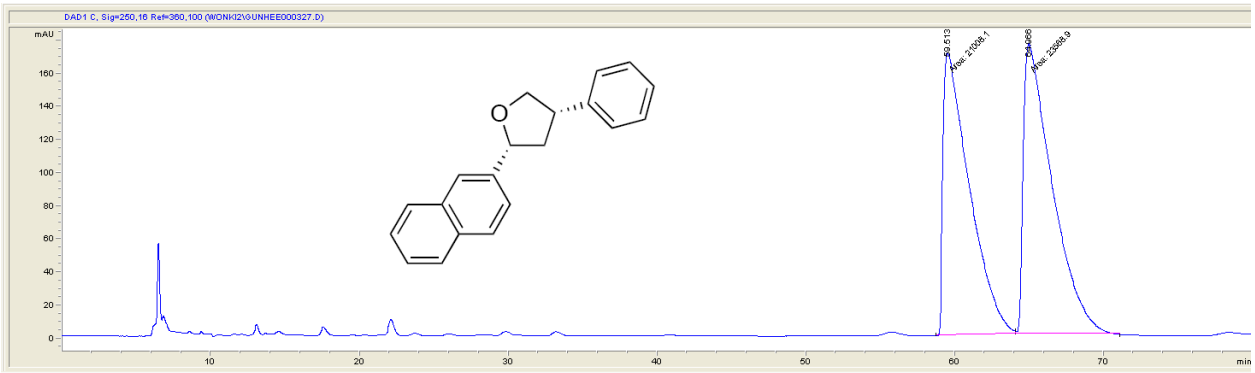


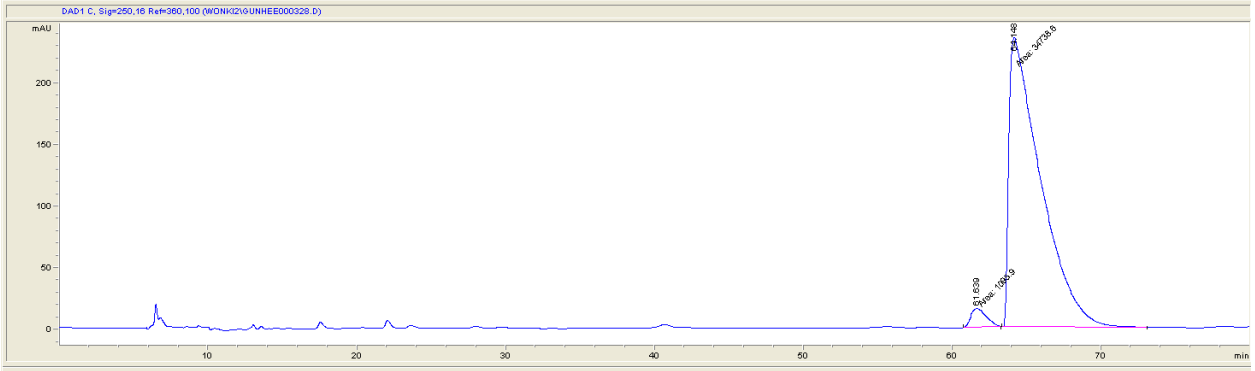


File Information	
LC-File	GUNHEE000227.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	10-Mar-21, 13:39:05
Sample	SY OD-2% trans-THF 9-10
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	41.673 min
Sampling Rate	0.0067 min (0.402 sec), 6252 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	18.987	1096.5	23.1	0.7913	3.452	0.65
2	22.274	30666.1	330.4	1.5469	96.548	0.356

cis-**6**: Chiralcel OJ-H, 10% IPA/HXN, 0.5ml/min

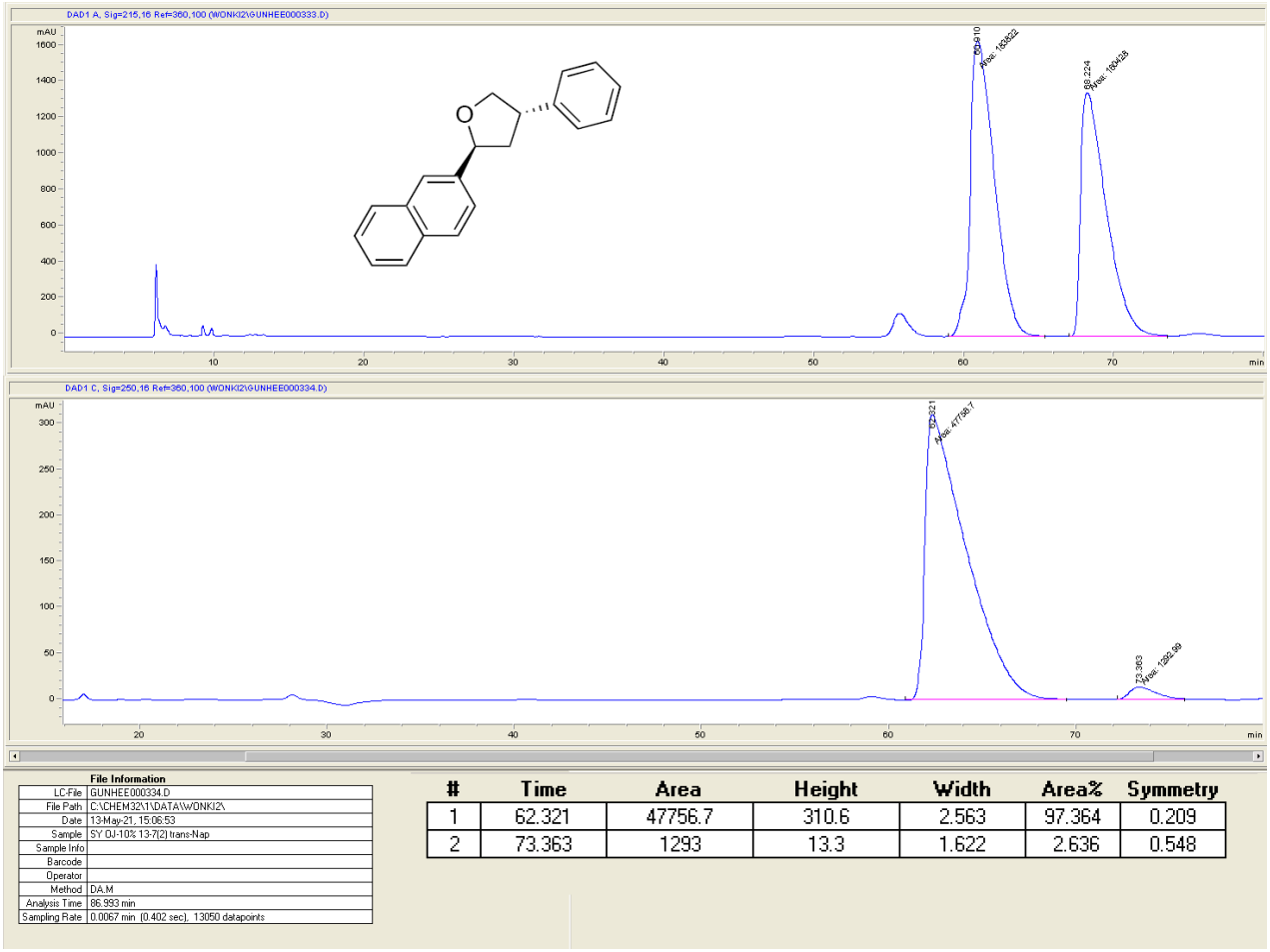




File Information	
LC-File	GUNHEE000328.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	07-May-21, 17:27:55
Sample	SY OJ-10% Nap cis 13-6
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	80.273 min
Sampling Rate	0.0067 min (0.402 sec), 12042 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	61.639	1095.9	15.1	1.2091	3.058	0.587
2	64.148	34738.6	234.8	2.4658	96.942	0.184

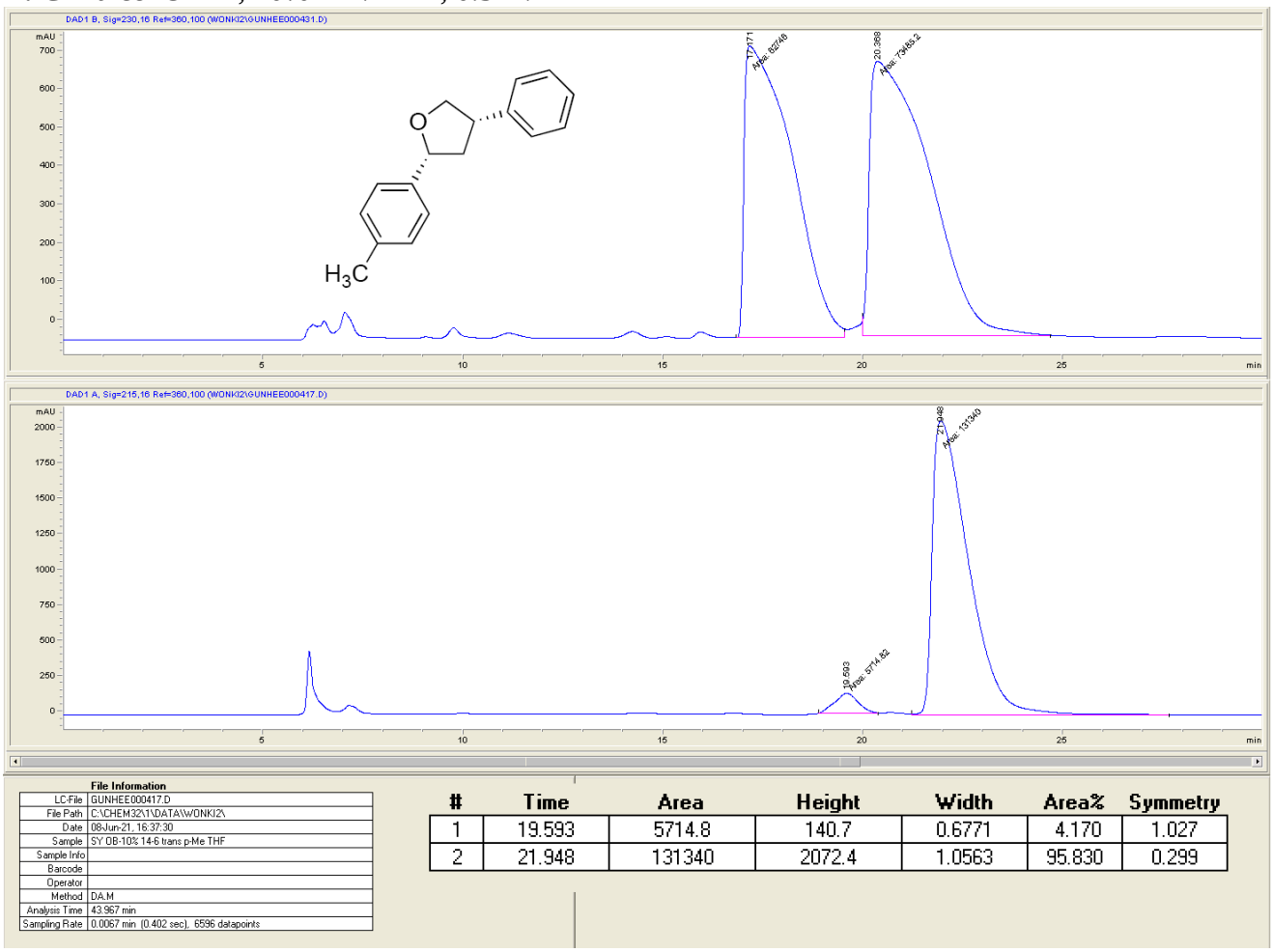
trans-**6**: Chiralcel OJ-H, 10% IPA/HXN, 0.5ml/min



File Information	
LC-File	GUNHEE000334.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	13-May-21, 15:06:53
Sample	SY OJ-10% 13-7(2) trans-Nap
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	86.993 min
Sampling Rate	0.0067 min (0.402 sec), 13050 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	62.321	47756.7	310.6	2.563	97.364	0.209
2	73.363	1293	13.3	1.622	2.636	0.548

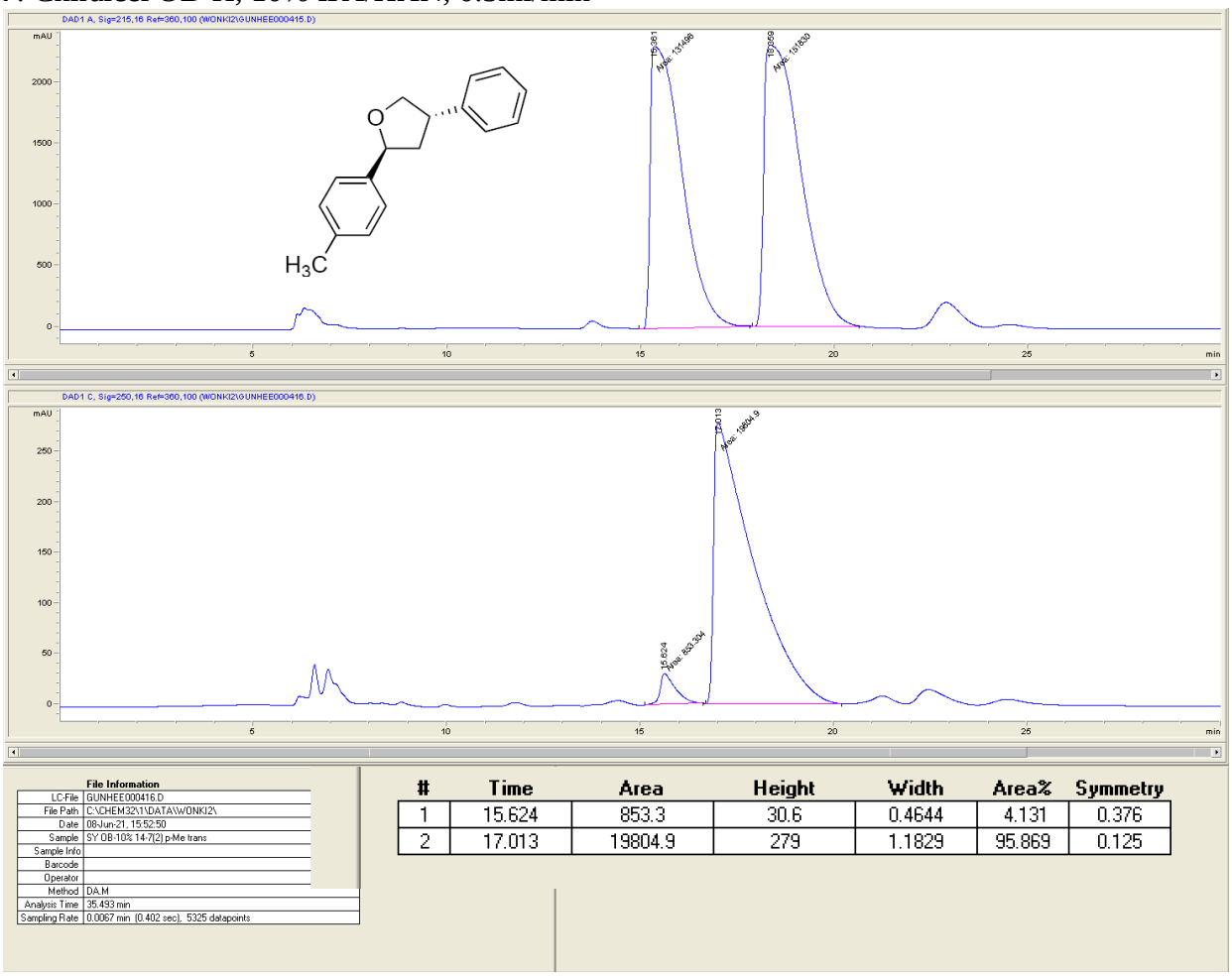
cis-**7:** Chiralcel OB-H, 10% IPA/HXN, 0.5ml/min



File Information	
LC-File	GUNHEE000417.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	08-Jun-21, 16:37:30
Sample	SY OB-10% 14-6 trans p-Me THF
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	43.967 min
Sampling Rate	0.0067 min (0.402 sec), 6596 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	19.593	5714.8	140.7	0.6771	4.170	1.027
2	21.948	131340	2072.4	1.0563	95.830	0.299

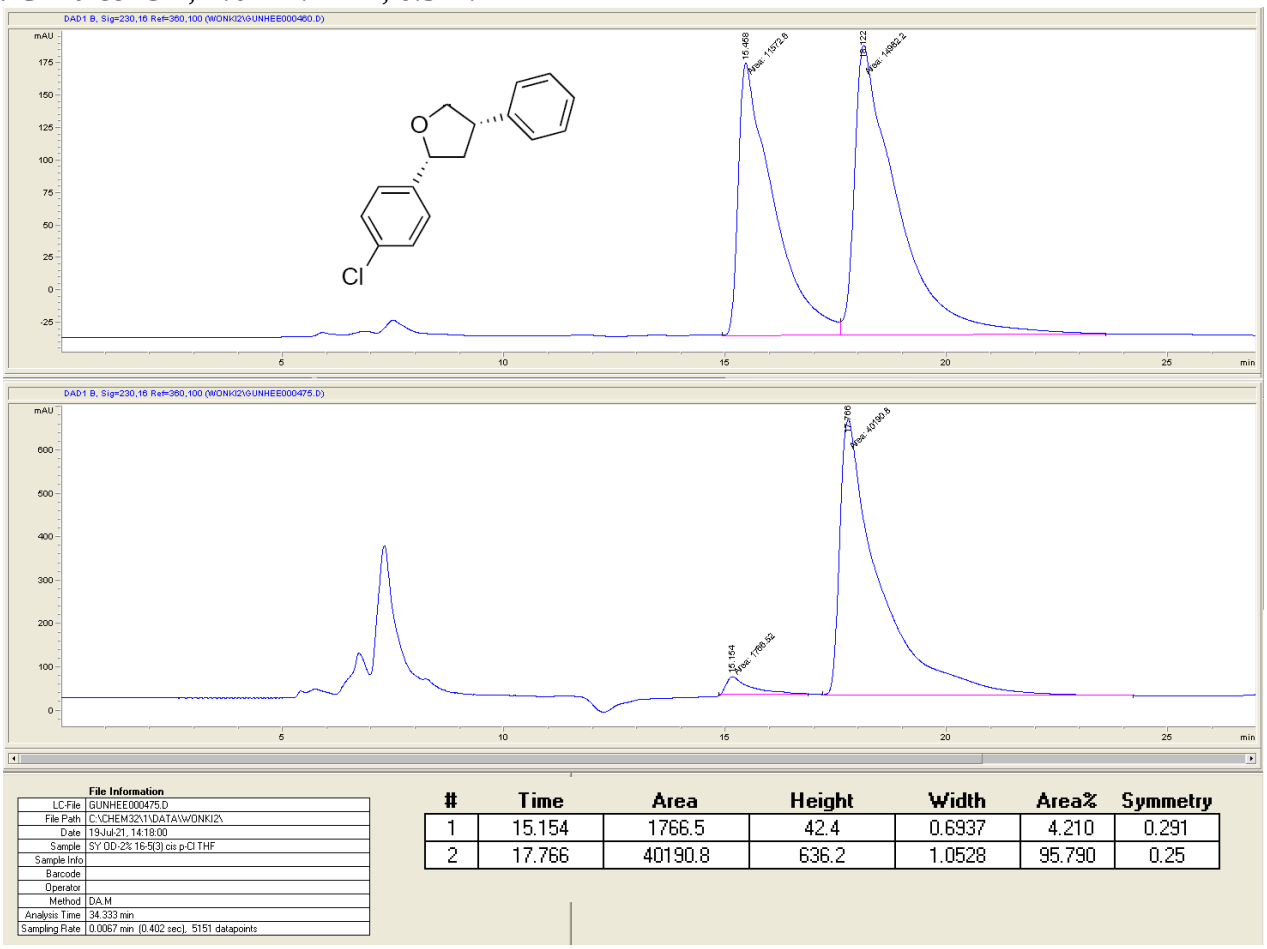
trans-**7**: Chiralcel OB-H, 10% IPA/HXN, 0.5ml/min



File Information	
LC-File	GUNHEE000416.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	08-Jun-21, 15:52:50
Sample	SY OB-10% 14-7(2) p-Me trans
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	35.493 min
Sampling Rate	0.0067 min (0.402 sec), 5325 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	15.624	853.3	30.6	0.4644	4.131	0.376
2	17.013	19804.9	279	1.1829	95.869	0.125

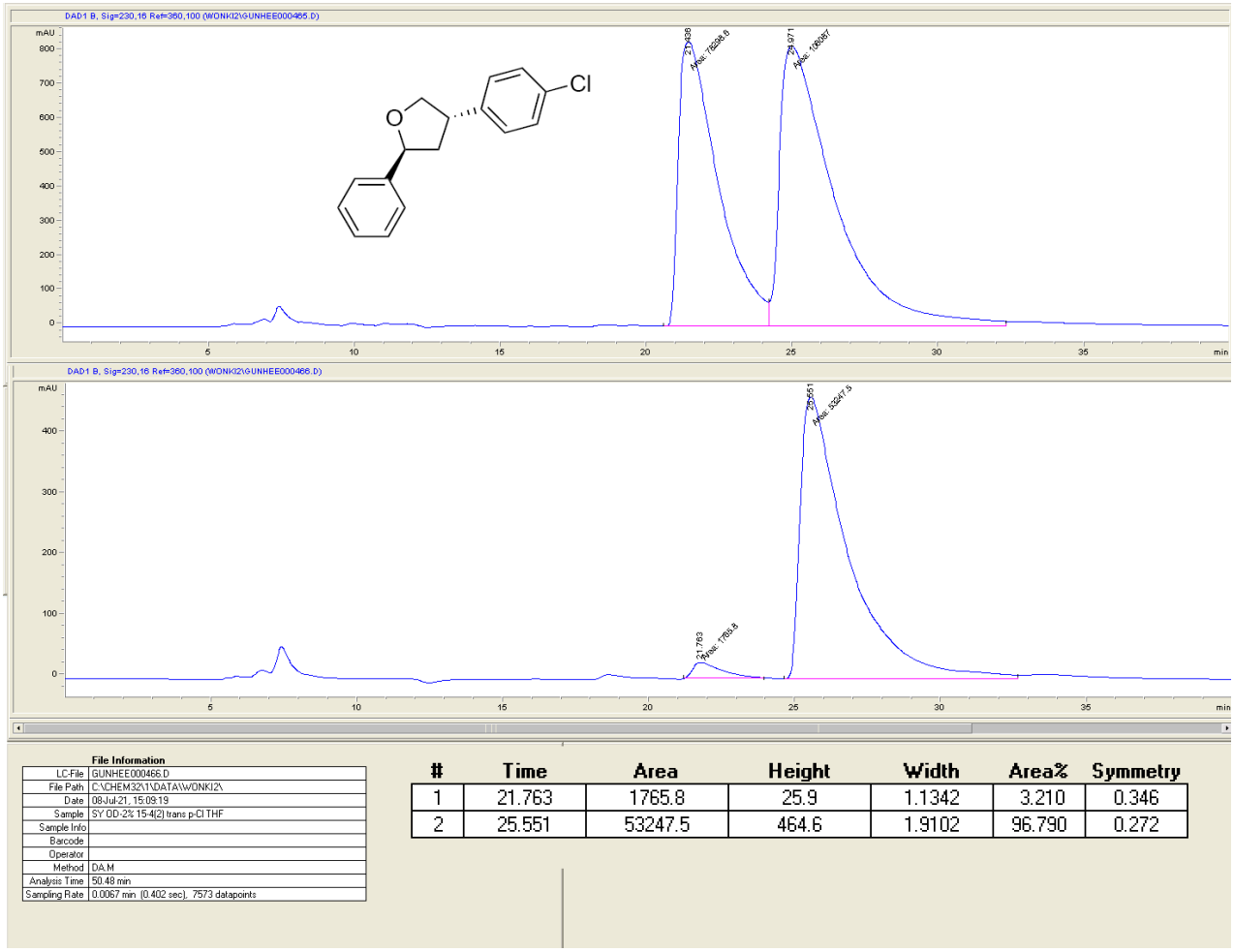
cis-**8:** Chiralcel OD, 2% IPA/HXN, 0.5ml/min



File Information	
LC-File	GUNHEE000475.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	19-Jul-21, 14:18:00
Sample	SY OD-2% 16-5[3] cis p-Cl THF
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	34.333 min
Sampling Rate	0.0067 min (0.402 sec), 5151 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	15.154	1766.5	42.4	0.6937	4.210	0.291
2	17.766	40190.8	636.2	1.0528	95.790	0.25

trans-**9**: Chiralcel OD, 2% IPA/HXN, 0.5ml/min



File Information	
LC-File	GUNHEE000466.D
File Path	C:\CHEM32\1\DATA\WONKI2\
Date	08-Jul-21, 15:09:19
Sample	SY OD-2% 15-4(2) trans p-Cl THF
Sample Info	
Barcode	
Operator	
Method	DA.M
Analysis Time	50.48 min
Sampling Rate	0.0067 min (0.402 sec), 7573 datapoints

#	Time	Area	Height	Width	Area%	Symmetry
1	21.763	1765.8	25.9	1.1342	3.210	0.346
2	25.551	53247.5	464.6	1.9102	96.790	0.272