

Appendix D to AHRI Standard 700

2012 Appendix D for Gas Chromatograms for **AHRI Standard 700-2014 – Informative**



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IMPORTANT

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AHRI uses its best efforts to develop standards/guidelines employing state-of-the-art and accepted industry practices. AHRI does not certify or guarantee that any tests conducted under its standards/guidelines will be non-hazardous or free from risk.

Note:

This Appendix supersedes the 2008 version of Appendix D.

FOREWORD

The intent of this normative appendix is to provide figures for the gas chromatograms used with the 2008 Appendix C, *Analytical Procedures for AHRI Standard 700 – Normative*.

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Gas Chromatogram Figures

Section 1. Purpose

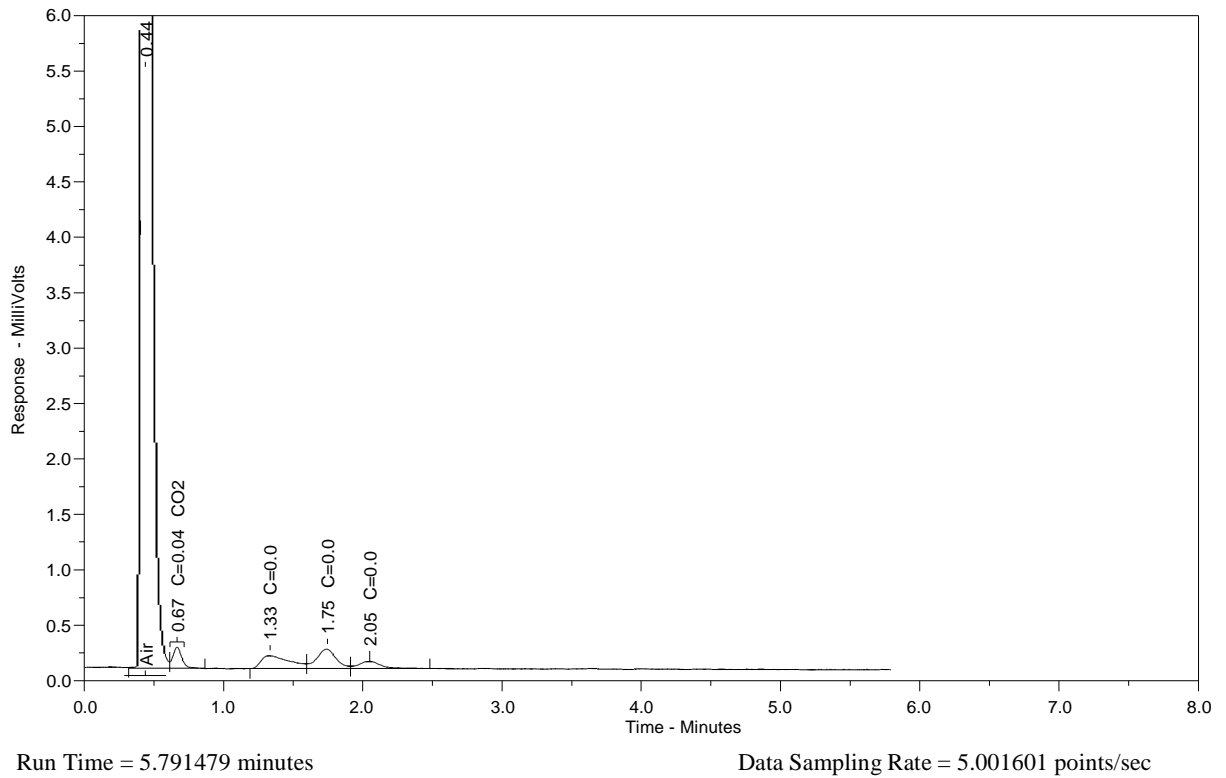
The purpose of this normative appendix is to provide figures for the gas chromatograms used with the 2008 Appendix C, *Analytical Procedures for AHRI Standard 700 – Normative*.

Section 2. Definitions

Note for all figures:

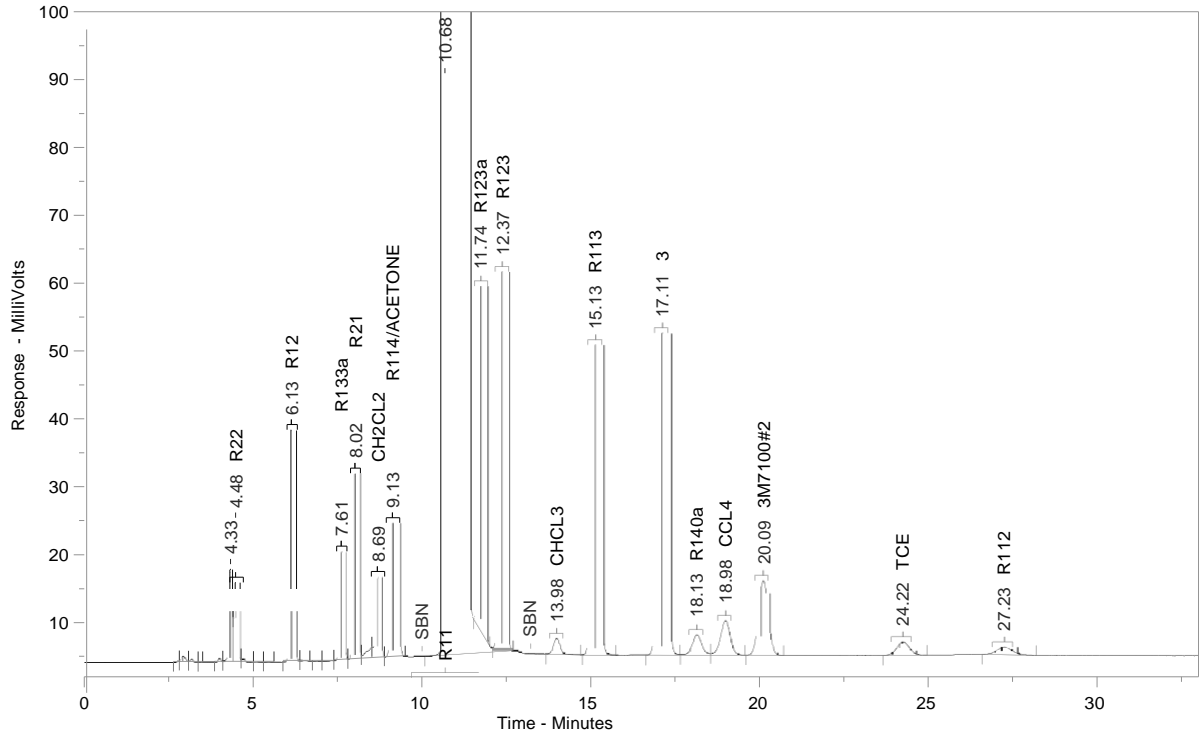
2.1 Ret. Time = Retention Time

2.2 Comp. = Component



Ret. Time	Component
0.44	Air
0.67	CO2
1.33	C=0.0
1.75	C=0.0
2.05	C=0.0

Figure 1. Gas Chromatogram of Non-Condensable Gas

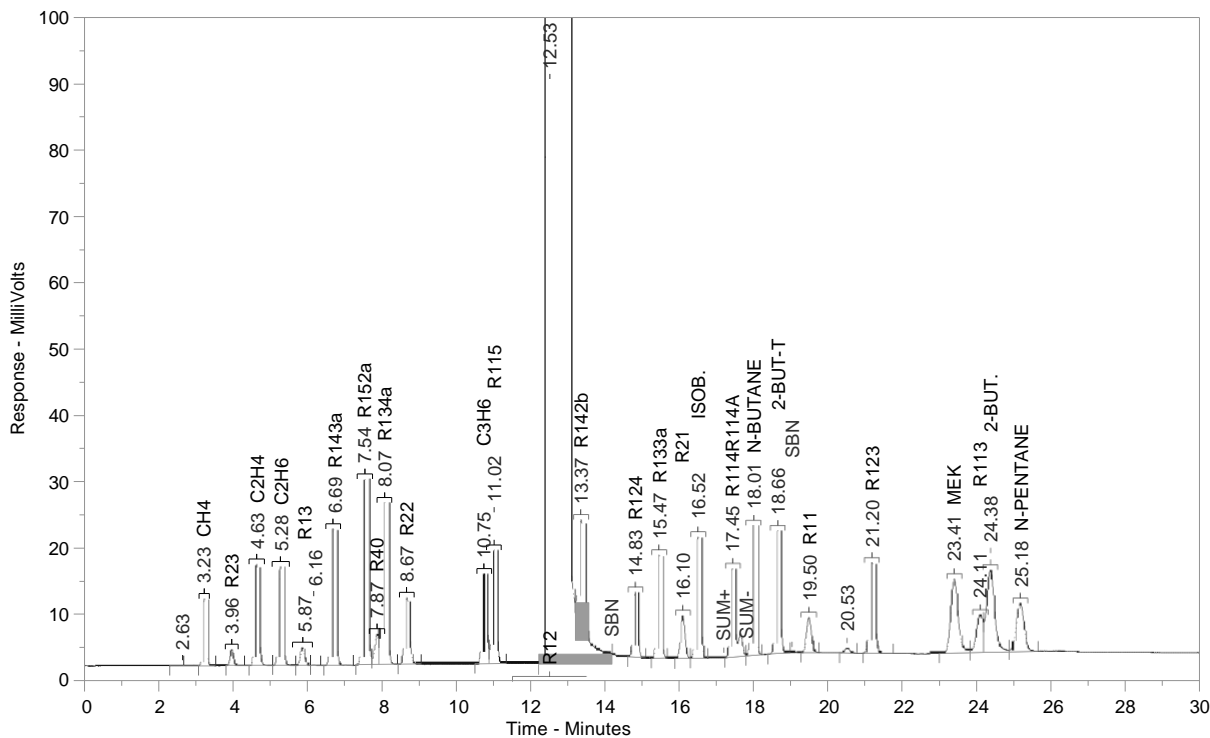


Run Time = 32.99667 minutes

Data Sampling Rate = 5 points/sec

Ret. Time	Component
4.33	
4.48	R22
6.13	R12
7.61	R133a
8.02	R21
8.69	CH2CL2
9.13	R114/ACETONE
10.68	R11
11.74	R123a
12.37	R123
13.98	CHCL3
15.13	R113
17.11	3M7100#1
18.13	R140a
18.98	CCL4
20.09	3M7100#2
24.22	TCE
27.23	R112

Figure 2. Gas Chromatogram of R-11

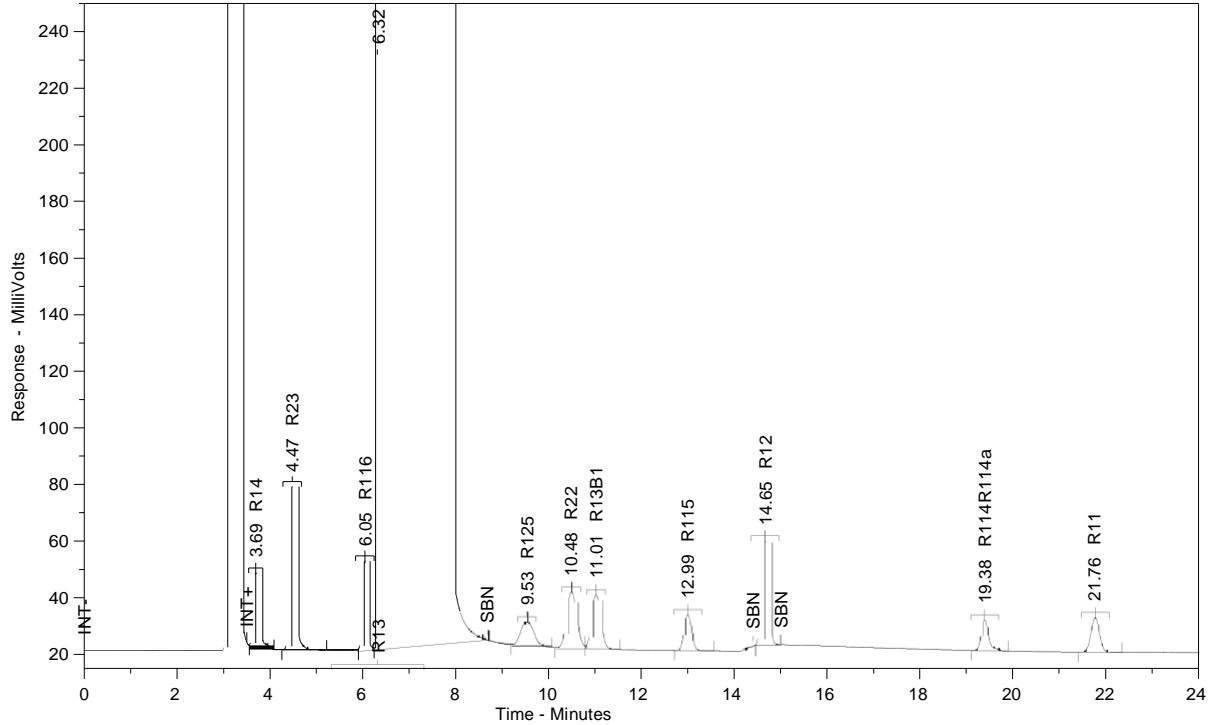


Run Time = 30 minutes

Data Sampling Rate = 5 points/sec

Ret. Time	Component	Ret. Time	Component
2.63		21.20	R123
3.23	CH4	23.41	MEK
3.96	R23	24.11	R113
4.63	C2H4	24.38	2-BUT.
5.28	C2H6	25.18	N-PENTANE
5.87	R13		
6.16			
6.69	R143a		
7.54	R152a		
7.87	R40		
8.07	R134a		
8.67	R22		
10.75	C3H6		
11.02	R115		
12.53	R12		
13.37	R142b		
14.83	R124		
15.47	R133a		
16.10	R21		
16.52	ISOB.		
17.45	R114R114A		
18.01	N-BUTANE		
18.66	2-BUT-T		
19.50	R11		
20.53			

Figure 3. Gas Chromatogram of R-12

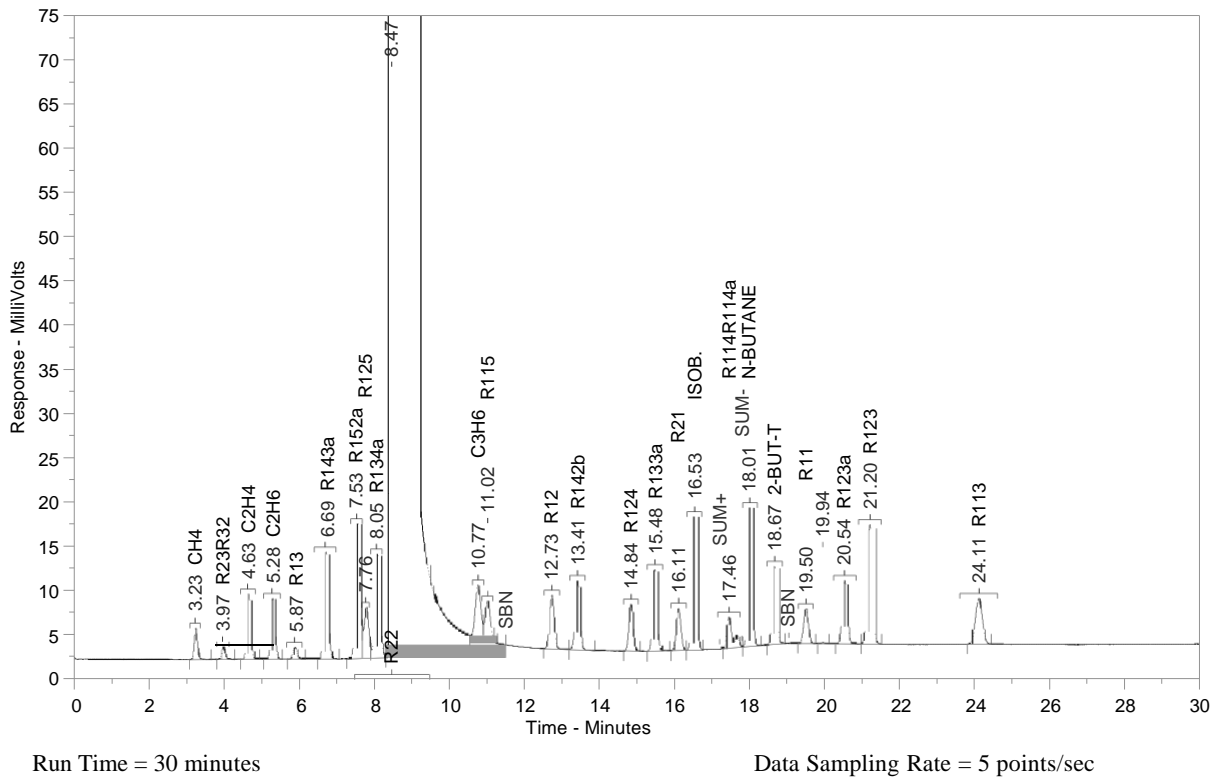


Run Time = 24 minutes

Data Sampling Rate = 5 points/sec

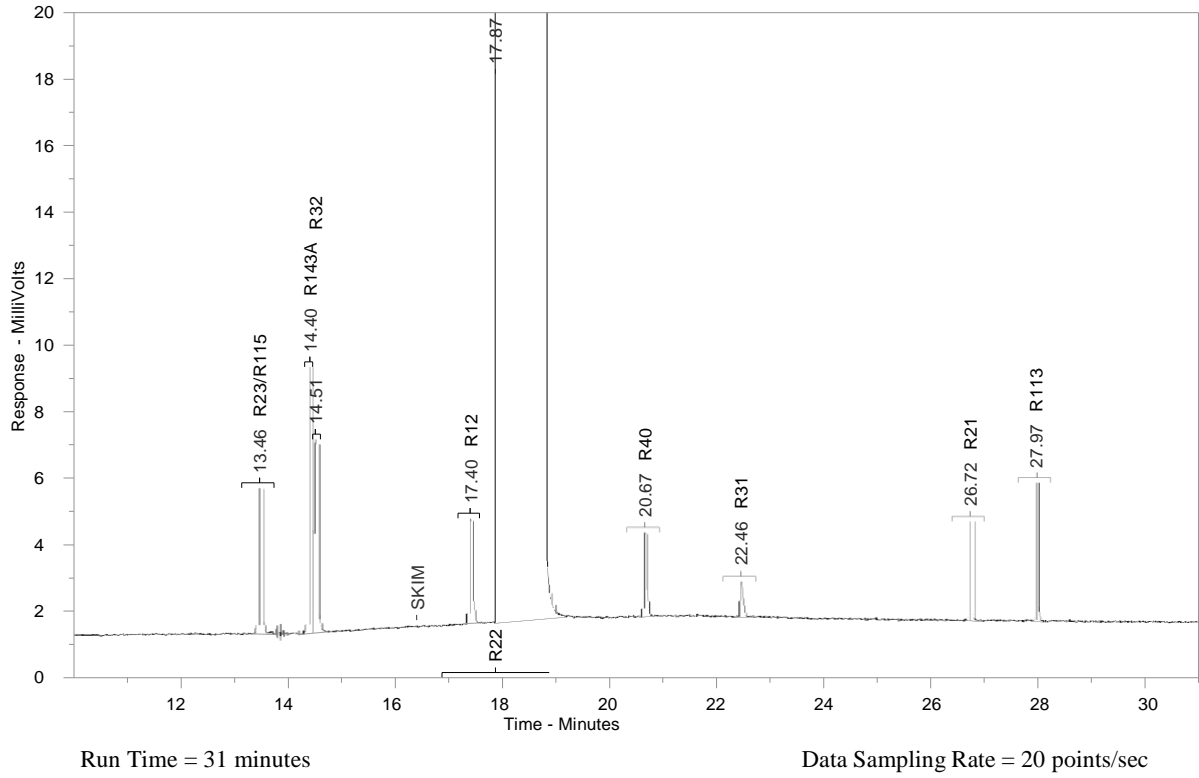
Ret. Time	Component
3.69	R14
4.47	R23
6.05	R116
6.32	R13
9.53	R125
10.48	R22
11.01	R13B1
12.99	R115
14.65	R12
19.38	R114R114a
21.76	R11

Figure 4. Gas Chromatogram of R-13



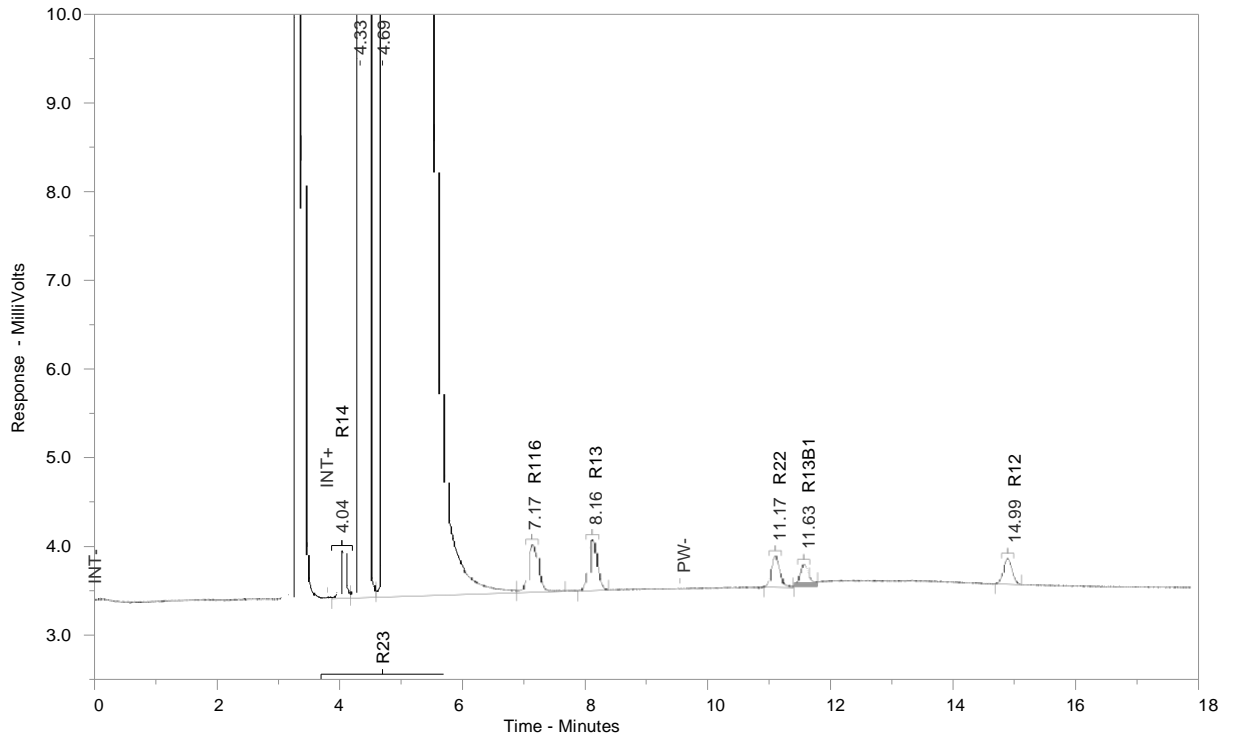
Ret. Time	Component
3.23	CH4
3.97	R23R32
4.63	C2H4
5.28	C2H6
5.87	R13
6.69	R143a
7.53	R152a
7.76	R125
8.05	R134a
8.47	R22
10.77	C3H6
11.02	R115
12.73	R12
13.41	R142b
14.84	R124
15.48	R133a
16.11	R21
16.53	ISOB.
17.46	R114R114a
18.01	N-BUTANE
18.67	2-BUT-T
19.50	R11
19.94	
20.54	R123a
21.20	R123
24.11	R113

Figure 5. Gas Chromatogram of R-22 (Packed)



Ret. Time	Component
13.46	R23/R115
14.40	R143A
14.51	R32
17.40	R12
17.87	R22
20.67	R40
22.46	R31
26.72	R21
27.97	R113

Figure 6. Gas Chromatogram of R-22 (Capillary)

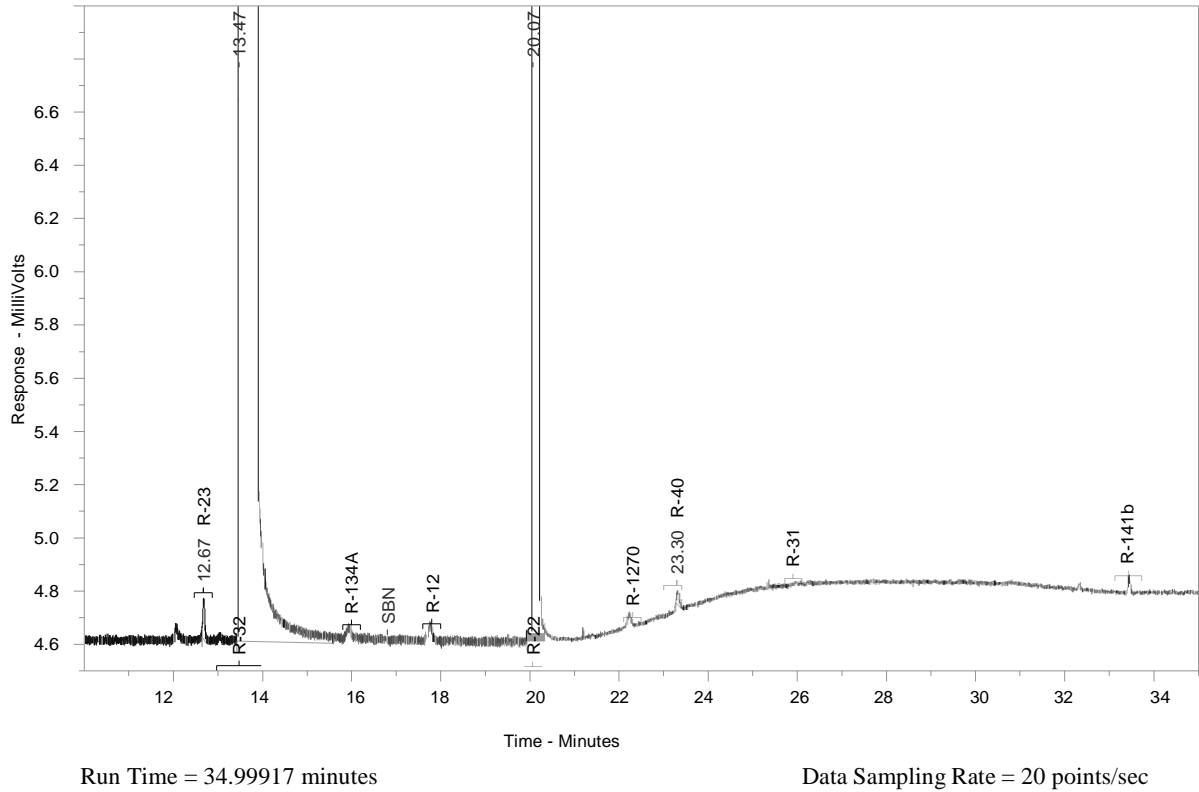


Run Time = 18 minutes

Data Sampling Rate = 5 points/sec

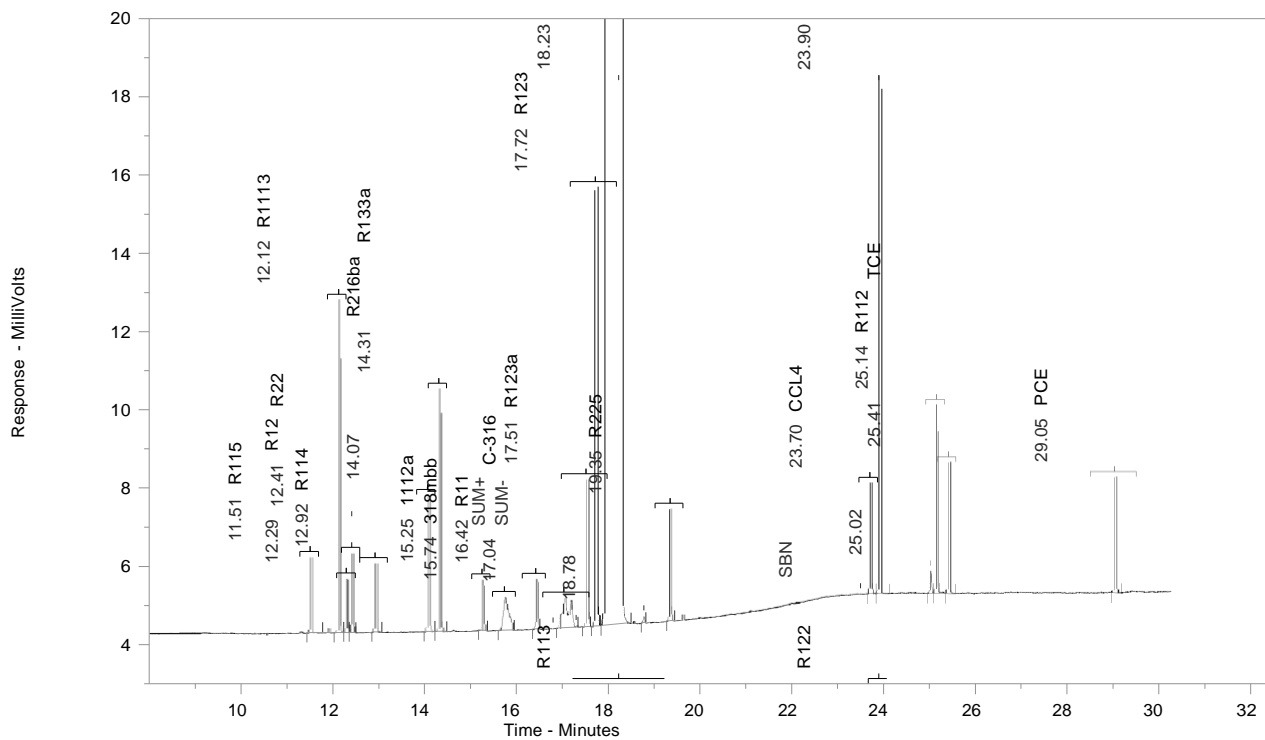
Ret. Time	Component
4.04	R14
4.33	
4.69	R23
7.17	R116
8.16	R13
11.17	R22
11.63	R13B1
14.99	R12

Figure 7. Gas Chromatogram of R-23



Ret. Time	Component
12.67	R-23
13.47	R-32
20.07	R-22
23.30	R-40

Figure 8. Gas Chromatogram of R-32

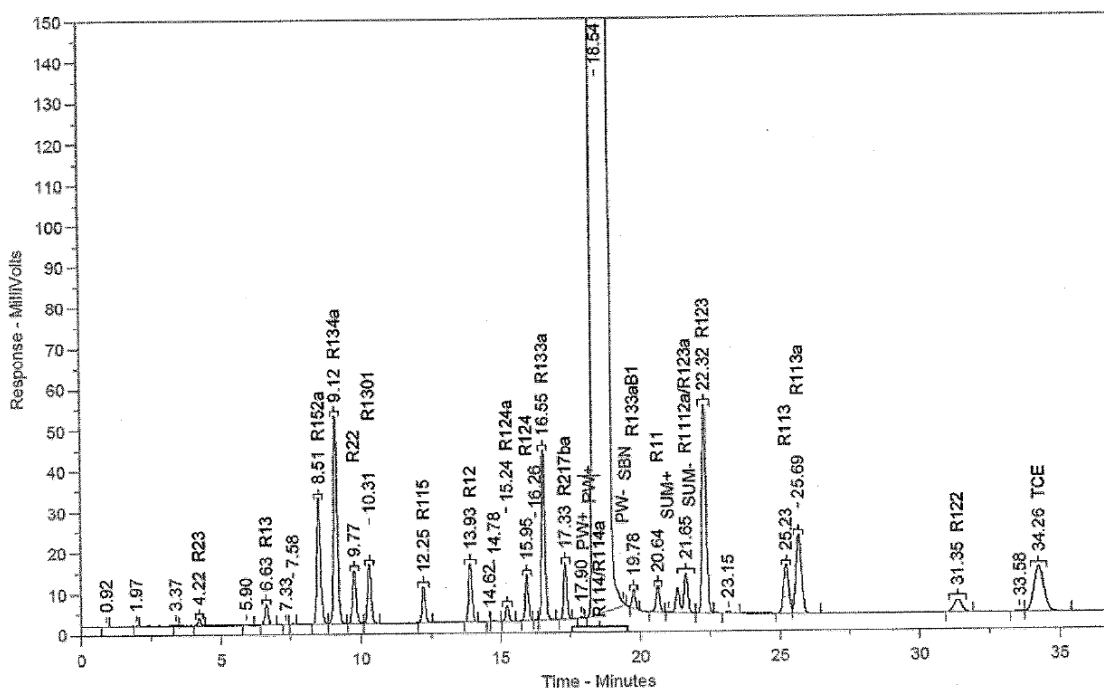


Run Time = 30.27 minutes

Data Sampling Rate = 20 points/sec

Ret. Time	Component
11.51	R115
12.12	R1113
12.29	R12
12.41	R22
12.92	R114
14.07	R216ba
14.31	R133a
15.25	1112a
15.74	318mbb
16.42	R11
17.04	C-316
17.51	R123a
17.72	R123
18.23	R113
18.78	R113
19.35	R225
23.70	CCL4
23.90	R122
25.02	
25.14	R112
25.41	TCE
29.05	PCE

Figure 9. Chromatogram of R-113

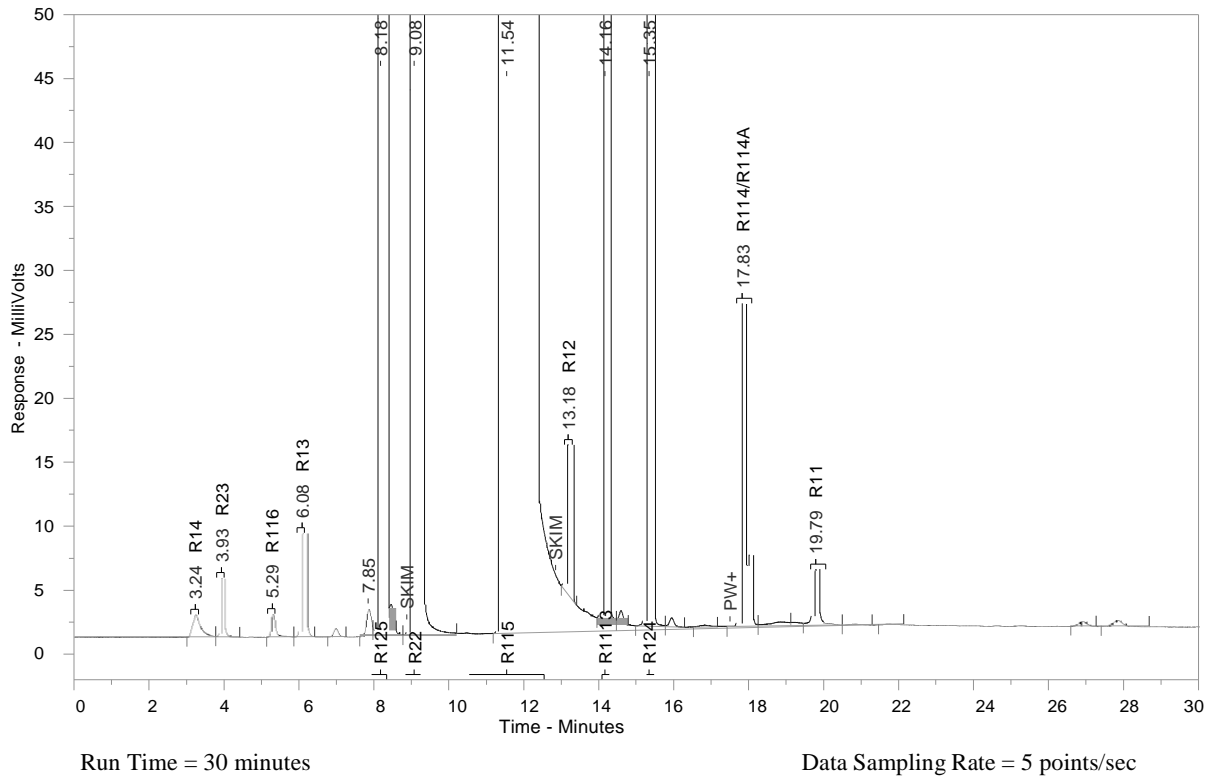


Run Time = 37

Data Sampling Rate = 5

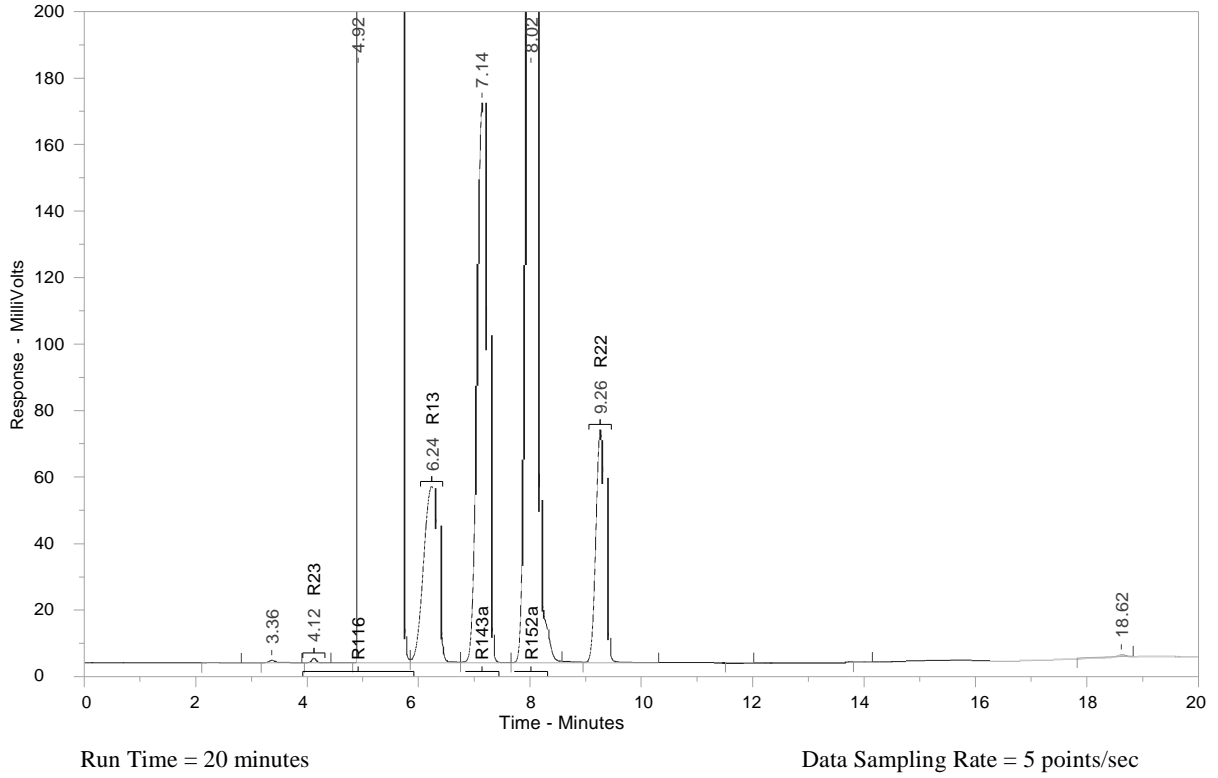
Ret. Time	Component
0.92	
1.97	
3.37	
4.22	R23
5.90	
6.63	R13
7.33	
7.58	
8.51	R152a
9.12	R134a
9.77	R22
10.31	R1301
12.25	R115
13.93	R12
14.62	
14.78	
15.24	R124a
15.95	R124
16.26	
16.55	R133a
17.33	R217ba
17.90	PW+ PW+ PW+ R114/R114a
18.54	R114/R114a
19.78	PW- SBN R133aB1
20.64	SUM+ R11
21.65	R1112a/R123a
22.32	SUM- R123
23.15	
25.23	R113
25.69	R113a
31.35	R122
33.58	
34.26	TCE

Figure 10. Gas Chromatogram of R-114



Ret. Time	Component
3.24	R14
3.93	R23
5.29	R116
6.08	R13
7.85	
8.18	R125
9.08	R22
11.54	R115
13.18	R12
14.16	R1113
15.35	R124
17.83	R114/R114A
19.79	R11

Figure 11. Gas Chromatogram of R-115



Ret. Time	Component
3.36	
4.12	R23
4.92	R116
6.24	R13
7.14	R143a
8.02	R152a
9.26	R22
18.62	
21.65	R1112a/R123a
22.32	R123
23.15	
25.23	R113
25.69	R113a
31.35	R122
33.58	
34.26	TCE

Figure 12. Gas Chromatogram of R116

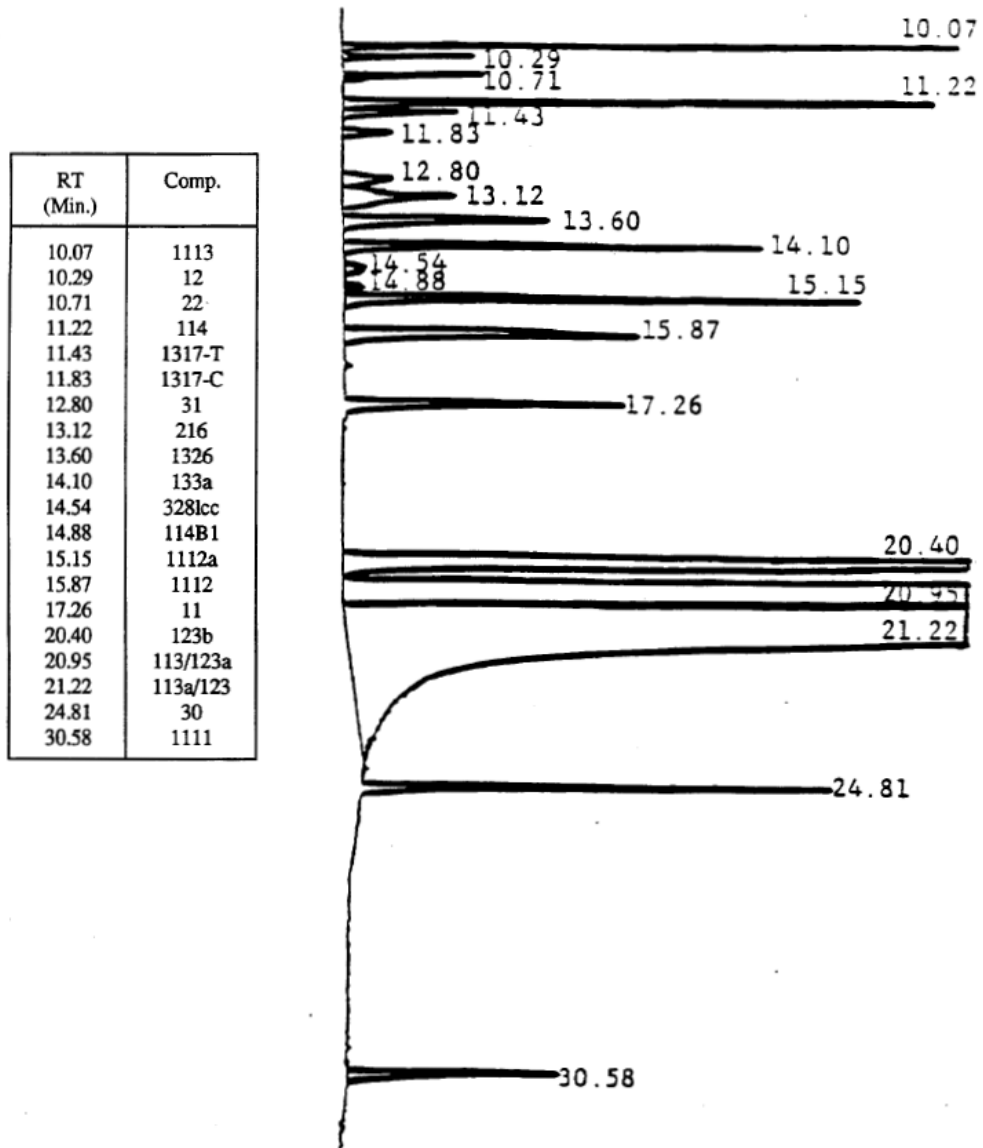
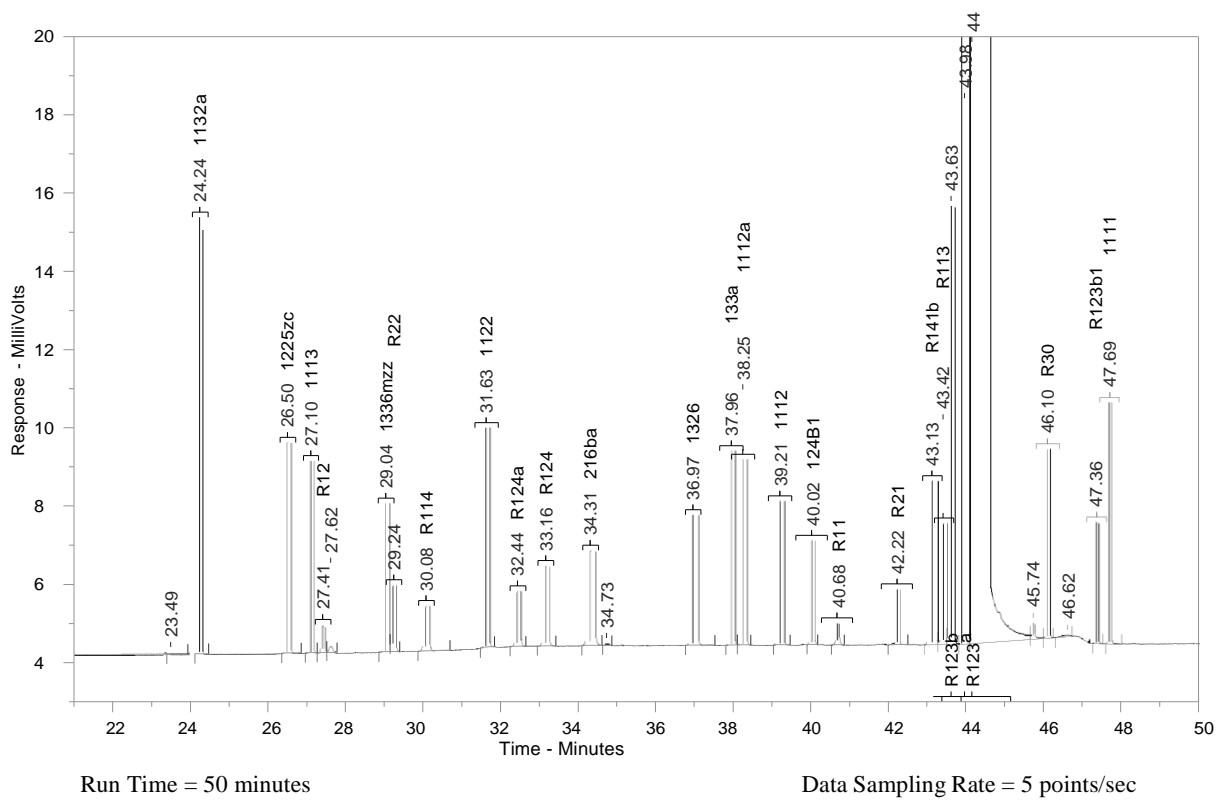


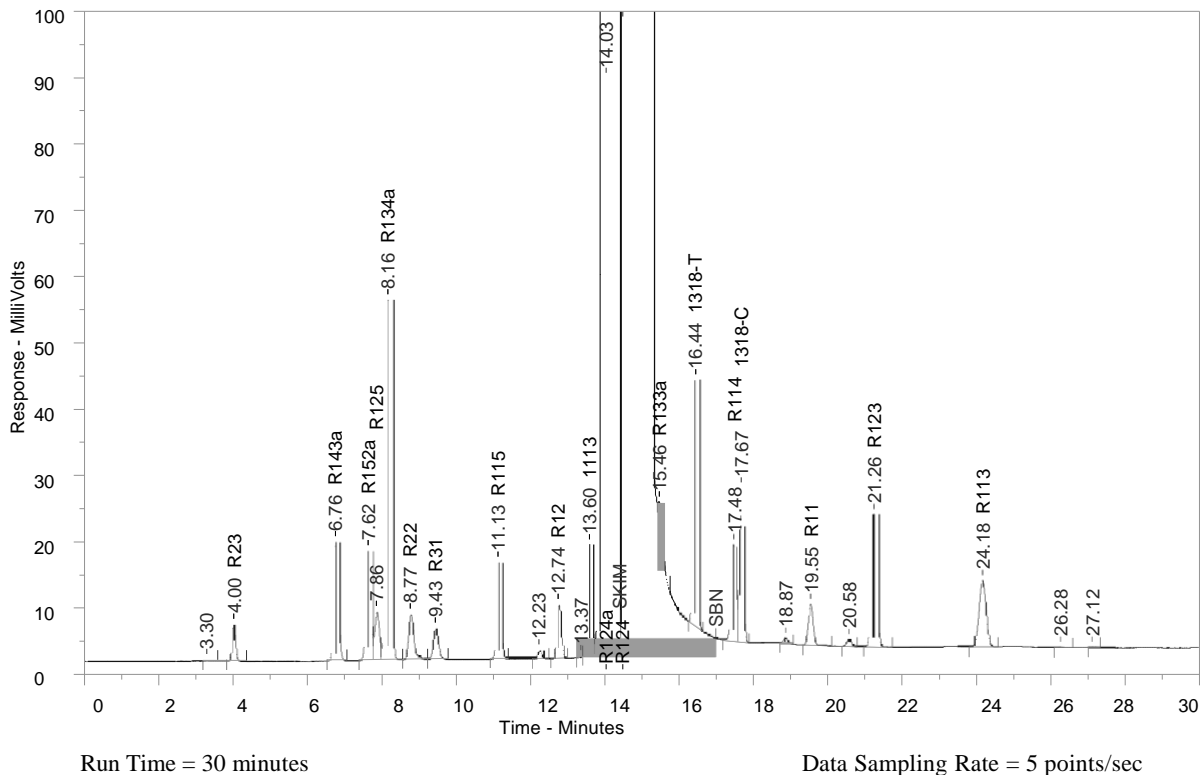
Figure 13. Gas Chromatogram of R-123 (Packed)



Ret. Time	Component
23.49	
24.24	1132a
26.50	1225zc
27.10	1113
27.41	R12
27.62	
29.04	1336mzz
29.24	R22
30.08	R114
31.63	1122
32.44	R124a
33.16	R124
34.31	216ba
34.73	
36.97	1326
37.96	133a
38.25	1112a
39.21	1112
40.02	124B1

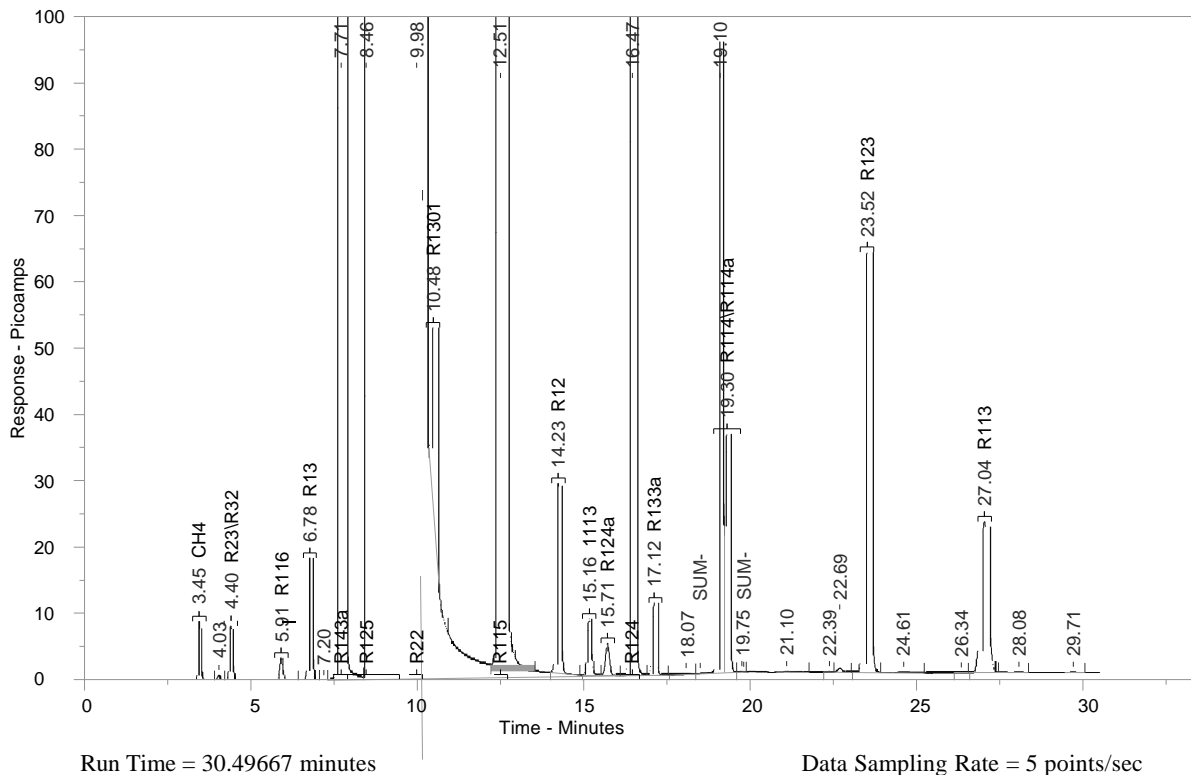
Ret. Time	Component
40.68	R11
42.22	R21
43.13	R141b
43.42	R113
43.63	R123b
43.98	R123a
44.16	R123
45.74	
46.10	R30
46.62	
47.36	R123b1
47.69	1111

Figure 14. Gas Chromatogram of R-123 (Capillary)



Ret. Time	Component
3.30	
4.00	R23
6.76	R143a
7.62	R152a
7.86	R125
8.16	R134a
8.77	R22
9.43	R31
11.13	R115
12.23	
12.74	R12
13.37	
13.60	1113
14.03	R124a
14.49	R124
15.46	R133a
16.44	1318-T
17.48	R114
17.67	1318-C
18.87	
19.55	R11
20.58	
21.26	R123
24.18	R113
26.28	
27.12	

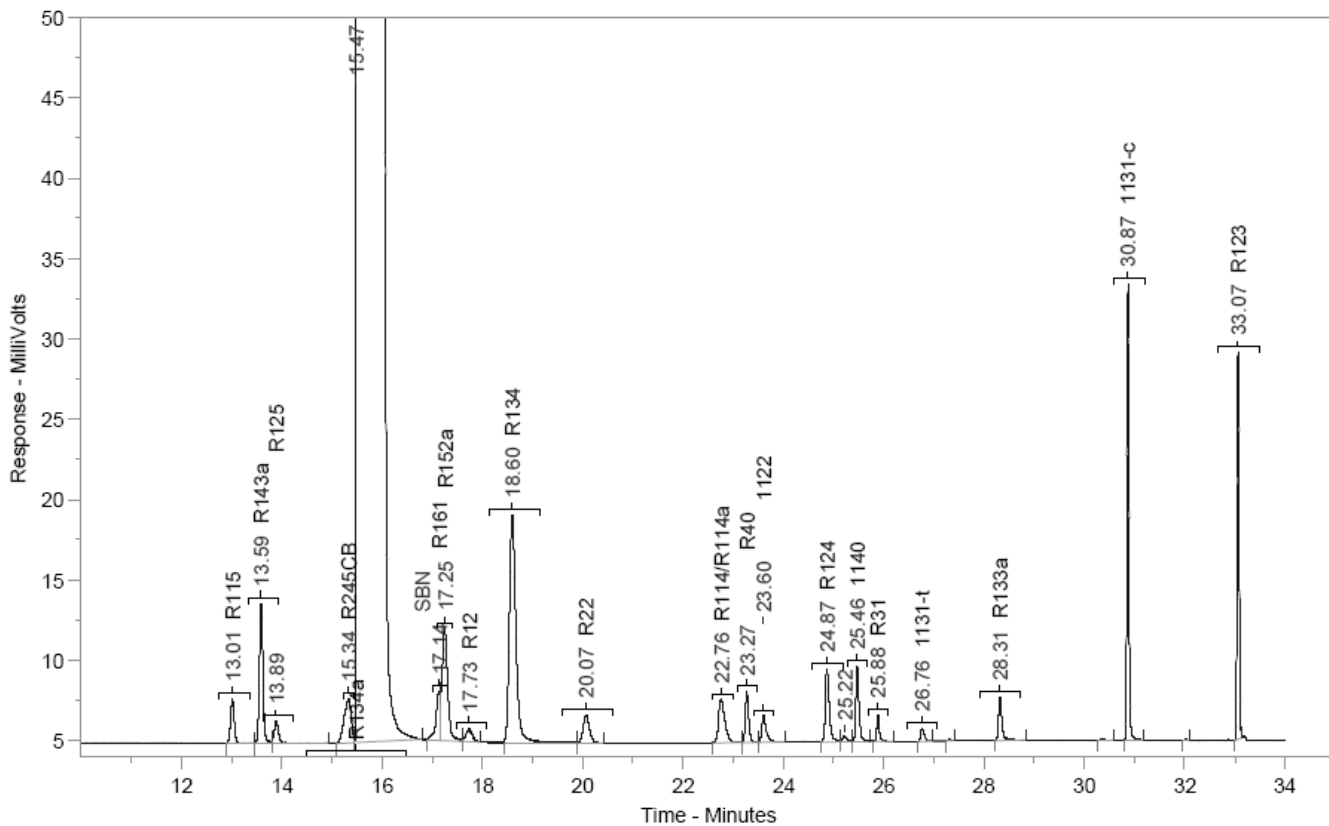
Figure 15. Gas Chromatogram of R-124



Ret. Time	Component
3.45	CH4
4.03	
4.40	R23\R32
5.91	R116
6.78	R13
7.20	
7.71	R143a
8.46	R125
9.98	R22
10.48	R1301
12.51	R115
14.23	R12
15.16	1113
15.71	R124a
16.47	R124
17.12	R133a
18.07	
19.10	
19.30	R114\R114a
19.75	
21.10	
22.39	
22.69	
23.52	R123
24.61	

Ret. Time	Component
26.34	
27.04	R113
28.08	
29.71	

Figure 16. Gas Chromatogram of R-125



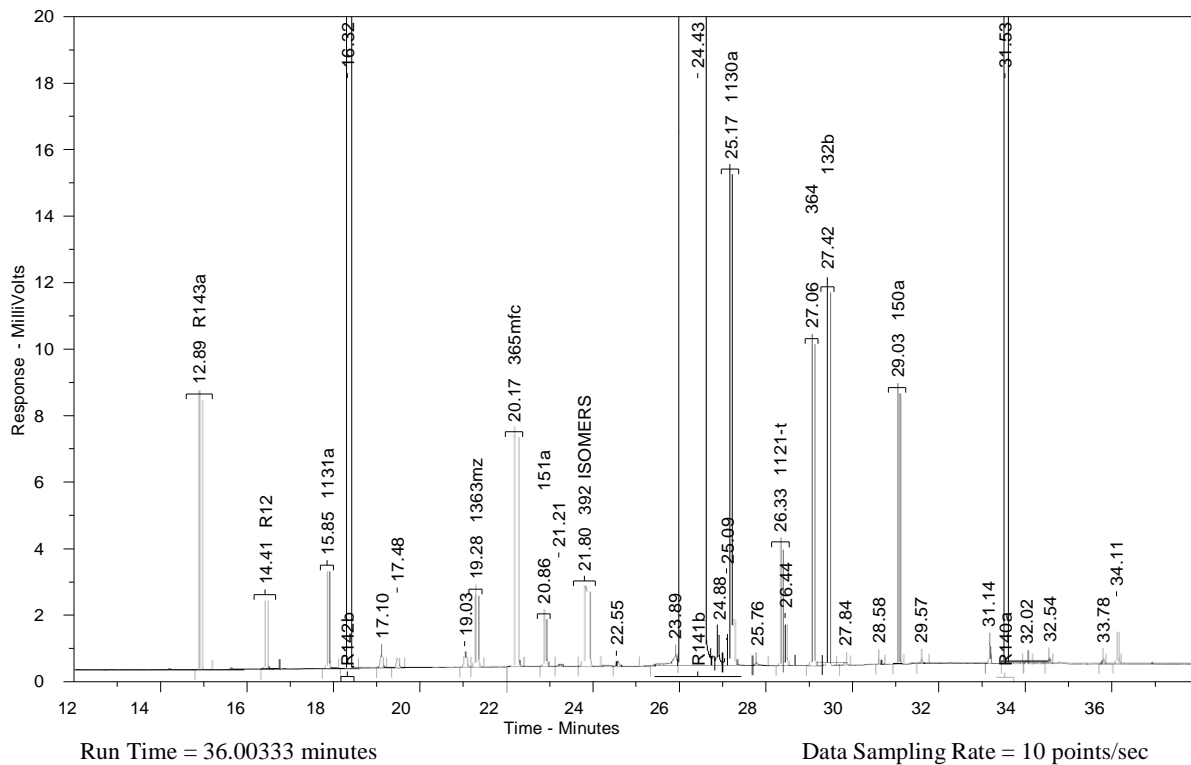
Run Time = 33.99667 minutes

Data Sampling Rate = 20 points/sec

Ret. Time Component

13.01	R115
13.59	R143a
13.89	R125
15.34	R245CB
15.47	R134a
17.14	SBN
17.25	R161 R152a
17.73	R12
18.60	R134
20.07	R22
22.76	R114/R114a
23.27	R40
23.60	1122
24.87	R124
25.22	
25.46	1140
25.88	R31
26.76	1131-t
28.31	R133a
30.87	1131-c
33.07	R123

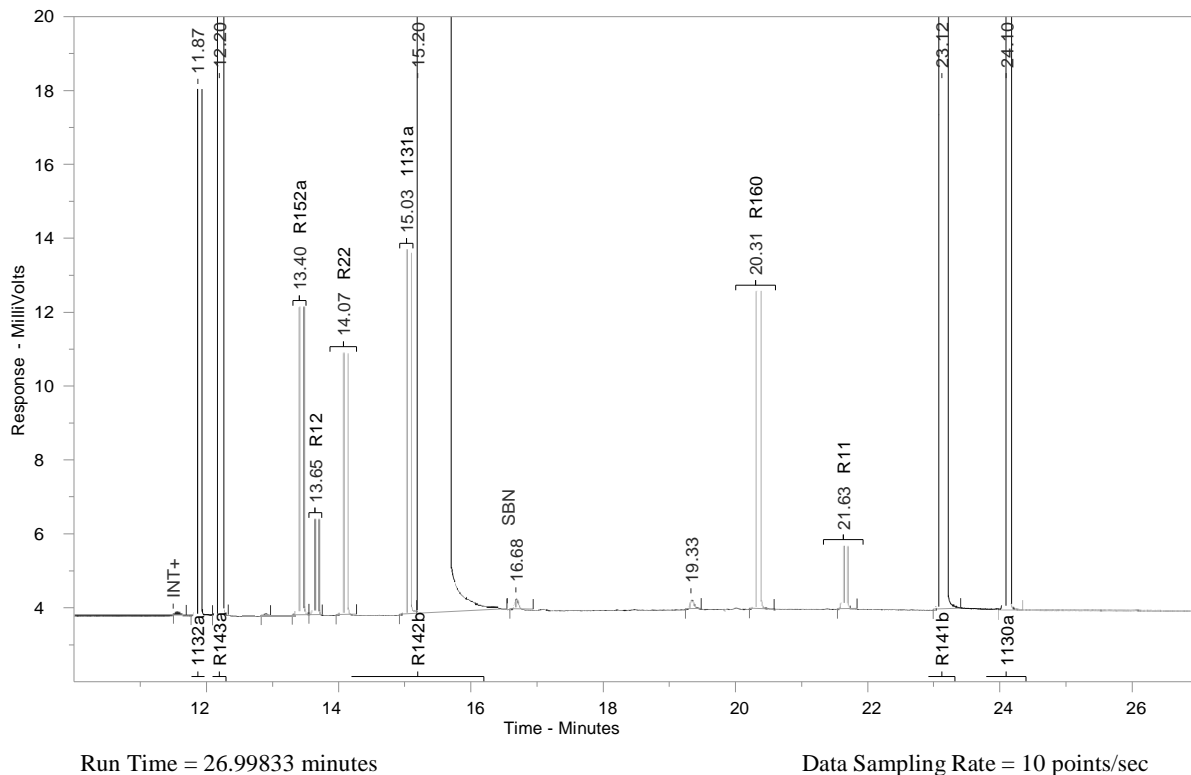
Figure 17. Gas Chromatogram of R-134a



Ret. Time	Component
12.89	R143a
14.41	R12
15.85	1131a
16.32	R142b
17.10	
17.48	
19.03	
19.28	1363mz
20.17	365mfc
20.86	151a
21.21	
21.80	392 ISOMERS
22.55	
23.89	
24.43	R141b
24.88	
25.09	
25.17	1130a
25.76	
26.33	1121-t
26.44	
27.06	364
27.42	132b
27.84	
28.58	
29.03	150a

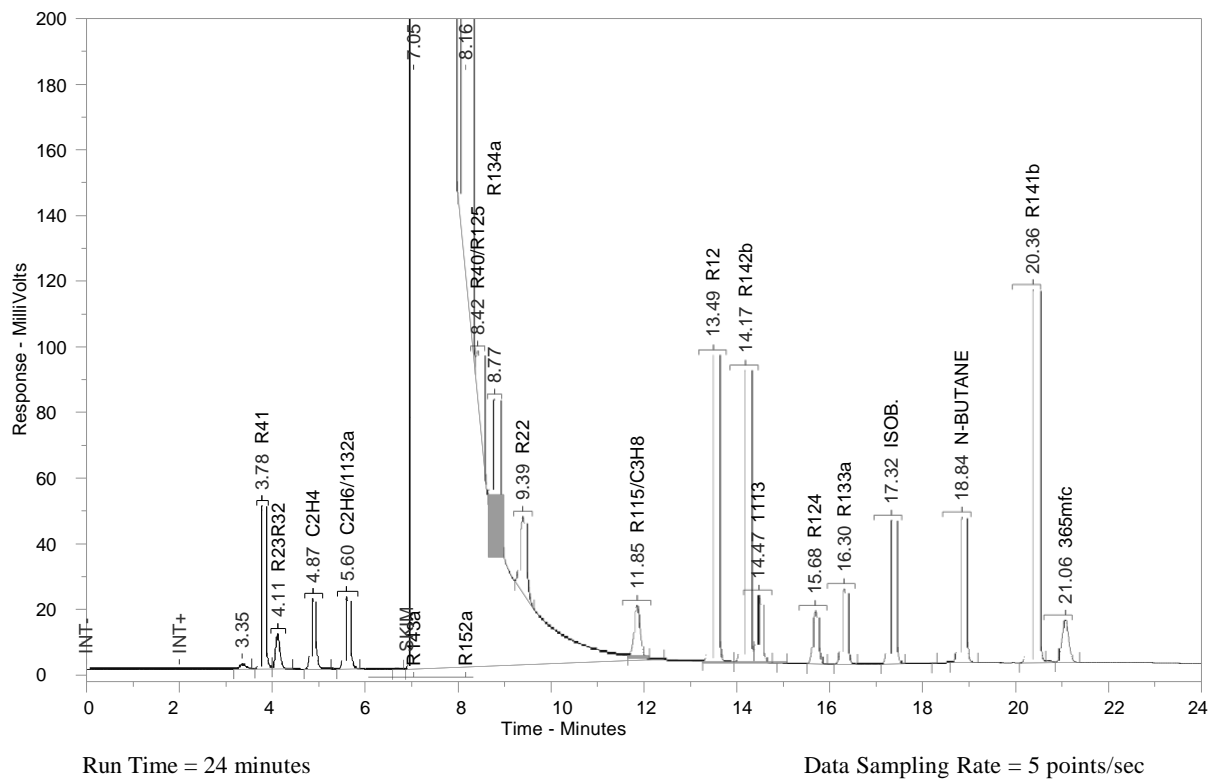
Ret. Time	Component
29.57	
31.14	
31.53	R140a
32.02	
32.54	
33.78	
34.11	

Figure 18. Gas Chromatogram of R-141b



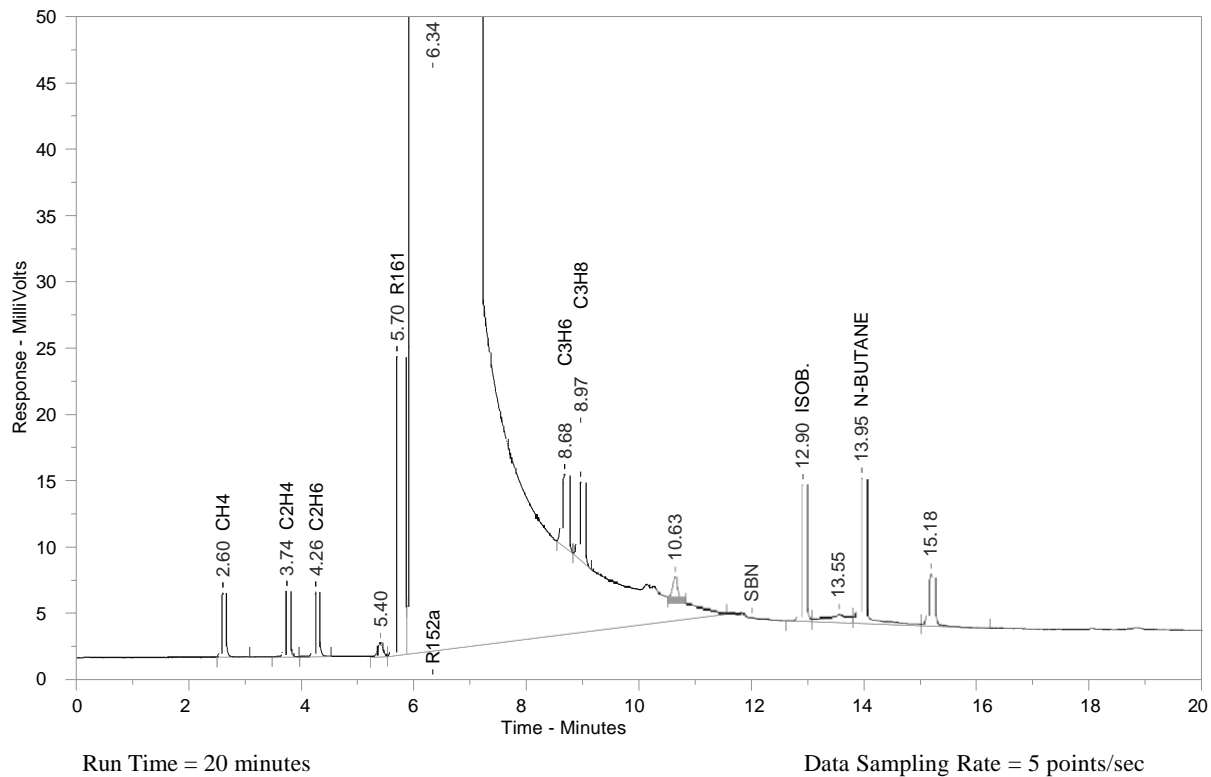
Ret. Time	Component
11.87	1132a
12.20	R143a
13.40	R152a
13.65	R12
14.07	R22
15.03	1131a
15.20	R142b
16.68	
19.33	
20.31	R160
21.63	R11
23.12	R141b
24.10	1130a
32.02	
32.54	
33.78	
34.11	

Figure 19. Gas Chromatogram of R-142b



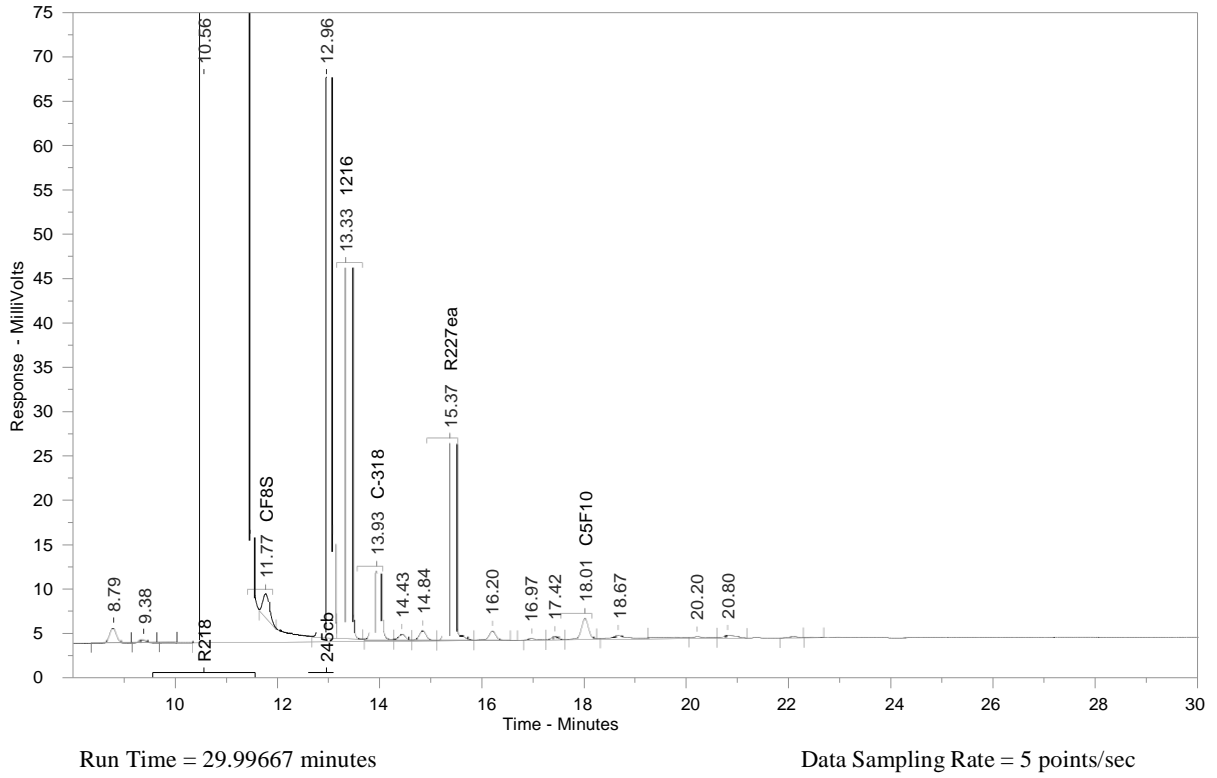
Ret. Time	Component
3.35	
3.78	R41
4.11	R23R32
4.87	C2H4
5.60	C2H6/1132a
7.05	R143a
8.16	R152a
8.42	R40/R125
8.77	R134a
9.39	R22
11.85	R115/C3H8
13.49	R12
14.17	R142b
14.47	1113
15.68	R124
16.30	R133a
17.32	ISOB.
18.84	N-BUTANE
20.36	R141b
21.06	365mfc

Figure 20. Gas Chromatogram of R-143a



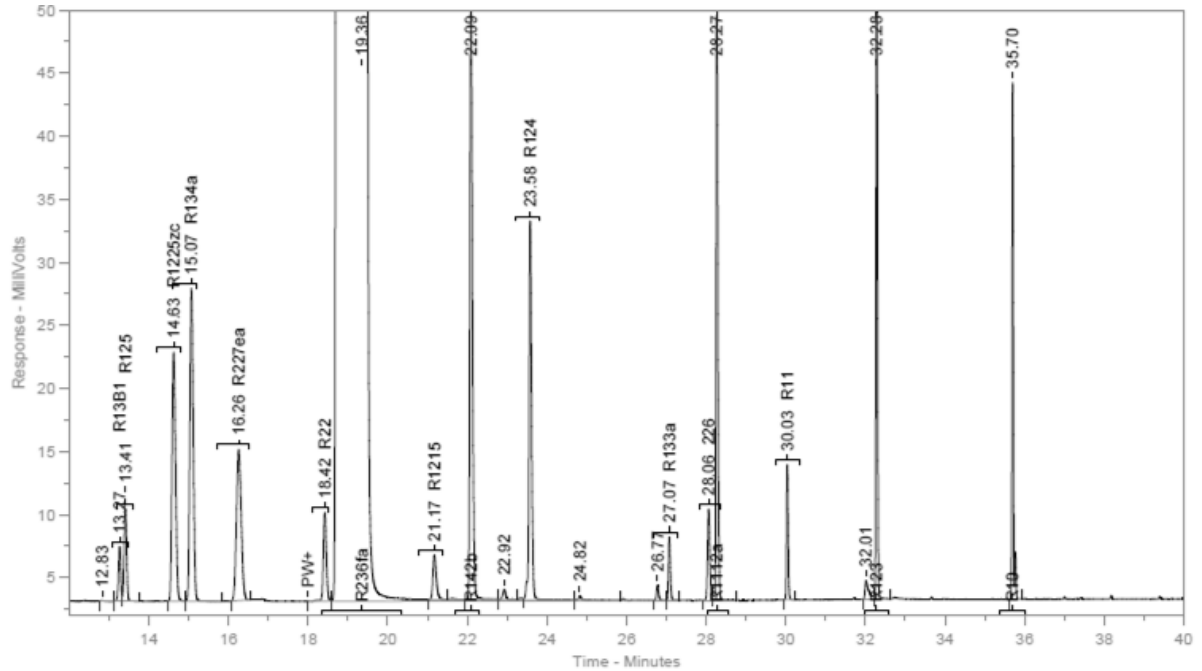
Ret. Time	Component
2.60	CH4
3.74	C2H4
4.26	C2H6
5.40	
5.70	R161
6.34	R152a
8.68	C3H6
8.97	C3H8
10.63	
12.90	ISOB.
13.55	
13.95	N-BUTANE
<u>15.18</u>	

Figure 21. Gas Chromatogram of R-152a



Ret. Time	Component
3.42	
5.63	
8.79	
9.38	
10.56	R218
11.77	CF8S
12.96	245cb
13.33	1216
13.93	C-318
14.43	
14.84	
15.37	R227ea
16.20	
16.97	
17.42	
18.01	C5F10
18.67	
20.20	
20.80	

Figure 22. Gas Chromatogram of R-218

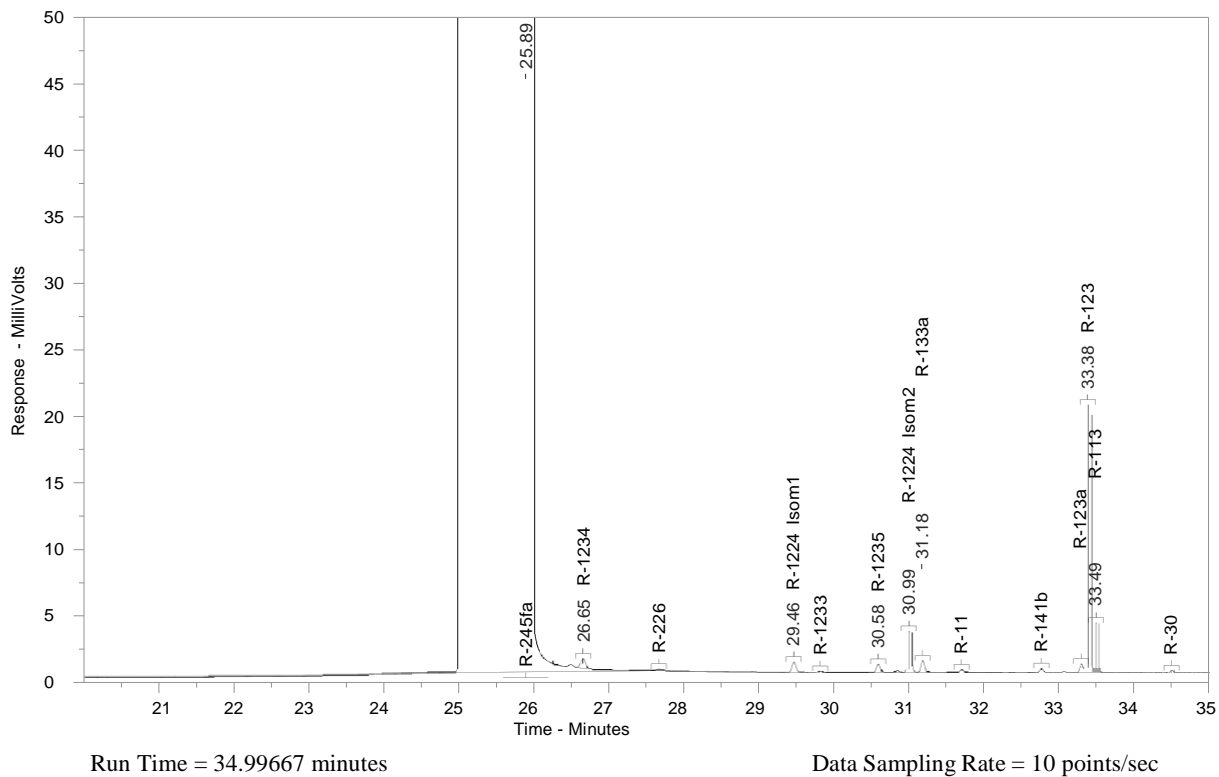


Run Time = 39.99667

Data Sampling Rate = 10

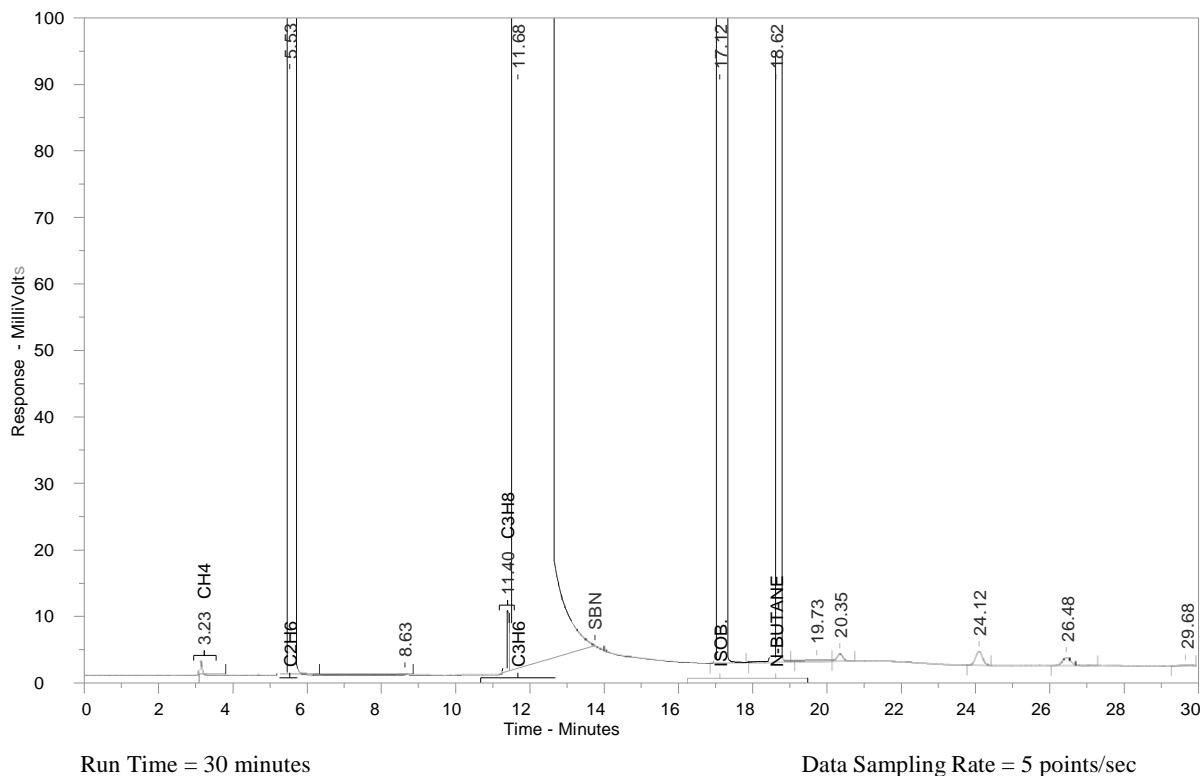
Ret. Time	Component
13.27	R13B1
13.41	R125
14.63	R1225zc
15.07	R134a
16.26	R227ea
18.42	R22
19.36	R236fa
21.17	R1215
22.09	R142b
23.58	R124
27.07	R133a
28.06	226
28.27	R1112a
30.03	R11
32.28	R123
35.70	R10

Figure 23. Gas Chromatogram of R-236fa



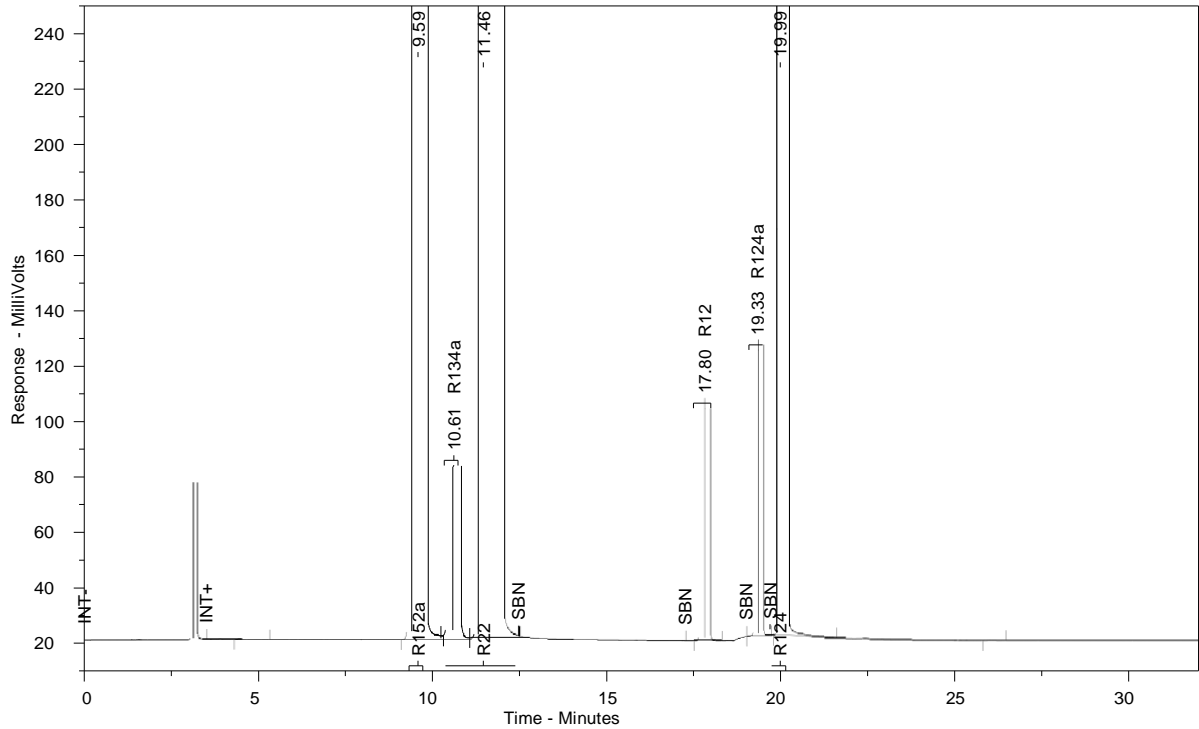
Ret. Time	Component
25.89	R-245fa
26.65	R-1234
29.46	R-1224 Isom1
30.58	R-1235
30.99	R-1224 Isom2
31.18	R-133a
33.38	R-123
33.49	R-113

Figure 24. Gas Chromatogram of R245fa



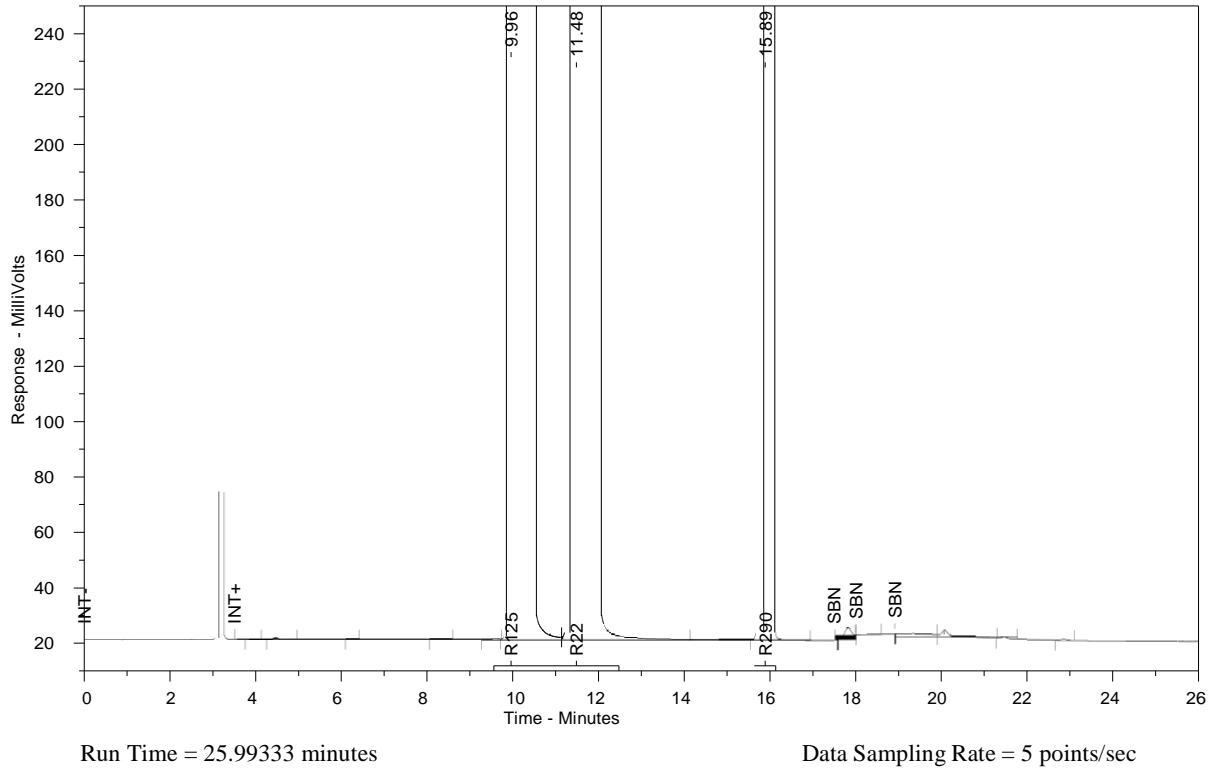
Ret. Time	Component
3.23	CH4
5.53	C2H6
8.63	
11.40	C3H8
11.68	C3H6
17.12	ISOB.
18.62	N-BUTANE
19.73	
20.35	
24.12	
26.48	
29.68	
24.11	R113

Figure 25. Gas Chromatogram of R-290



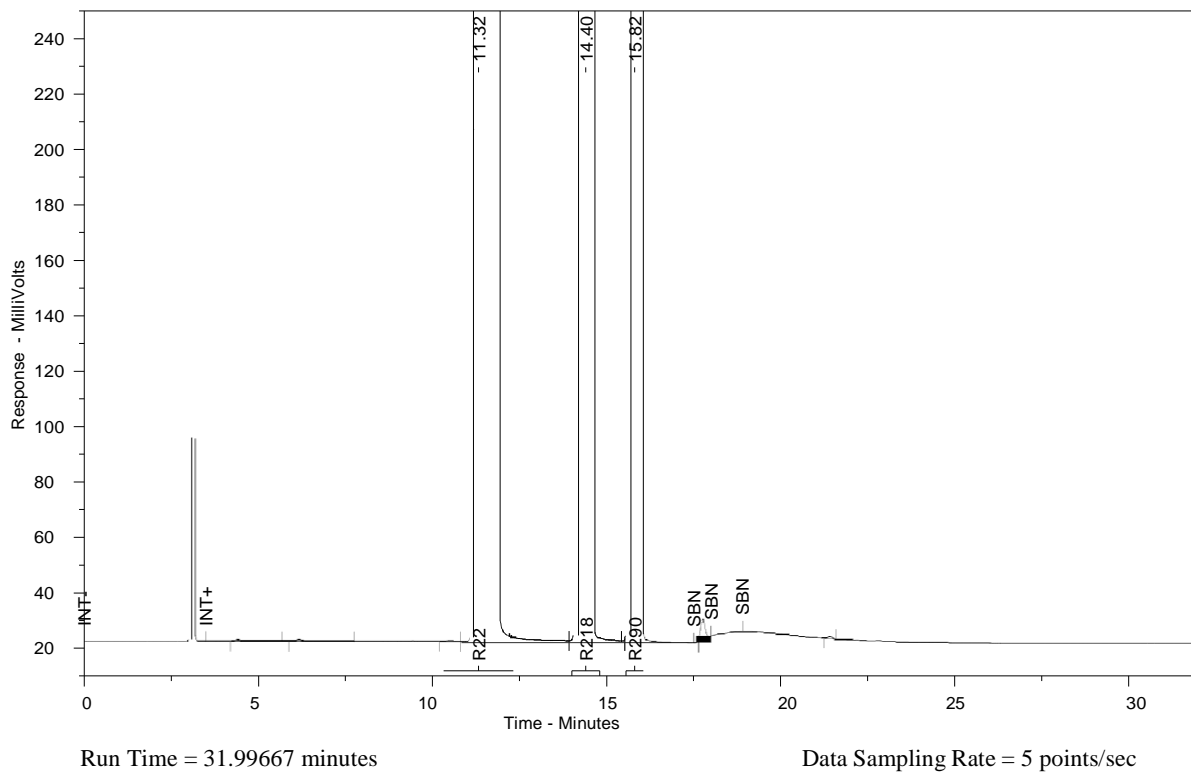
Ret. Time	Component
9.59	R152a
10.61	R134a
11.46	R22
17.80	R12
19.33	R124a
19.99	R124

Figure 26. Gas Chromatogram of R-401



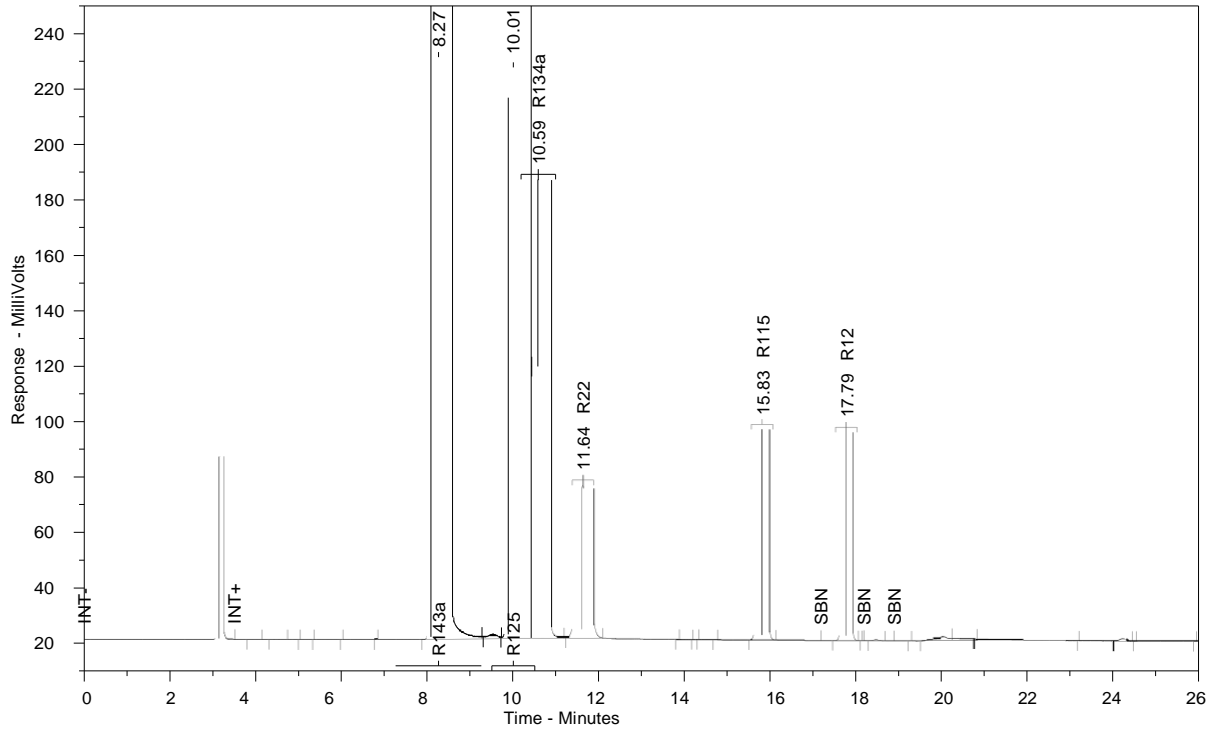
Ret. Time	Component
9.96	R125
11.48	R22
15	

Figure 27. Gas Chromatogram of R-402



Ret. Time	Component
11.32	R22
14.40	R218
15.82	R290

Figure 28. Gas Chromatogram of R-403

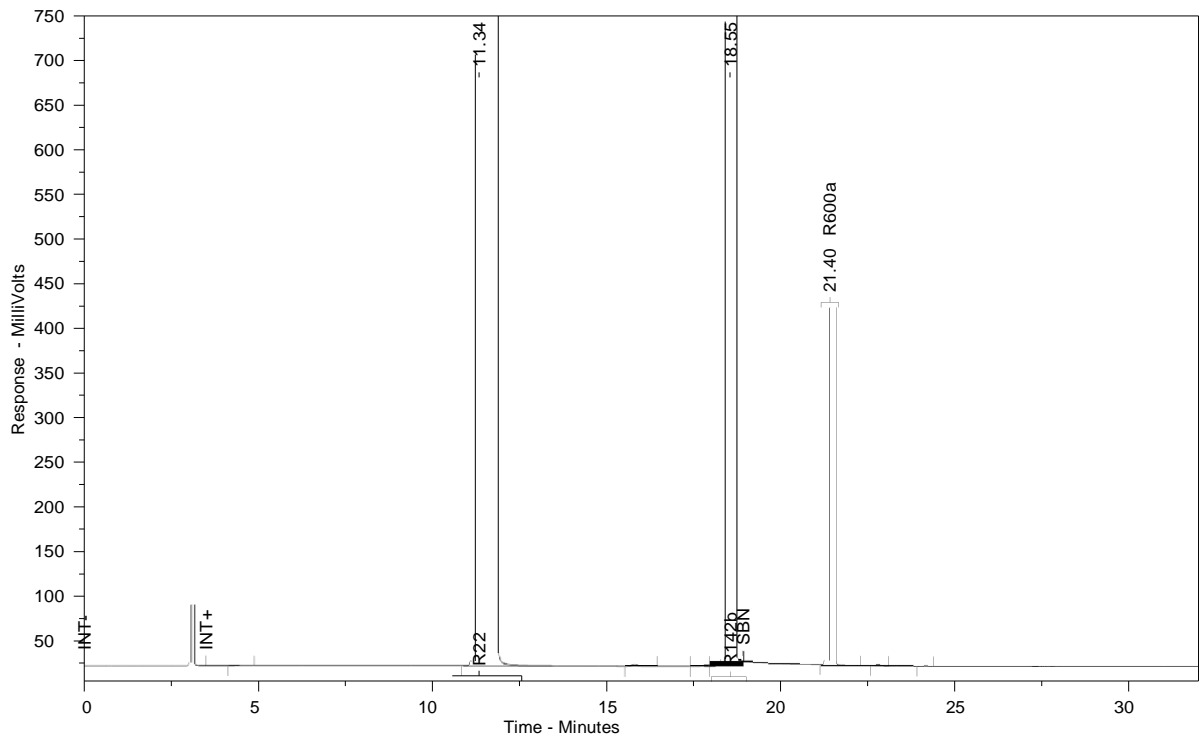


Run Time = 26 minutes

Data Sampling Rate = 5 points/sec

Ret. Time	Component
8.27	R143a
10.01	R125
10.59	R134a
11.64	R22
15.83	R115
17.79	R12

Figure 29. Gas Chromatogram of R-404

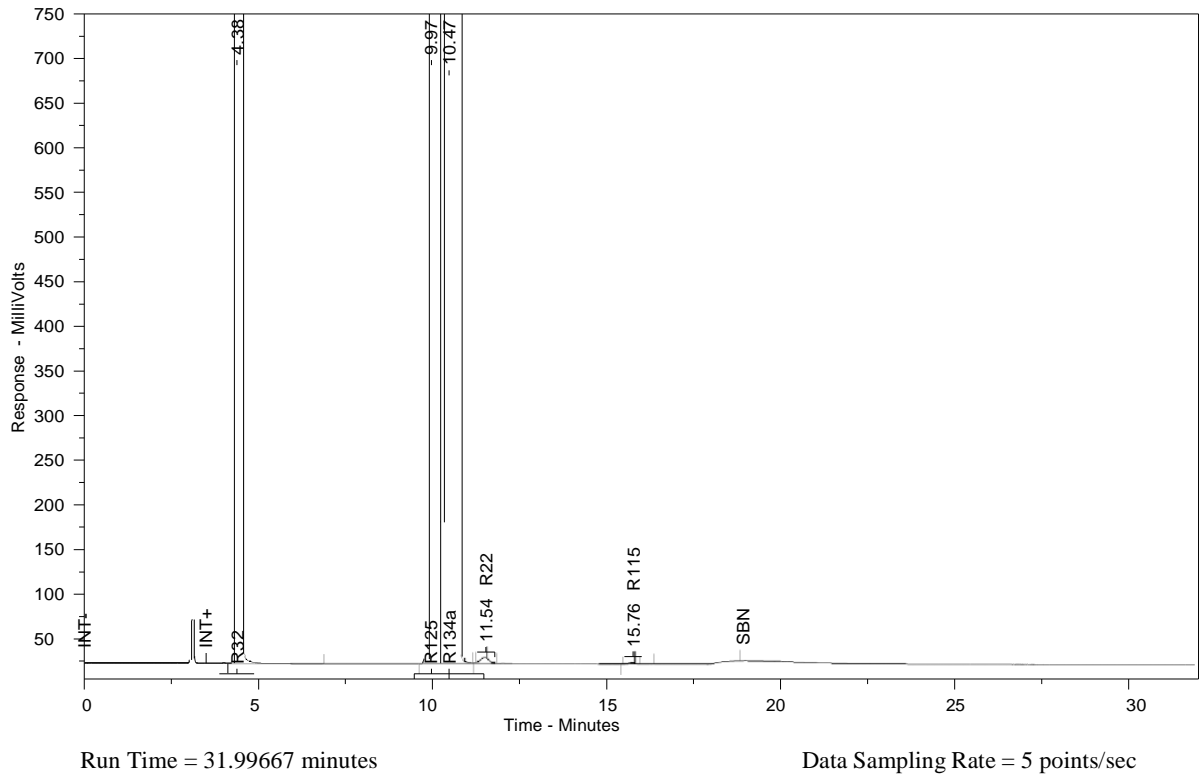


Run Time = 31.99667 minutes

Data Sampling Rate = 5 points/sec

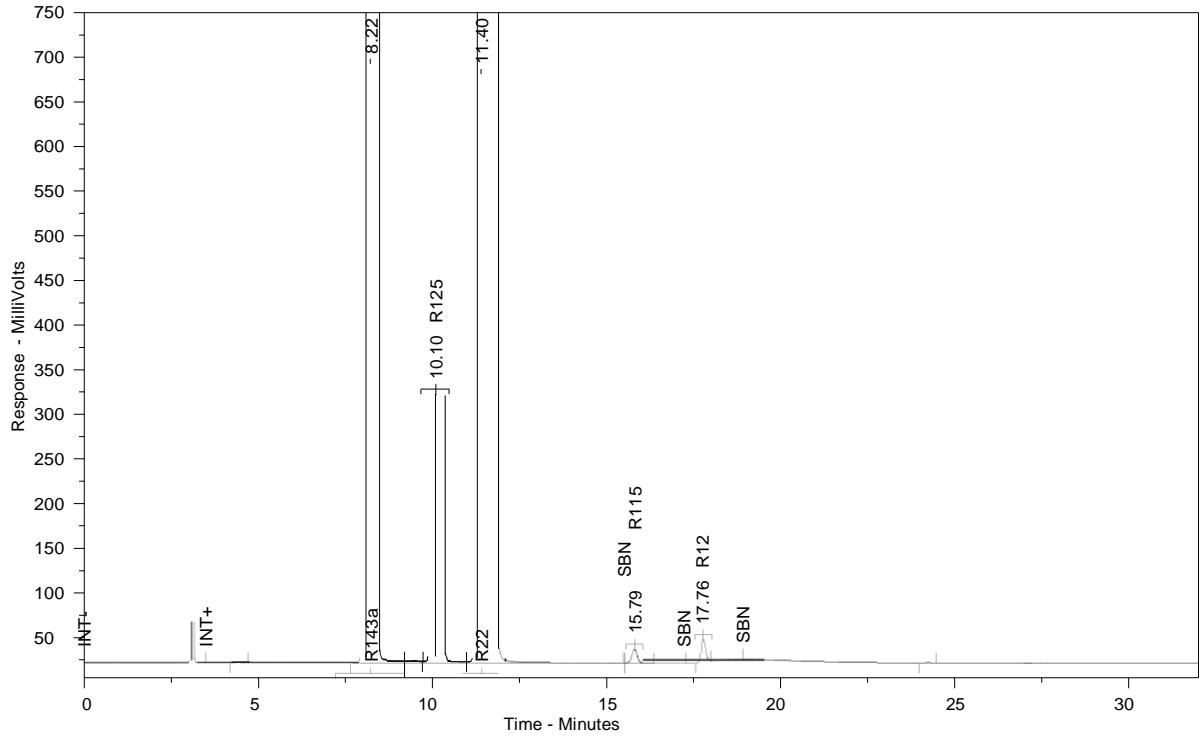
Ret. Time	Component
11.34	R22
18.55	R142b
21.40	R600a

Figure 30. Gas Chromatogram of R-406



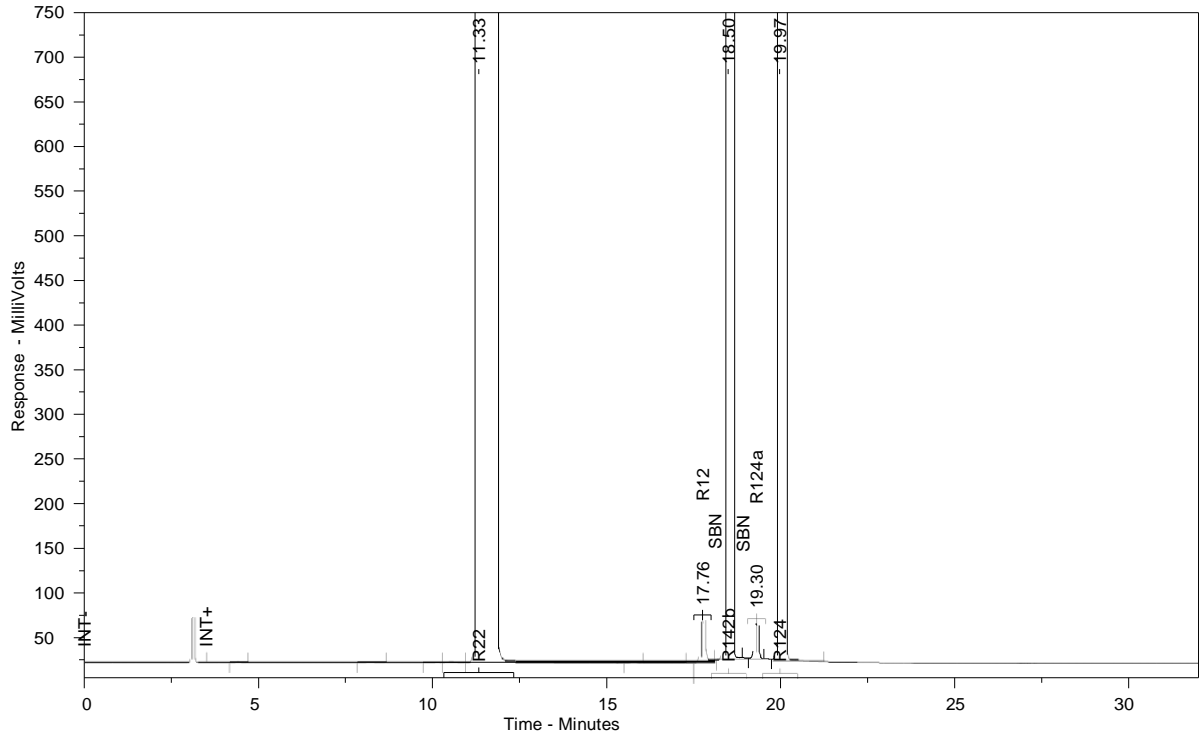
Ret. Time	Component
4.38	R32
9.97	R125
10.47	R134a
11.54	R22
15.76	R115

Figure 31. Gas Chromatogram of R-407



Ret. Time	Component
8.22	R143a
10.10	R125
11.40	R22
15.79	R115
17.76	R12

Figure 32. Gas Chromatogram of R-408

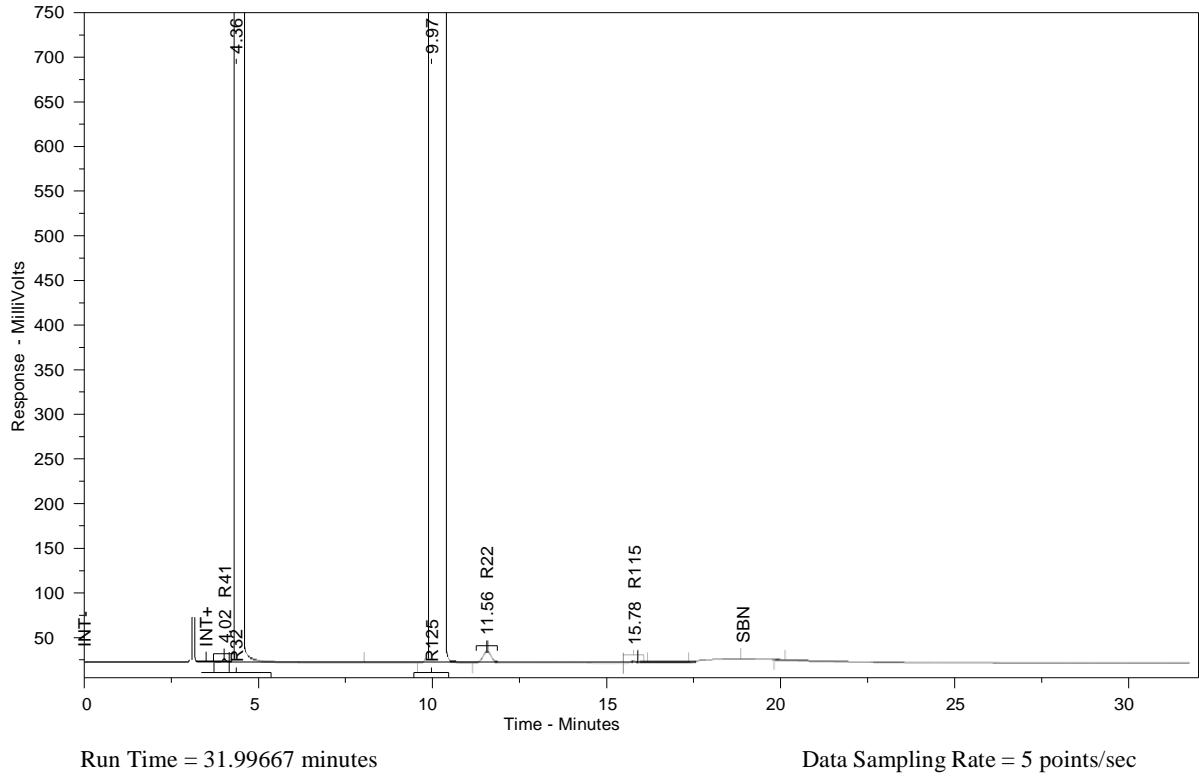


Run Time = 32 minutes

Data Sampling Rate = 5 points/sec

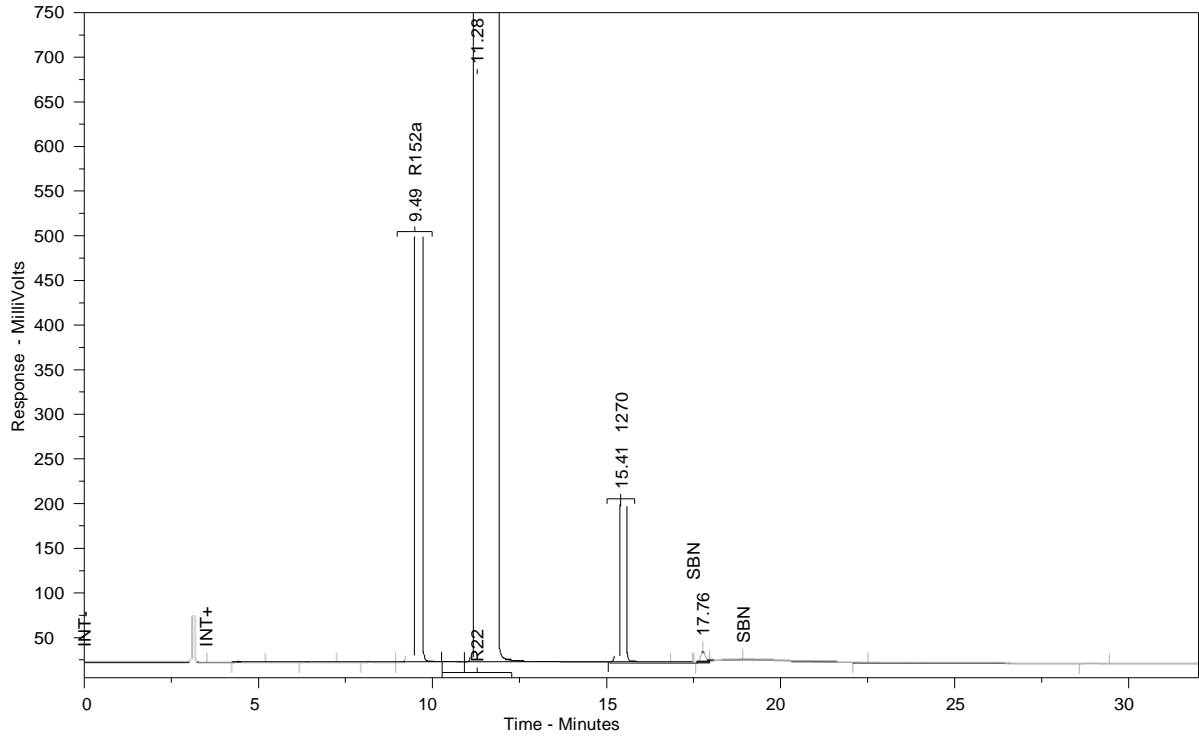
Ret. Time	Component
11.33	R22
17.76	R12
18.50	R142b
19.30	R124a
19.97	R124

Figure 33. Gas Chromatogram of R-409



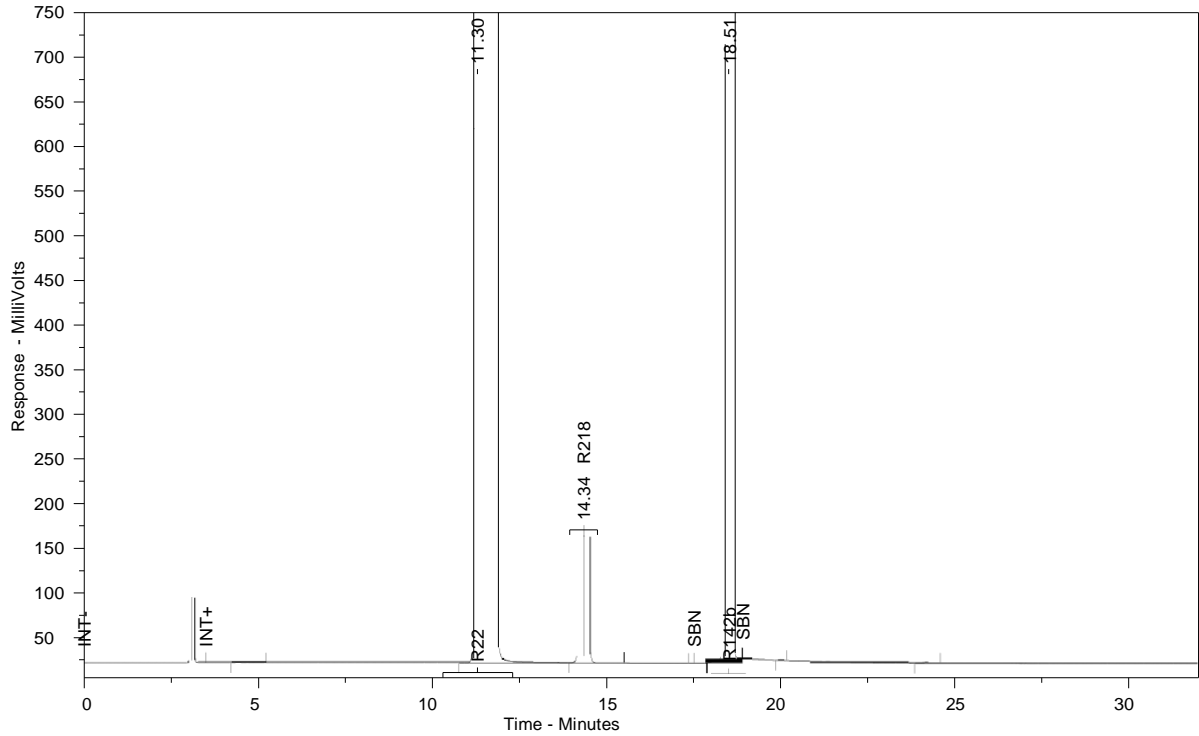
Ret. Time	Component
4.02	R41
4.36	R32
9.97	R125
11.56	R22
15.78	R115

Figure 34. Gas Chromatogram of R-410



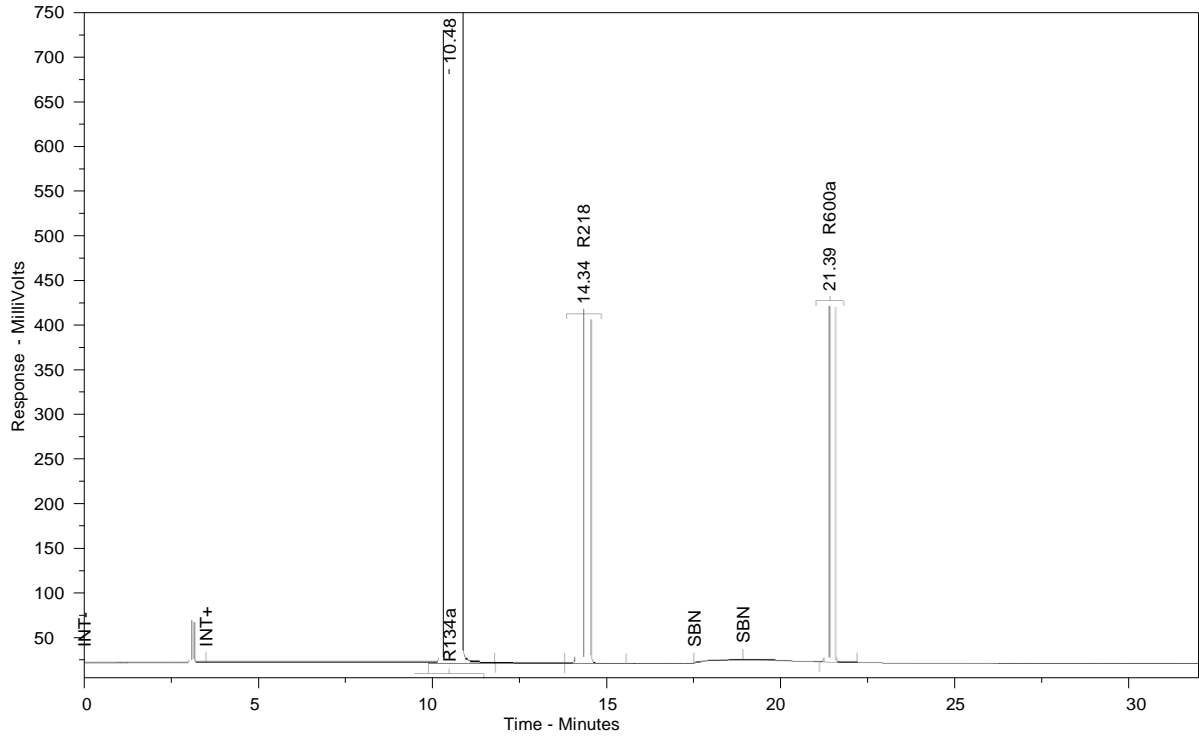
Ret. Time	Component
9.49	R152a
11.28	R22
15.41	1270
17.76	SBN

Figure 35. Gas Chromatogram of R-411



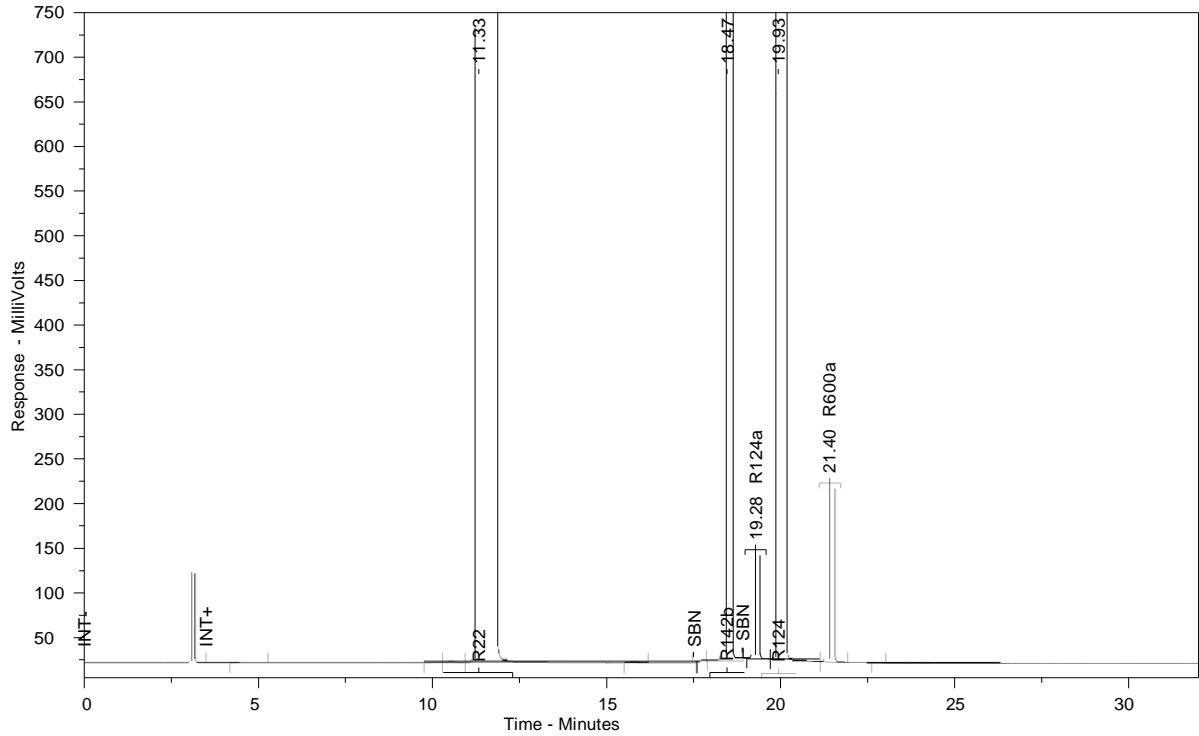
Ret. Time	Component
11.30	R22
14.34	R218
18.51	R142b

Figure 36. Gas Chromatogram of R-412



Ret. Time	Component
10.48	R134a
14.34	R218
21.39	R600a

Figure 37. Gas Chromatogram of R-413

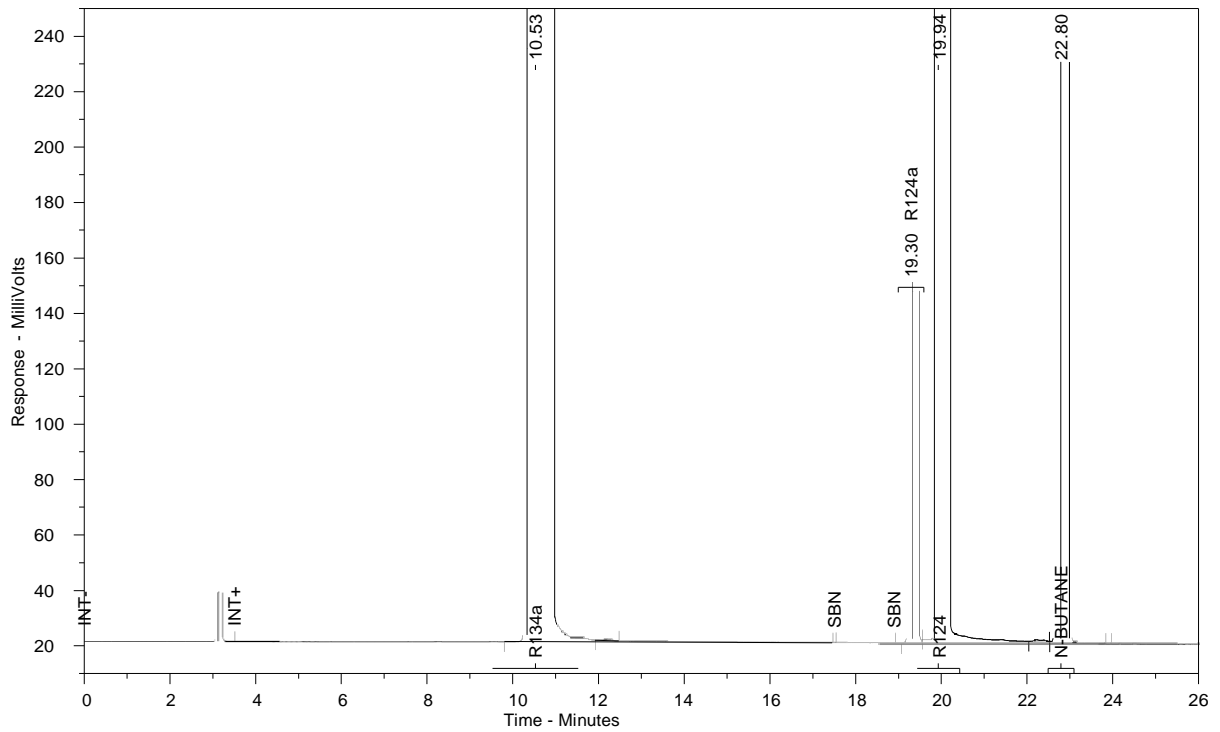


Run Time = 31.99333 minutes

Data Sampling Rate = 5 points/sec

Ret. Time	Component
11.33	R22
18.47	R142b
19.28	R124a
19.93	R124
21.40	R600a

Figure 38. Gas Chromatogram of R-414

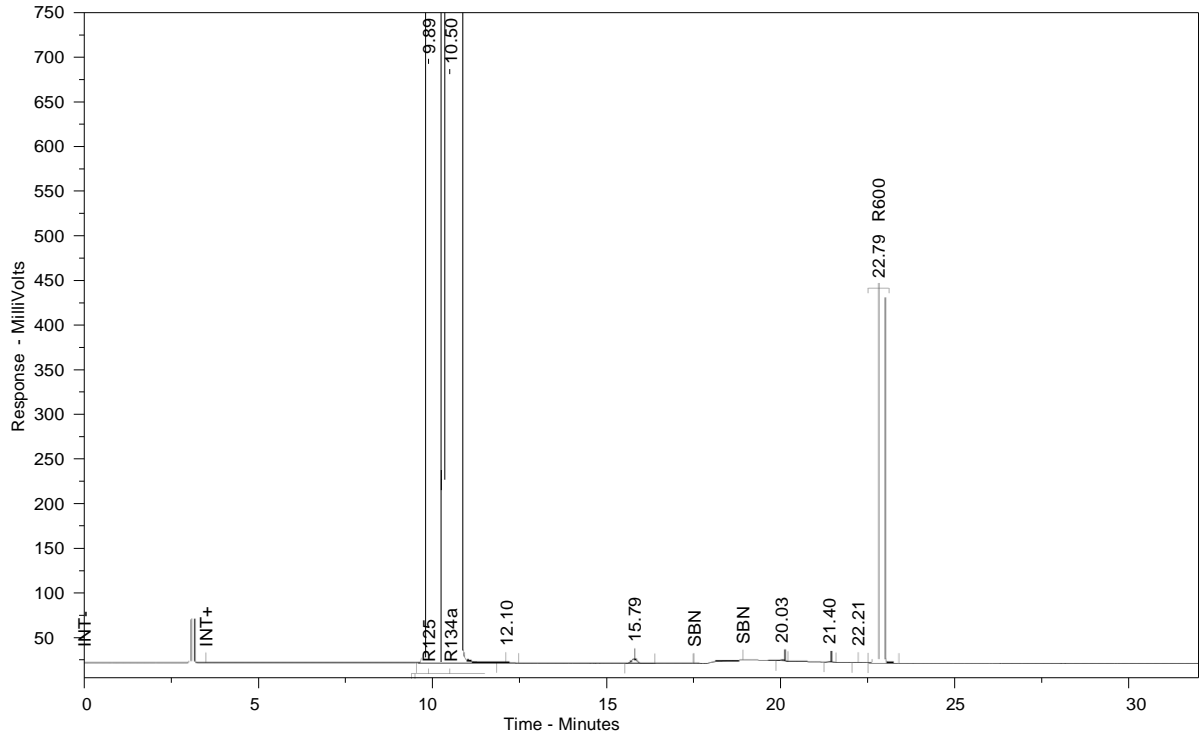


Run Time = 25.99667 minutes

Data Sampling Rate = 5 points/sec

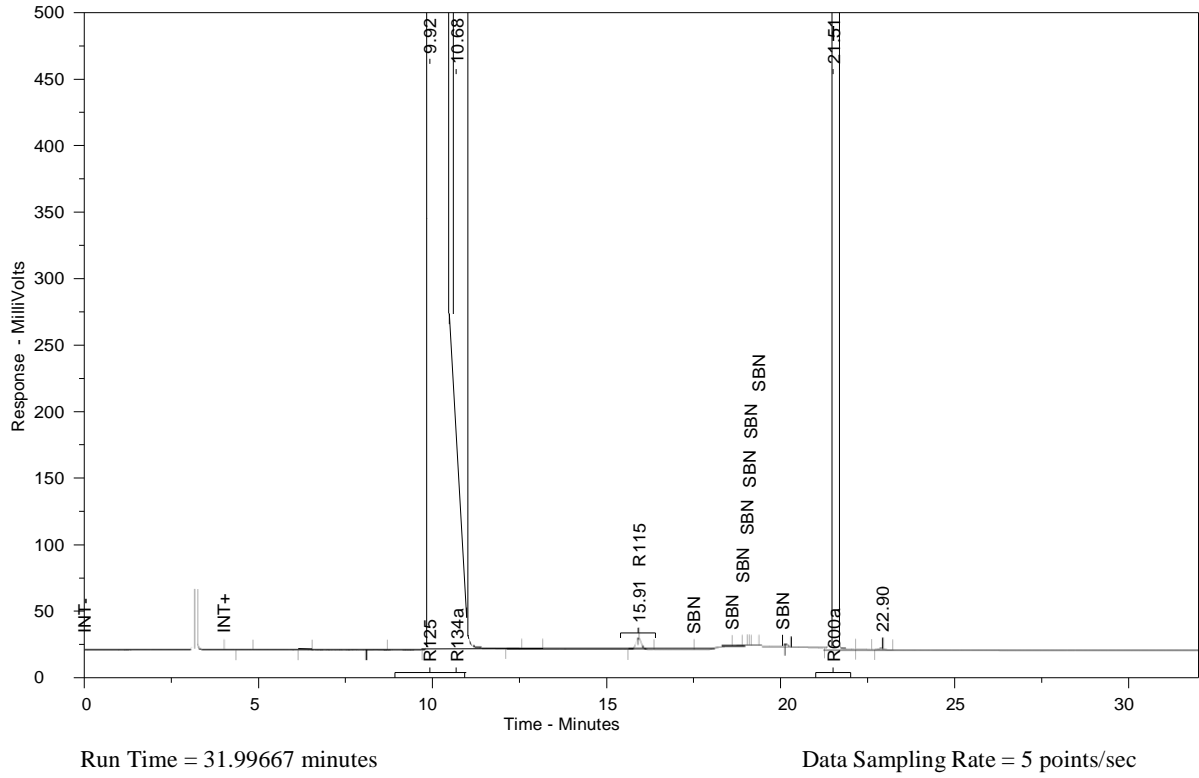
Ret. Time	Component
10.53	R134a
19.30	R124a
19.94	R124
22.80	N-BUTANE

Figure 39. Gas Chromatogram of R-416



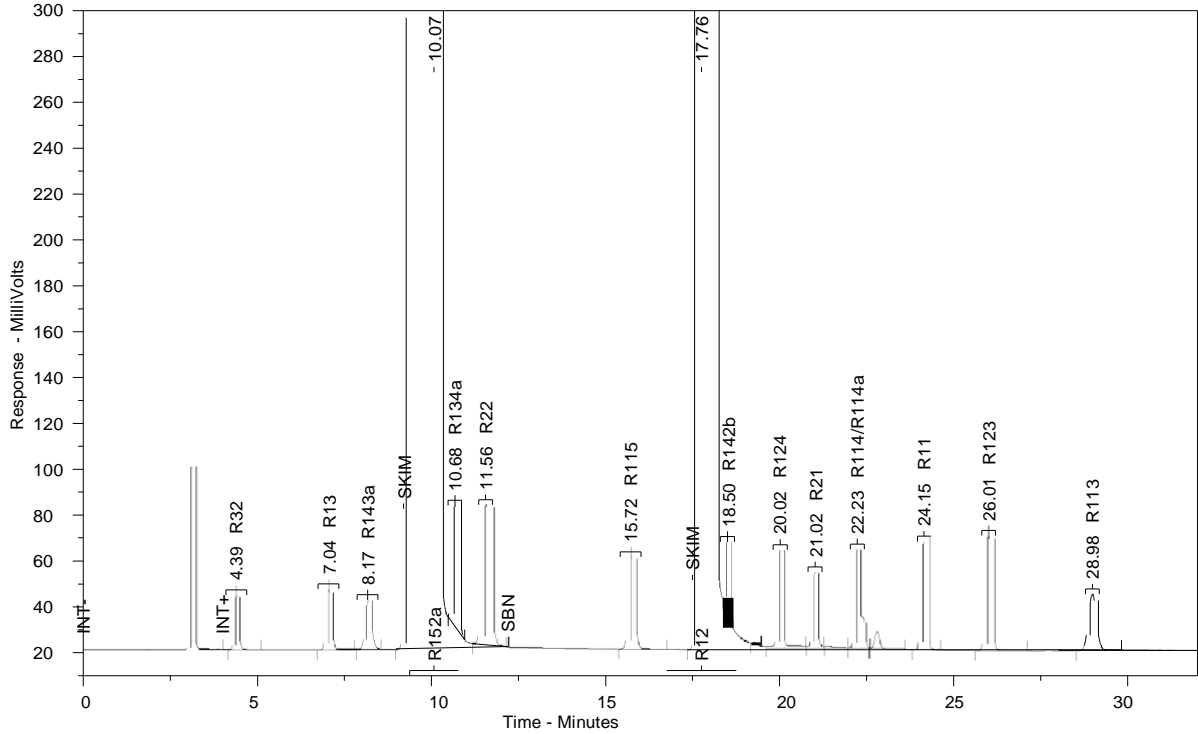
Ret. Time	Component
9.89	R125
10.50	R134a
12.10	
15.79	
20.03	
21.40	
22.21	
22.79	R600

Figure 40. Gas Chromatogram of R-417



Ret. Time	Component
9.92	R125
10.68	R134a
15.91	R115
21.51	R600a
22.90	

Figure 41. Gas Chromatogram of R-422

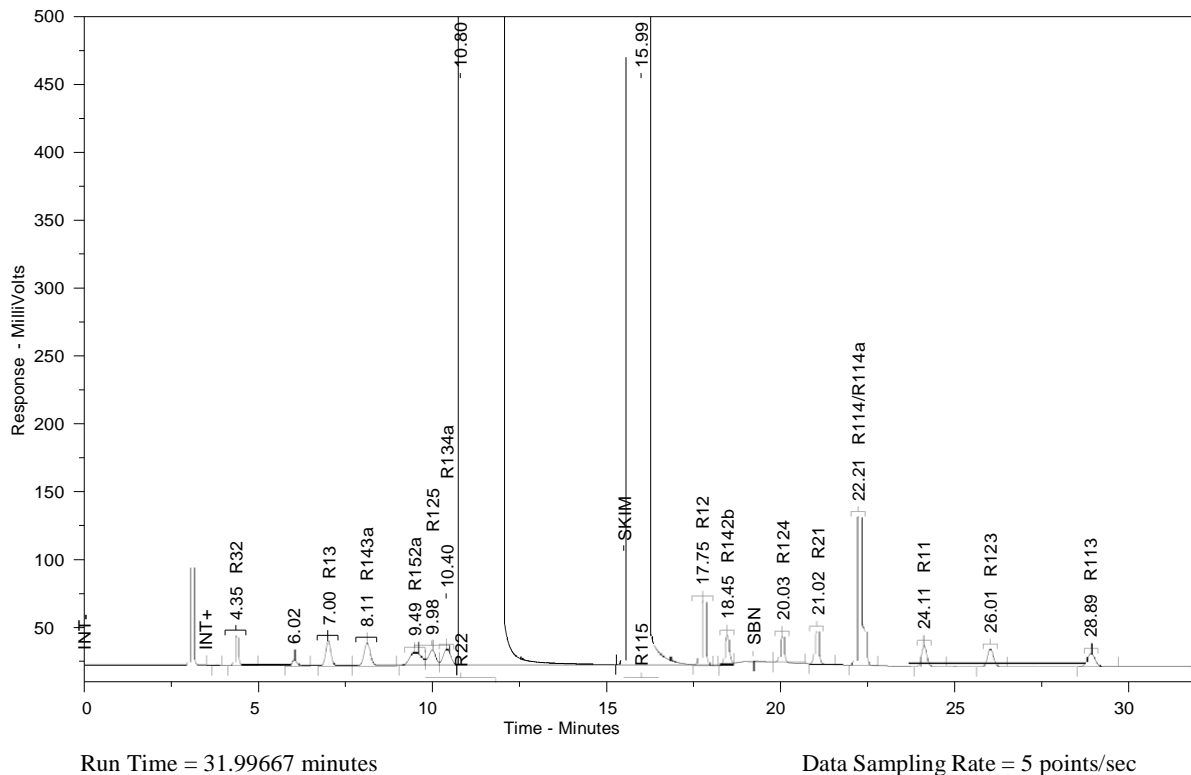


Run Time = 31.99333 minutes

Data Sampling Rate = 5 points/sec

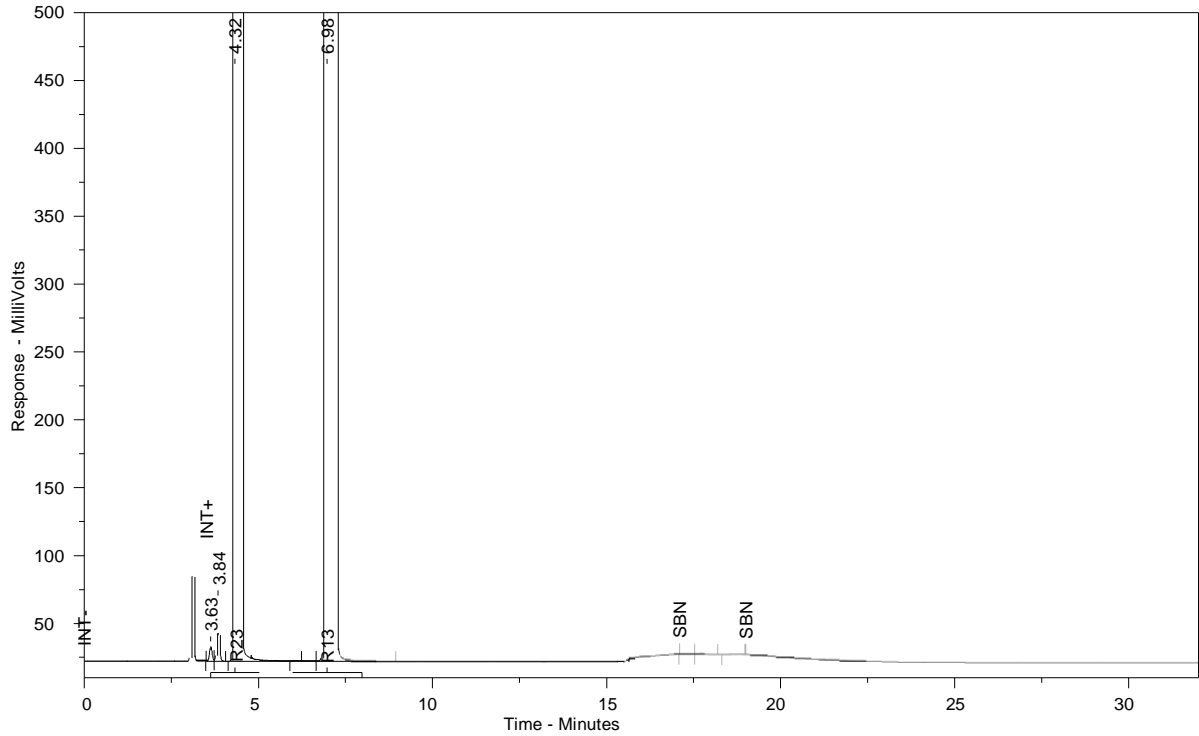
Ret. Time	Component
4.39	R32
7.04	R13
8.17	R143a
10.07	R152a
10.68	R134a
11.56	R22
15.72	R115
17.76	R12
18.50	R142b
20.02	R124
21.02	R21
22.23	R114/R114a
24.15	R11
26.01	R123
28.98	R113

Figure 42. Gas Chromatogram of R-500



Ret. Time	Component
4.35	R32
6.02	
7.00	R13
8.11	R143a
9.49	R152a
9.98	R125
10.40	R134a
10.80	R22
15.99	R115
17.75	R12
18.45	R142b
20.03	R124
21.02	R21
22.21	R114/R114a
24.11	R11
26.01	R123
28.89	R113

Figure 43. Gas Chromatogram of R-502

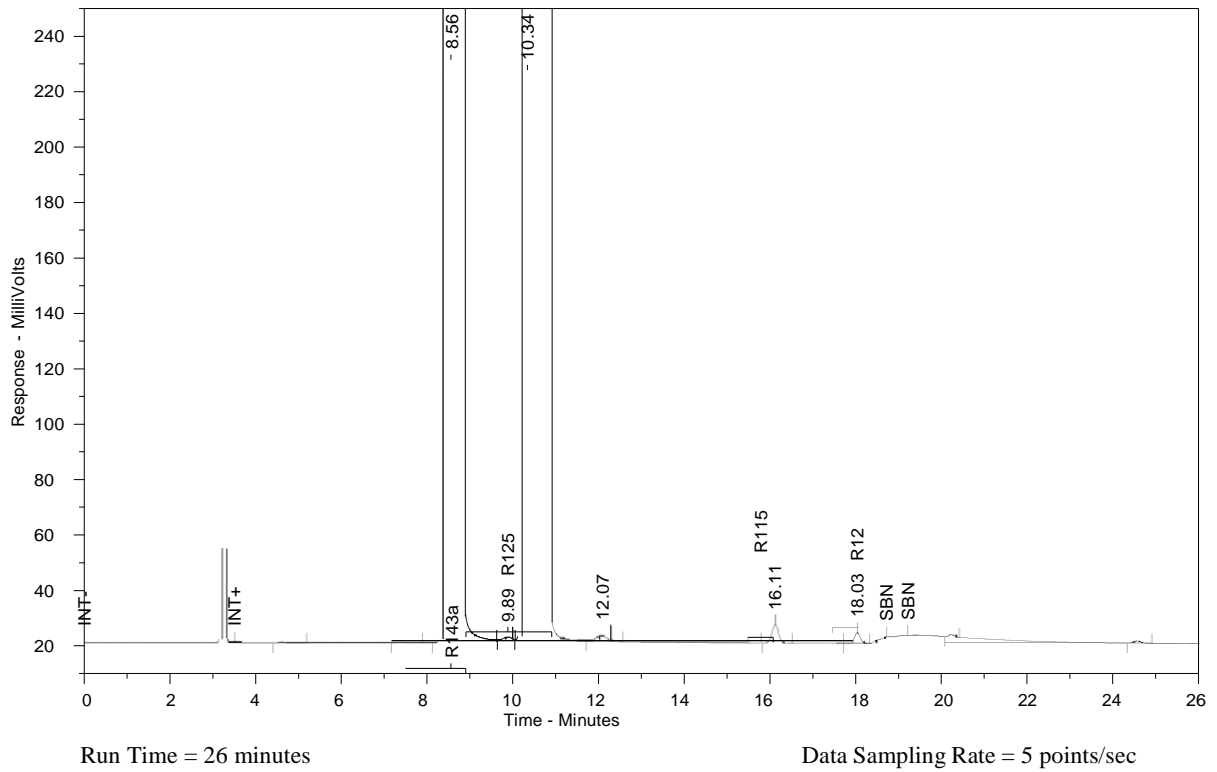


Run Time = 31.99667 minutes

Data Sampling Rate = 5 points/sec

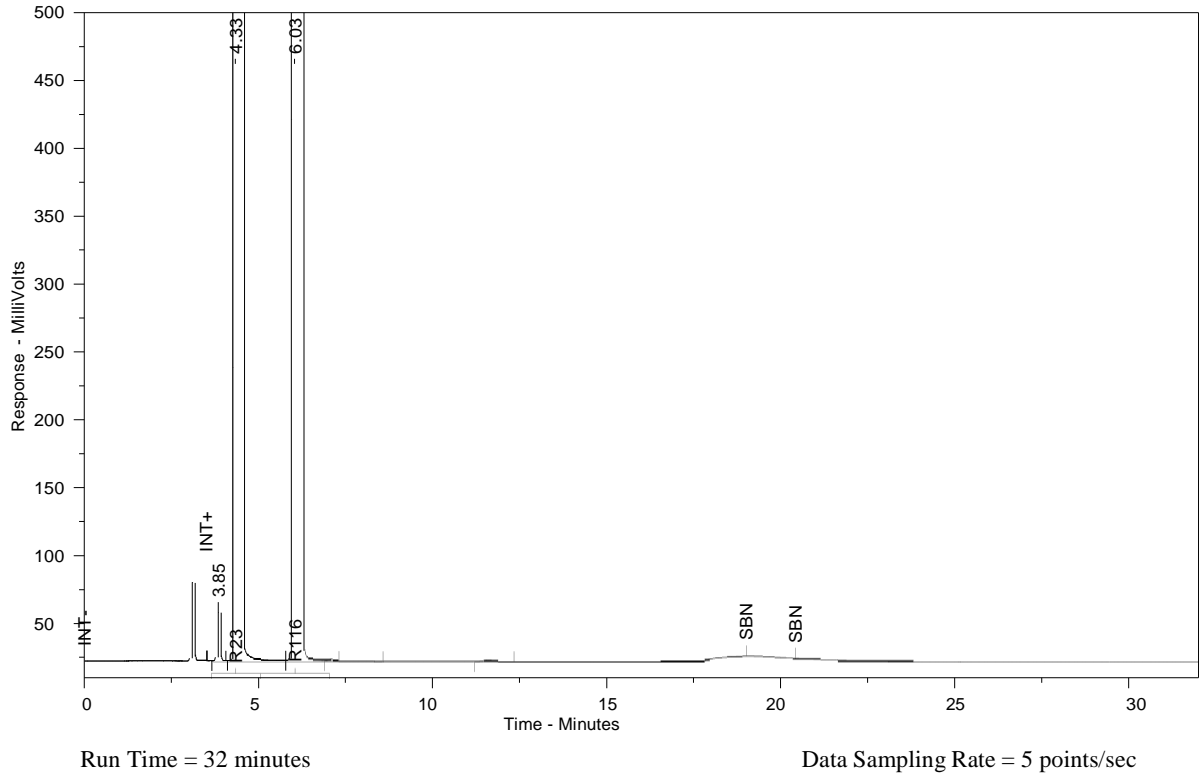
Ret. Time	Component
3.63	
3.84	
4.32	R23
6.98	R13

Figure 44. Gas Chromatogram of R-503



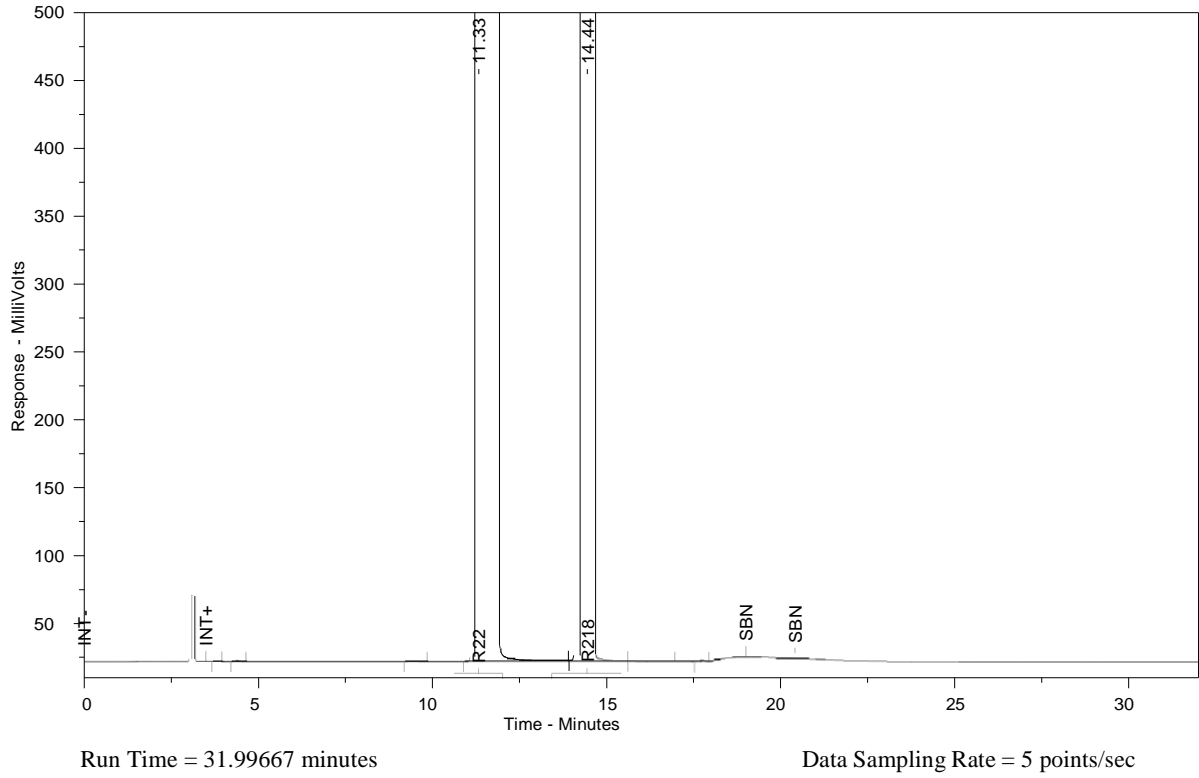
Ret. Time	Component
8.56	R143a
9.89	R125
10.34	
12.07	
16.11	
18.03	R12

Figure 45. Gas Chromatogram of R-507



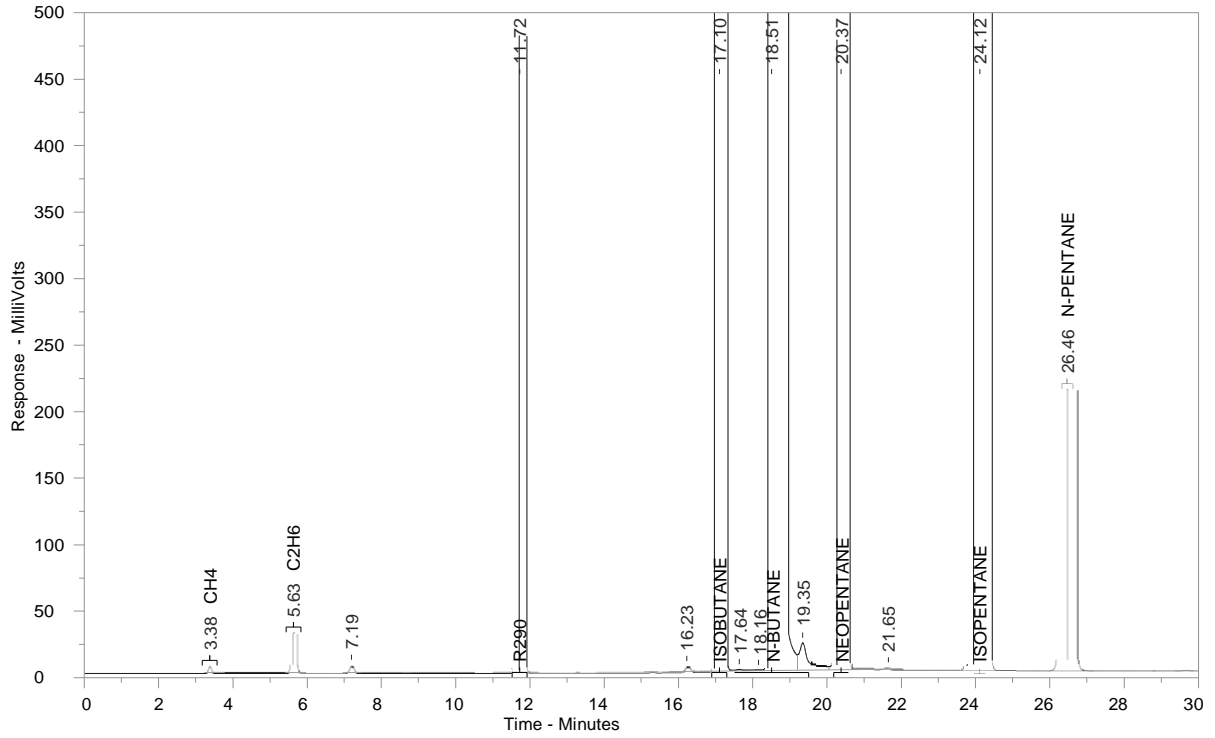
Ret. Time	Component
3.85	
4.33	R23
6.03	R116

Figure 46. Gas Chromatogram of R-508



Ret. Time	Component
11.33	R22
14.44	R218
32.02	
32.54	
33.78	
34.11	

Figure 47. Gas Chromatogram of R-509



Run Time = 29.99 minutes

Data Sampling Rate = 5 points/sec

Ret. Time	Component
3.38	CH4
5.63	C2H6
7.19	
11.72	R290
16.23	
17.10	ISOBUTANE
17.64	
18.16	
18.51	N-BUTANE
19.35	
20.37	NEOPENTANE
21.65	
24.12	ISOPENTANE
26.46	N-PENTANE

Figure 48. Gas Chromatogram of R-600