

Supporting Information-II

Rawal's Catalyst as an Effective Stimulant for the Highly Asymmetric Michael Addition of β -Keto Esters to Functionally Rich Nitro-olefins

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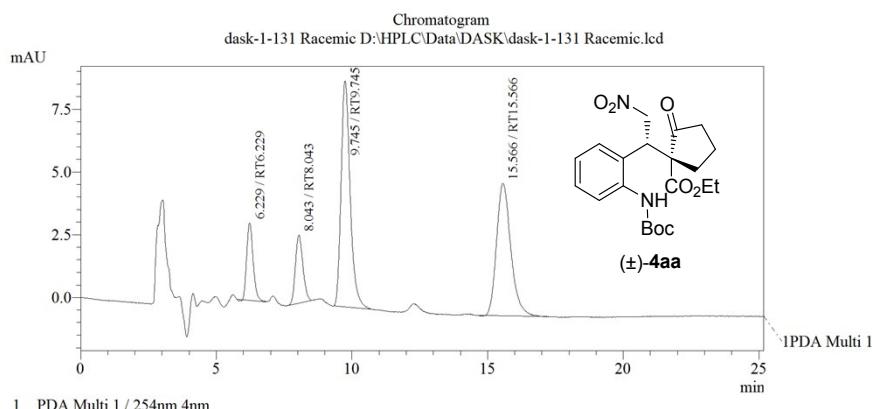
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General Methods: The ^1H NMR and ^{13}C NMR spectra were recorded at 400 MHz and 100 MHz, respectively. The chemical shifts are reported in ppm downfield to TMS ($\delta = 0$) for ^1H NMR and relative to the central CDCl_3 resonance ($\delta = 77.0$) for ^{13}C NMR. In the ^{13}C NMR spectra, the nature of the carbons (C, CH, CH_2 or CH_3) was determined by recording the DEPT-135 experiment, and is given in parentheses. The coupling constants J are given in Hz. Column chromatography was performed using Acme's silica gel (particle size 0.063-0.200 mm). High-resolution mass spectra (HRMS) were recorded on ESI-TOF maXis. IR spectra were recorded on JASCO FT/IR-5300. Elemental analyses were recorded on a Thermo Finnigan Flash EA 1112 analyzer. Mass spectra were recorded on either VG7070H mass spectrometer using EI technique or Shimadzu-LCMS-2010 a mass spectrometer. The X-ray diffraction measurements were carried out at 298 K on an automated Enraf-Nonius MACH 3 diffractometer using graphite monochromated, Mo-K α ($\lambda = 0.71073 \text{ \AA}$) radiation with CAD4 software or the X-ray intensity data were measured at 298 K on a Bruker SMART APEX CCD area detector system equipped with a graphite monochromator and a Mo-K α fine-focus sealed tube ($\lambda = 0.71073 \text{ \AA}$). For thin-layer chromatography (TLC), silica gel plates Merck 60 F254 were used and compounds were visualized by irradiation with UV light and/or by treatment with a solution of *p*-anisaldehyde (23 mL), conc. H_2SO_4 (35 mL), acetic acid (10 mL), and ethanol (900 mL) followed by heating.

The enantiomeric excess (*ee*) of the Michael products **4** and **5** were determined by chiral stationary phase HPLC using a Daicel Chiralcel OD-H columns and hexane/2-propanol as the eluent or using a Daicel Chiralpak AD-H or ID-H columns and hexane/2-propanol as the eluent or using a Lux 5u cellulose 2 columns and hexane/2-propanol as the eluent. Retention times and solvent ratios are indicated in the respective entries.

RACEMIC 4aa:

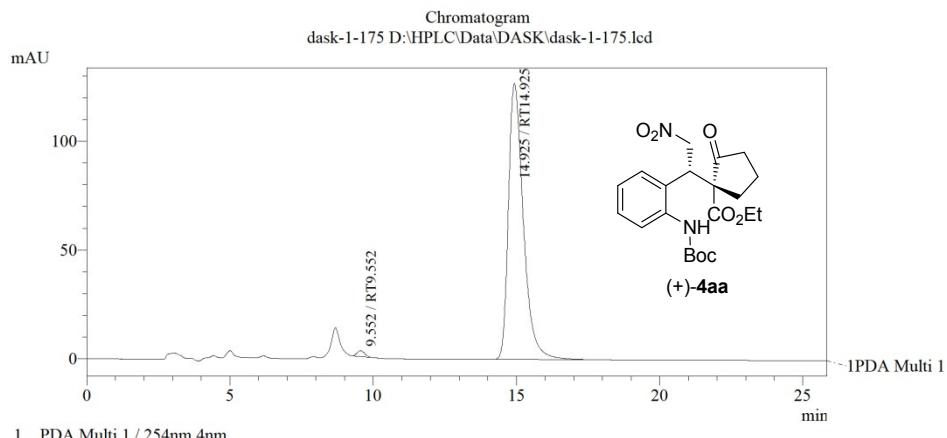


Lux 5u Cellulose-2, Hexane/ *i*-PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm						
Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT6.229	6.229	49758	3082	9.877	15.341
2	RT8.043	8.043	52379	2720	10.397	13.542
3	RT9.745	9.745	209000	9011	41.486	44.856
4	RT15.566	15.566	192643	5275	38.239	26.261
Total			503780	20088	100.000	100.000

CHIRAL-(+)-4aa (98% ee and >99% de):

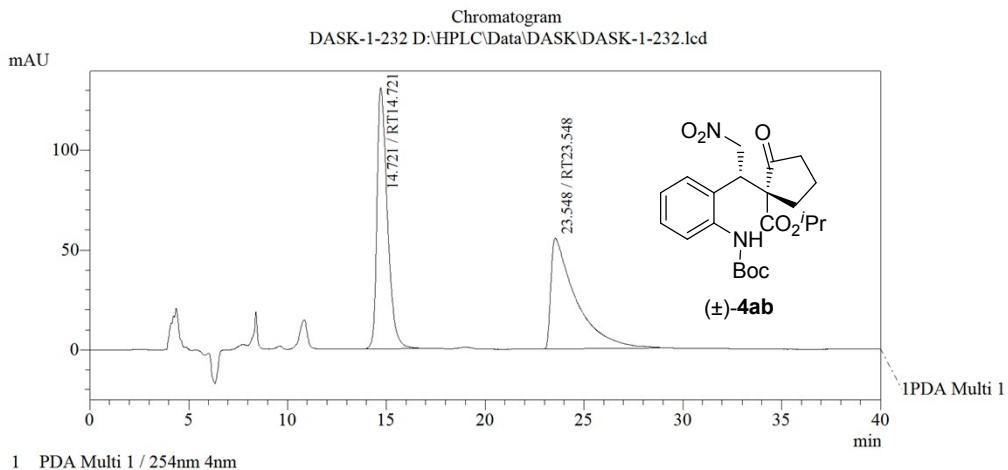


Lux 5u Cellulose-2, Hexane/ *i*-PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm						
Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT9.552	9.552	50624	2710	1.091	2.093
2	RT14.925	14.925	4589979	126773	98.909	97.907
Total			4640603	129482	100.000	100.000

RACEMIC 4ab:



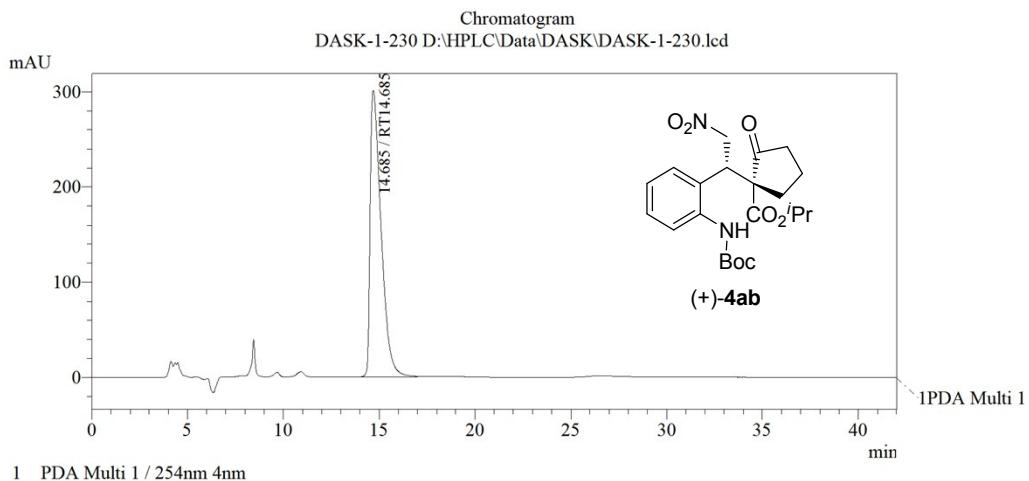
Daicel Chiralpak ID-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.8 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.721	14.721	4804439	130738	49.659	70.249
2	RT23.548	23.548	4870386	55368	50.341	29.751
Total			9674825	186106	100.000	100.000

CHIRAL-(+)-4ab (>99% ee and >99% de):



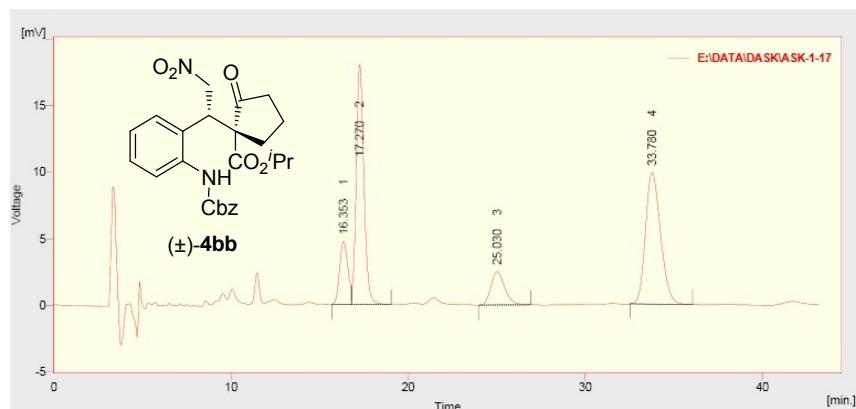
Daicel Chiralpak ID-H, Hexane/ *i*-PrOH = 90:10 Flow Rate 0.8 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.685	14.685	11893017	300614	100.000	100.000
Total			11893017	300614	100.000	100.000

RACEMIC 4bb:

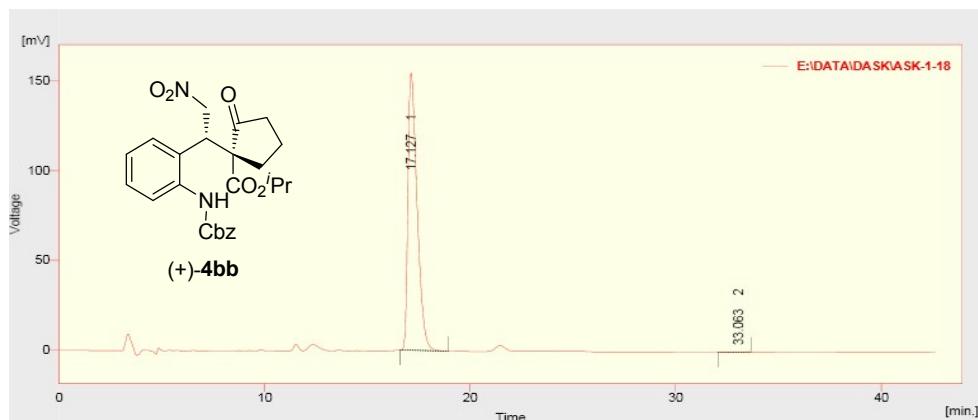


Daicel Chiralpak ID-H, Hexane/ *i*-PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\DAKASK\ASK-1-17)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	16.353	152.075	4.724	10.8	13.5	0.63
2	17.270	541.276	17.972	38.3	51.2	0.46
3	25.030	135.468	2.507	9.6	7.1	0.83
4	33.780	584.221	9.882	41.3	28.2	0.92
Total		1413.040	35.085	100.0	100.0	

CHIRAL-(+)-4bb (>99% ee and >99% de):

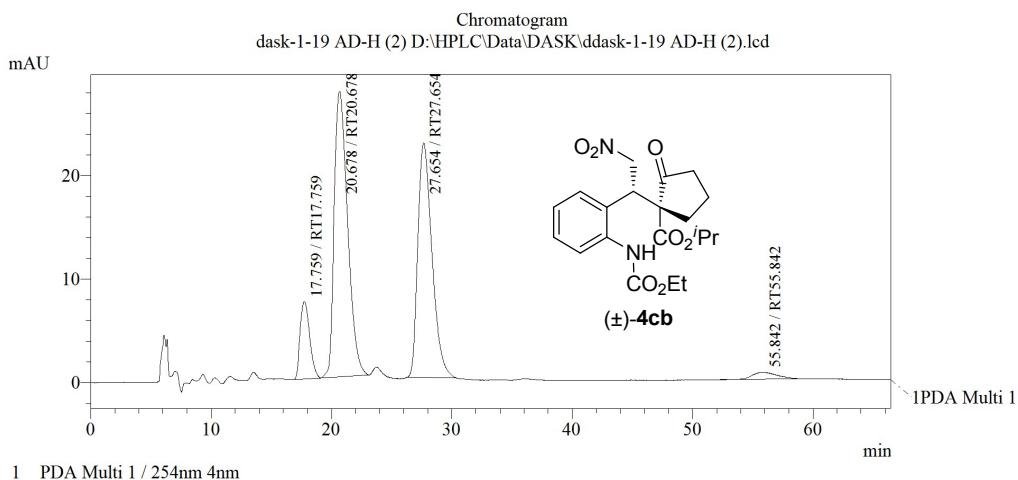


Daicel Chiralpak ID-H, Hexane/ *i*-PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\DAKASK\ASK-1-18)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	17.127	4766.945	154.008	99.9	99.9	0.48
2	33.063	4.509	0.099	0.1	0.1	0.89
Total		4771.455	154.107	100.0	100.0	

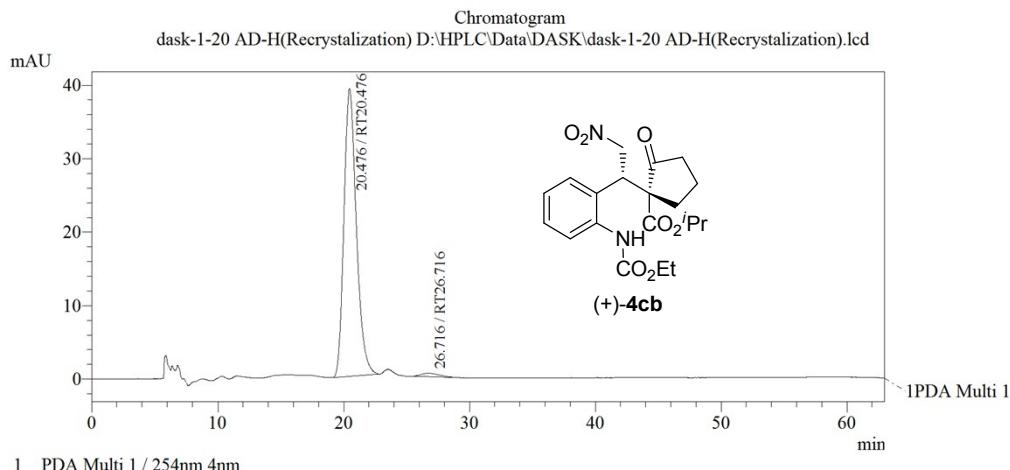
RACEMIC 4cb:



Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.5 mL/Min, 254 nm

PeakTable						
Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT17.759	17.759	414789	7471	9.230	12.805
2	RT20.678	20.678	2136589	27546	47.543	47.215
3	RT27.654	27.654	1838951	22625	40.920	38.780
4	RT55.842	55.842	103638	700	2.306	1.200
Total			4493967	58342	100.000	100.000

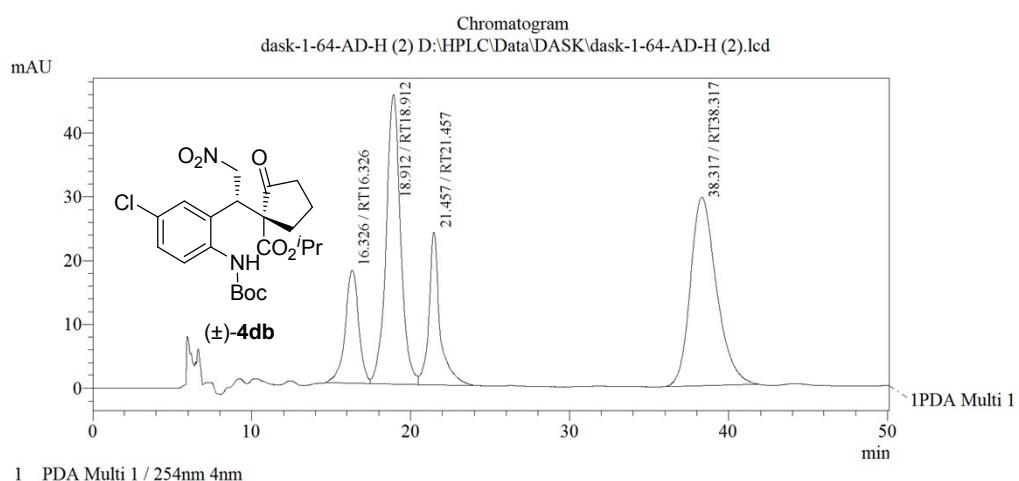
CHIRAL-(+)-4cb (96% ee and >99% de):



Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.5 mL/Min, 254 nm

PeakTable						
PDA Ch1 254nm 4nm						
Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT20.476	20.476	2708872	39139	98.149	98.718
2	RT26.716	26.716	51080	508	1.851	1.282
Total			2759951	39647	100.000	100.000

RACEMIC 4db:



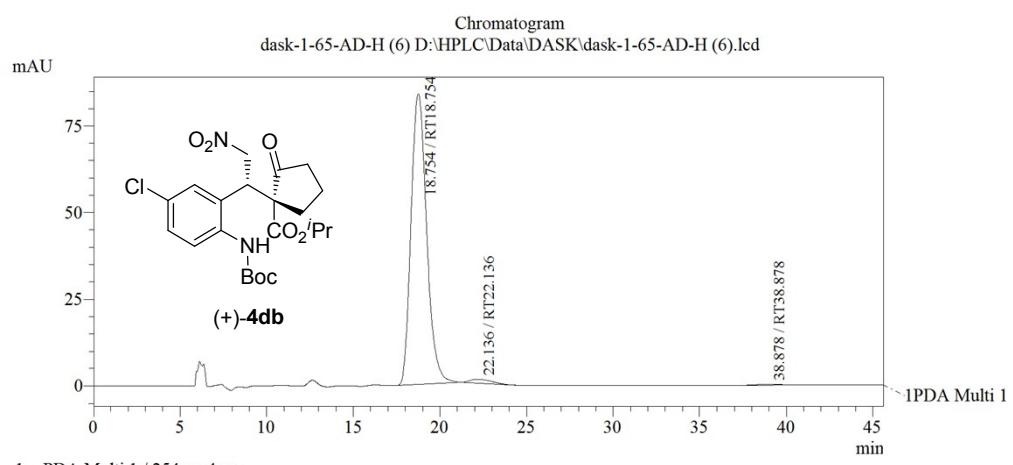
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH =95:5, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT16.326	16.326	1044505	17680	12.365	15.184
2	RT18.912	18.912	2872409	45289	34.004	38.895
3	RT21.457	21.457	1151960	23940	13.637	20.560
4	RT38.317	38.317	3378309	29530	39.993	25.361
Total			8447183	116439	100.000	100.000

CHIRAL-(+)-4db (>99 ee for both major & minor isomers and 97% de):



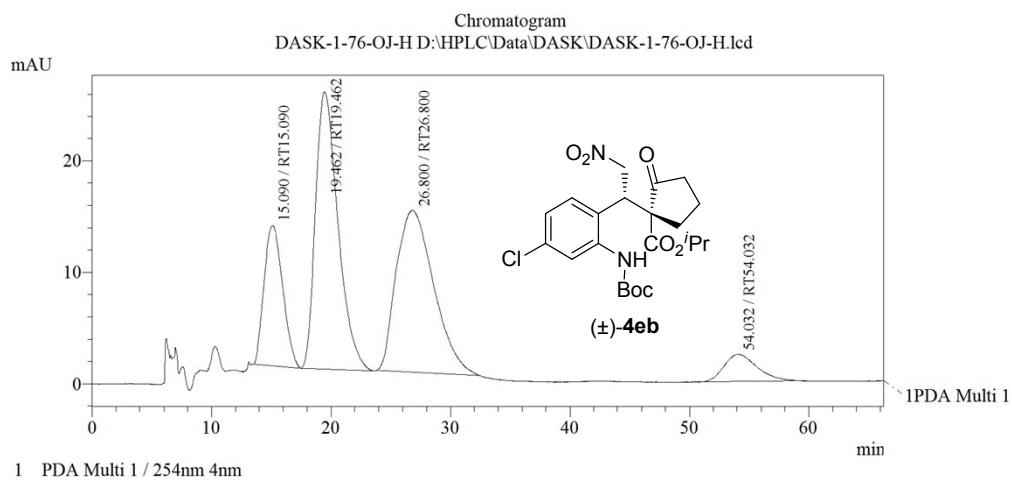
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH =95:5, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT18.754	18.754	5250429	83845	97.840	98.493
2	RT22.136	22.136	88966	1015	1.658	1.193
3	RT38.878	38.878	26920	268	0.502	0.315
Total			5366315	85128	100.000	100.000

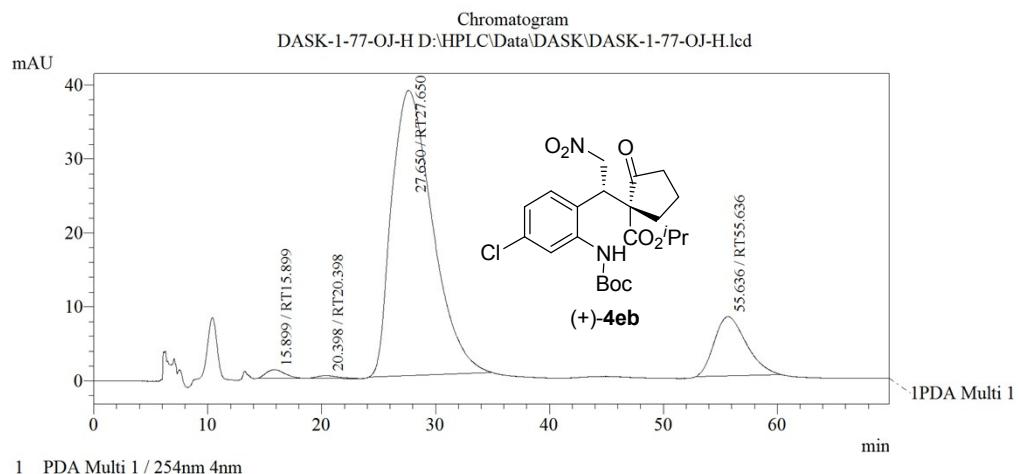
RACEMIC 4eb:



Daicel Chiralcel OJ-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.5 mL/Min, 254 nm

PeakTable						
PDA Ch1 254nm 4nm						
Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT15.090	15.090	1363903	12602	16.502	23.157
2	RT19.462	19.462	3264092	24855	39.492	45.672
3	RT26.800	26.800	3165976	14505	38.305	26.653
4	RT54.032	54.032	471253	2459	5.702	4.518
Total			8265224	54421	100.000	100.000

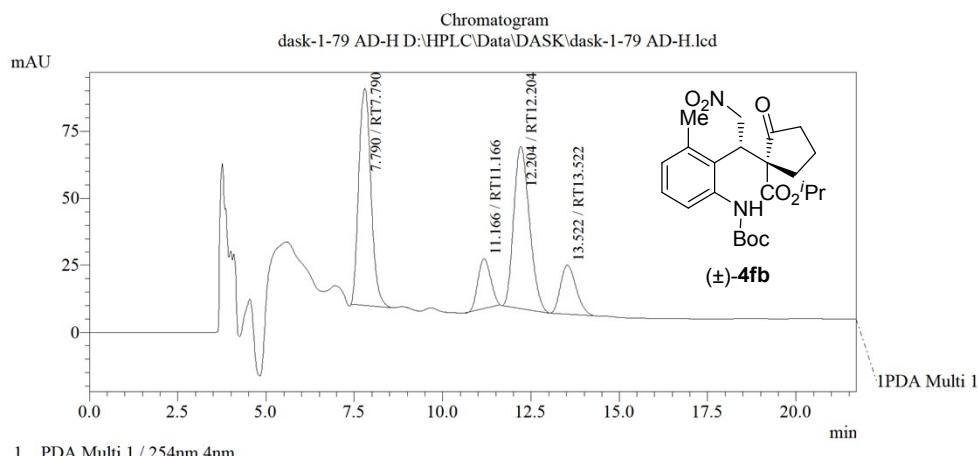
CHIRAL-(+)-4eb [99% ee for major isomer, 85% ee for minor isomer and 70% de]:



Daicel Chiralcel OJ-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.5 mL/Min, 254 nm

PeakTable						
PDA Ch1 254nm 4nm						
Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT15.899	15.899	128675	1141	1.136	2.369
2	RT20.398	20.398	43833	369	0.387	0.766
3	RT27.650	27.650	9589429	38606	84.636	80.166
4	RT55.636	55.636	1568210	8041	13.841	16.698
Total			11330147	48157	100.000	100.000

RACEMIC 4fb:



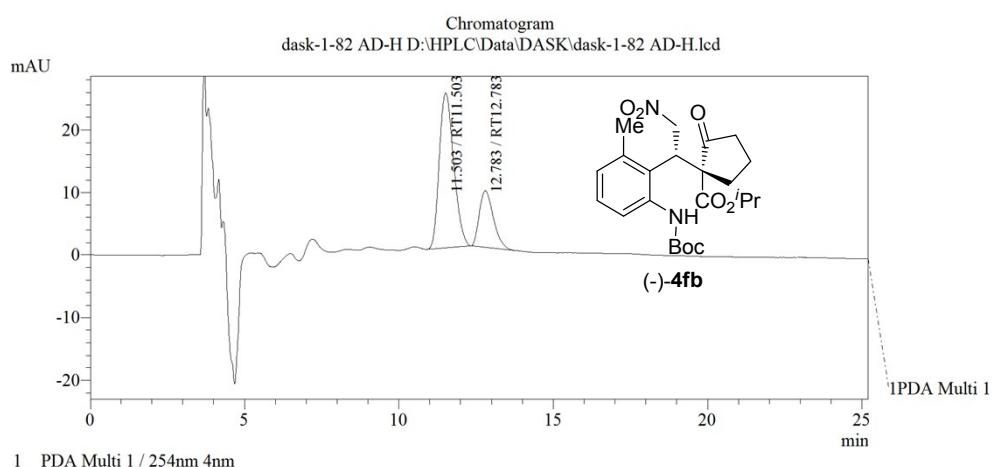
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.8 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT7.790	7.790	1943195	80794	40.135	45.428
2	RT11.166	11.166	462809	18448	9.559	10.373
3	RT12.204	12.204	1874429	60388	38.714	33.954
4	RT13.522	13.522	561267	18221	11.592	10.245
Total			4841700	177851	100.000	100.000

CHIRAL-(-)-4fb (>99% ee for both major/minor isomers and 3:1 dr):



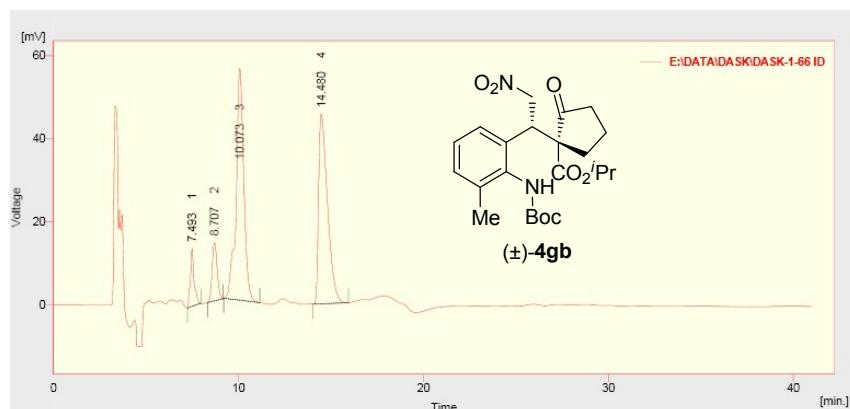
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.8 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT11.503	11.503	801225	24753	73.749	73.346
2	RT12.783	12.783	285199	8995	26.251	26.654
Total			1086424	33748	100.000	100.000

RACEMIC 4gb:

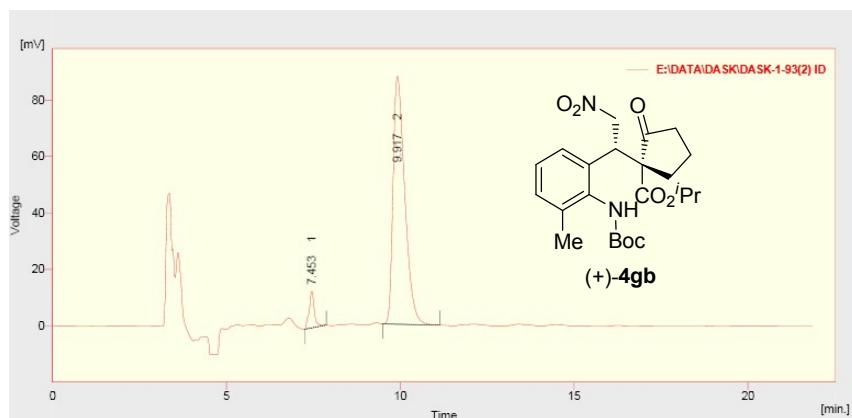


Daicel Chiraldex ID-H column, Hexane/ *i*-PrOH = 90:10, Flow Rate 1.0 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\DAKIDASK\1-66 ID)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	7.493	194.856	13.927	5.4	10.7	0.17
2	8.707	261.542	14.049	7.3	10.8	0.30
3	10.073	1617.241	55.831	44.8	43.1	0.40
4	14.480	1533.074	45.758	42.5	35.3	0.52
Total		3606.713	129.565	100.0	100.0	

CHIRAL-(+)-4gb (>99% ee and 88% de):

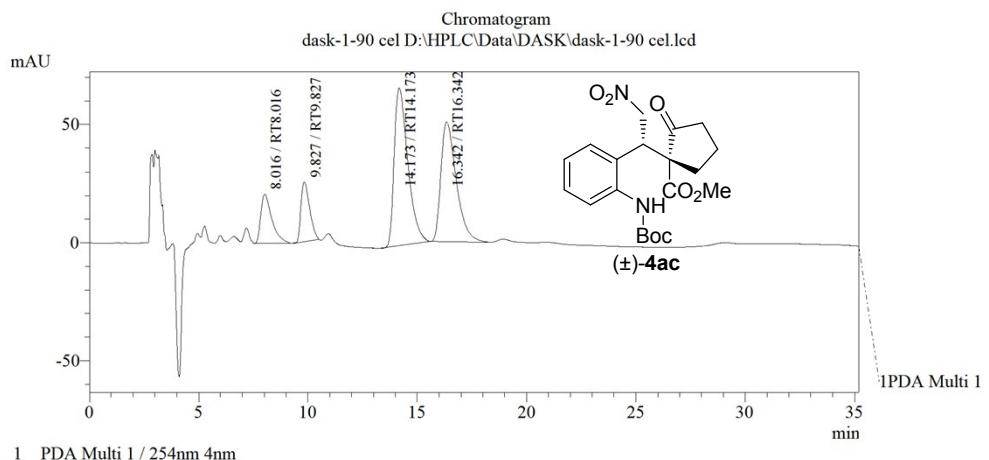


Daicel Chiraldex ID-H column, Hexane/ *i*-PrOH = 90:10, Flow Rate 1.0 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\DAKIDASK\1-93(2) ID)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	7.453	133.860	12.940	6.1	12.8	0.14
2	9.917	2058.540	87.821	93.9	87.2	0.36
Total		2192.399	100.761	100.0	100.0	

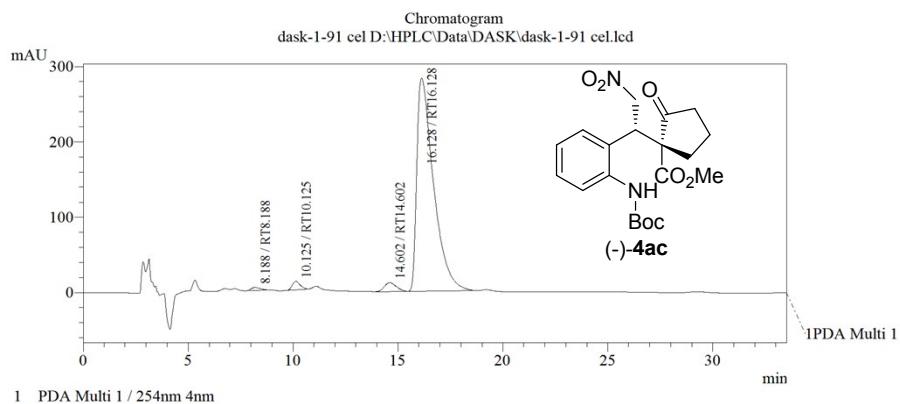
RACEMIC 4ac:



Lux 5u Cellulose-2, Hexane/ *i*-PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable						
PDA Ch1 254nm 4nm	Peak#	Name	Ret. Time	Area	Height	Area %
	1	RT8.016	8.016	733235	20890	10.754
	2	RT9.827	9.827	699404	25259	10.258
	3	RT14.173	14.173	2903547	66718	42.586
	4	RT16.342	16.342	2481904	50685	36.402
	Total			6818091	163552	100.000
						100.000

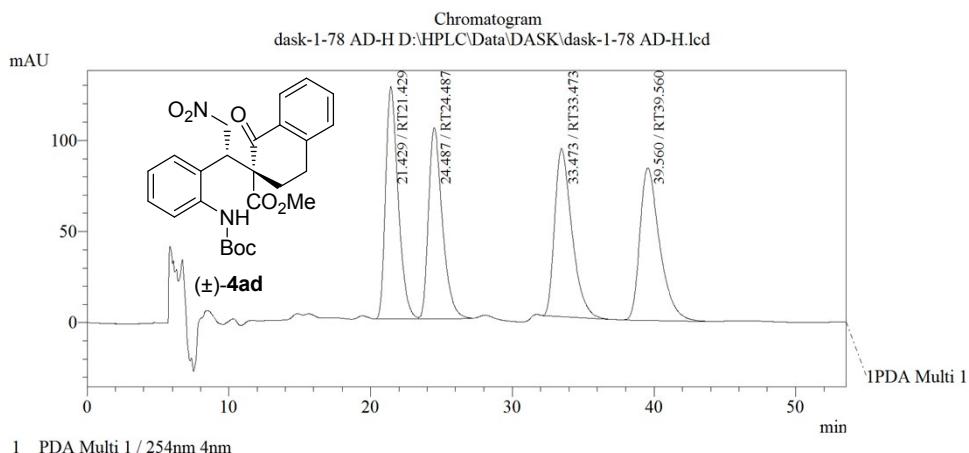
CHIRAL-(-)-4ac (94% ee and 95% de):



Lux 5u Cellulose-2, Hexane/ *i*-PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable						
PDA Ch1 254nm 4nm	Peak#	Name	Ret. Time	Area	Height	Area %
	1	RT8.188	8.188	112216	3775	0.676
	2	RT10.125	10.125	303812	11709	1.831
	3	RT14.602	14.602	469979	11993	2.833
	4	RT16.128	16.128	15704092	282739	94.659
	Total			16590099	310215	100.000
						100.000

RACEMIC 4ad:



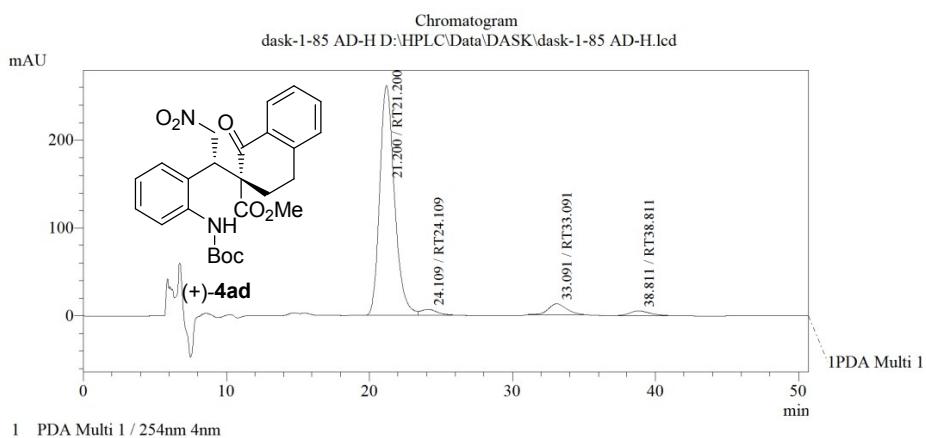
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT21.429	21.429	7893513	127510	25.501	31.243
2	RT24.487	24.487	7136096	104809	23.054	25.680
3	RT33.473	33.473	7814171	92235	25.245	22.599
4	RT39.560	39.560	8109819	83575	26.200	20.478
Total			30953600	408130	100.000	100.000

CHIRAL-(+)-4ad (94% ee and 84% de):



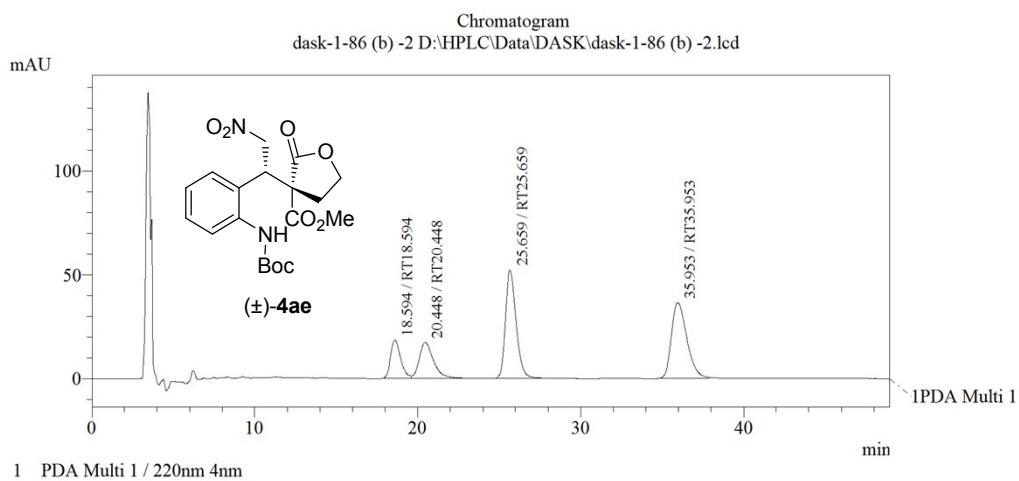
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT21.200	21.200	18749515	261306	89.580	91.444
2	RT24.109	24.109	541748	6713	2.588	2.349
3	RT33.091	33.091	1113259	12379	5.319	4.332
4	RT38.811	38.811	526019	5357	2.513	1.875
Total			20930542	285755	100.000	100.000

RACEMIC 4ae:



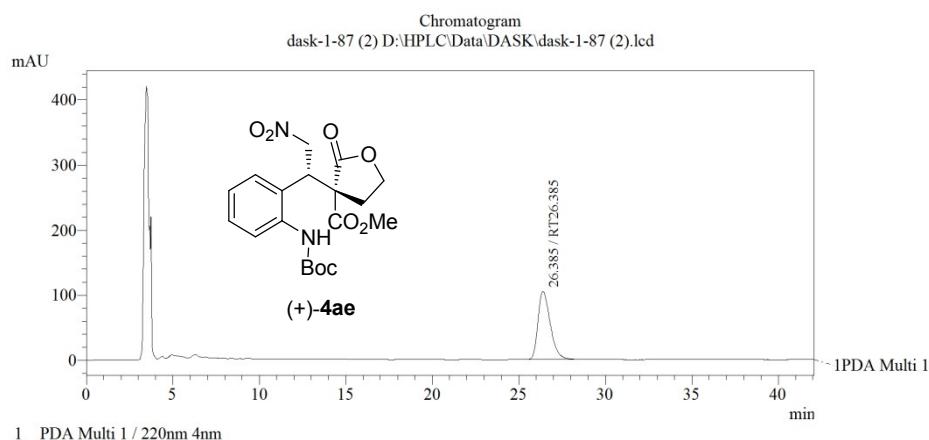
Daicel Chiralpak ID-H, Hexane/ i-PrOH = 90:10, Flow Rate 1 mL/Min, 220 nm

PeakTable

PDA Ch1 220nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT18.594	18.594	804616	18596	12.227	14.956
2	RT20.448	20.448	1045022	17288	15.880	13.904
3	RT25.659	25.659	2344747	52014	35.631	41.832
4	RT35.953	35.953	2386209	36443	36.261	29.309
Total			6580594	124342	100.000	100.000

CHIRAL-(+)-4ae (>99% ee and >99% de):



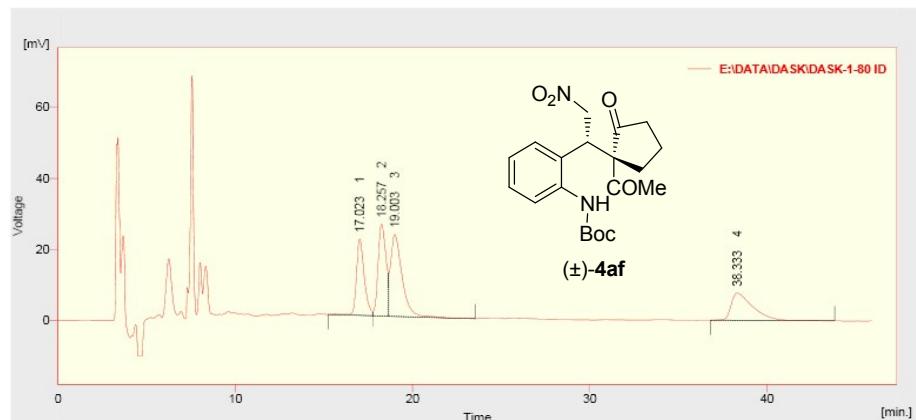
Daicel Chiralpak ID-H, Hexane/ i-PrOH = 90:10, Flow Rate 1 mL/Min, 220 nm

PeakTable

PDA Ch1 220nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT26.385	26.385	5192317	105249	100.000	100.000
Total			5192317	105249	100.000	100.000

RACEMIC 4af:

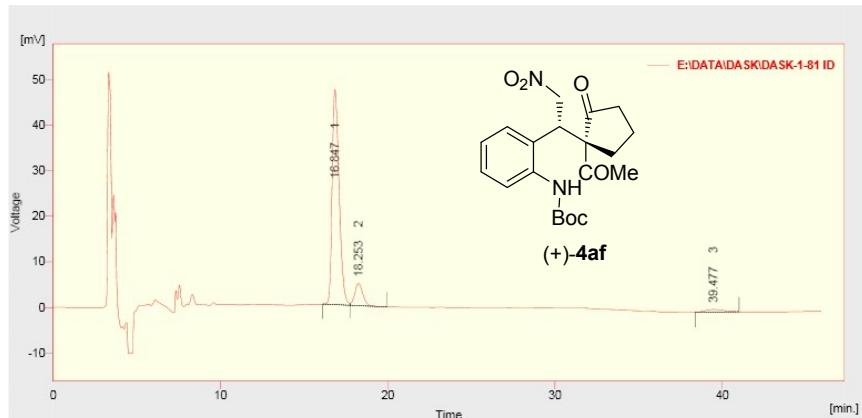


Daicel Chiralpak ID-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 1.0 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\IDASK\IDASK-1-80 ID)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	17.023	665.838	21.502	20.9	27.5	0.45
2	18.257	808.566	25.857	25.4	33.1	0.56
3	19.003	1045.451	23.056	32.9	29.5	0.75
4	38.333	669.811	7.682	20.8	9.8	1.26
Total		3179.666	78.097	100.0	100.0	

CHIRAL-(+)-4af (94% ee and 79% de):

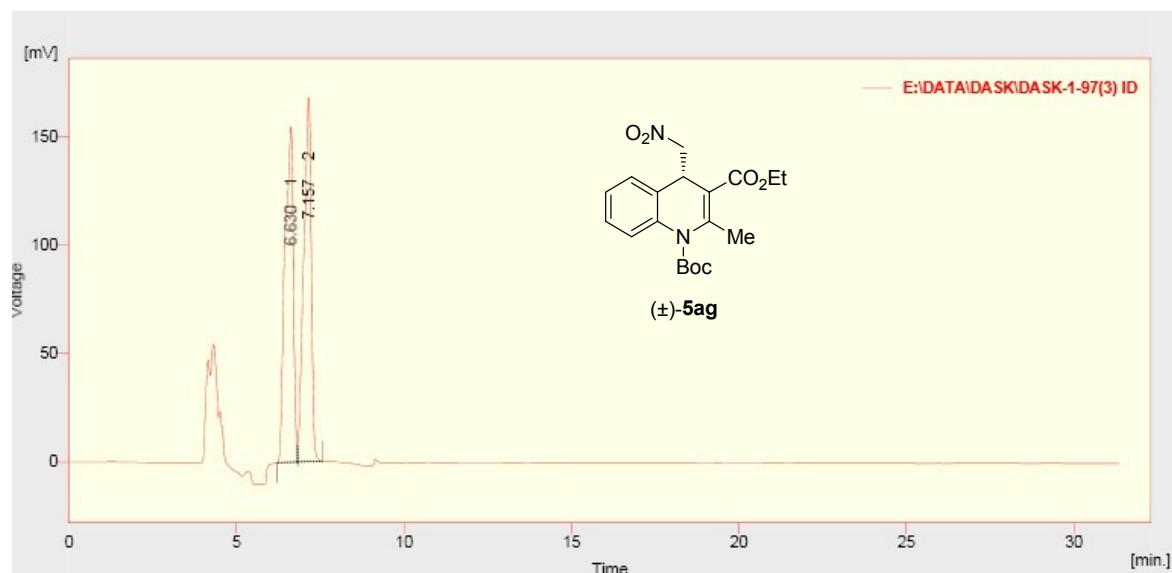


Daicel Chiralpak ID-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 1.0 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\IDASK\IDASK-1-81 ID)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	16.847	1356.436	47.201	86.5	89.6	0.45
2	18.253	166.346	4.885	10.6	9.3	0.52
3	39.477	45.849	0.579	2.9	1.1	1.32
Total		1568.632	52.664	100.0	100.0	

RACEMIC 5ag

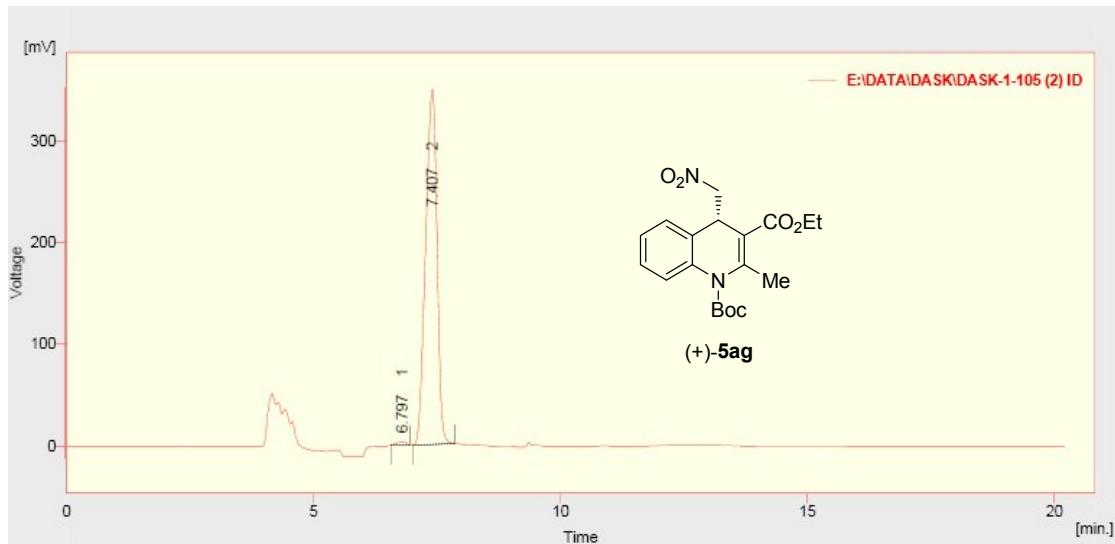


Daicel Chiraldpak ID-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.8 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\IDASK\IDASK-1-97(3).ID)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	6.630	2693.817	154.493	50.7	47.9	0.31
2	7.157	2623.138	167.862	49.3	52.1	0.26
Total		5316.952	322.355	100.0	100.0	

CHIRAL-(+)-5ag (98% ee):

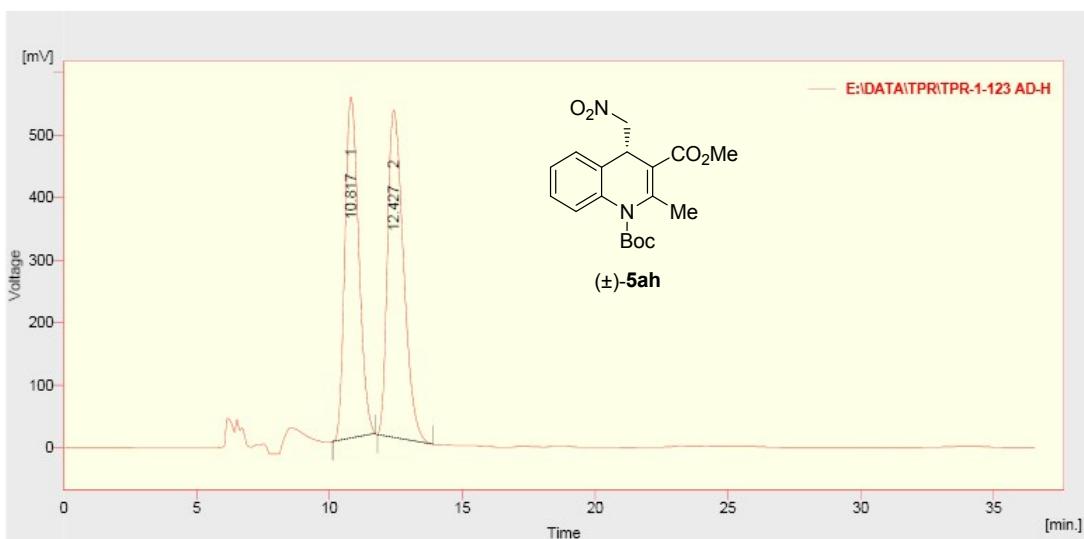


Daicel Chiraldpak ID-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.8 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\IDASK\IDASK-1-105 (2).ID)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	6.797	42.785	3.197	0.8	0.9	0.23
2	7.407	5586.417	349.093	99.2	99.1	0.26
Total		5629.202	352.290	100.0	100.0	

RACEMIC 5ah:

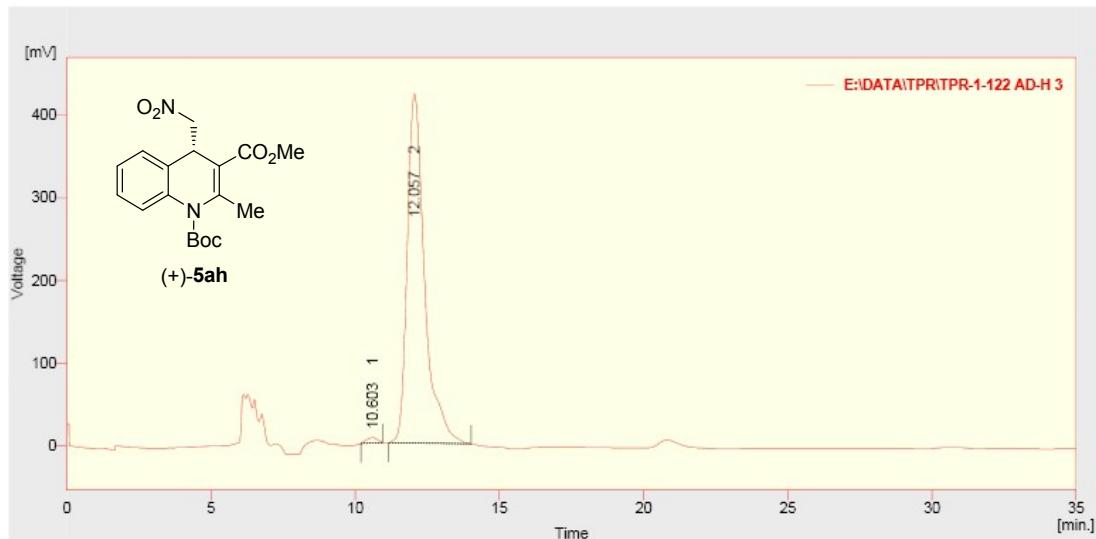


Daicel Chiralcel AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\TPR\TPR-1-123 AD-H)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	10.817	19776.415	545.672	47.5	51.0	0.57
2	12.427	21888.802	523.707	52.5	49.0	0.85
Total		41645.016	1069.379	100.0	100.0	

CHIRAL-(+)-5ah (98% ee):

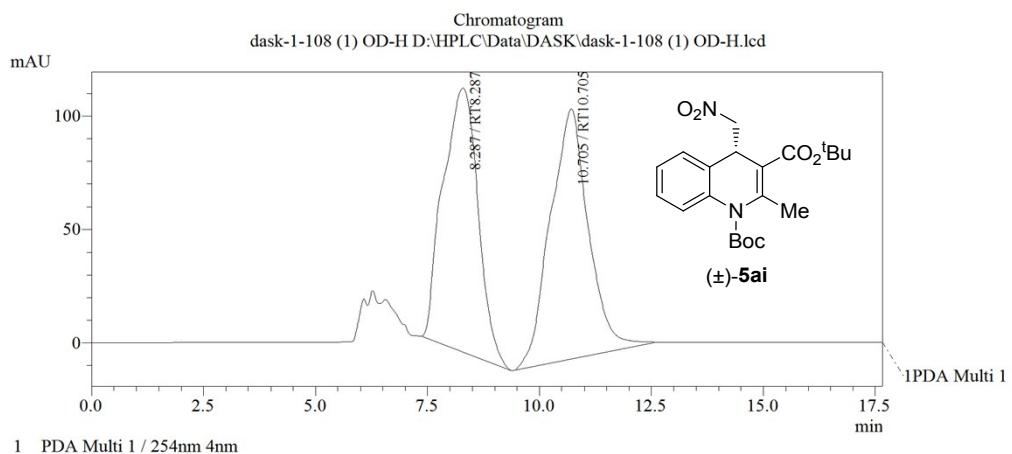


Daicel Chiralcel AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\TPR\TPR-1-122 AD-H 3)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	10.603	183.663	6.711	1.0	1.6	0.47
2	12.057	17718.173	423.314	99.0	98.4	0.60
Total		17901.835	430.025	100.0	100.0	

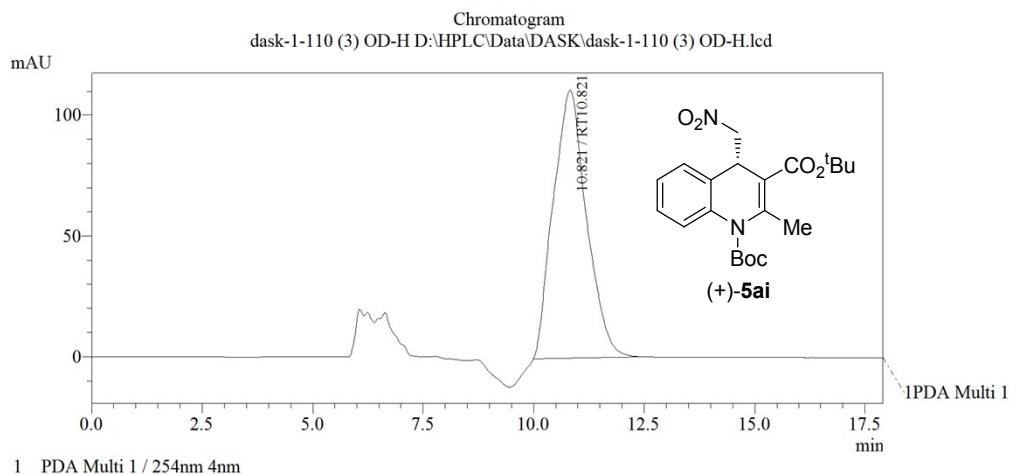
RACEMIC 5ai:



Daicel Chiralcel OD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm



CHIRAL-(+)-5ai (99% ee):



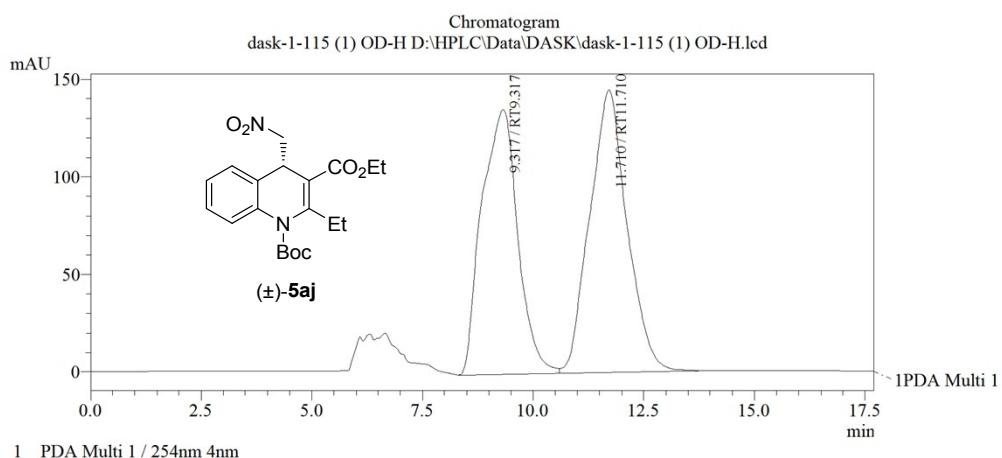
Daicel Chiralcel OD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

PDA Ch1 254nm 4nm

PeakTable

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT10.821	10.821	5807950	111064	100.000	100.000
Total			5807950	111064	100.000	100.000

RACEMIC 5aj:



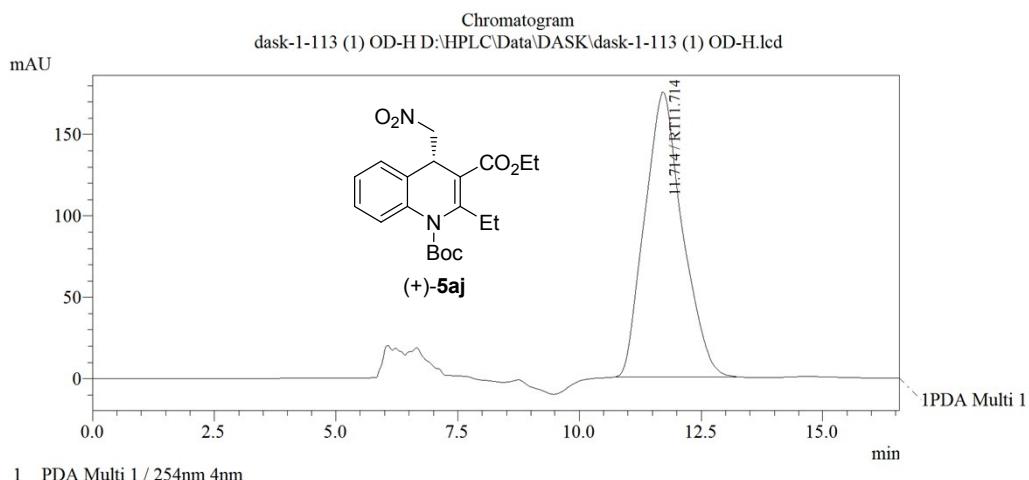
Daicel Chiralcel OD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT9.317	9.317	7686156	135690	47.527	48.378
2	RT11.710	11.710	8486016	144788	52.473	51.622
Total			16172172	280478	100.000	100.000

CHIRAL-(+)-5aj (99% ee):



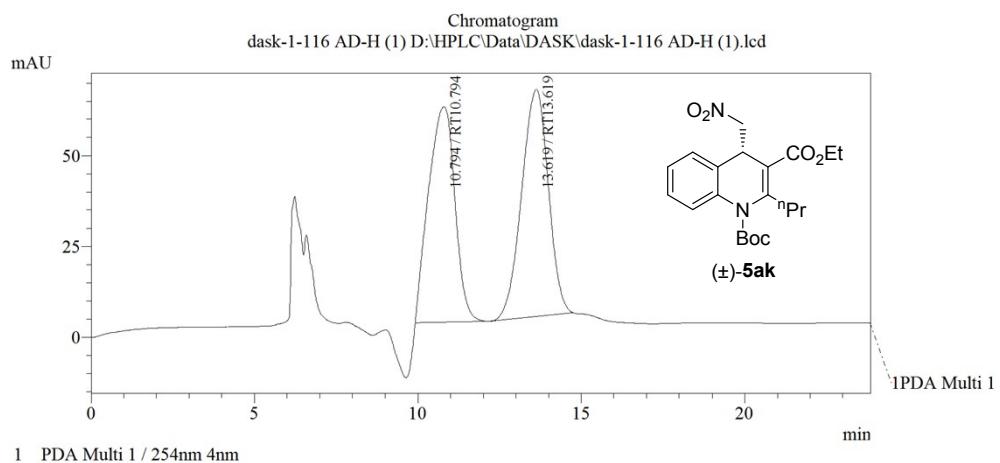
Daicel Chiralcel OD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT11.714	11.714	9448384	174886	100.000	100.000
Total			9448384	174886	100.000	100.000

RACEMIC 5ak:



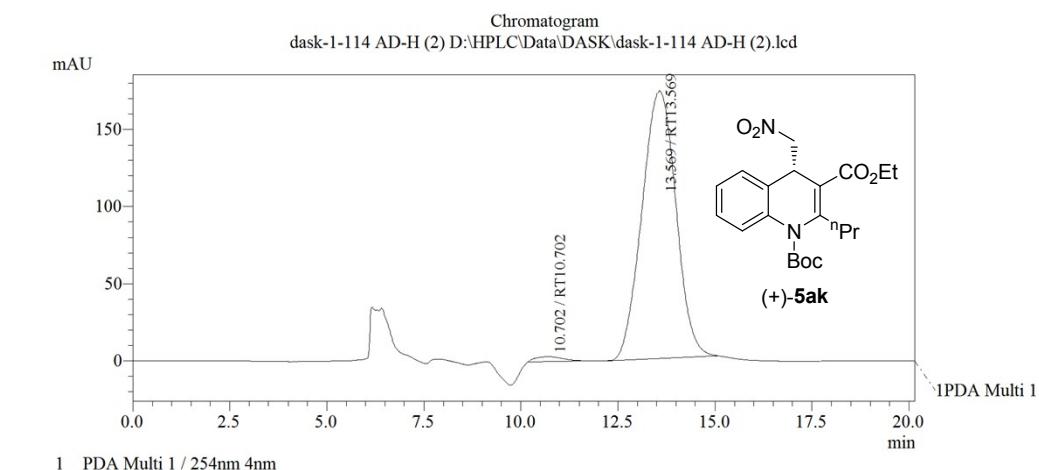
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 97:3, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT10.794	10.794	3324988	59285	48.369	48.702
2	RT13.619	13.619	3549164	62444	51.631	51.298
Total			6874152	121729	100.000	100.000

CHIRAL-(+)-5ak (97% ee):



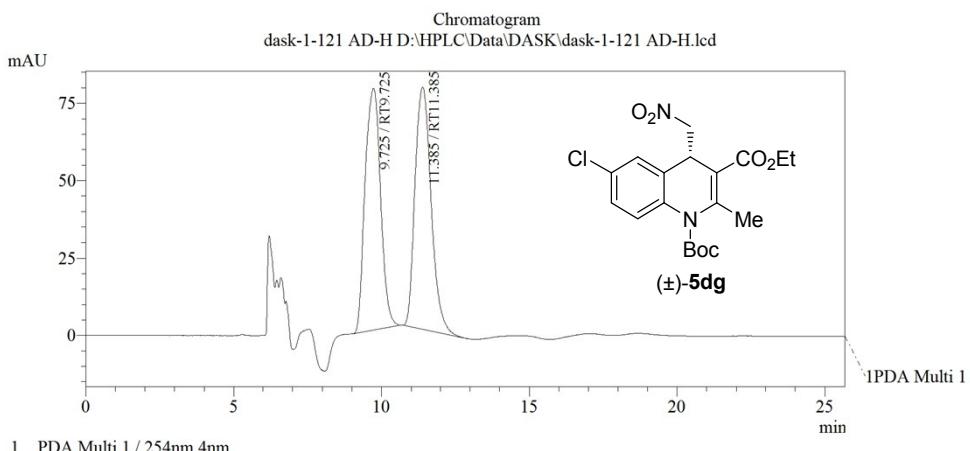
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 97:3, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT10.702	10.702	145813	3003	1.363	1.704
2	RT13.569	13.569	10552848	173237	98.637	98.296
Total			10698661	176240	100.000	100.000

RACEMIC 5dg:



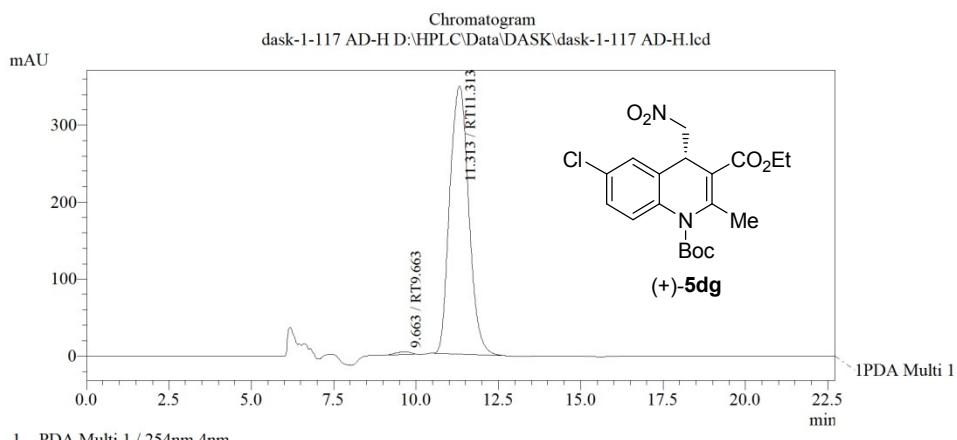
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT9.725	9.725	2848722	78150	48.996	49.983
2	RT11.385	11.385	2965516	78202	51.004	50.017
Total			5814238	156353	100.000	100.000

CHIRAL-(+)-5dg (99% ee):



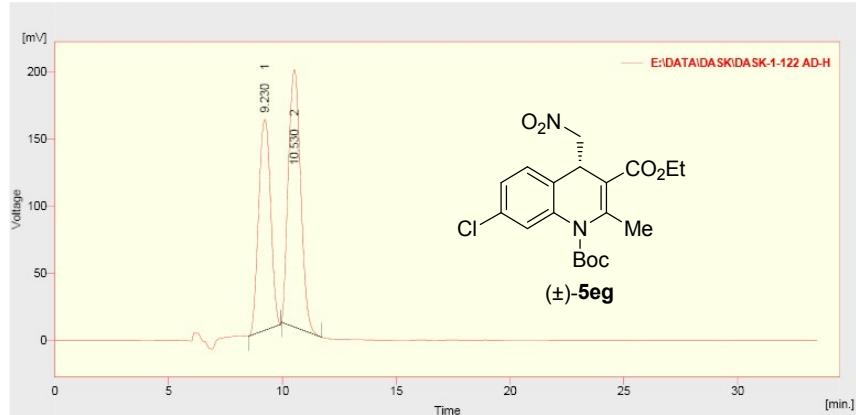
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT9.663	9.663	100621	3134	0.716	0.892
2	RT11.313	11.313	13956105	348358	99.284	99.108
Total			14056726	351492	100.000	100.000

RACEMIC 5eg:

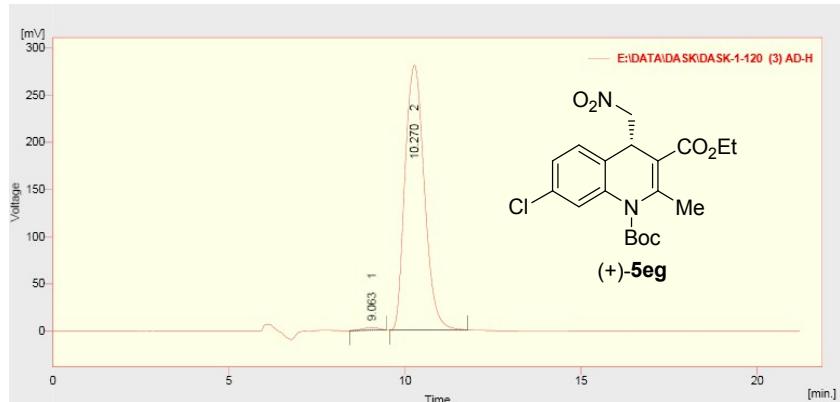


Daicel Chiraldpak AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\DAKIDAK\DAK-1-122 AD-H)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	9.230	5749.810	156.893	44.4	45.0	0.59
2	10.530	7212.232	191.513	55.6	55.0	0.61
Total		12962.041	348.405	100.0	100.0	

CHIRAL-(+)-5eg (98% ee):

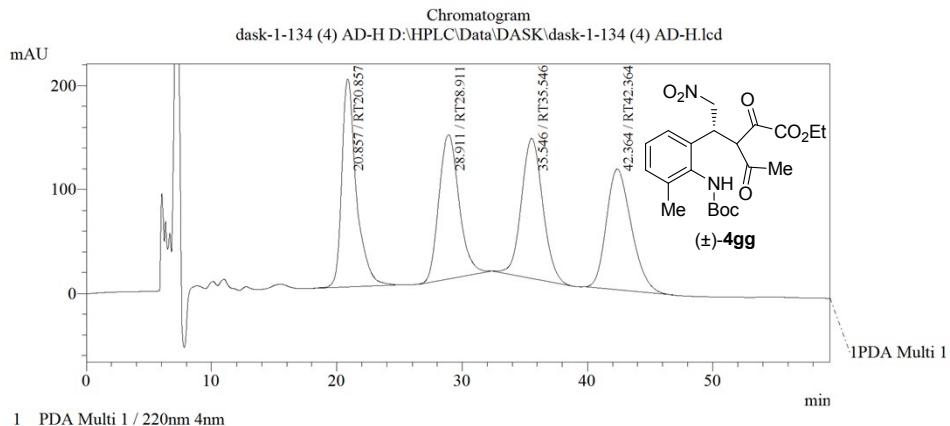


Daicel Chiraldpak AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

Result Table (Uncal - E:\DATA\DAKIDAK\DAK-1-120 (3) AD-H)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	9.063	89.789	2.807	0.8	1.0	0.53
2	10.270	10715.082	280.728	99.2	99.0	0.61
Total		10804.871	283.535	100.0	100.0	

RACEMIC 4gg:



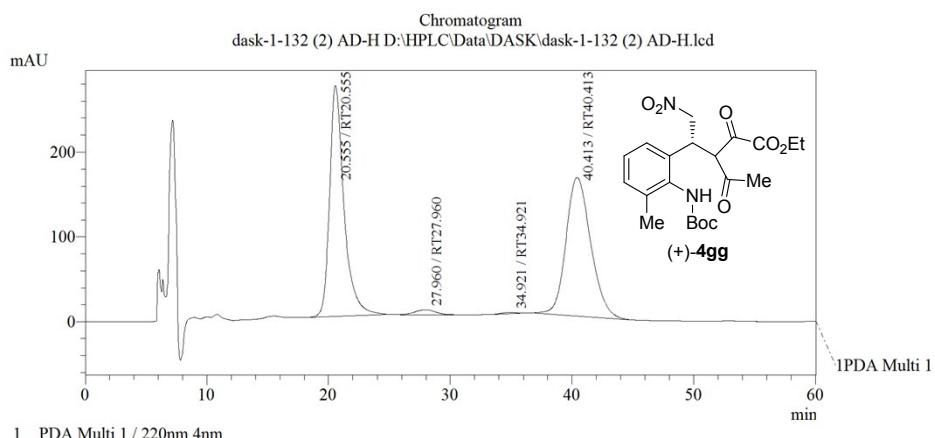
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 220 nm

PeakTable

PDA Ch1 220nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT20.857	20.857	16126250	200170	25.197	33.914
2	RT28.911	28.911	15600845	138776	24.376	23.512
3	RT35.546	35.546	16084302	134973	25.131	22.868
4	RT42.364	42.364	16190001	116314	25.296	19.706
Total			64001399	590233	100.000	100.000

CHIRAL-(+)-4gg (99% ee; 94% ee and 1:1 dr):



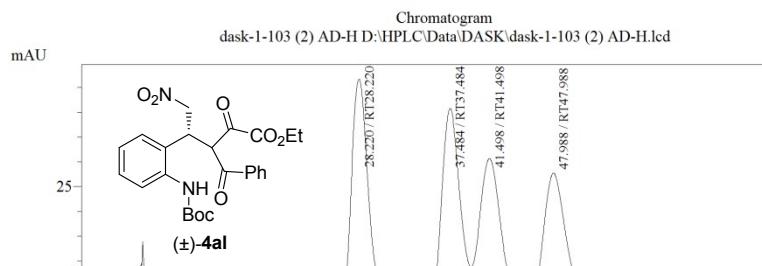
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 220 nm

PeakTable

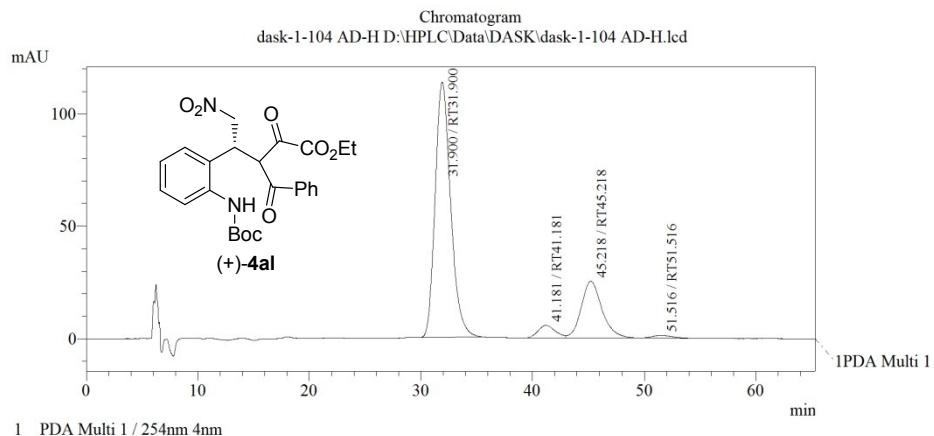
PDA Ch1 220nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT20.555	20.555	22350991	272091	48.152	61.412
2	RT27.960	27.960	722096	5913	1.556	1.335
3	RT34.921	34.921	165398	1657	0.356	0.374
4	RT40.413	40.413	23178933	163395	49.936	36.879
Total			46417418	443055	100.000	100.000

RACEMIC 4al:



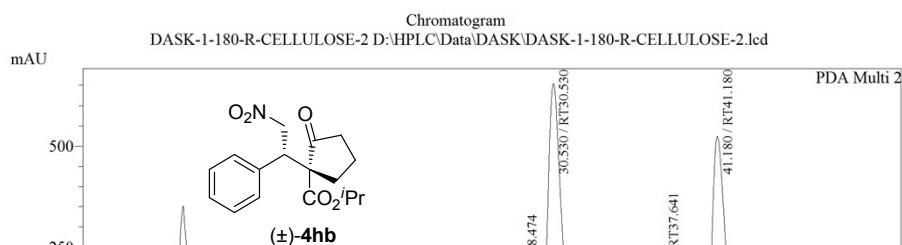
CHIRAL-(+)-4al (90% ee, 91% ee and 3.4:1 dr):



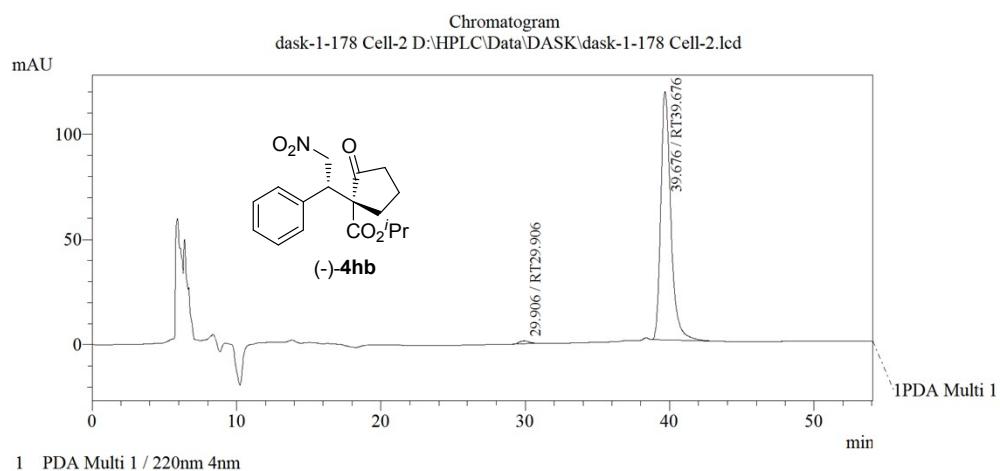
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 254 nm

PeakTable						
Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT31.900	31.900	10923190	113503	73.556	78.160
2	RT41.181	41.181	580100	5420	3.906	3.733
3	RT45.218	45.218	3197043	25105	21.529	17.288
4	RT51.516	51.516	149744	1190	1.008	0.819
Total			14850077	145218	100.000	100.000

RACEMIC 4hb:



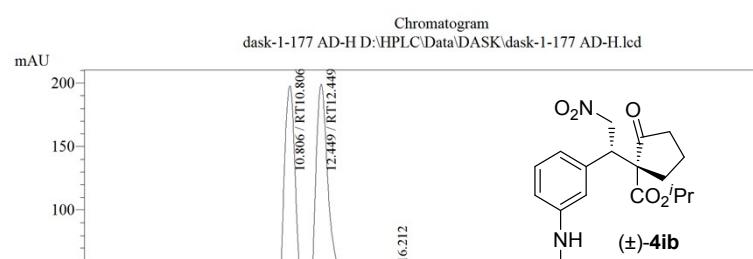
CHIRAL-(-)-4hb (98% ee and >99% de):



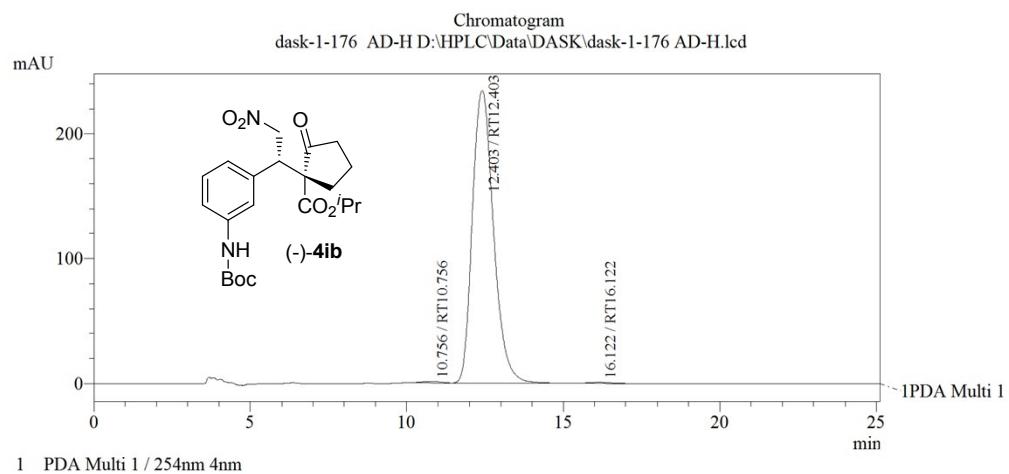
Lux 5u Cellulose-2, Hexane/ *i*-PrOH = 95:5, Flow Rate 0.5 mL/Min, 220 nm

PeakTable						
PDA Ch1 220nm 4nm						
Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT29.906	29.906	69284	1409	1.199	1.181
2	RT39.676	39.676	5708588	117893	98.801	98.819
Total			5777871	119302	100.000	100.000

RACEMIC 4ib:



CHIRAL-(-)-4ib (99% ee and >99% de):



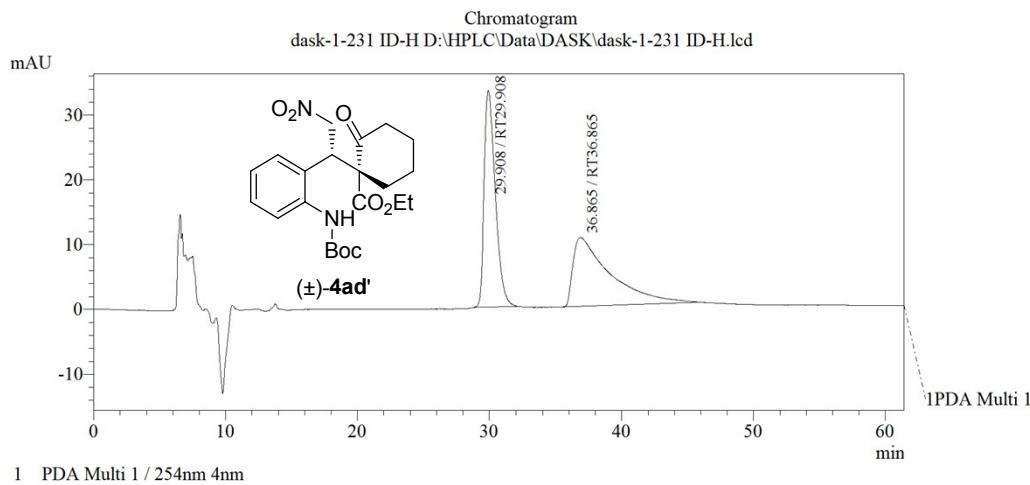
Daicel Chiralpak AD-H, Hexane/ *i*-PrOH = 90:10, Flow Rate 0.8 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT10.756	10.756	46885	1098	0.424	0.466
2	RT12.403	12.403	10973016	234036	99.291	99.217
3	RT16.122	16.122	31432	748	0.284	0.317
Total			11051333	235882	100.000	100.000

RACEMIC 4ad':



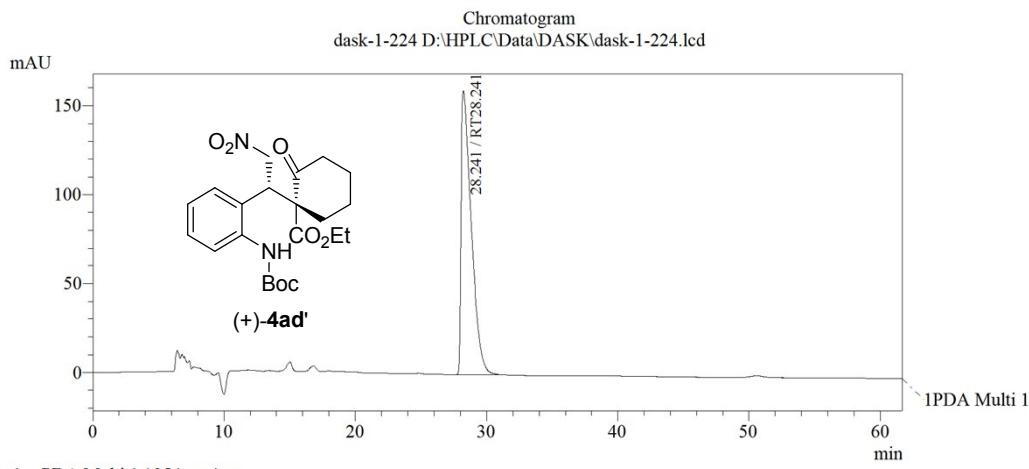
Daicel Chiralpak ID-H, Hexane/ i-PrOH = 90:10, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT29.908	29.908	1960715	33370	48.545	75.878
2	RT36.865	36.865	2078213	10609	51.455	24.122
Total			4038927	43979	100.000	100.000

CHIRAL-(+)-4ad' (>99% ee and >99% de):



Daicel Chiralpak ID-H, Hexane/ i-PrOH = 90:10, Flow Rate 0.5 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT28.241	28.241	8690702	159732	100.000	100.000
Total			8690702	159732	100.000	100.000