MILLENNIUM APPLICATION BRIEF

TOPIC: Gradient Analysis of PAH's using an Alliance System

AUTHOR: Stuart Oehrle **Date: 07/12/96**

INTRODUCTION:

Analysis of the 16 common PAH's was done using an Alliance system. This gradient HPLC method was done using a Supelcosil PAH colmn and A waters developed ternary gradient. Figure 1 is a chromatgram of the separation of the 16 common PAH's. As can be seen all PAH's are separated in less than 20 minutes. Total analysis times of less than 25 minutes is possible using this method. Figures 2 and 3 are overlay plots for six (6) replicate injections of this mixture. As shown in these plots very good gradient reproducibility is found. This is further shown in figure 4 which is a summary report for retention times of all 16 PAH's. Retention time percent RSD's of less than 0.1% were achieved

EXPERIMENTAL:

HPLC Analysis

Mobile phase:	A: Water
	B: Methanol
	C: Acetonitrile
Flow rate:	1.0 mL/min
Detection:	254nm
Column:	Supelcosil PAH (4.6 X 150mm)
Temperature:	30 degrees Celsius

Gradient Table

#	Time (min)	Flow (ml)	%A (%)	%B (%)	%C (%)	%D (%)	Curve
1	0.00	1.00	35.0	65.0	0.0	0.0	0
2	11.00	1.00	0.0	0.0	100.0	0.0	6
3	18.00	1.00	35.0	65.0	0.0	0.0	11
4	30.00	1.00	35.0	65.0	0.0	0.0	11
5	35.00	0.50	0.0	0.0	100.0	0.0	11
6	50.00	0.00	0.0	0.0	100.0	0.0	11

FIGURES:

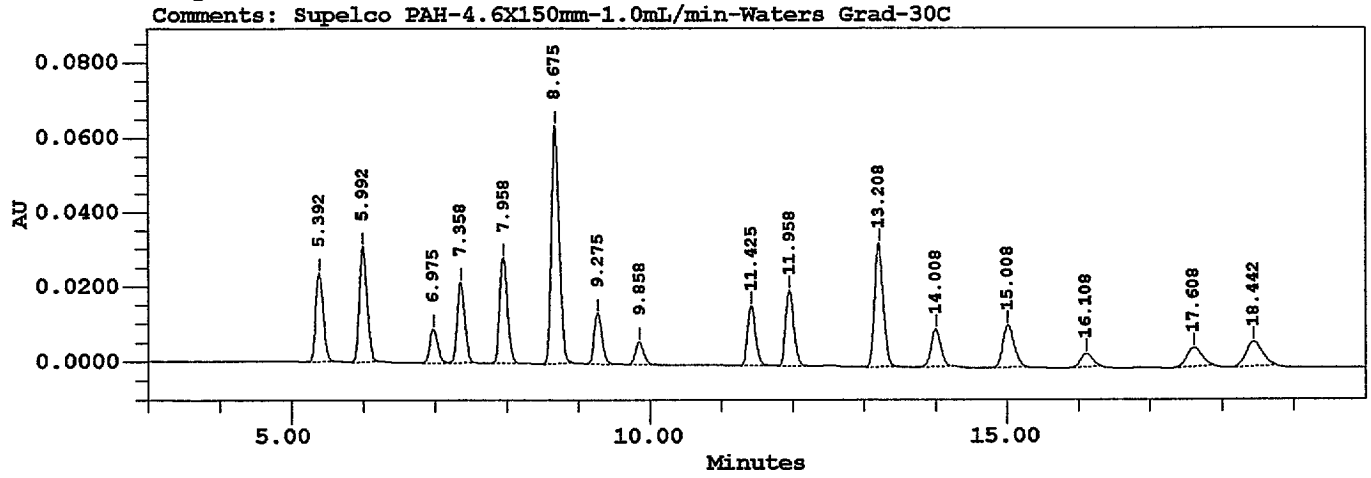
Figure 1:	Chromatogram of PAH Mix
Figure 2 and 3:	Overlay of 6 injections of PAH Mix
Figure 4:	Summary Report for 6 injections.

Waters Corporation

Sample Information

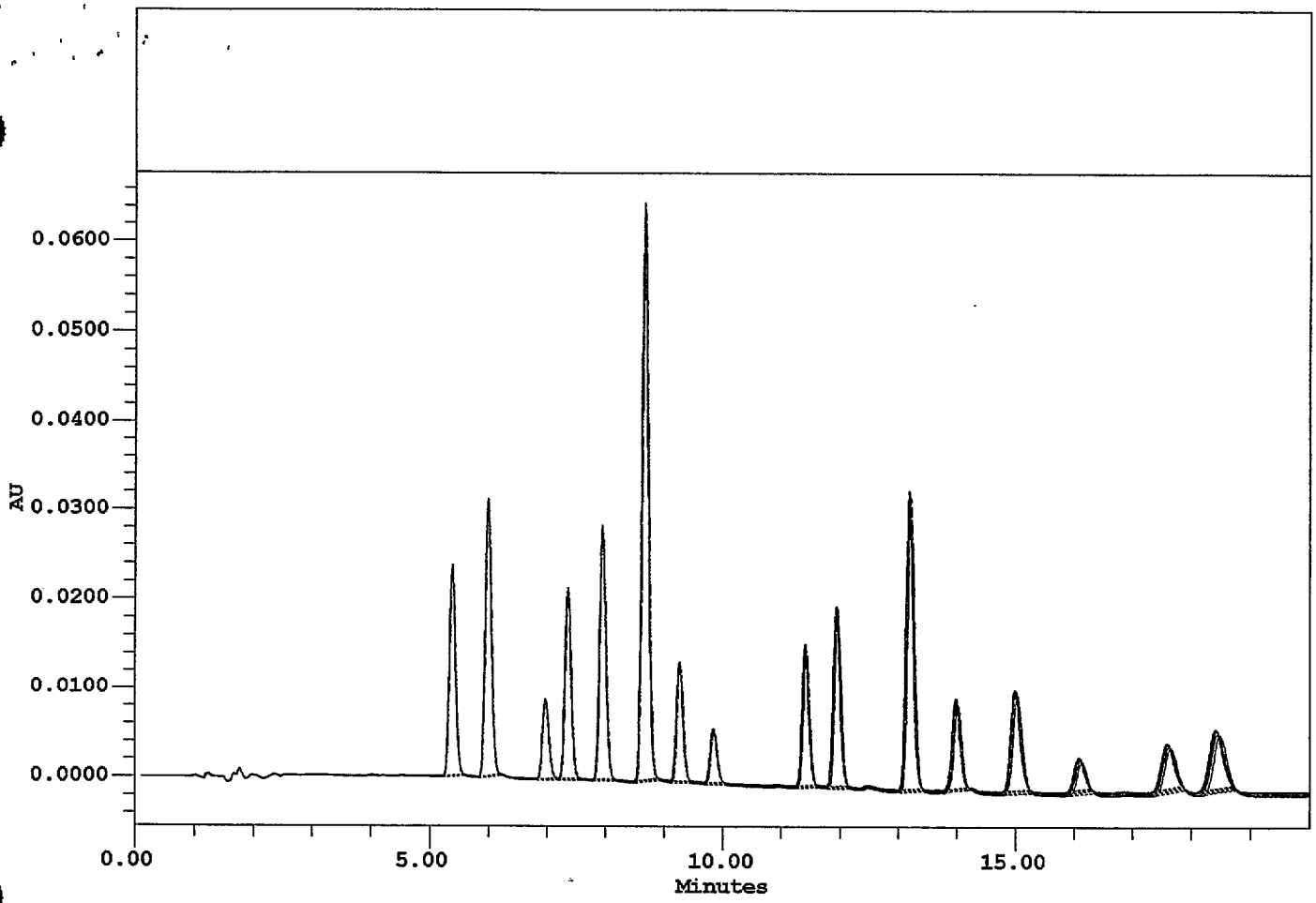
Project Name:	PAH_2690	Sample Type:	Unknown
Vial:	2	Volume (uL):	7.00
Injection:	6	Run Time:	25.0 min
Channel:	996	Date Processed:	06/03/96 01:22:59 PM
Date Acquired:	06/01/96 04:58:48 PM	Dilution:	1.00000
Processing Method:	Stu_PAH01		

SampleName: PAH Std (.075-3mL)-7uL Channel Name: 254nm
Comments: Supelco PAH-4.6X150mm-1.0mL/min-Waters Grad-30C



Peak Results

#	Name	Ret Time (min)	Area (uV*sec)	Height (uV)
1	Napthalene	5.392	171150	23645
2	Acenaphthylene	5.992	228136	30757
3	Acenapthene	6.975	67499	8988
4	Fluorene	7.358	156355	21403
5	Phenanthrene	7.958	211243	28057
6	Anthracene	8.675	480409	63809
7	Fluoranthene	9.275	101255	13426
8	Pyrene	9.858	46501	5956
9	Benzo(a)anthracene	11.425	121331	15848
10	Chrysene	11.958	159384	20216
11	Benzo(b)fluoranthene	13.208	275474	32991
12	Benzo(k)fluoranthene	14.008	92167	9956
13	Benzo(a)pyrene	15.008	123343	11248
14	Dibenzo(a,h)anthracene	16.108	39024	3504
15	Benzo(g,h,i)perylene	17.608	70169	4994
16	Indeno(1,2,3-cd)pyrene	18.442	100121	6478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Minutes

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Acenaphthylene	254nm	PAH Std (.075-3mL)-7uL	6.000
2	Acenaphthylene	254nm	PAH Std (.075-3mL)-7uL	5.992
3	Acenaphthylene	254nm	PAH Std (.075-3mL)-7uL	5.987
4	Acenaphthylene	254nm	PAH Std (.075-3mL)-7uL	5.992
5	Acenaphthylene	254nm	PAH Std (.075-3mL)-7uL	5.993
6	Acenaphthylene	254nm	PAH Std (.075-3mL)-7uL	5.997

-- Peak Results Summary --

RT Min: 5.987 min
RT Max: 6.000 min
RT Average: 5.994 +/- 0.0045 min
RT Std. Deviation: 0.0045 min
RT %RSD: 0.075

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Acenapthene	254nm	PAH Std (.075-3mL)-7uL	6.983
2	Acenapthene	254nm	PAH Std (.075-3mL)-7uL	6.975
3	Acenapthene	254nm	PAH Std (.075-3mL)-7uL	6.977
4	Acenapthene	254nm	PAH Std (.075-3mL)-7uL	6.975
5	Acenapthene	254nm	PAH Std (.075-3mL)-7uL	6.970
6	Acenapthene	254nm	PAH Std (.075-3mL)-7uL	6.963

-- Peak Results Summary --

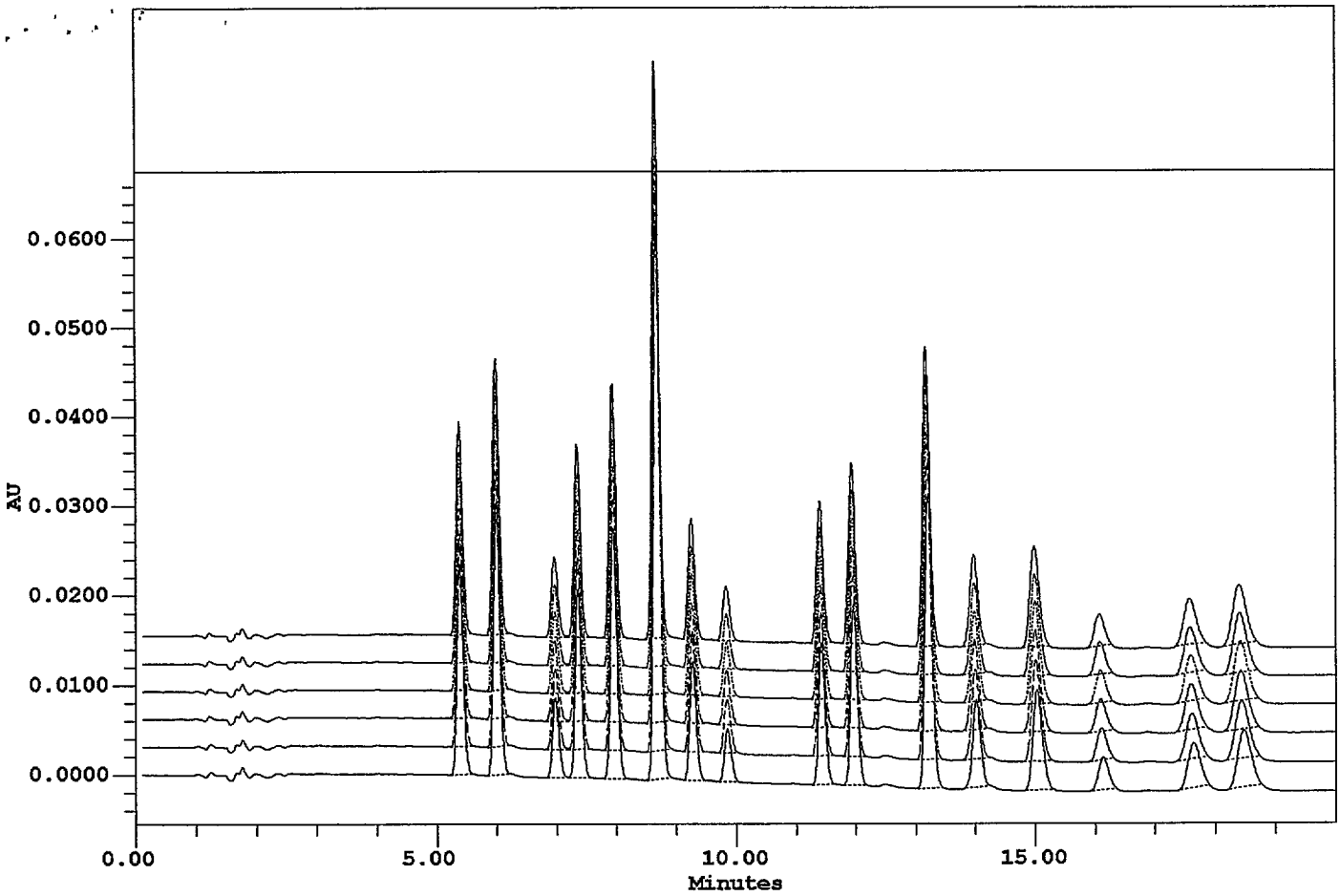
RT Min: 6.963 min
RT Max: 6.983 min
RT Average: 6.974 +/- 0.0068 min
RT Std. Deviation: 0.0068 min
RT %RSD: 0.097

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Anthracene	254nm	PAH Std (.075-3mL)-7uL	8.683
2	Anthracene	254nm	PAH Std (.075-3mL)-7uL	8.675
3	Anthracene	254nm	PAH Std (.075-3mL)-7uL	8.675
4	Anthracene	254nm	PAH Std (.075-3mL)-7uL	8.670
5	Anthracene	254nm	PAH Std (.075-3mL)-7uL	8.677
6	Anthracene	254nm	PAH Std (.075-3mL)-7uL	8.663

-- Peak Results Summary --

RT Min: 8.663 min
RT Max: 8.683 min
RT Average: 8.674 +/- 0.0068 min
RT Std. Deviation: 0.0068 min
RT %RSD: 0.078



Samples

#	Sample Name	Channel	Channel Name	Date Processed
1	PAH Std (.075-3mL)-7uL	996	254nm	06/03/96 01:22:01 PM
2	PAH Std (.075-3mL)-7uL	996	254nm	06/03/96 01:22:59 PM
3	PAH Std (.075-3mL)-7uL	996	254nm	06/03/96 01:24:20 PM
4	PAH Std (.075-3mL)-7uL	996	254nm	06/03/96 01:25:32 PM
5	PAH Std (.075-3mL)-7uL	996	254nm	06/03/96 01:26:59 PM
6	PAH Std (.075-3mL)-7uL	996	254nm	06/03/96 01:27:41 PM

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Benzo(a)anthracene	254nm	PAH Std (.075-3mL)-7uL	11.433
2	Benzo(a)anthracene	254nm	PAH Std (.075-3mL)-7uL	11.425
3	Benzo(a)anthracene	254nm	PAH Std (.075-3mL)-7uL	11.397
4	Benzo(a)anthracene	254nm	PAH Std (.075-3mL)-7uL	11.420
5	Benzo(a)anthracene	254nm	PAH Std (.075-3mL)-7uL	11.408
6	Benzo(a)anthracene	254nm	PAH Std (.075-3mL)-7uL	11.410

-- Peak Results Summary --

RT Min: 11.397 min
RT Max: 11.433 min
RT Average: 11.416 +/- 0.0130 min
RT Std. Deviation: 0.0130 min
RT %RSD: 0.114

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Benzo(a)pyrene	254nm	PAH Std (.075-3mL)-7uL	15.033
2	Benzo(a)pyrene	254nm	PAH Std (.075-3mL)-7uL	14.997
3	Benzo(a)pyrene	254nm	PAH Std (.075-3mL)-7uL	14.992
4	Benzo(a)pyrene	254nm	PAH Std (.075-3mL)-7uL	15.003
5	Benzo(a)pyrene	254nm	PAH Std (.075-3mL)-7uL	15.010
6	Benzo(a)pyrene	254nm	PAH Std (.075-3mL)-7uL	15.008

-- Peak Results Summary --

RT Min: 14.992 min
RT Max: 15.033 min
RT Average: 15.007 +/- 0.0143 min
RT Std. Deviation: 0.0143 min
RT %RSD: 0.095

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Benzo(b)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.217
2	Benzo(b)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.180
3	Benzo(b)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.192
4	Benzo(b)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.187
5	Benzo(b)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.193
6	Benzo(b)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.208

-- Peak Results Summary --

RT Min: 13.180 min
RT Max: 13.217 min
RT Average: 13.196 +/- 0.0138 min
RT Std. Deviation: 0.0138 min
RT %RSD: 0.104

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Benzo(g,h,i)perylene	254nm	PAH Std (.075-3mL)-7uL	17.650
2	Benzo(g,h,i)perylene	254nm	PAH Std (.075-3mL)-7uL	17.580
3	Benzo(g,h,i)perylene	254nm	PAH Std (.075-3mL)-7uL	17.592
4	Benzo(g,h,i)perylene	254nm	PAH Std (.075-3mL)-7uL	17.608
5	Benzo(g,h,i)perylene	254nm	PAH Std (.075-3mL)-7uL	17.603
6	Benzo(g,h,i)perylene	254nm	PAH Std (.075-3mL)-7uL	17.610

-- Peak Results Summary --

RT Min: 17.580 min
RT Max: 17.650 min
RT Average: 17.607 +/- 0.0238 min
RT Std. Deviation: 0.0238 min
RT %RSD: 0.135

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Benzo(k)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	14.017
2	Benzo(k)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.980
3	Benzo(k)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.992
4	Benzo(k)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.987
5	Benzo(k)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	13.993
6	Benzo(k)fluoranthene	254nm	PAH Std (.075-3mL)-7uL	14.008

-- Peak Results Summary --

RT Min: 13.980 min
RT Max: 14.017 min
RT Average: 13.996 +/- 0.0138 min
RT Std. Deviation: 0.0138 min
RT %RSD: 0.098

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Chrysene	254nm	PAH Std (.075-3mL)-7uL	11.967
2	Chrysene	254nm	PAH Std (.075-3mL)-7uL	11.930
3	Chrysene	254nm	PAH Std (.075-3mL)-7uL	11.942
4	Chrysene	254nm	PAH Std (.075-3mL)-7uL	11.953
5	Chrysene	254nm	PAH Std (.075-3mL)-7uL	11.943
6	Chrysene	254nm	PAH Std (.075-3mL)-7uL	11.958

-- Peak Results Summary --

RT Min: 11.930 min
RT Max: 11.967 min
RT Average: 11.949 +/- 0.0132 min
RT Std. Deviation: 0.0132 min
RT %RSD: 0.110

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Dibenzo(a,h)anthracene	254nm	PAH Std (.075-3mL)-7uL	16.133
2	Dibenzo(a,h)anthracene	254nm	PAH Std (.075-3mL)-7uL	16.108
3	Dibenzo(a,h)anthracene	254nm	PAH Std (.075-3mL)-7uL	16.103
4	Dibenzo(a,h)anthracene	254nm	PAH Std (.075-3mL)-7uL	16.080
5	Dibenzo(a,h)anthracene	254nm	PAH Std (.075-3mL)-7uL	16.092
6	Dibenzo(a,h)anthracene	254nm	PAH Std (.075-3mL)-7uL	16.093

-- Peak Results Summary --

RT Min: 16.080 min
RT Max: 16.133 min
RT Average: 16.102 +/- 0.0182 min
RT Std. Deviation: 0.0182 min
RT %RSD: 0.113

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Fluoranthene	254nm	PAH Std (.075-3mL)-7uL	9.283
2	Fluoranthene	254nm	PAH Std (.075-3mL)-7uL	9.263
3	Fluoranthene	254nm	PAH Std (.075-3mL)-7uL	9.258
4	Fluoranthene	254nm	PAH Std (.075-3mL)-7uL	9.270
5	Fluoranthene	254nm	PAH Std (.075-3mL)-7uL	9.260
6	Fluoranthene	254nm	PAH Std (.075-3mL)-7uL	9.275

-- Peak Results Summary --

RT Min: 9.258 min
RT Max: 9.283 min
RT Average: 9.268 +/- 0.0097 min
RT Std. Deviation: 0.0097 min
RT %RSD: 0.104

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Fluorene	254nm	PAH Std (.075-3mL)-7uL	7.367
2	Fluorene	254nm	PAH Std (.075-3mL)-7uL	7.347
3	Fluorene	254nm	PAH Std (.075-3mL)-7uL	7.358
4	Fluorene	254nm	PAH Std (.075-3mL)-7uL	7.353
5	Fluorene	254nm	PAH Std (.075-3mL)-7uL	7.360
6	Fluorene	254nm	PAH Std (.075-3mL)-7uL	7.358

-- Peak Results Summary --

RT Min: 7.347 min
RT Max: 7.367 min
RT Average: 7.357 +/- 0.0067 min
RT Std. Deviation: 0.0067 min
RT %RSD: 0.092

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Indeno(1,2,3-cd)pyrene	254nm	PAH Std (.075-3mL)-7uL	18.483
2	Indeno(1,2,3-cd)pyrene	254nm	PAH Std (.075-3mL)-7uL	18.397
3	Indeno(1,2,3-cd)pyrene	254nm	PAH Std (.075-3mL)-7uL	18.408
4	Indeno(1,2,3-cd)pyrene	254nm	PAH Std (.075-3mL)-7uL	18.420
5	Indeno(1,2,3-cd)pyrene	254nm	PAH Std (.075-3mL)-7uL	18.427
6	Indeno(1,2,3-cd)pyrene	254nm	PAH Std (.075-3mL)-7uL	18.442

-- Peak Results Summary --

RT Min: 18.397 min
RT Max: 18.483 min
RT Average: 18.430 +/- 0.0304 min
RT Std. Deviation: 0.0304 min
RT %RSD: 0.165

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Napthalene	254nm	PAH Std (.075-3mL)-7uL	5.383
2	Napthalene	254nm	PAH Std (.075-3mL)-7uL	5.380
3	Napthalene	254nm	PAH Std (.075-3mL)-7uL	5.392
4	Napthalene	254nm	PAH Std (.075-3mL)-7uL	5.387
5	Napthalene	254nm	PAH Std (.075-3mL)-7uL	5.393
6	Napthalene	254nm	PAH Std (.075-3mL)-7uL	5.392

-- Peak Results Summary --

RT Min: 5.380 min
RT Max: 5.393 min
RT Average: 5.388 +/- 0.0054 min
RT Std. Deviation: 0.0054 min
RT %RSD: 0.101

Peak Results

#	Name	Channel Name	SampleName	RT (min)
1	Phenanthrene	254nm	PAH Std (.075-3mL)-7uL	7.950
2	Phenanthrene	254nm	PAH Std (.075-3mL)-7uL	7.947
3	Phenanthrene	254nm	PAH Std (.075-3mL)-7uL	7.942
4	Phenanthrene	254nm	PAH Std (.075-3mL)-7uL	7.958
5	Phenanthrene	254nm	PAH Std (.075-3mL)-7uL	7.953
6	Phenanthrene	254nm	PAH Std (.075-3mL)-7uL	7.943

-- Peak Results Summary --

RT Min: 7.942 min
RT Max: 7.958 min
RT Average: 7.949 +/- 0.0061 min
RT Std. Deviation: 0.0061 min
RT %RSD: 0.077