Electronic Supplementary Material (ESI) for Chemical Communications

Supporting Information-II

Discovery of 2-Aminobuta-1,3-enynes in Asymmetric Organocascade Catalysis: Construction of Drug-like Spirocyclic Cyclohexanes Having Five to Six Contiguous Stereocenters

Dhevalapally B. Ramachary,* Chintalapudi Venkaiah, and Patoju Murali Krishna

School of Chemistry, University of Hyderabad, Central University (P.O.), Hyderabad 500 046, India

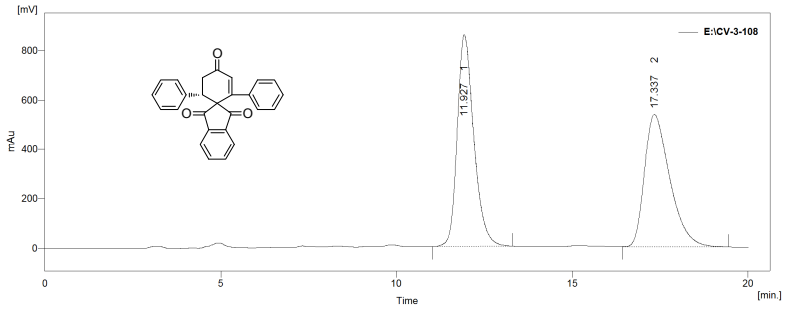
ramsc@uohyd.ernet.in

General Methods: The ^{1}H 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 ^{1}H 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 were recorded on micromass ESI-TOF MS. GCMS mass spectrometry was performed on Shimadzu GCMS-QP2010 mass spectrometer. 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-Nonious MACH 3 diffractometer using graphite monochromated, Mo-Kα ($\lambda = 0.71073$ Å) 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-Kα fine-focus sealed tube ($\lambda = 0.71073$ Å). 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 *r*-M products **6** and **7** was determined by chiral stationary phase HPLC using a Daicel Chiralcel OD-H, or OJ-H columns and hexane/2-propanol as the eluent or using a Daicel Chiralpak AD-H column and hexane/2-propanol as the eluent. Retention times and solvent ratios are indicated in the respective entries.

RACEMIC 6aa:

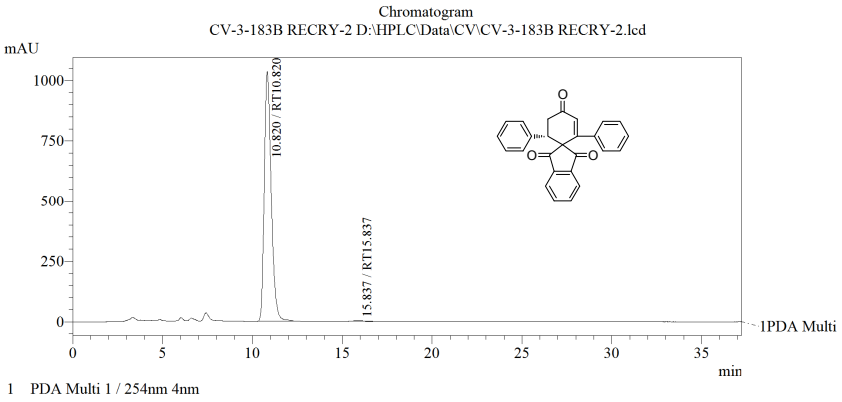


Daicel Chiral Cel OD-H, Hexane/ i-PrOH = 85:15, Flow Rate 1.0 mL/Min, 254 nm

Result Table (Uncal - E:\CV-3-108)

	Reten. Time [min]	Area [mV.s]	Height [mV]	Area [%]	Height [%]	W05 [min]
1	11.927	18808.141	571.865	51.2	61.5	0.50
2	17.337	17896.024	358.269	48.8	38.5	0.76
	Total	36704.165	930.134	100.0	100.0	

CHIRAL 6aa (>99% *ee*):



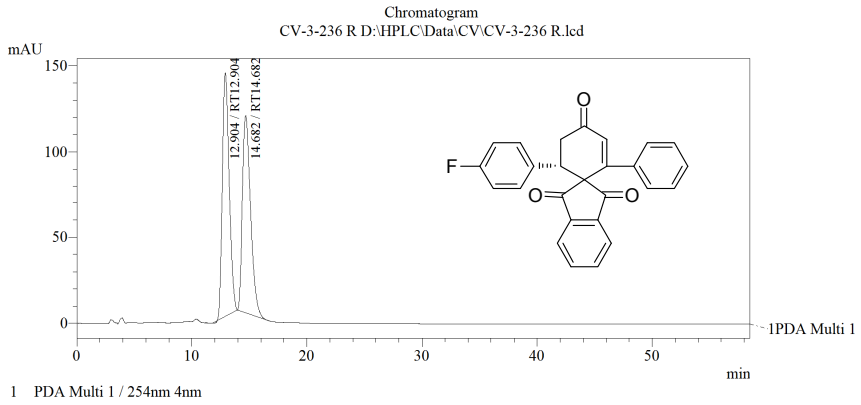
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 85:15, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT10.820	10.820	27593124	1033547	99.722	99.857
2	RT15.837	15.837	76978	1478	0.278	0.143
Total			27670101	1035025	100.000	100.000

RACEMIC 6ab:



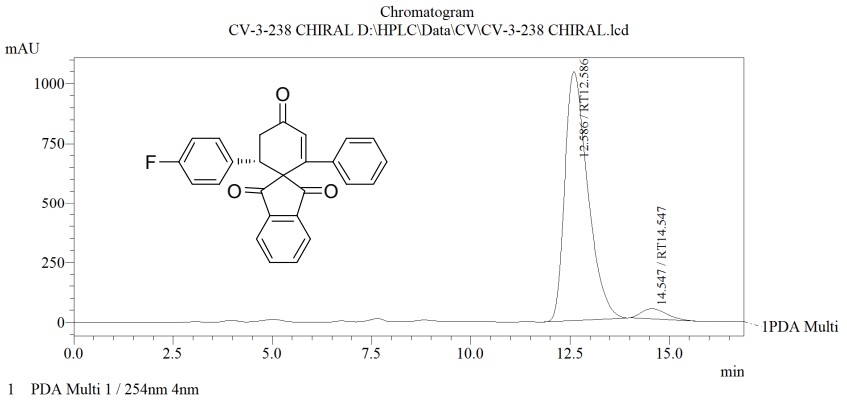
Daicel Chiral Cel OD-H, Hexane/ i- PrOH =80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT12.904	12.904	5809106	141839	50.438	55.225
2	RT14.682	14.682	5708129	114997	49.562	44.775
Total			11517235	256836	100.000	100.000

CHIRAL 6ab (92% *ee*):



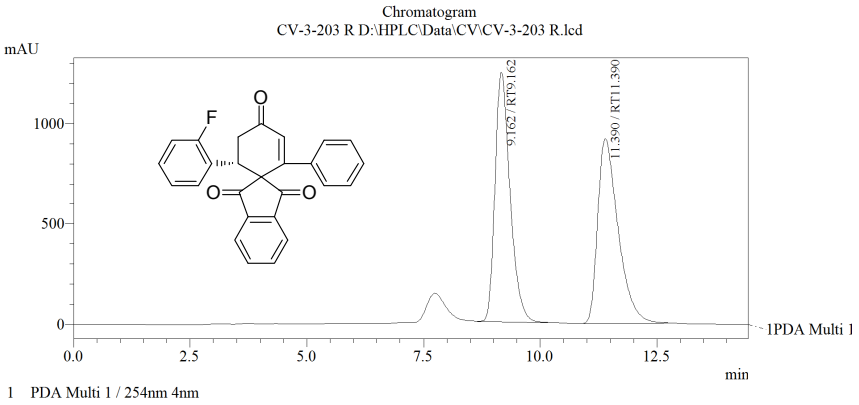
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT12.586	12.586	42038554	1042136	95.866	96.155
2	RT14.547	14.547	1812729	41675	4.134	3.845
Total			43851284	1083811	100.000	100.000

RACEMIC 6ac:



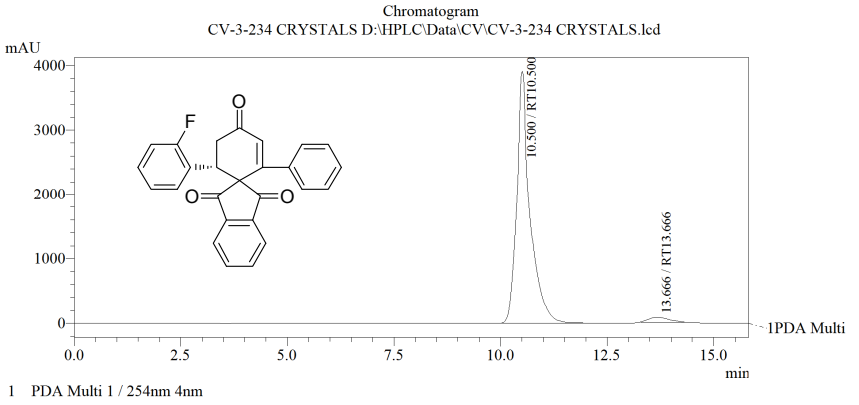
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT9.162	9.162	27796002	1241503	49.759	57.378
2	RT11.390	11.390	28065295	922222	50.241	42.622
Total			55861297	2163725	100.000	100.000

CHIRAL 6ac (93% *ee*):



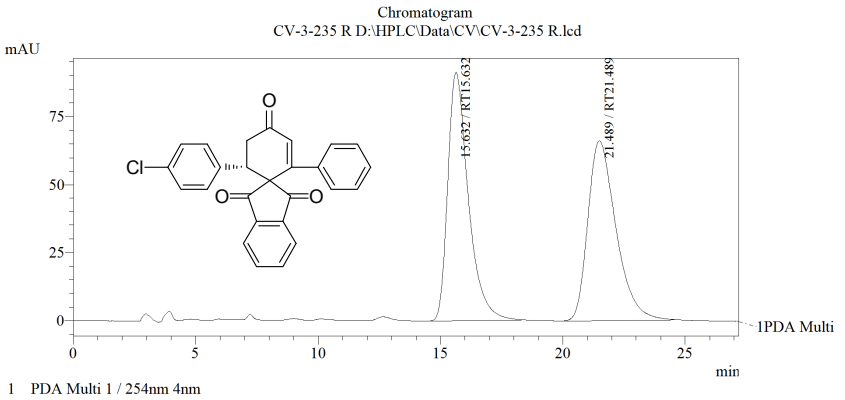
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT10.500	10.500	83686306	3902929	96.742	97.967
2	RT13.666	13.666	2818337	80993	3.258	2.033
Total			86504643	3983922	100.000	100.000

RACEMIC 6ad:



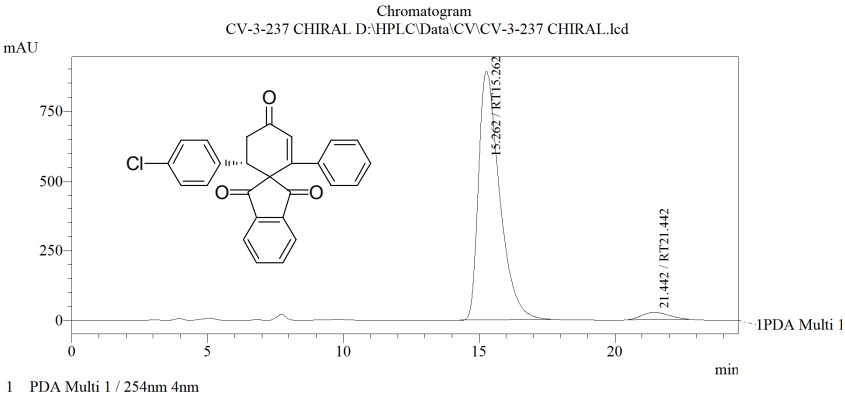
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT15.632	15.632	5344475	91147	50.347	57.946
2	RT21.489	21.489	5270840	66149	49.653	42.054
Total			10615315	157297	100.000	100.000

CHIRAL 6ad (93% *ee*):



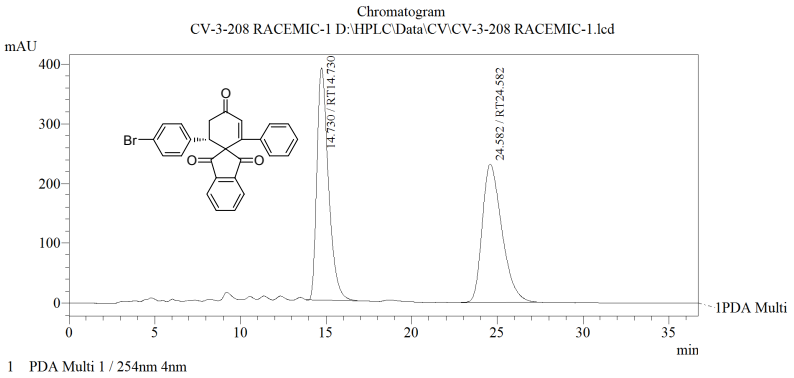
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT15.262	15.262	48027534	891857	96.535	97.234
2	RT21.442	21.442	1723836	25370	3.465	2.766
Total			49751370	917227	100.000	100.000

RACEMIC 6ae:



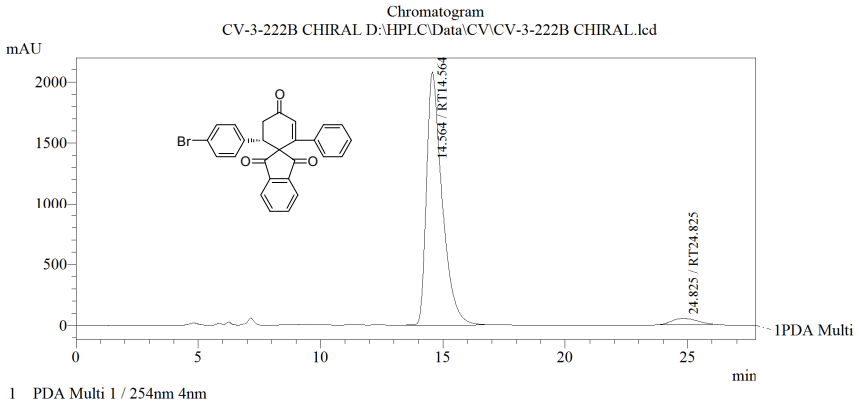
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.730	14.730	18191490	388003	49.673	62.649
2	RT24.582	24.582	18430912	231329	50.327	37.351
Total			36622402	619332	100.000	100.000

CHIRAL 6ae (92% *ee*):



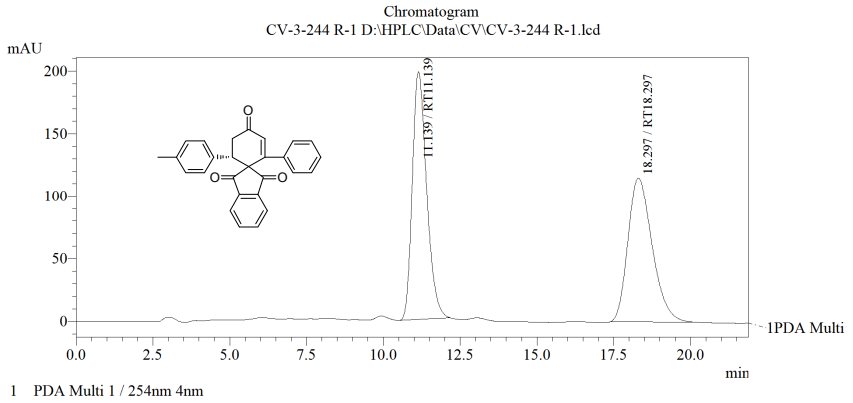
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.564	14.564	91567649	2076508	96.062	97.496
2	RT24.825	24.825	3754171	53333	3.938	2.504
Total			95321819	2129841	100.000	100.000

RACEMIC 6af:



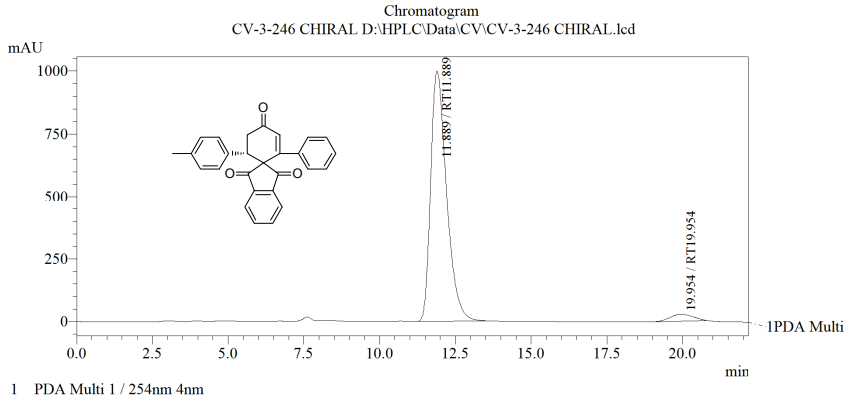
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT11.139	11.139	6393967	197855	50.432	63.235
2	RT18.297	18.297	6284409	115034	49.568	36.765
Total			12678376	312889	100.000	100.000

CHIRAL 6af (93% *ee*):



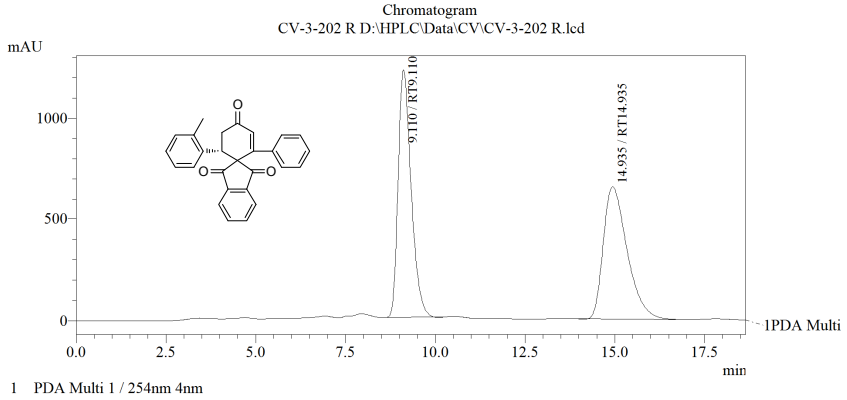
DaiceChiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT11.889	11.889	36489649	998698	96.283	97.359
2	RT19.954	19.954	1408844	27091	3.717	2.641
Total			37898493	1025789	100.000	100.000

RACEMIC 6ag:



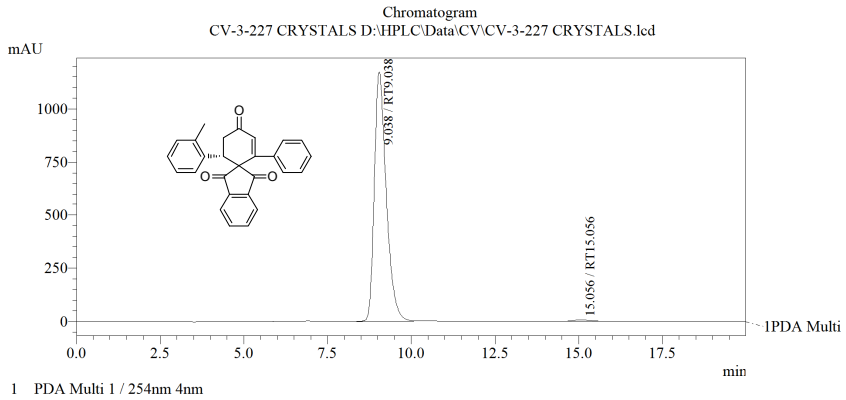
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT9.110	9.110	30548205	1221327	50.438	65.115
2	RT14.935	14.935	30017583	654321	49.562	34.885
Total			60565788	1875647	100.000	100.000

CHIRAL 6ag (98% *ee*):



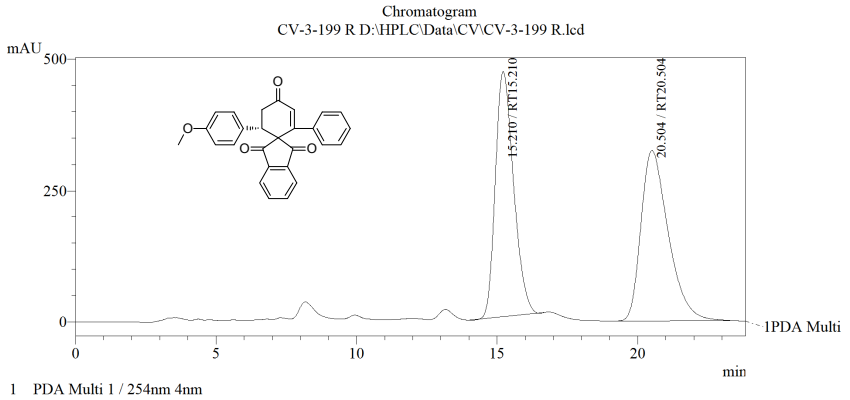
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT9.038	9.038	29067231	1170624	99.206	99.467
2	RT15.056	15.056	232655	6269	0.794	0.533
Total			29299886	1176893	100.000	100.000

RACEMIC 6ah:



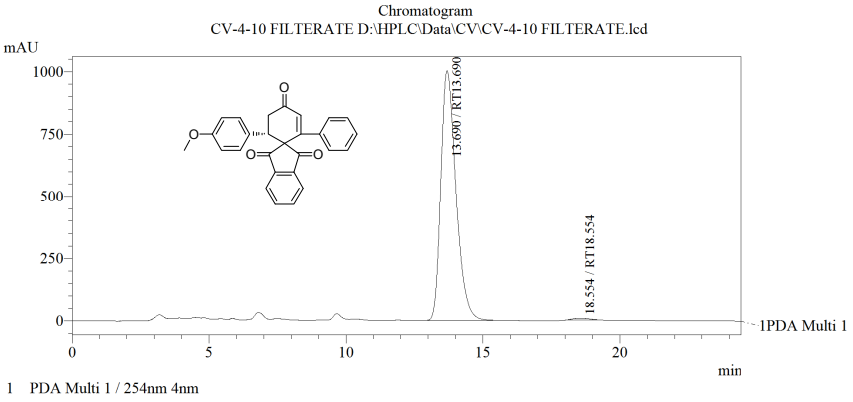
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT15.210	15.210	20984808	466146	48.917	58.922
2	RT20.504	20.504	21914351	324980	51.083	41.078
Total			42899159	791126	100.000	100.000

CHIRAL 6ah (98% *ee*):



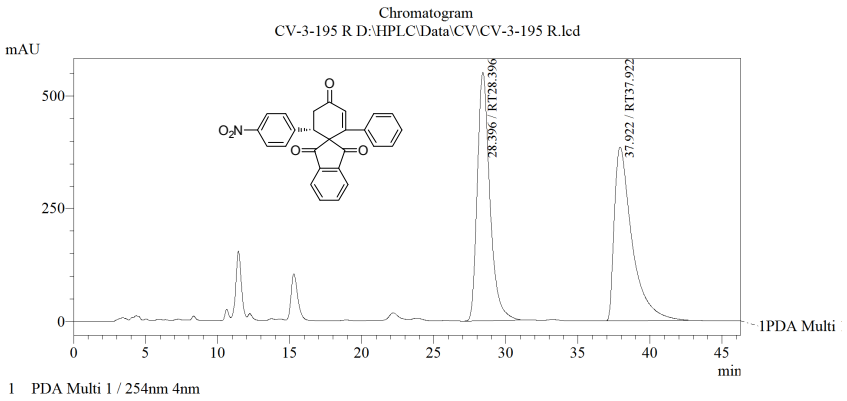
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT13.690	13.690	38351373	1001122	99.179	99.238
2	RT18.554	18.554	317607	7686	0.821	0.762
Total			38668980	1008807	100.000	100.000

RACEMIC 6ai:



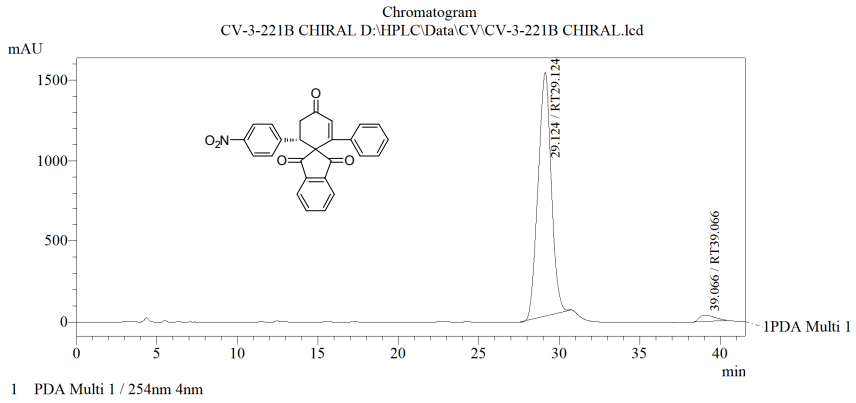
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT28.396	28.396	33290290	551140	50.202	58.822
2	RT37.922	37.922	33021986	385821	49.798	41.178
Total			66312276	936961	100.000	100.000

CHIRAL 6ai (94% *ee*):



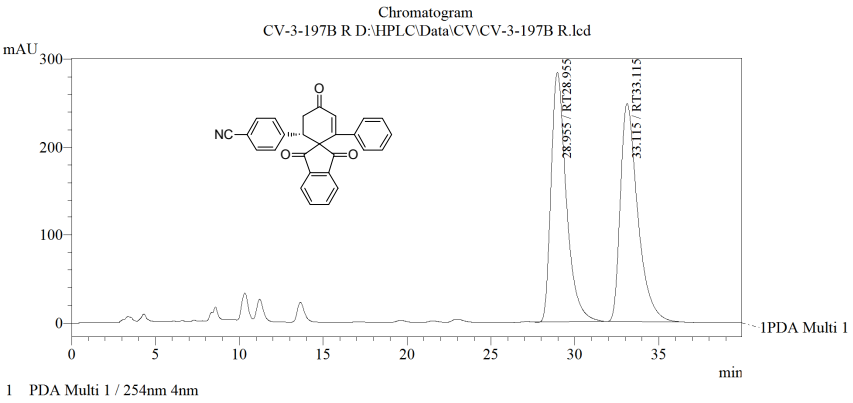
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT29.124	29.124	86418090	1514500	96.869	97.353
2	RT39.066	39.066	2792749	41179	3.131	2.647
Total			89210839	1555679	100.000	100.000

RACEMIC 6aj:



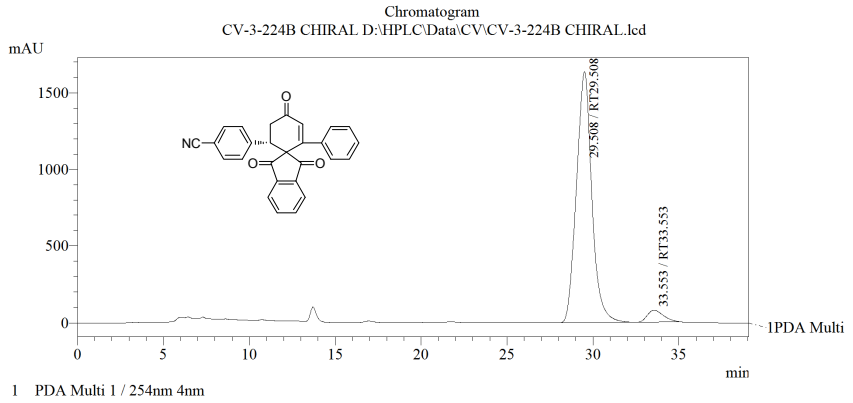
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT28.955	28.955	17856880	283642	50.038	53.341
2	RT33.115	33.115	17829853	248114	49.962	46.659
Total			35686733	531756	100.000	100.000

CHIRAL 6aj (90% *ee*):



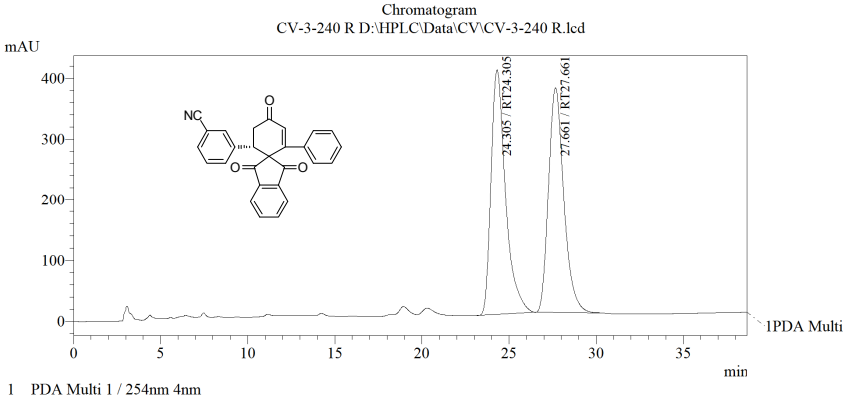
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT29.508	29.508	101445695	1633849	95.202	95.460
2	RT33.553	33.553	5112405	77702	4.798	4.540
Total			106558100	1711551	100.000	100.000

RACEMIC 6ak:



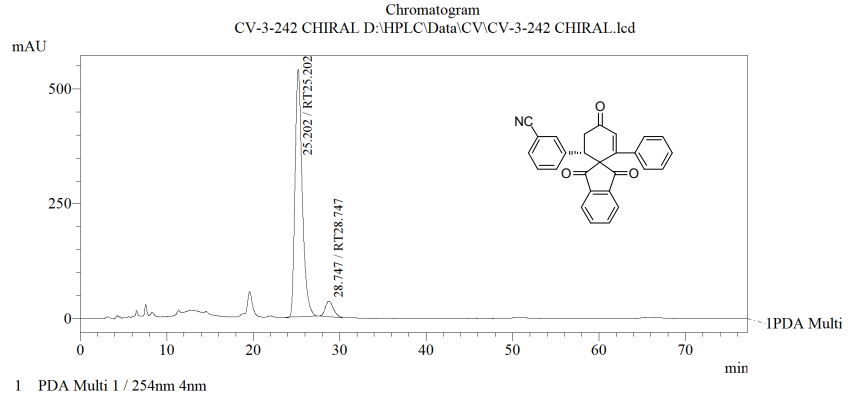
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT24.305	24.305	23236894	402102	50.745	52.105
2	RT27.661	27.661	22554943	369618	49.255	47.895
Total			45791837	771720	100.000	100.000

CHIRAL 6ak (87% *ee*):



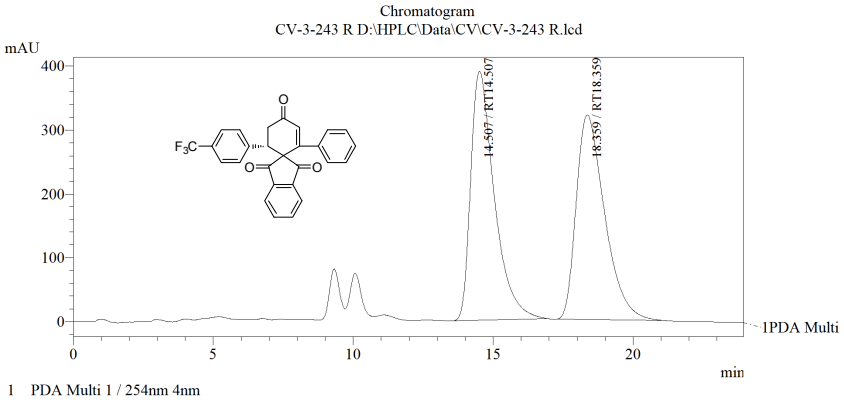
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT25.202	25.202	31092506	537661	93.312	94.058
2	RT28.747	28.747	2228561	33968	6.688	5.942
Total			33321068	571629	100.000	100.000

RACEMIC 6al:



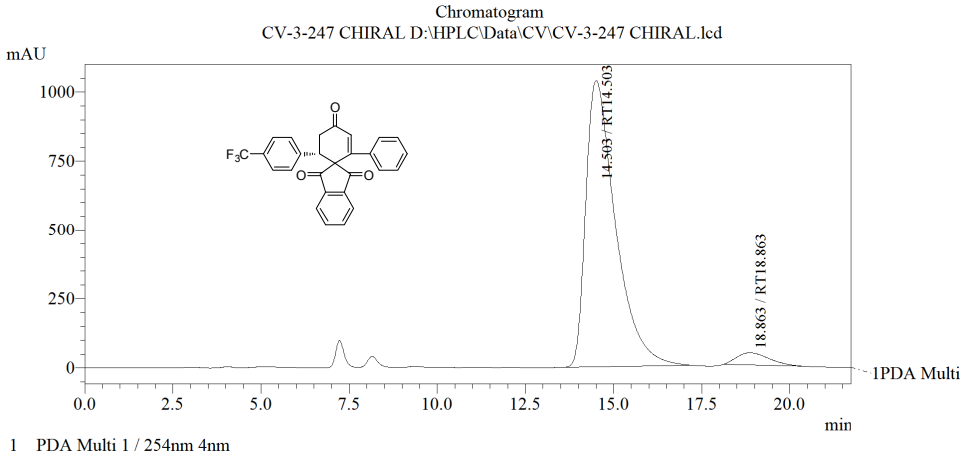
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.507	14.507	22799126	389048	50.148	54.824
2	RT18.359	18.359	22664144	320588	49.852	45.176
Total			45463271	709636	100.000	100.000

CHIRAL 6al (91% *ee*):



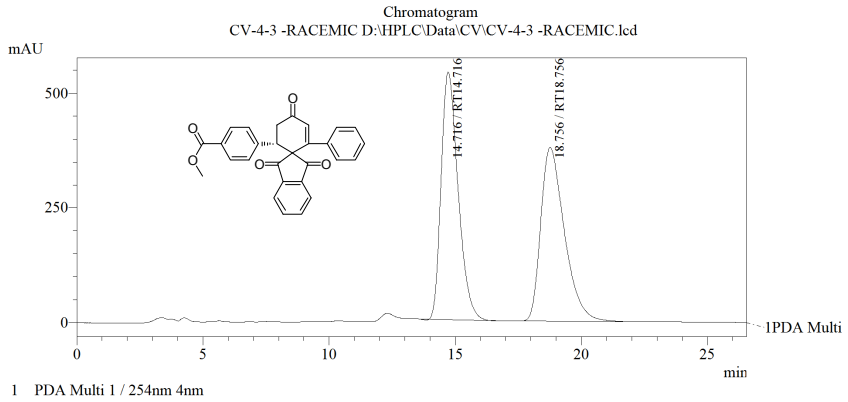
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.503	14.503	60781746	1037281	95.548	95.930
2	RT18.863	18.863	2832306	44008	4.452	4.070
Total			63614052	1081289	100.000	100.000

RACEMIC 6am:



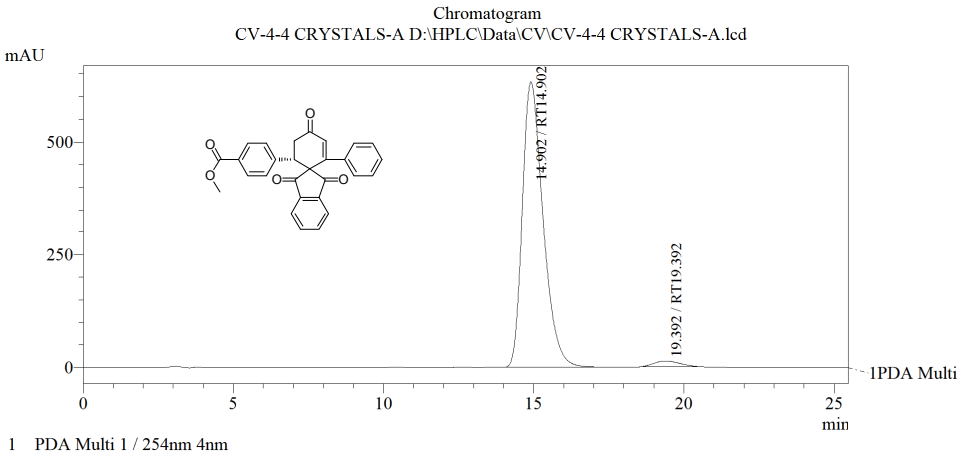
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.716	14.716	25140510	538826	50.559	58.749
2	RT18.756	18.756	24584630	378342	49.441	41.251
Total			49725140	917168	100.000	100.000

CHIRAL 6am (95% *ee*):



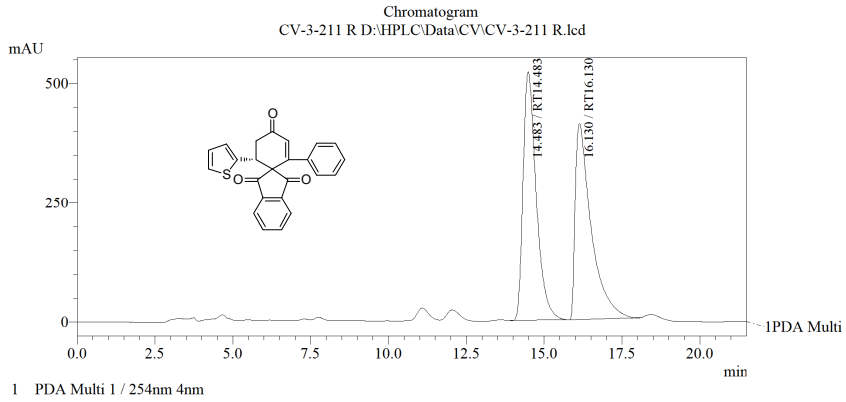
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.902	14.902	30321935	631488	97.542	98.009
2	RT19.392	19.392	764049	12830	2.458	1.991
Total			31085984	644318	100.000	100.000

RACEMIC 6an:



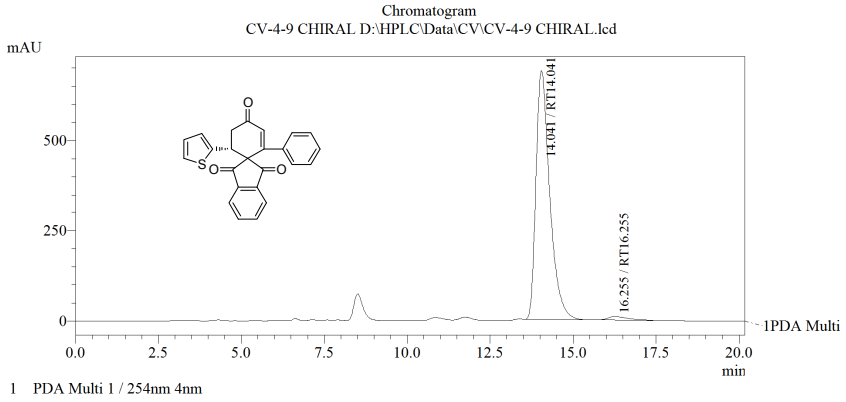
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.483	14.483	15257534	520204	50.937	55.868
2	RT16.130	16.130	14695959	410921	49.063	44.132
Total			29953492	931126	100.000	100.000

CHIRAL 6an (96% *ee*):



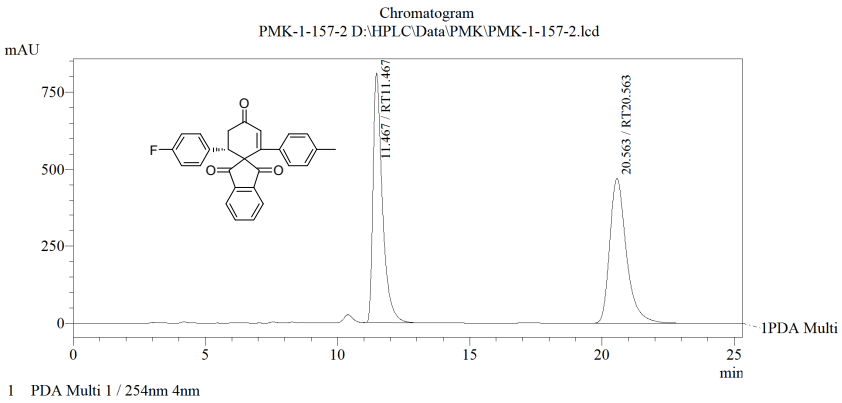
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT14.041	14.041	19861846	687652	98.027	98.661
2	RT16.255	16.255	399784	9335	1.973	1.339
Total			20261630	696987	100.000	100.000

RACEMIC 6bb:



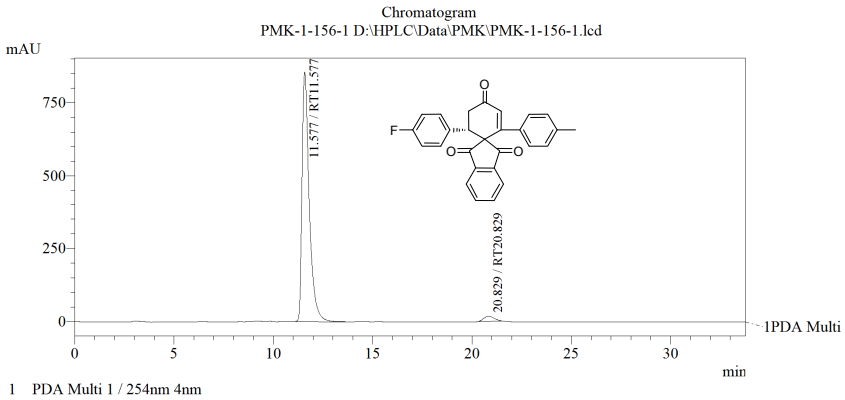
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT11.467	11.467	20030020	808722	49.367	63.154
2	RT20.563	20.563	20543537	471838	50.633	36.846
Total			40573557	1280559	100.000	100.000

CHIRAL 6bb (94% *ee*):



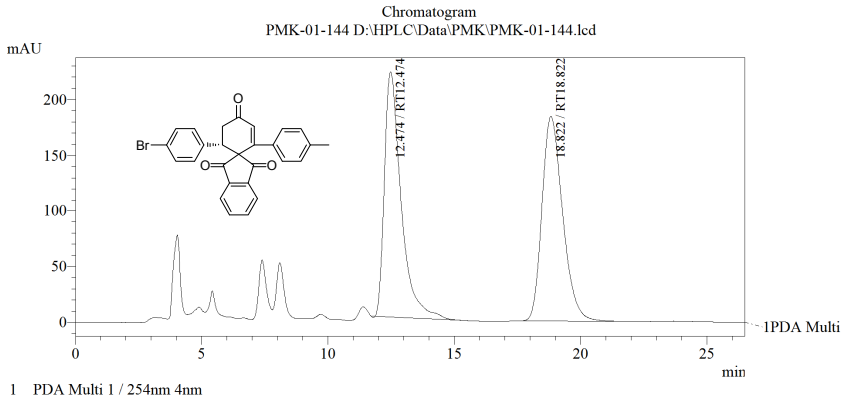
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT11.577	11.577	21467721	853901	97.070	97.987
2	RT20.829	20.829	647999	17546	2.930	2.013
Total			22115720	871447	100.000	100.000

RACEMIC 6be:



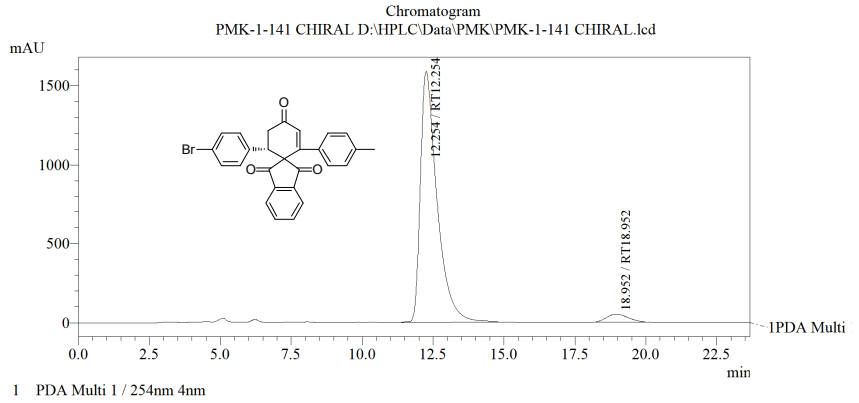
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT12.474	12.474	10117431	219794	49.160	54.455
2	RT18.822	18.822	10463304	183834	50.840	45.545
Total			20580735	403628	100.000	100.000

CHIRAL 6be (92% *ee*):



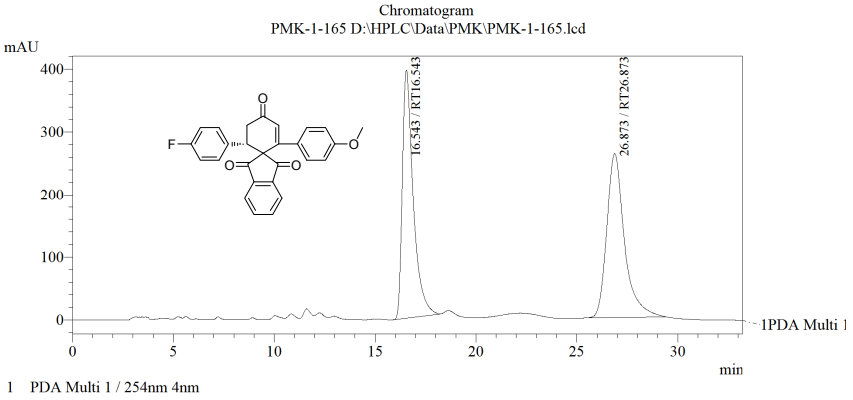
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT12.254	12.254	65230924	1588482	96.223	96.968
2	RT18.952	18.952	2560710	49672	3.777	3.032
Total			67791634	1638155	100.000	100.000

RACEMIC 6cb:



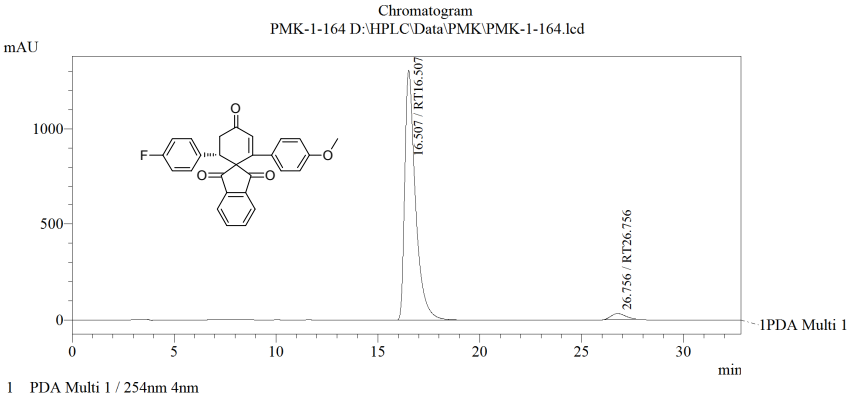
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT16.543	16.543	14868921	395383	48.376	60.170
2	RT26.873	26.873	15867430	261731	51.624	39.830
Total			30736351	657114	100.000	100.000

CHIRAL 6cb (94% *ee*):



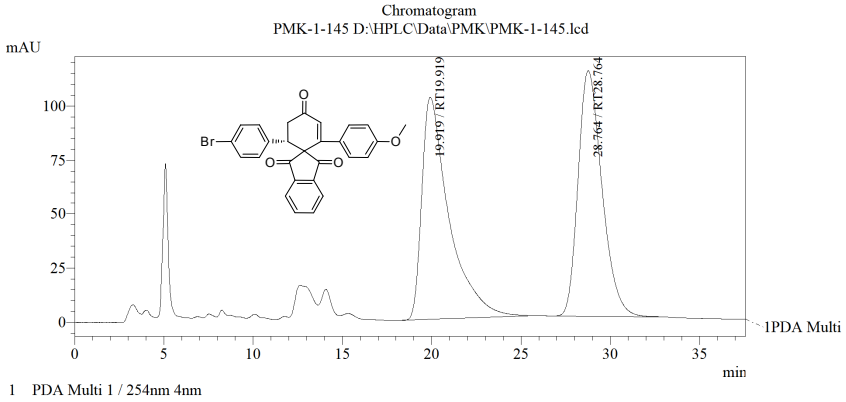
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT16.507	16.507	47507828	1305534	96.867	97.665
2	RT26.756	26.756	1536680	31220	3.133	2.335
Total			49044508	1336754	100.000	100.000

RACEMIC 6ce:



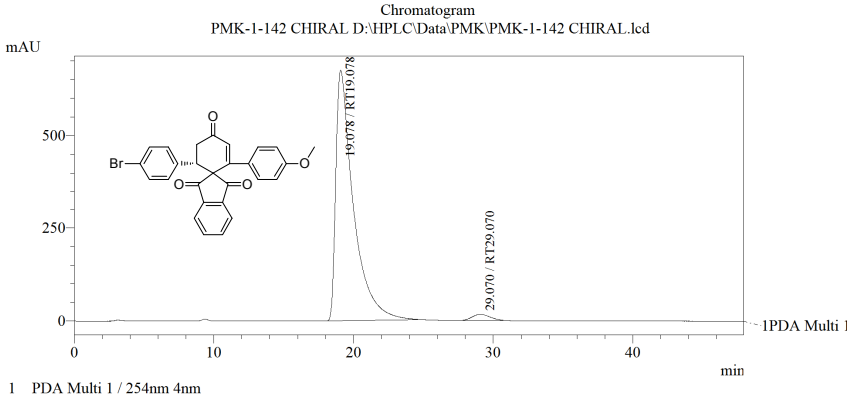
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT19.919	19.919	10869752	102614	50.757	47.486
2	RT28.764	28.764	10545543	113479	49.243	52.514
Total			21415295	216093	100.000	100.000

CHIRAL 6ce (95% *ee*):



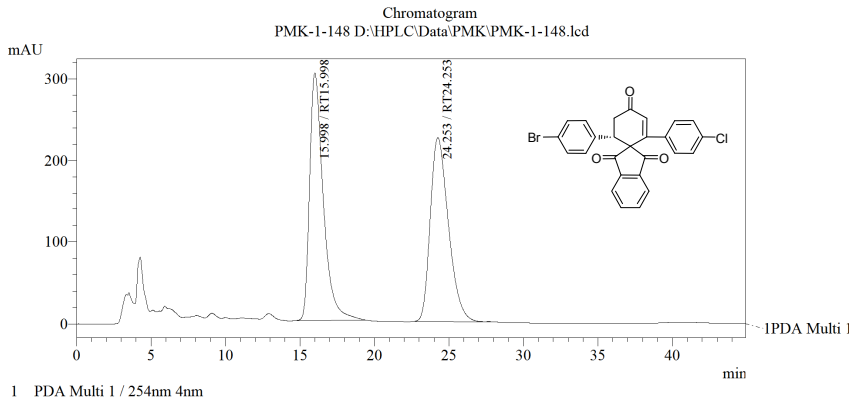
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT19.078	19.078	59142226	674179	97.619	97.620
2	RT29.070	29.070	1442796	16436	2.381	2.380
Total			60585021	690614	100.000	100.000

RACEMIC 6de:



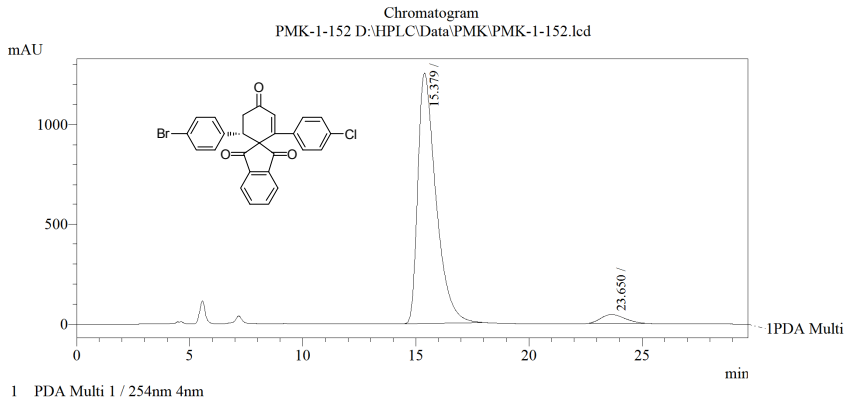
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT15.998	15.998	19385262	302927	50.409	57.338
2	RT24.253	24.253	19070843	225389	49.591	42.662
Total			38456105	528316	100.000	100.000

CHIRAL 6de (91% *ee*):



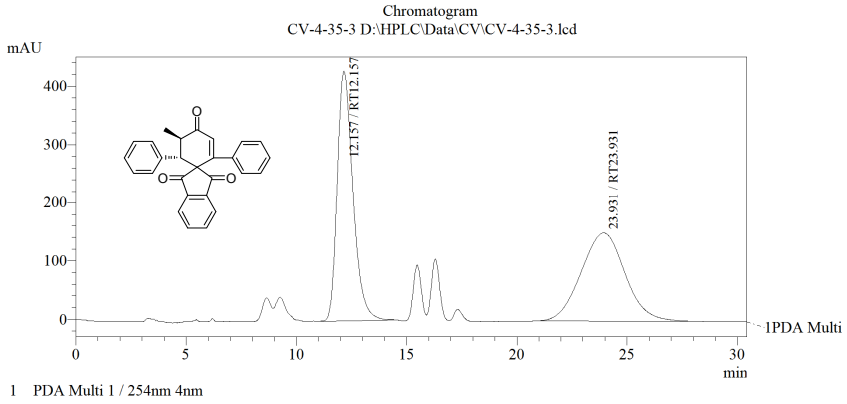
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1		15.379	70088584	1253621	95.467	96.551
2		23.650	3328341	44787	4.533	3.449
Total			73416926	1298408	100.000	100.000

RACEMIC 6ea:



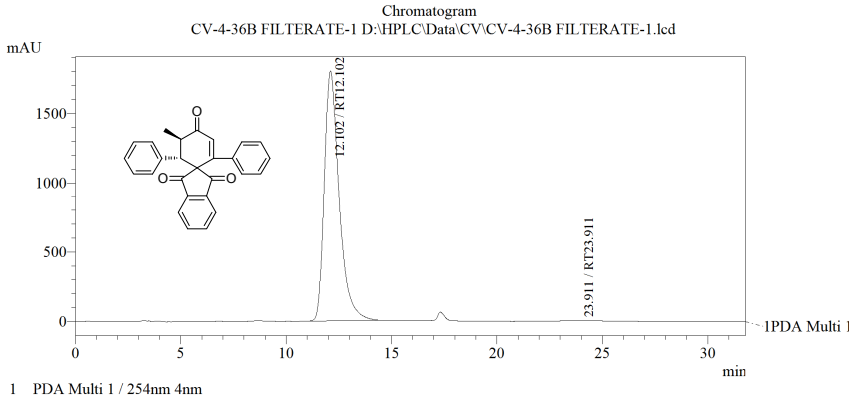
Daicel Chiral Cel OJ-H, Hexane/ i- PrOH = 90:10, Flow Rate 0.6 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT12.157	12.157	21157646	427907	50.254	73.962
2	RT23.931	23.931	20944026	150642	49.746	26.038
Total			42101671	578549	100.000	100.000

CHIRAL 6ea (>99% *ee*):

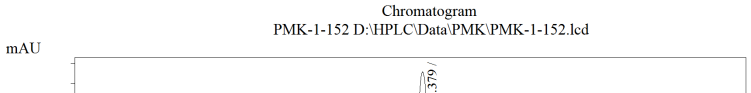


Daicel Chiral Cel OJ-H, Hexane/ i- PrOH = 90:10, Flow Rate 0.6 mL/Min, 254 nm

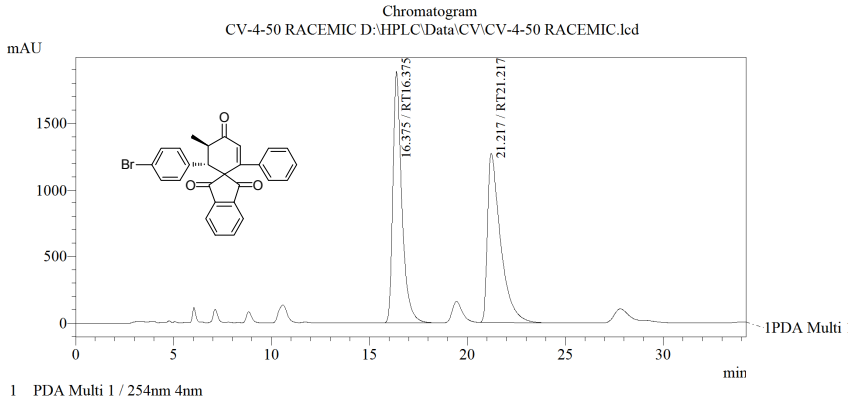
PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT12.102	12.102	88013362	1800842	99.787	99.909
2	RT23.911	23.911	187719	1646	0.213	0.091
Total			88201080	1802489	100.000	100.000



RACEMIC 6ee:



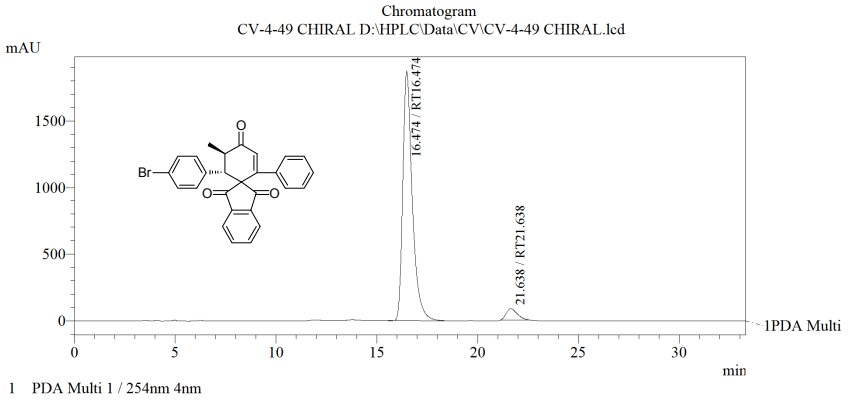
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT16.375	16.375	59791545	1884858	50.324	59.686
2	RT21.217	21.217	59022424	1273123	49.676	40.314
Total			118813969	3157981	100.000	100.000

CHIRAL 6ee (90% *ee*):



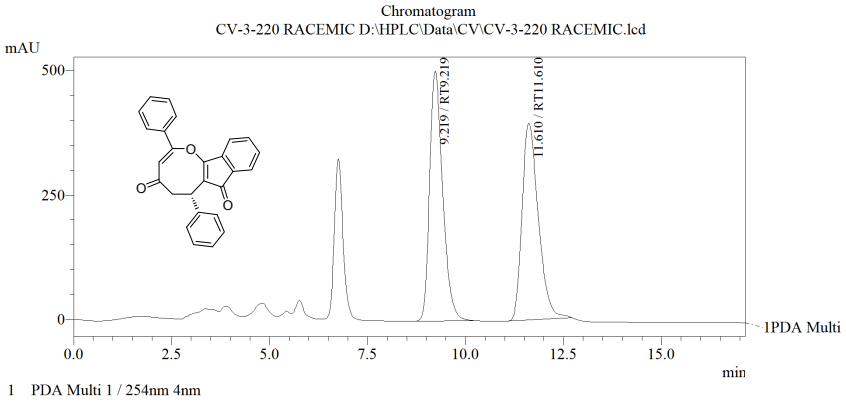
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT16.474	16.474	61302240	1871727	95.080	95.719
2	RT21.638	21.638	3172211	83720	4.920	4.281
Total			64474451	1955447	100.000	100.000

RACEMIC 7aa:



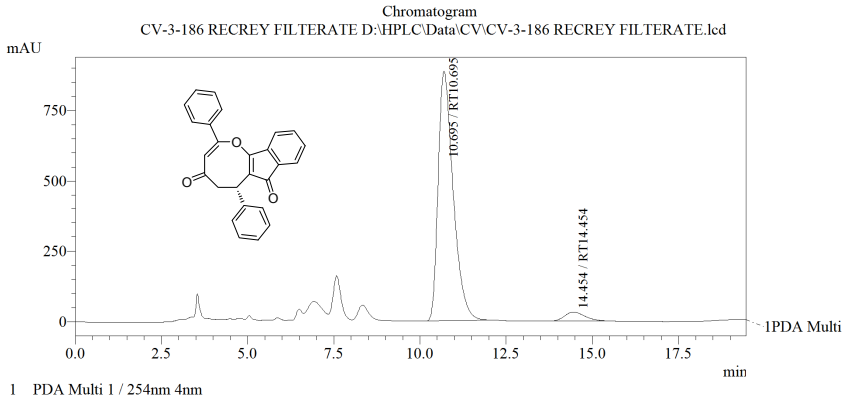
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 85:15, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT9.219	9.219	11629604	500511	50.499	55.894
2	RT11.610	11.610	11399885	394947	49.501	44.106
Total			23029489	895458	100.000	100.000

CHIRAL 7aa (91% *ee*):



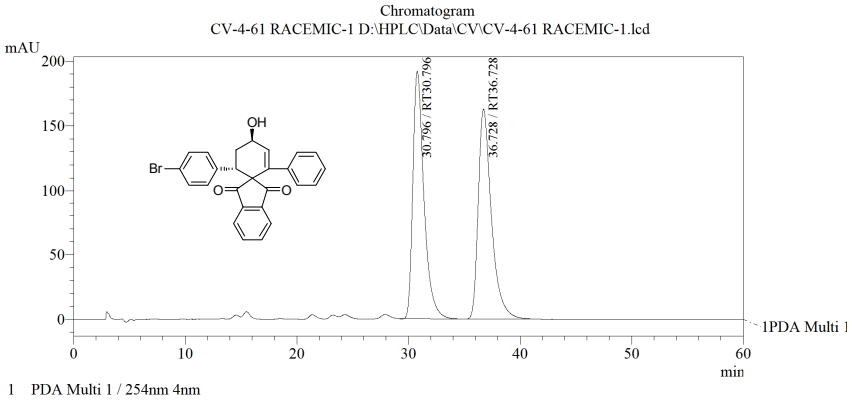
Daicel Chiral Cel OD-H, Hexane/ i- PrOH = 85:15, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT10.695	10.695	26823305	884425	95.543	96.570
2	RT14.454	14.454	1251353	31409	4.457	3.430
Total			28074659	915834	100.000	100.000

RACEMIC 8ae:



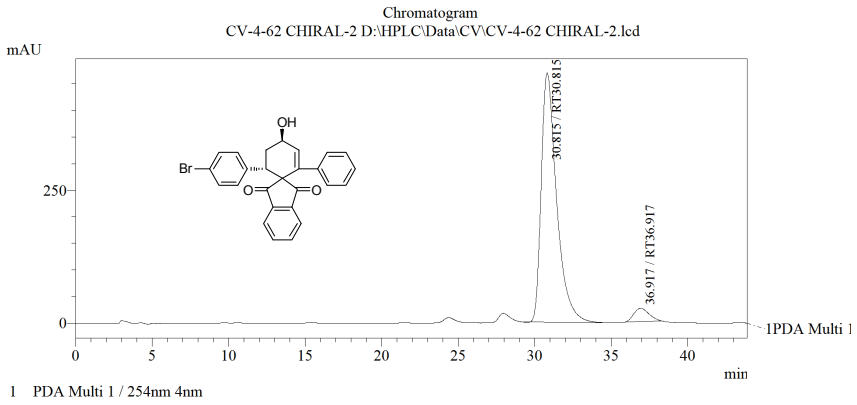
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 90:10, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT30.796	30.796	13237177	191813	49.768	54.099
2	RT36.728	36.728	13360673	162744	50.232	45.901
Total			26597850	354556	100.000	100.000

CHIRAL 8ae (90% *ee*):



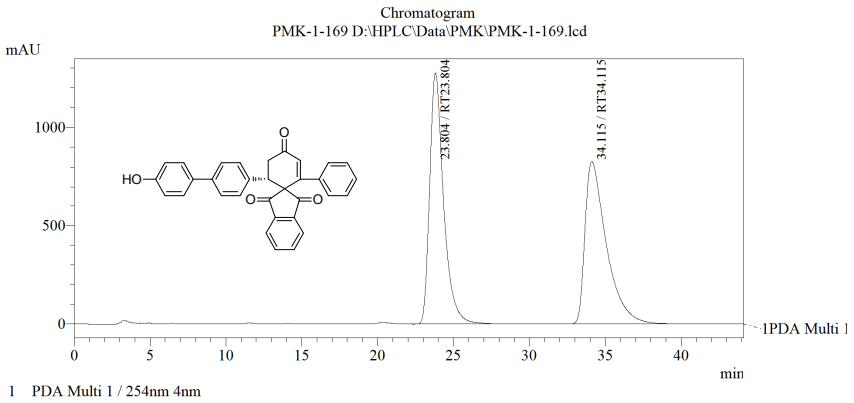
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 90:10, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT30.815	30.815	32704990	467539	94.987	94.942
2	RT36.917	36.917	1725906	24910	5.013	5.058
Total			34430896	492449	100.000	100.000

RACEMIC 11aea:



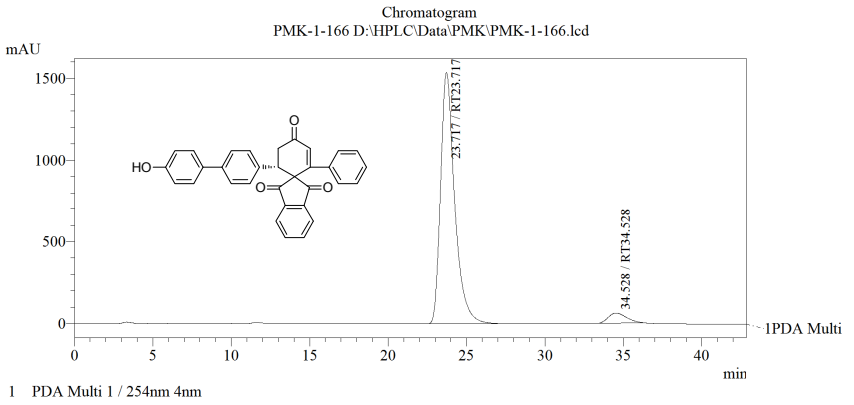
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT23.804	23.804	81435235	1274300	50.197	60.643
2	RT34.115	34.115	80797062	827021	49.803	39.357
Total			162232297	2101321	100.000	100.000

CHIRAL 11aea (90% *ee*):



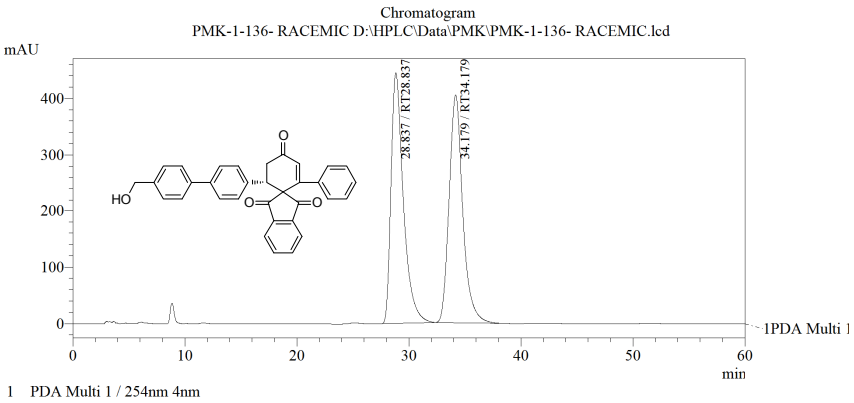
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT23.717	23.717	95667855	1534768	95.040	96.119
2	RT34.528	34.528	4992363	61974	4.960	3.881
Total			100660218	1596743	100.000	100.000

RACEMIC 11aeb:



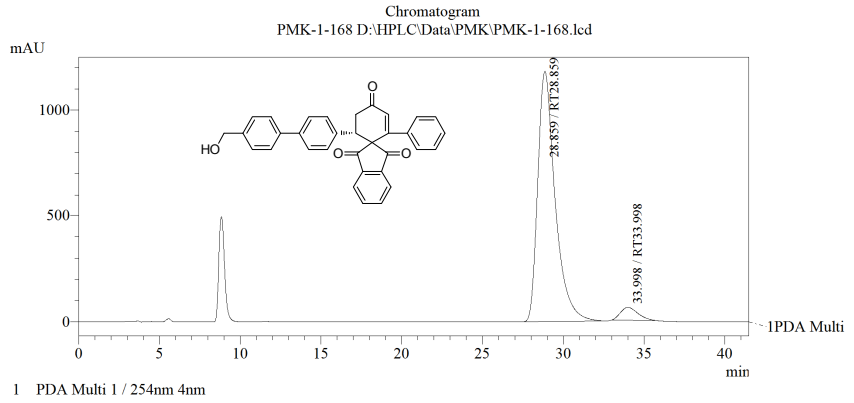
Daicel Chiral Pak AD-H, Hexane/ i- PrOH = 80:20, Flow Rate 1.0 mL/Min, 254 nm

PeakTable

PDA Ch1 254nm 4nm

Peak#	Name	Ret. Time	Area	Height	Area %	Height %
1	RT28.837	28.837	33922921	444765	49.790	52.362
2	RT34.179	34.179	34208499	404640	50.210	47.638
Total			68131420	849406	100.000	100.000

CHIRAL 11aeb (90% *ee*):



Daicel Chiral Pak AD-H, 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	RT28.859	28.859	88081819	1180509	95.088	95.110
2	RT33.998	33.998	4549652	60693	4.912	4.890
Total			92631472	1241202	100.000	100.000