

# HT8-PCBカラムにおける PCB 209異性体等量混合標準品 溶出順位

Trajan Scientific and  
Medical

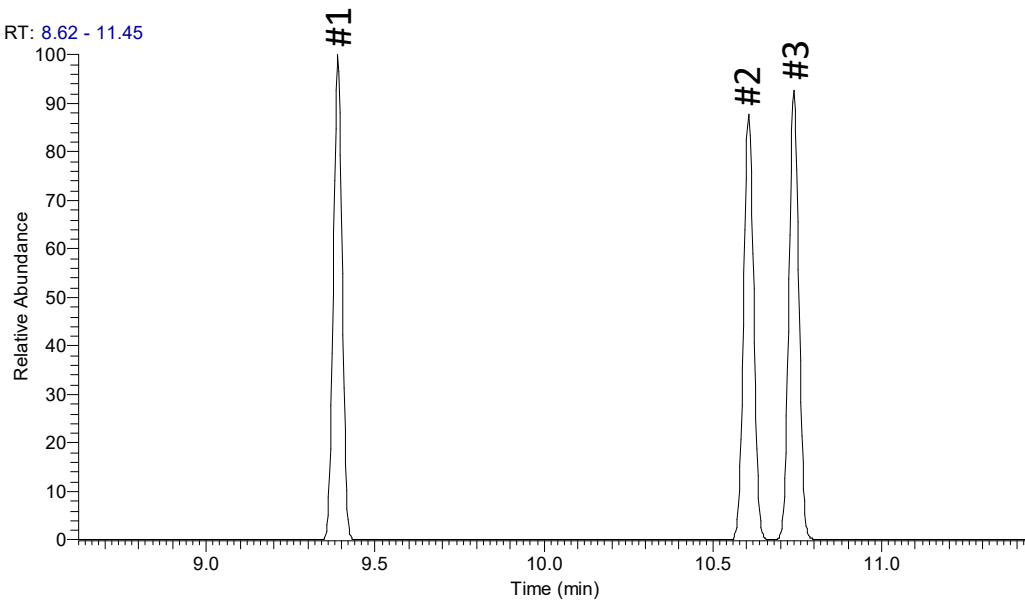
# GC-Orbitrap MS測定条件

Science that benefits people

- 測定装置: Q Exactive GC (Thermo Fisher Scientific)
- 分析カラム: HT-8 PCB (60 m, 0.25 mm)
- スプリットレス注入法
- 試料導入量: 1 $\mu$ L
- 注入口温度: 280 $^{\circ}$ C
- 昇温条件: 100 $^{\circ}$ C (1 min hold)  $\rightarrow$  20 $^{\circ}$ C/min  $\rightarrow$  180 $^{\circ}$ C (0 min hold)  $\rightarrow$  2 $^{\circ}$ C/min  $\rightarrow$  260 $^{\circ}$ C (0 min hold)  $\rightarrow$  5 $^{\circ}$ C/min  $\rightarrow$  300 $^{\circ}$ C (0 min hold)  $\rightarrow$  10 $^{\circ}$ C/min  $\rightarrow$  320 $^{\circ}$ C (5 min hold)
- キャリアガス: He 1.0 mL/min (constant flow)
- インターフェース温度: 300 $^{\circ}$ C
- イオン化法: EI
- イオン化電圧 :70eV
- トラップ電流: 50 $\mu$ A
- イオン化室温度: 300 $^{\circ}$ C
- 設定質量分解能: 60,000 (FWHM)
- 測定質量範囲: m/z 150-550
- Mass tolerance:  $\pm$ 10ppm
- PCB 209異性体等量混合標準品 10 ng/mL

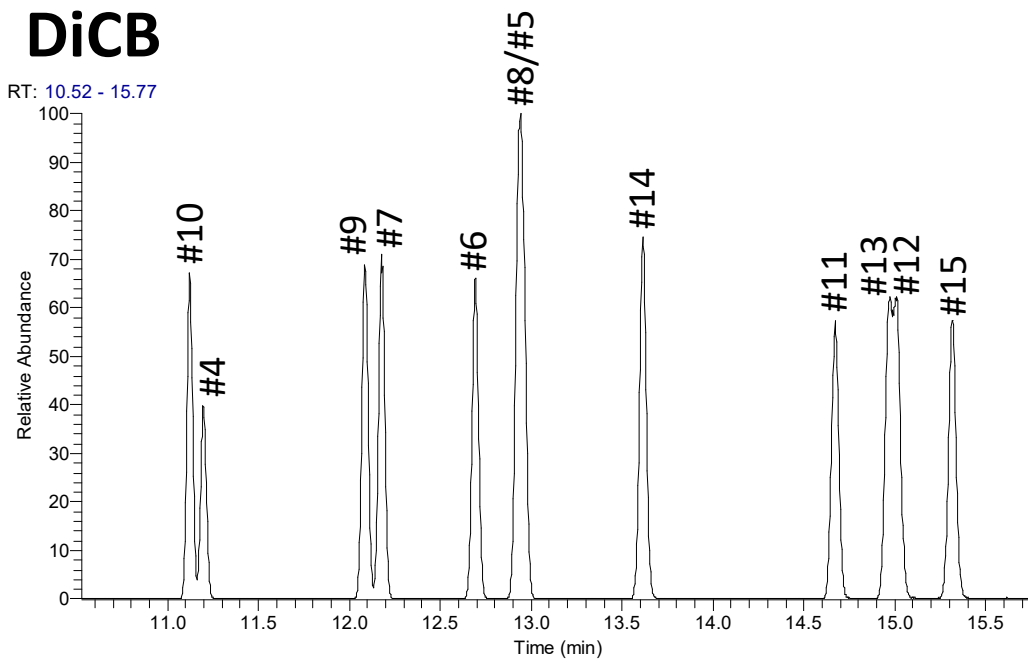
# MCB

RT: 8.62 - 11.45



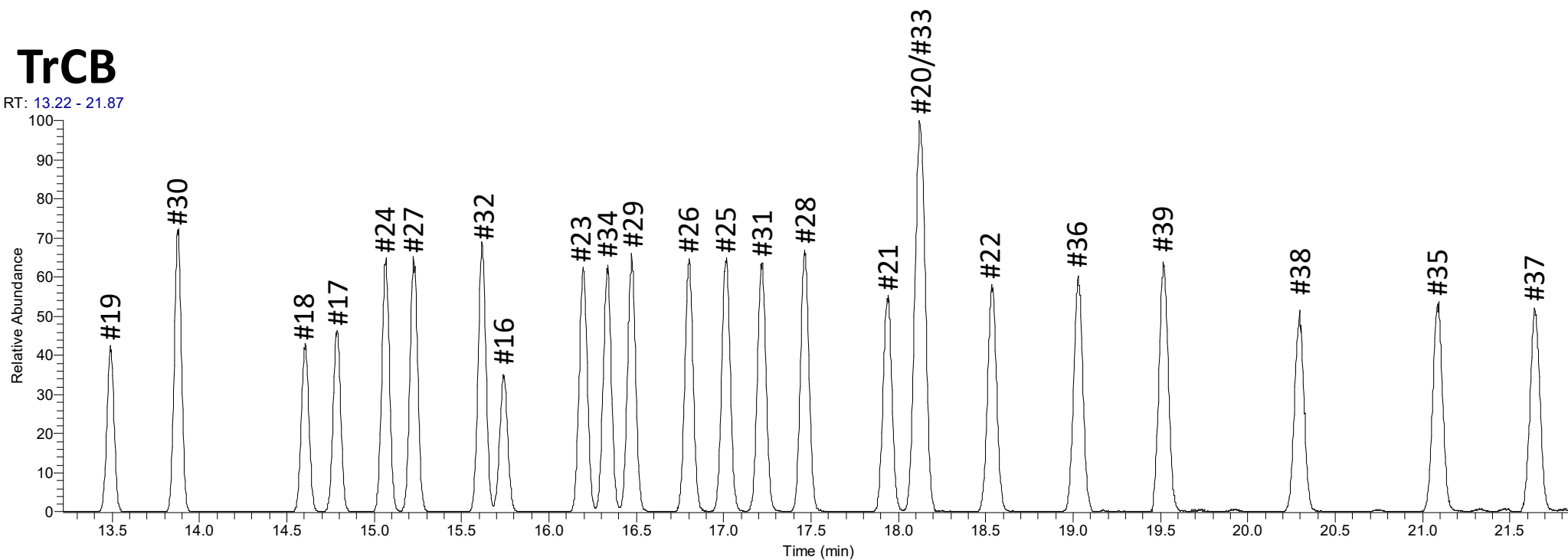
# DiCB

RT: 10.52 - 15.77



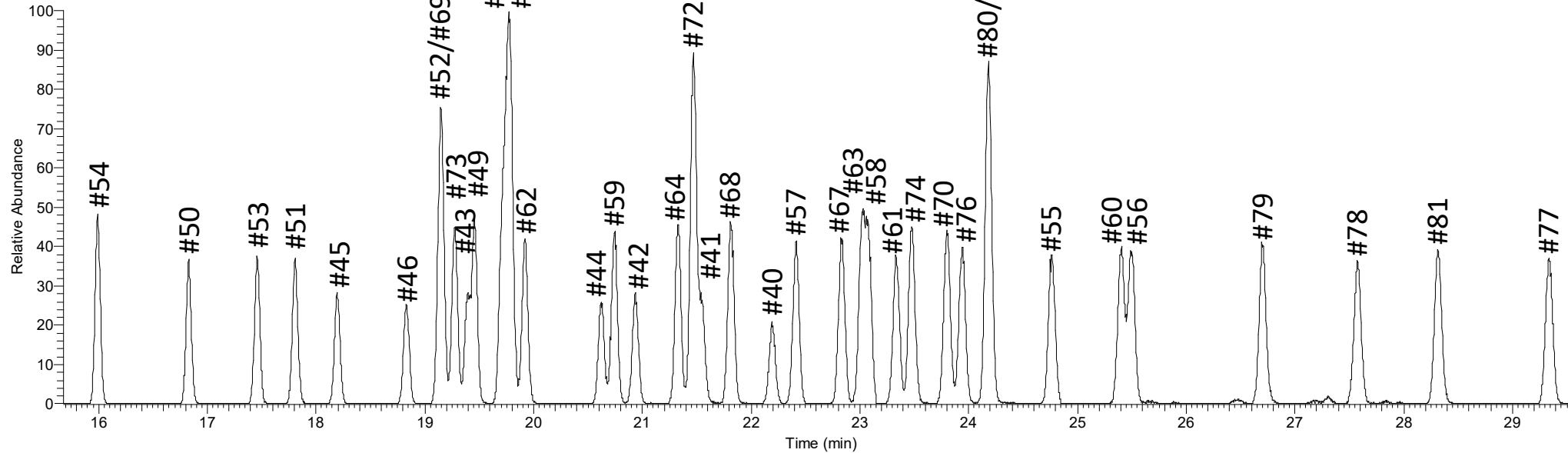
# TrCB

RT: 13.22 - 21.87



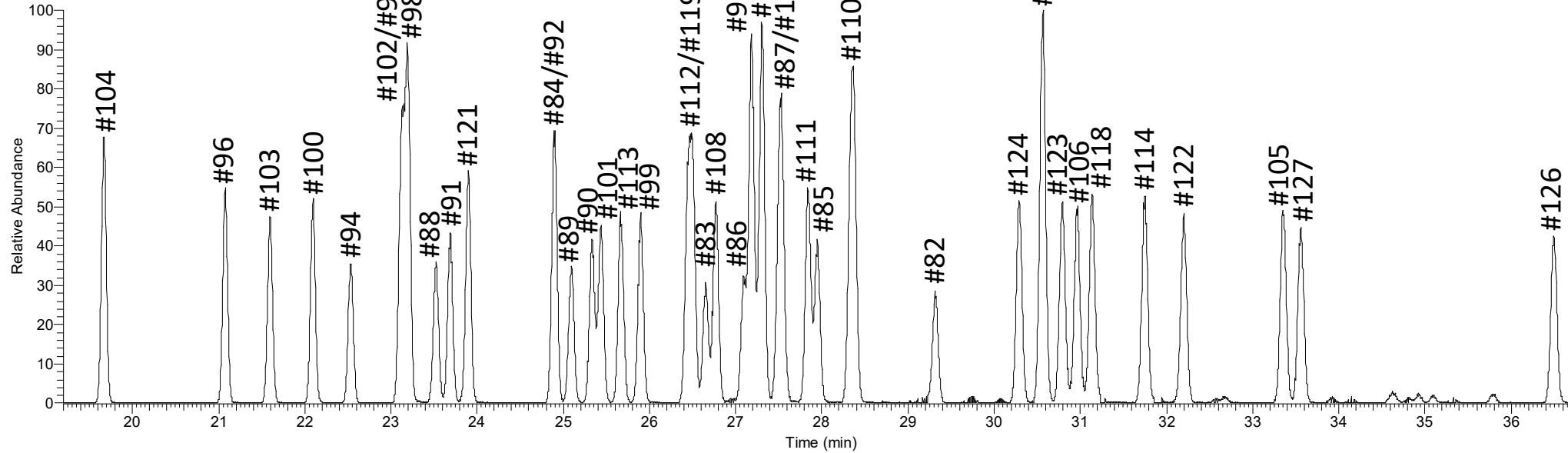
# TeCB

RT: 15.67 - 29.62



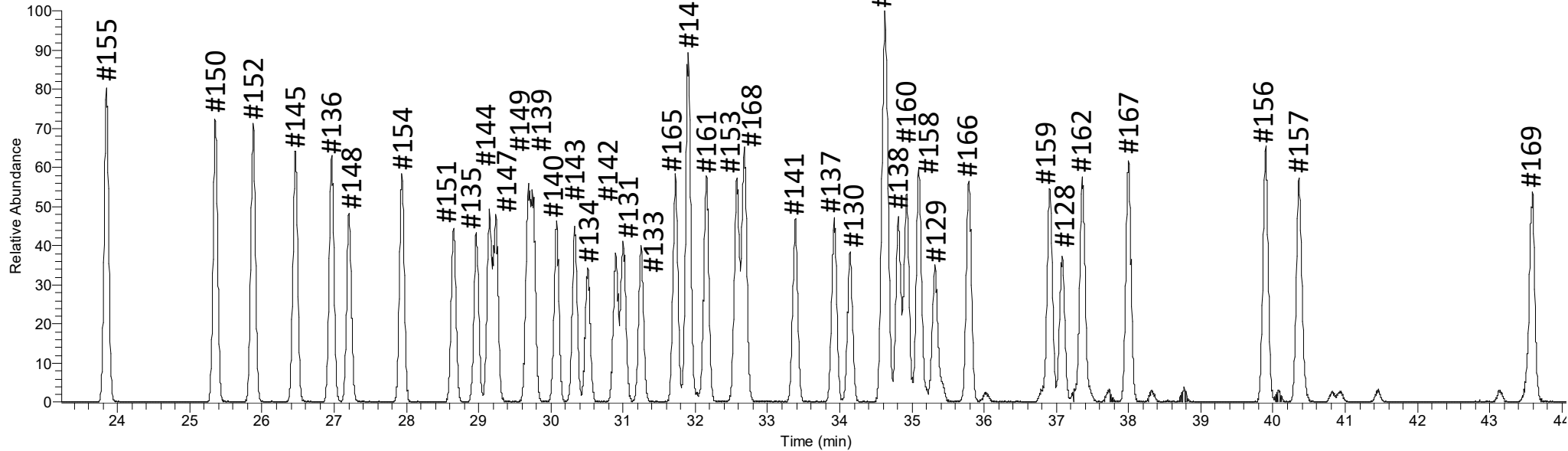
# PeCB

RT: 19.19 - 36.80



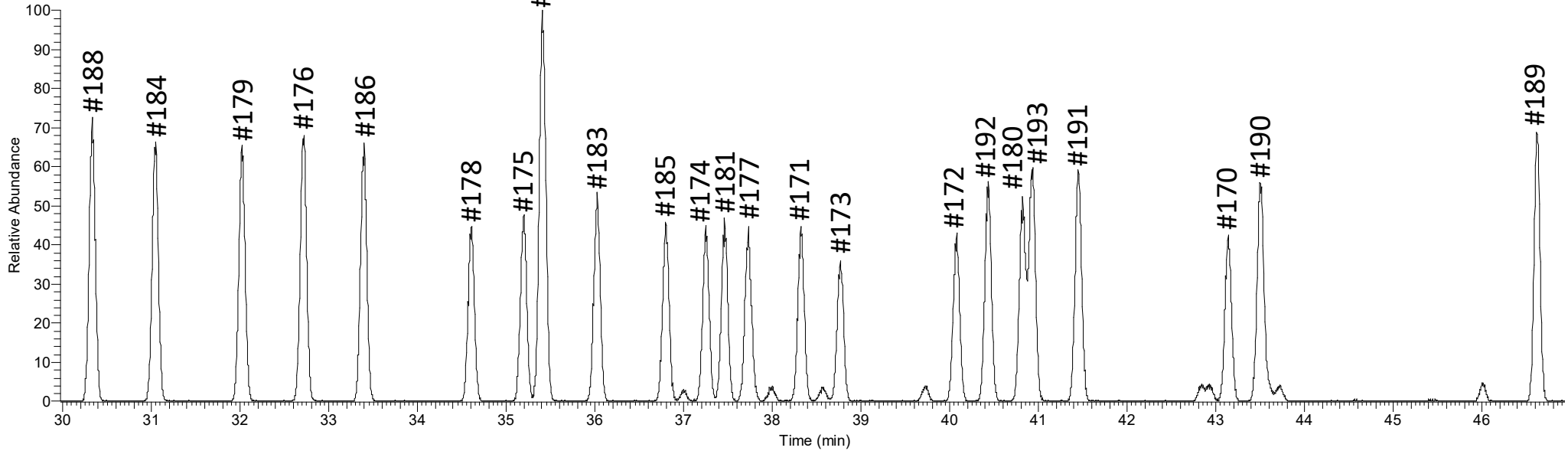
# HxCB

RT: 23.22 - 44.13



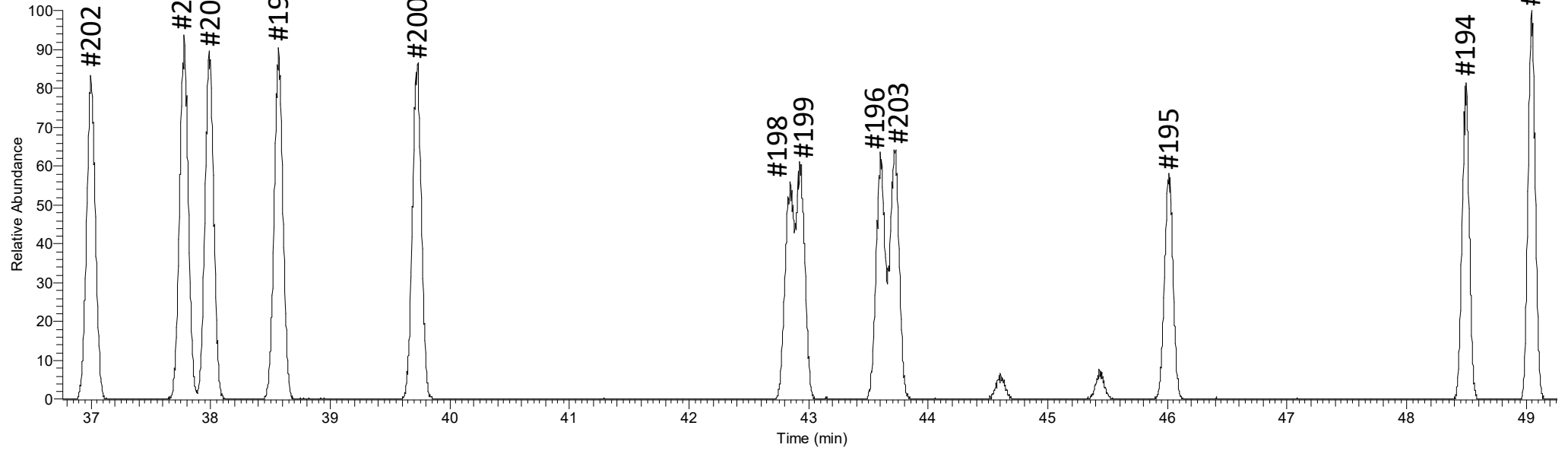
# HpCB

RT: 29.97 - 46.99



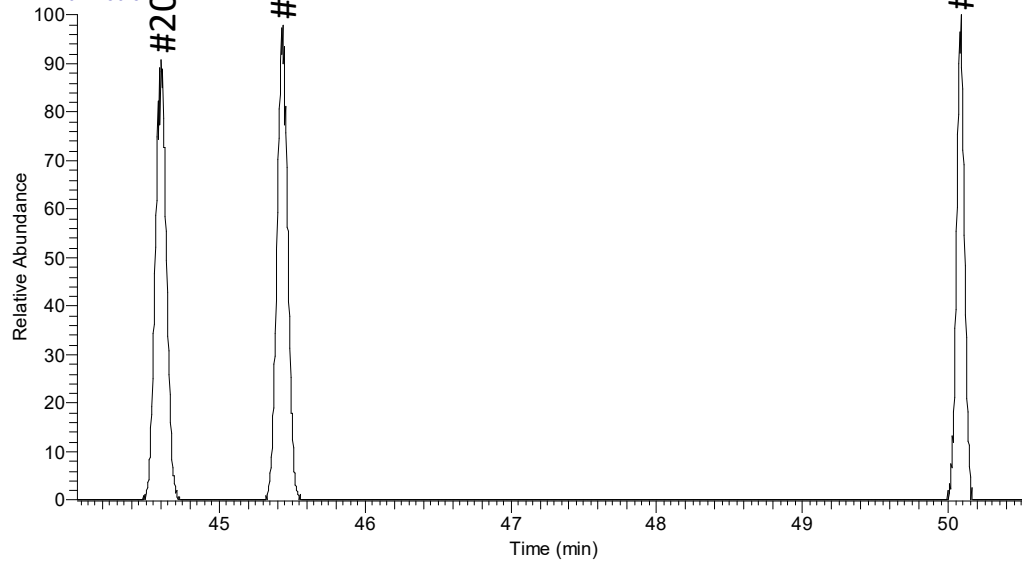
# OCB

RT: 36.76 - 49.30



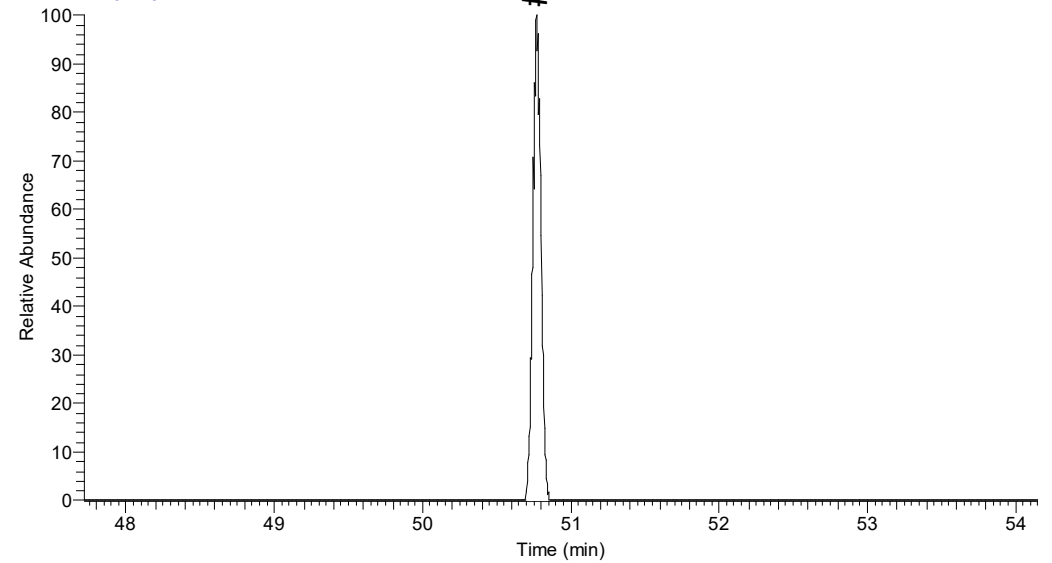
# NCB

RT: 44.02 - 50.57

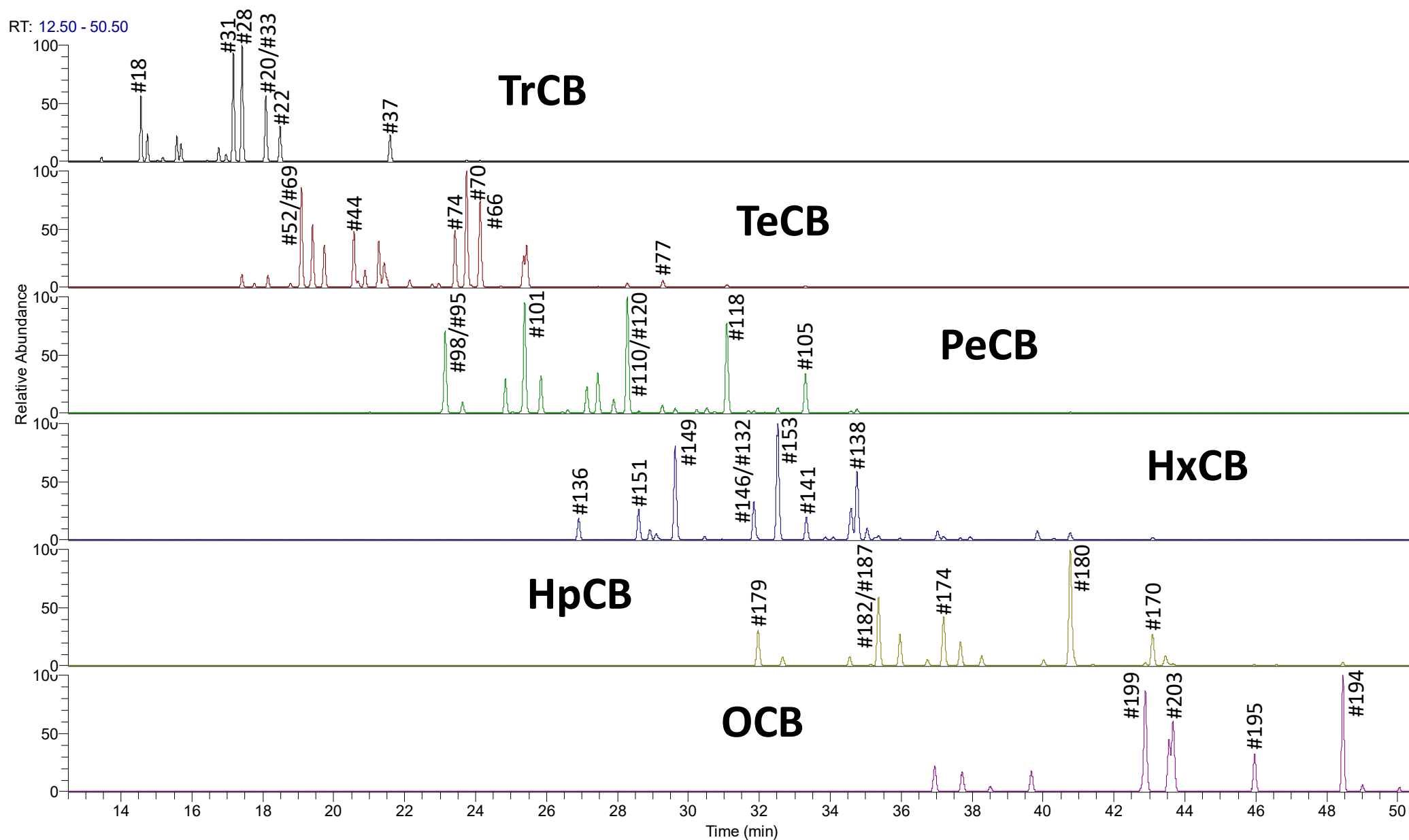


# DeCB

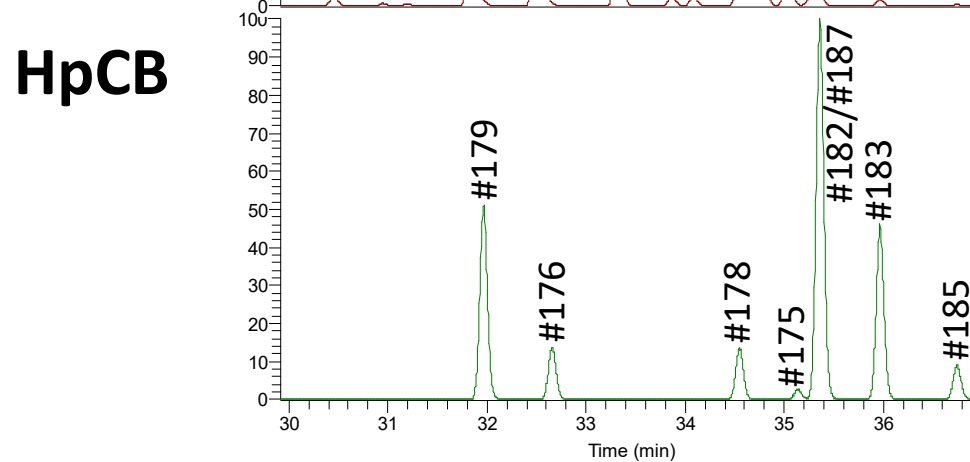
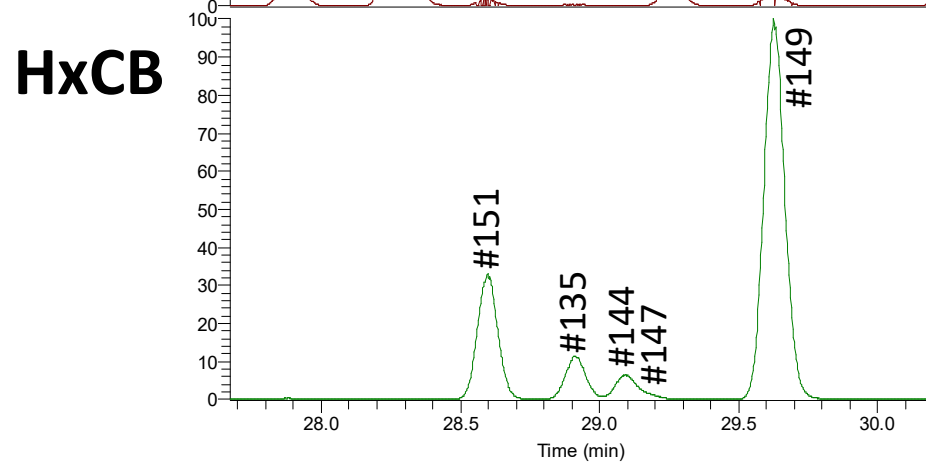
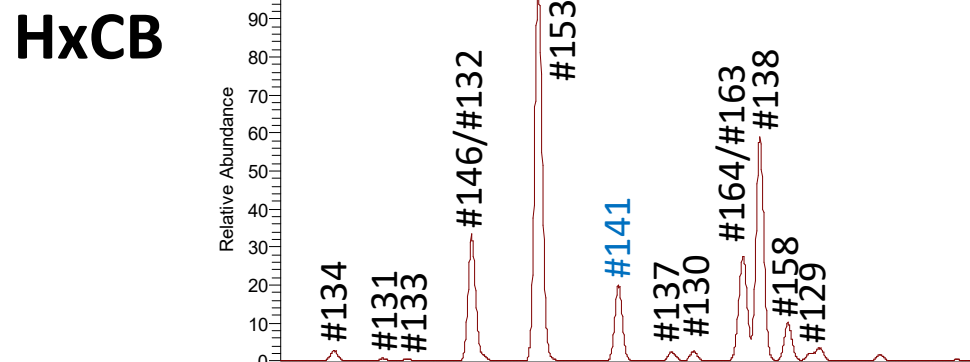
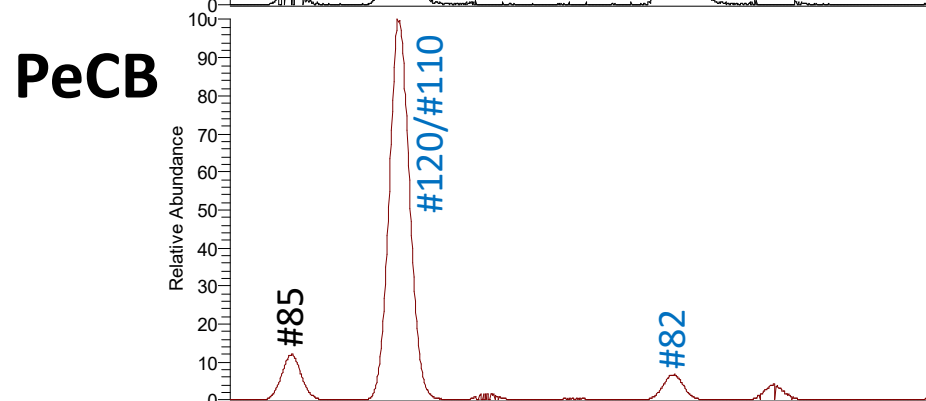
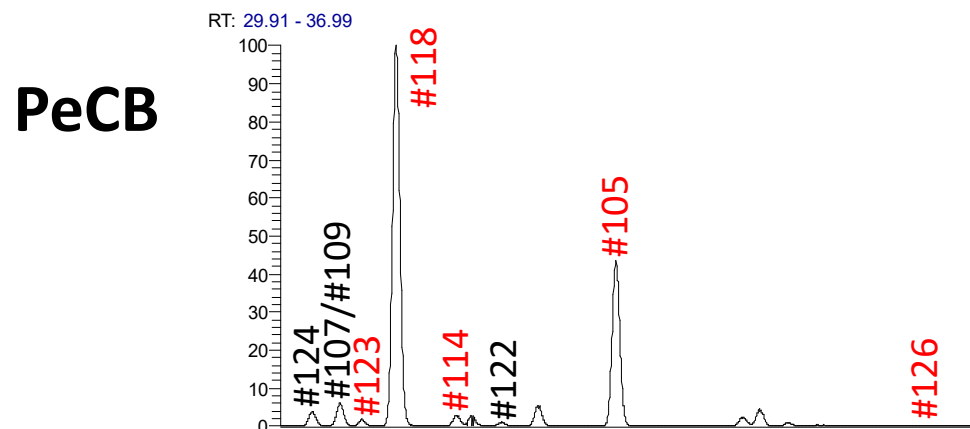
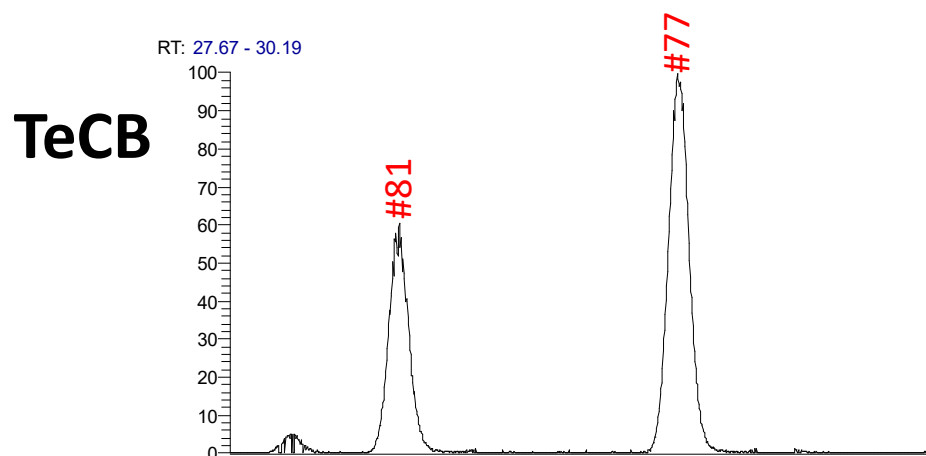
RT: 47.71 - 54.15



# KC-Mix(KC-300:KC-400:KC-500:KC-600=1:1:1:1) 5ppm分析例

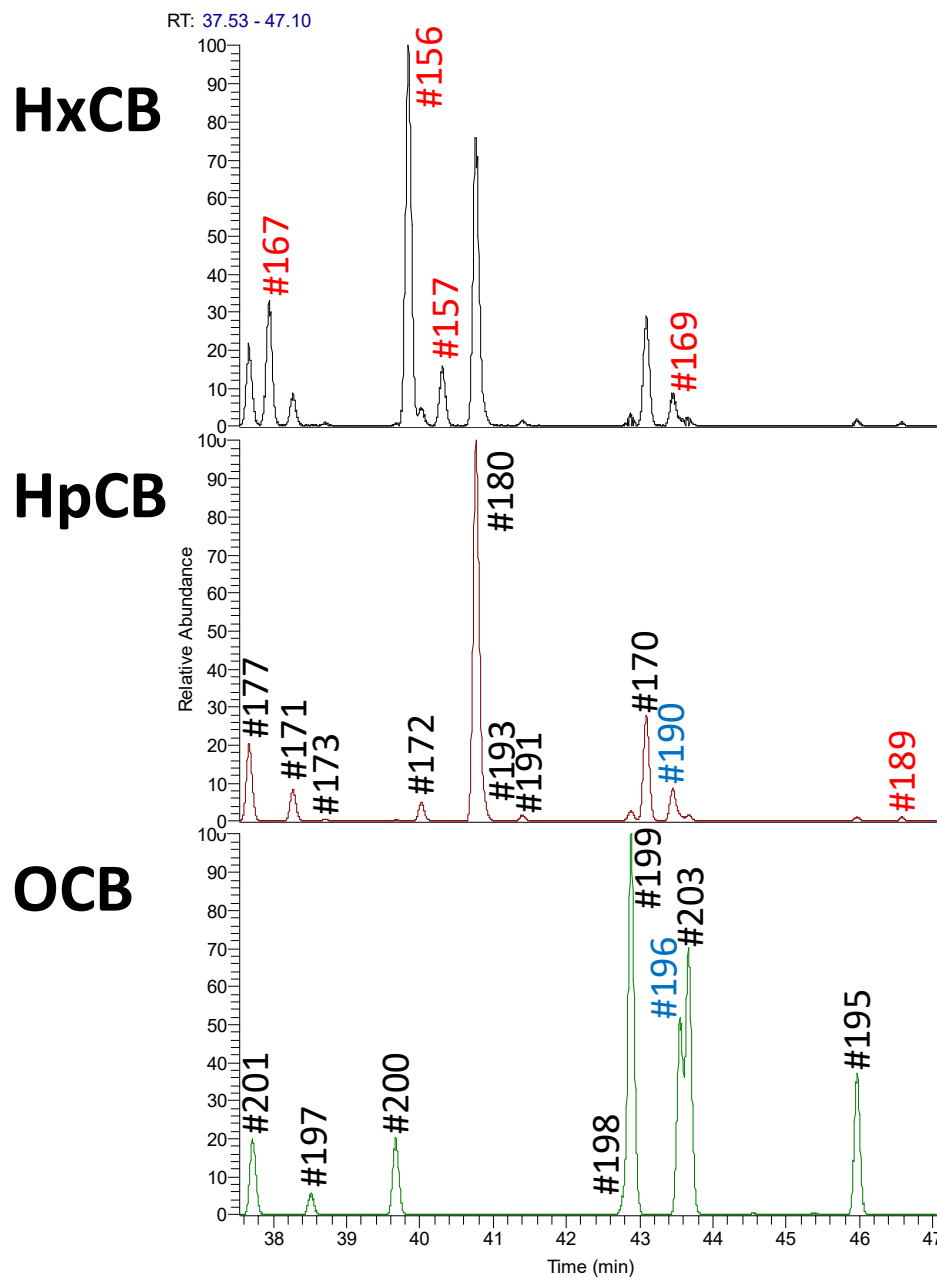


# DL-PCB分析例 KC-Mix(KC-300:KC-400:KC-500:KC-600=1:1:1:1) 5ppm





# DL-PCB分析例 KC-Mix(KC-300:KC-400:KC-500:KC-600=1:1:1:1) 5ppm



## DL-PCBに近接して溶出する異性体

IUPAC #	Isomer		tR
#110	2,3,3',4',6-	PeCB	28.286
#81	3,4,4',5-	TeCB	28.310
#120	2,3',4,5,5'-	PeCB	28.333
#82	2,2',3,3',4-	PeCB	29.315
#77	3,3',4,4'-	TeCB	29.335
#123	2,3',4,4',5'-	PeCB	30.797
#142	2,2',3,4,5,6-	HxCB	30.892
#184	2,2',3,4,4',6,6'-	HpCB	31.043
#118	2,3',4,4',5-	PeCB	31.136
#165	2,3,3',5,5',6-	HxCB	31.723
#114	2,3,4,4',5-	PeCB	31.748
#105	2,3,3',4,4'-	PeCB	33.348
#141	2,2',3,4,5,5'-	HxCB	33.388
#186	2,2',3,4,5,6,6'-	HpCB	33.398
#204	2,2',3,4,4',5,6,6'-	OCB	37.992
#167	2,3',4,4',5,5'-	HxCB	38.002
#157	2,3,3',4,4',5'-	HxCB	40.357
#192	2,3,3',4,5,5',6-	HpCB	40.430
#190	2,3,3',4,4',5,6-	HpCB	43.497
#169	3,3',4,4',5,5'-	HxCB	43.595
#196	2,2',3,3',4,4',5,6'-	OCB	43.603

青字はKC-Mix中でDL-PCBへの影響が大きい異性体  
 non-ortho-PCB(#81, #77, #169)を精度良く測定するには、  
 アルミナカラムや活性炭カラムでの分画が必要

IUPAC #	Isomer		tR	RT index
#1	2-	MCB	9.390	1570
#2	3-	MCB	10.605	1653
#3	4-	MCB	10.739	1661
#10	2,6-	DiCB	11.120	1685
#4	2,2'-	DiCB	11.196	1690
#9	2,5-	DiCB	12.086	1737
#7	2,4-	DiCB	12.177	1741
#6	2,3'-	DiCB	12.694	1767
#8	2,4'-	DiCB	12.889	1777
#5	2,3-	DiCB	12.921	1779
#19	2,2',6-	TrCB	13.490	1806
#14	3,5-	DiCB	13.615	1811
#30	2,4,6-	TrCB	13.879	1822
#18	2,2',5-	TrCB	14.605	1852
#11	3,3'-	DiCB	14.673	1855
#17	2,2',4-	TrCB	14.786	1860
#13	3,4'-	DiCB	14.974	1868
#12	3,4-	DiCB	15.012	1869
#24	2,3,6-	TrCB	15.069	1872
#27	2,3',6-	TrCB	15.223	1878
#15	4,4'-	DiCB	15.313	1882
#32	2,4',6-	TrCB	15.617	1894
#16	2,2',3-	TrCB	15.737	1899
#54	2,2',6,6'-	TeCB	15.991	1908
#23	2,3,5-	TrCB	16.194	1915
#34	2,3',5'-	TrCB	16.338	1921
#29	2,4,5-	TrCB	16.471	1925
#26	2,3',5-	TrCB	16.805	1937
#50	2,2',4,6-	TeCB	16.830	1938
#25	2,3',4-	TrCB	17.018	1944
#31	2,4',5-	TrCB	17.219	1952
#53	2,2',5,6'-	TeCB	17.452	1960
#28	2,4,4'-	TrCB	17.460	1960
#51	2,2',4,6'-	TeCB	17.809	1972
#21	2,3,4-	TrCB	17.942	1977

IUPAC #	Isomer		tR	RT index
#20	2,3,3'-	TrCB	18.064	1981
#33	2,3',4'-	TrCB	18.092	1982
#45	2,2',3,6-	TeCB	18.191	1986
#22	2,3,4'-	TrCB	18.532	1998
#46	2,2',3,6'-	TeCB	18.826	2007
#36	3,3',5-	TrCB	19.029	2014
#52	2,2',5,5'-	TeCB	19.092	2016
#69	2,3',4,6-	TeCB	19.100	2016
#73	2,3',5',6-	TeCB	19.275	2021
#43	2,2',3,5-	TeCB	19.338	2023
#49	2,2',4,5'-	TeCB	19.411	2026
#39	3,4',5-	TrCB	19.517	2029
#65	2,3,5,6-	TeCB	19.661	2033
#104	2,2',4,6,6'-	PeCB	19.665	2034
#75	2,4,4',6-	TeCB	19.700	2035
#47	2,2',4,4'-	TeCB	19.732	2036
#48	2,2',4,5-	TeCB	19.742	2036
#62	2,3,4,6-	TeCB	19.918	2042
#38	3,4,5-	TrCB	20.295	2053
#44	2,2',3,5'-	TeCB	20.621	2064
#59	2,3,3',6-	TeCB	20.747	2068
#42	2,2',3,4'-	TeCB	20.935	2074
#96	2,2',3,6,6'-	PeCB	21.081	2078
#35	3,3',4-	TrCB	21.091	2078
#64	2,3,4',6-	TeCB	21.324	2086
#72	2,3',5,5'-	TeCB	21.414	2089
#71	2,3',4',6-	TeCB	21.421	2089
#41	2,2',3,4-	TeCB	21.494	2091
#103	2,2',4,5',6-	PeCB	21.593	2094
#37	3,4,4'-	TrCB	21.641	2096
#68	2,3',4,5'-	TeCB	21.812	2101
#100	2,2',4,4',6-	PeCB	22.100	2109
#40	2,2',3,3'-	TeCB	22.193	2112
#57	2,3,3',5-	TeCB	22.414	2118
#94	2,2',3,5,6'-	PeCB	22.530	2122

IUPAC #	Isomer		tR	RT index
#67	2,3',4,5-	TeCB	22.826	2130
#63	2,3,4',5-	TeCB	22.971	2135
#58	2,3,3',5'-	TeCB	23.036	2136
#102	2,2',4,5,6'-	PeCB	23.048	2137
#93	2,2',3,5,6-	PeCB	23.088	2138
#98	2,2',3,4',6'-	PeCB	23.137	2139
#95	2,2',3,5',6-	PeCB	23.152	2140
#61	2,3,4,5-	TeCB	23.331	2145
#74	2,4,4',5-	TeCB	23.479	2149
#88	2,2',3,4,6-	PeCB	23.519	2150
#91	2,2',3,4',6-	PeCB	23.688	2155
#70	2,3',4',5-	TeCB	23.795	2158
#155	2,2',4,4',6,6'-	HxCB	23.843	2160
#121	2,3',4,5',6-	PeCB	23.896	2161
#76	2,3',4',5'-	TeCB	23.946	2163
#80	3,3',5,5'-	TeCB	24.130	2168
#66	2,3',4,4'-	TeCB	24.136	2168
#55	2,3,3',4-	TeCB	24.762	2186
#84	2,2',3,3',6-	PeCB	24.841	2189
#92	2,2',3,5,5'-	PeCB	24.854	2189
#89	2,2',3,4,6'-	PeCB	25.089	2196
#90	2,2',3,4',5-	PeCB	25.335	2203
#150	2,2',3,4',6,6'-	HxCB	25.357	2203
#60	2,3,4,4'-	TeCB	25.405	2205
#101	2,2',4,5,5'-	PeCB	25.435	2206
#56	2,3,3',4'-	TeCB	25.490	2207
#113	2,3,3',5',6-	PeCB	25.669	2212
#152	2,2',3,5,6,6'-	HxCB	25.875	2218
#99	2,2',4,4',5-	PeCB	25.897	2218
#112	2,3,3',5,6-	PeCB	26.395	2232
#119	2,3',4,4',6-	PeCB	26.453	2234
#145	2,2',3,4,6,6'-	HxCB	26.460	2234
#83	2,2',3,3',5-	PeCB	26.653	2239
#79	3,3',4,5'-	TeCB	26.696	2240
#108	2,3,3',4,6-	PeCB	26.771	2242

IUPAC #	Isomer		tR	RT index
#136	2,2',3,3',6,6'-	HxCB	26.964	2248
#86	2,2',3,4,5-	PeCB	27.045	2250
#97	2,2',3,4',5'-	PeCB	27.128	2252
#117	2,3,4',5,6-	PeCB	27.136	2252
#148	2,2',3,4',5,6'-	HxCB	27.201	2254
#116	2,3,4,5,6-	PeCB	27.251	2256
#125	2,3',4',5',6-	PeCB	27.255	2256
#87	2,2',3,4,5'-	PeCB	27.454	2261
#115	2,3,4,4',6-	PeCB	27.480	2262
#78	3,3',4,5-	TeCB	27.575	2265
#111	2,3,3',5,5'-	PeCB	27.833	2272
#154	2,2',4,4',5,6'-	HxCB	27.931	2274
#85	2,2',3,4,4'-	PeCB	27.944	2275
#110	2,3,3',4',6-	PeCB	28.286	2284
#81	3,4,4',5-	TeCB	28.310	2285
#120	2,3',4,5,5'-	PeCB	28.333	2285
#151	2,2',3,5,5',6-	HxCB	28.654	2294
#135	2,2',3,3',5,6'-	HxCB	28.966	2303
#144	2,2',3,4,5',6-	HxCB	29.101	2307
#147	2,2',3,4',5,6-	HxCB	29.185	2309
#82	2,2',3,3',4-	PeCB	29.315	2312
#77	3,3',4,4'-	TeCB	29.335	2313
#149	2,2',3,4',5',6-	HxCB	29.637	2321
#139	2,2',3,4,4',6-	HxCB	29.703	2323
#140	2,2',3,4,4',6'-	HxCB	30.081	2333
#124	2,3',4',5,5'-	PeCB	30.287	2339
#143	2,2',3,4,5,6'-	HxCB	30.329	2340
#188	2,2',3,4',5,6,6'-	HpCB	30.332	2340
#134	2,2',3,3',5,6-	HxCB	30.508	2345
#107	2,3,3',4,5'-	PeCB	30.513	2345
#109	2,3,3',4',5-	PeCB	30.525	2345
#123	2,3',4,4',5'-	PeCB	30.797	2353
#142	2,2',3,4,5,6-	HxCB	30.892	2355
#106	2,3,3',4,5-	PeCB	30.967	2357
#131	2,2',3,3',4,6-	HxCB	31.000	2358

IUPAC #	Isomer		tR	RT index
#184	2,2',3,4,4',6,6'-	HpCB	31.043	2359
#118	2,3',4,4',5-	PeCB	31.136	2362
#133	2,2',3,3',5,5'-	HxCB	31.249	2365
#165	2,3,3',5,5',6-	HxCB	31.723	2378
#114	2,3,4,4',5-	PeCB	31.748	2378
#146	2,2',3,4',5,5'-	HxCB	31.856	2381
#132	2,2',3,3',4,6'-	HxCB	31.859	2381
#179	2,2',3,3',5,6,6'-	HpCB	32.020	2386
#161	2,3,3',4,5',6-	HxCB	32.155	2389
#122	2,3,3',4',5'-	PeCB	32.198	2391
#153	2,2',4,4',5,5'-	HxCB	32.572	2401
#168	2,3',4,4',5',6-	HxCB	32.680	2404
#176	2,2',3,3',4,6,6'-	HpCB	32.715	2405
#105	2,3,3',4,4'-	PeCB	33.348	2422
#141	2,2',3,4,5,5'-	HxCB	33.388	2423
#186	2,2',3,4,5,6,6'-	HpCB	33.398	2423
#127	3,3',4,5,5'-	PeCB	33.564	2427
#137	2,2',3,4,4',5-	HxCB	33.926	2437
#130	2,2',3,3',4,5'-	HxCB	34.144	2443
#164	2,3,3',4',5',6-	HxCB	34.551	2454
#163	2,3,3',4',5,6-	HxCB	34.594	2455
#178	2,2',3,3',5,5',6-	HpCB	34.609	2456
#138	2,2',3,4,4',5'-	HxCB	34.810	2461
#160	2,3,3',4,5,6-	HxCB	34.920	2464
#158	2,3,3',4,4',6-	HxCB	35.091	2469
#175	2,2',3,3',4,5',6-	HpCB	35.199	2472
#129	2,2',3,3',4,5-	HxCB	35.319	2475
#182	2,2',3,4,4',5,6'-	HpCB	35.354	2476
#187	2,2',3,4',5,5',6-	HpCB	35.365	2476
#166	2,3,4,4',5,6-	HxCB	35.787	2487
#183	2,2',3,4,4',5',6-	HpCB	36.025	2494
#126	3,3',4,4',5-	PeCB	36.497	2507
#185	2,2',3,4,5,5',6-	HpCB	36.794	2515
#159	2,3,3',4,5,5'-	HxCB	36.912	2518
#202	2,2',3,3',5,5',6,6'-	OCB	36.995	2520

IUPAC #	Isomer		tR	RT index
#128	2,2',3,3',4,4'-	HxCB	37.080	2523
#174	2,2',3,3',4,5,6'-	HpCB	37.251	2527
#162	2,3,3',4',5,5'-	HxCB	37.359	2530
#181	2,2',3,4,4',5,6-	HpCB	37.457	2533
#177	2,2',3,3',4,5',6'-	HpCB	37.728	2540
#201	2,2',3,3',4,5',6,6'-	OCB	37.776	2541
#204	2,2',3,4,4',5,6,6'-	OCB	37.992	2547
#167	2,3',4,4',5,5'-	HxCB	38.002	2548
#171	2,2',3,3',4,4',6-	HpCB	38.318	2556
#197	2,2',3,3',4,4',6,6'-	OCB	38.569	2563
#173	2,2',3,3',4,5,6-	HpCB	38.765	2568
#200	2,2',3,3',4,5,6,6'-	OCB	39.729	2594
#156	2,3,3',4,4',5-	HxCB	39.898	2599
#172	2,2',3,3',4,5,5'-	HpCB	40.078	2604
#157	2,3,3',4,4',5'-	HxCB	40.357	2612
#192	2,3,3',4,5,5',6-	HpCB	40.430	2614
#180	2,2',3,4,4',5,5'-	HpCB	40.822	2625
#193	2,3,3',4',5,5',6-	HpCB	40.932	2628
#191	2,3,3',4,4',5',6-	HpCB	41.450	2642
#198	2,2',3,3',4,5,5',6-	OCB	42.849	2681
#199	2,2',3,3',4,5,5',6'-	OCB	42.929	2683
#170	2,2',3,3',4,4',5-	HpCB	43.140	2689
#190	2,3,3',4,4',5,6-	HpCB	43.497	2699
#169	3,3',4,4',5,5'-	HxCB	43.595	2702
#196	2,2',3,3',4,4',5,6'-	OCB	43.603	2702
#203	2,2',3,4,4',5,5',6-	OCB	43.721	2706
#208	2,2',3,3',4,5,5',6,6'-	NCB	44.600	2732
#207	2,2',3,3',4,4',5,6,6'-	NCB	45.436	2757
#195	2,2',3,3',4,4',5,6-	OCB	46.011	2774
#189	2,3,3',4,4',5,5'-	HpCB	46.616	2792
#194	2,2',3,3',4,4',5,5'-	OCB	48.494	2860
#205	2,3,3',4,4',5,5',6-	OCB	49.044	2881
#206	2,2',3,3',4,4',5,5',6-	NCB	50.088	2924
#209	2,2',3,3',4,4',5,5',6,6'-	DeCB	50.771	2954