

**APPENDIX C**  
**DISSOLUTION KINETICS EXPERIMENT**

**Table 1C Dissolution kinetics experiment samples – 3 days A**  
**Average groundwater PAH concentrations (µg/L or ppb)**

Sampling Event	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(b) fluoranthene	Total PAHs	Avg 3-Ring PAHs	Avg 4-Ring PAHs
1													
2	0.00	6.89	46.99	17.22	7.04	4.26	2.28	1.72	0.00	4.16	91	16	1
3	0.00	3.83	28.97	7.57	4.51	7.01	2.19	1.64	0.00	4.19	60	10	1
4	0.00	5.56	49.59	21.85	12.26	8.57	2.49	1.85	0.00	4.76	107	20	1
5	0.00	7.94	62.68	31.25	21.34	7.02	2.88	2.20	0.00	4.84	140	26	2
6	0.00	9.25	65.22	32.40	25.70	7.03	3.00	2.98	0.00	4.81	150	28	2
7	0.00	8.11	58.75	28.81	22.07	6.68	2.85	2.13	0.00	5.04	134	25	2
8	0.00	5.87	48.52	24.39	17.50	6.22	2.76	2.08	0.00	4.74	112	20	2
9	0.00	7.31	51.71	25.13	21.25	6.15	2.67	2.10	0.00	4.49	121	22	2
10	0.00	6.33	38.62	19.60	16.54	5.25	2.56	1.97	0.00	4.31	95	17	2
11	0.00	8.39	43.11	26.16	21.24	10.32	7.96	5.41	13.09	13.76	149	22	9
12	0.00	14.80	81.78	49.37	39.64	15.22	8.96	5.94	0.00	15.93	232	40	5
13	48.40	14.38	61.03	34.89	30.88	13.43	<b>77.38</b>	<b>70.285</b>	<b>51.86</b>	<b>53.93</b>	408	31	67
14	0.00	9.58	55.47	31.93	26.76	12.12	8.26	5.6412	13.24	14.29	177	27	9
15	410.07	12.20	66.35	36.90	29.60	12.73	8.30	5.6502	13.20	14.06	199	32	9
16	252.51	9.78	47.26	27.50	21.71	10.71	8.04	5.48	13.05	13.89	157	23	9
17	0.00	6.83	31.66	20.14	14.77	9.69	7.80	5.29	12.90	13.64	123	17	9
18	0.00	5.06	14.80	8.72	<b>2.73</b>	<b>2.39</b>	<b>0.00</b>	<b>0.00</b>	0.00	<b>3.55</b>	37	7	0
19	0.00	<b>0.00</b>	3.72	<b>2.70</b>	<b>0.07</b>	<b>0.99</b>	<b>0.00</b>	<b>0.00</b>	0.00	<b>0.00</b>	7	1	0
20	0.00	7.28	13.12	11.12	12.90	13.41	<b>0.00</b>	<b>0.00</b>	0.00	<b>24.80</b>	83	12	0
21	0.00	10.19	31.91	23.75	17.35	18.63	7.32	8.69	0.00	14.07	132	20	5
22	0.00	6.69	9.51	13.78	9.45	<b>5.34</b>	<b>0.00</b>	8.39	0.00	12.85	66	9	3
23	1.69	7.05	13.24	14.42	11.38	16.14	6.88	8.38	0.00	12.46	90	12	5
24	413.79	8.50	26.21	19.29	12.48	17.63	7.49	8.61	0.00	13.43	114	17	5
25	0.00	9.25	30.04	21.52	17.45	18.37	7.38	8.73	0.00	13.47	126	19	5
26	32.01	10.24	28.76	19.91	16.45	17.65	7.03	8.52	0.00	12.96	122	19	5
27	377.55	11.23	36.60	23.72	18.73	18.11	7.21	8.61	0.00	13.12	137	22	5
28	1033.57	15.50	70.90	42.58	33.84	22.03	8.02	9.31	0.00	13.88	216	37	6
29	875.99	13.33	56.24	34.22	27.61	20.81	7.76	8.87	0.00	12.86	182	30	6
30	1441.21	13.83	57.15	35.26	29.41	21.48	7.96	9.11	0.00	12.93	187	31	6

\*indicates outlier

**Table 2C Dissolution kinetics experiment samples - 3 days B**  
**Average groundwater PAH concentrations (µg/L or ppb)**

Sampling Event	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(b) fluoranthene	Total PAHs	Avg 3-Ring PAHs	Avg 4-Ring PAHs
1	0.00	7.97	68.58	21.59	14.14	8.98	4.41	3.06	2.19	4.32	135	24	3
2	41.13	11.43	79.90	34.36	27.32	10.21	4.15	2.82	4.55	4.16	179	33	4
3	0.00	10.79	96.05	45.68	38.42	13.70	5.21	3.63	4.72	4.54	223	41	5
4	0.00	10.03	93.97	44.93	37.93	13.05	5.23	3.65	4.64	4.86	218	40	5
5	0.00	12.22	105.34	51.24	45.31	13.84	5.59	3.85	4.91	4.35	247	46	5
6	0.00	14.26	104.61	50.62	47.80	13.81	5.59	3.97	4.68	4.92	250	46	5
7	0.00	12.98	100.83	49.21	45.95	13.55	5.45	3.80	4.93	4.64	241	45	5
8	0.00	10.84	106.85	51.65	45.12	13.96	5.37	3.70	5.01	4.54	247	46	5
9	0.00	10.84	94.76	46.56	42.71	12.99	5.09	3.50	4.95	4.13	226	42	5
10	0.00	13.77	98.14	54.32	47.45	17.60	10.65	7.02	13.78	14.28	277	46	10
11	0.00	11.99	70.39	40.01	34.57	14.58	9.66	6.49	13.51	13.81	215	34	10
12	5.72	15.69	93.05	51.75	46.11	17.05	10.52	7.05	13.58	14.38	269	45	10
13	0.00	13.60	96.59	53.02	47.18	17.95	10.59	7.08	13.96	14.15	274	46	11
14	4.92	15.13	92.55	50.13	44.91	16.49	10.52	7.12	14.05	14.36	265	44	11
15	895.55	19.95	117.85	63.14	55.78	19.44	10.98	7.37	14.04	14.25	323	55	11
16	359.30	17.07	93.02	52.17	47.49	17.76	10.54	7.00	14.07	14.18	273	46	11
17	0.00	<b>0.56</b>	44.88	22.46	17.73	<b>6.74</b>	<b>1.21</b>	<b>0.32</b>	0.00	<b>0.00</b>	94	18	1
18	0.00	<b>3.25</b>	52.06	26.55	20.31	<b>5.88</b>	<b>0.50</b>	<b>0.00</b>	0.00	<b>0.00</b>	109	22	0
19	0.00	9.25	41.94	29.25	23.69	16.64	10.10	<b>3.39</b>	0.00	<b>24.76</b>	159	24	4
20	0.00	10.70	56.29	35.82	29.20	17.11	7.50	6.58	0.00	<b>25.54</b>	189	30	5
21	0.00	8.35	22.30	18.76	15.73	18.90	7.23	8.68	0.00	12.91	113	17	5
22	0.00	8.37	23.61	19.01	15.34	17.67	7.29	8.68	0.00	12.91	113	17	5
23	28.81	7.95	19.64	17.20	14.18	16.97	7.15	8.57	0.00	12.76	104	15	5
24	0.00	11.49	56.39	36.21	29.69	21.04	9.12	9.56	0.00	13.60	187	31	6
25	155.92	12.68	46.16	29.28	25.85	20.41	7.93	9.03	0.00	13.31	165	27	6
26	1028.84	24.17	120.24	64.21	51.55	24.73	9.97	9.99	0.00	13.89	319	57	7
27	652.43	11.92	42.62	28.15	23.87	19.52	7.86	8.95	0.00	12.70	156	25	6
28	2699.59	21.54	112.36	64.22	54.84	28.29	9.92	10.53	0.00	13.69	315	56	7
29	2218.64	17.99	85.95	51.26	47.80	25.66	9.87	10.35	0.00	13.36	262	46	7
30	2977.66	20.11	101.95	58.68	49.67	26.04	9.41	10.10	0.00	13.82	290	51	7

\*indicates outlier

**Table 3C Dissolution kinetics experiment samples - 6 days A**  
**Average groundwater PAH concentrations (µg/L or ppb)**

Sampling Event	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(b) fluoranthene	Total PAHs	Avg 3-Ring PAHs	Avg 4-Ring PAHs
1	537.39	17.02	94.24	45.97	24.95	8.89	2.83	2.08	4.45	4.33	205	38	3
2	0.00	13.91	92.54	44.02	30.20	11.42	3.26	2.20	4.29	4.28	206	38	3
3	0.00	15.43	110.39	52.50	39.97	13.47	3.51	2.40	4.31	4.52	247	46	3
4	0.00	10.73	90.77	44.54	36.54	12.19	3.51	2.43	4.31	4.46	209	39	3
5	187.46	18.54	101.68	56.91	45.80	17.21	9.32	6.0457	13.72	14.11	283	48	10
6	0.00	13.50	83.29	47.15	34.71	15.90	9.04	5.9971	13.44	13.89	237	39	9
7	14.16	13.22	77.38	44.23	35.82	15.09	8.82	5.904	13.66	13.85	228	37	9
8	933.40	15.17	76.33	42.91	34.29	14.44	8.74	5.81	13.29	13.72	225	37	9
9	0.00	<b>2.53</b>	46.48	26.70	16.91	<b>6.12</b>	<b>0.13</b>	<b>0.00</b>	0.00	<b>0.00</b>	99	20	0
10	0.00	10.15	41.29	29.08	24.49	16.55	9.70	9.13	0.00	<b>25.62</b>	166	24	6
11	0.00	10.00	31.22	22.21	19.03	18.51	7.24	8.70	0.00	12.75	130	20	5
12	269.96	15.29	66.22	40.42	34.92	22.29	8.43	9.30	0.00	13.52	210	36	6
13	1366.96	20.12	88.73	48.39	40.25	24.75	8.47	9.24	0.00	13.15	253	44	6
14	2627.43	22.15	107.80	62.20	50.75	26.92	8.85	9.64	0.00	13.51	302	54	6
15	3986.08	25.67	135.32	76.01	62.83	30.95	9.84	10.11	0.00	13.67	364	66	7
16	3805.59	22.80	117.61	66.73	58.52	30.01	9.86	10.40	0.00	13.51	329	59	7

*\*indicates outlier*

**Table 4C Dissolution kinetics experiment samples - 6 days B**  
**Average groundwater PAH concentrations (µg/L or ppb)**

Sampling Event	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(b) fluoranthene	Total PAHs	Avg 3-Ring PAHs	Avg 4-Ring PAHs
1	1662.83	23.18	131.93	61.41	42.78	9.26	4.29	3.19	2.86	4.74	284	54	3
2	3.88	18.44	133.22	59.61	47.12	12.80	4.65	3.33	4.95	4.98	289	54	4
3	0.00	8.69	87.50	34.81	29.09	10.21	3.76	2.65	4.82	4.45	186	34	4
4	0.00	11.46	85.74	43.14	34.75	14.85	9.45	6.22	13.64	14.10	233	38	10
5	0.00	8.96	97.04	47.97	36.08	16.25	9.80	6.52	13.91	14.20	251	41	10
6	3.69	19.57	124.95	65.73	58.21	18.62	10.34	6.94	14.35	14.10	333	57	11
7	0.00	<b>2.18</b>	45.37	23.88	17.06	<b>4.58</b>	<b>0.19</b>	<b>0.00</b>	0.00	<b>0.00</b>	93	19	0
8	0.00	16.89	97.44	62.36	55.77	22.14	11.52	10.03	0.00	<b>26.35</b>	303	51	7
9	85.06	8.88	22.87	19.58	16.04	17.78	7.06	8.52	0.00	12.65	113	17	5
10	207.53	9.95	28.46	22.41	18.92	18.40	7.20	8.61	0.00	12.74	127	20	5
11	401.19	14.64	56.71	36.36	31.13	20.83	8.06	9.07	0.00	13.28	190	32	6
12	2152.86	19.92	94.62	53.99	46.94	24.22	8.76	9.73	0.00	13.43	272	48	6
13	1881.93	13.99	58.77	37.64	32.44	20.79	7.99	9.19	0.00	13.34	194	33	6
14	3613.43	22.77	129.75	75.13	63.70	28.65	9.59	10.06	0.00	13.58	353	64	7

*\*indicates outlier*

**Table 5C Dissolution kinetics experiment - 12 days A**  
**Average groundwater PAH concentrations (µg/L or ppb)**

Sampling Event	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(b) fluoranthene	Total PAHs	Avg 3-Ring PAHs	Avg 4-Ring PAHs
1	1227.34	24.86	131.64	68.30	43.86	15.97	3.99	2.64	4.95	4.47	301	57	4
2	1216.31	26.45	156.04	78.46	59.14	19.39	4.90	3.04	4.68	4.92	357	68	4
3	1120.50	20.91	113.00	64.68	49.14	19.82	9.55	6.19	13.34	13.69	310	54	10
4	2301.63	24.78	138.87	72.32	63.71	23.70	10.74	6.95	13.74	14.49	369	65	10
5	537.47	14.80	63.75	39.41	33.93	17.70	10.04	9.34	0.00	<b>25.12</b>	214	34	6
6	2375.96	23.46	116.74	65.97	57.27	29.30	9.72	9.96	0.00	13.46	326	59	7
7	5140.00	31.36	178.05	99.13	79.31	36.62	10.44	10.59	0.00	13.71	459	85	7
8	4011.50	24.16	136.75	79.28	68.08	32.61	10.51	10.85	0.00	13.28	376	68	7

*\*indicates outlier*

**Table 6C Dissolution kinetics experiment - 12 days B**  
**Average groundwater PAH concentrations (µg/L or ppb)**

Sampling Event	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(b) fluoranthene	Total PAHs	Avg 3-Ring PAHs	Avg 4-Ring PAHs
1	2127.15	33.70	190.82	92.71	89.21	16.15	9.52	6.62	5.42	4.75	449	85	7
2	700.48	13.70	109.36	54.64	43.29	16.62	10.21	6.67	13.56	14.16	282	48	10
3	2419.11	21.45	129.13	69.34	62.92	19.62	10.73	7.25	14.42	13.90	349	60	11
4	607.34	12.45	60.19	41.33	34.91	17.47	10.14	9.32	0.00	<b>25.00</b>	211	33	6
5	2969.36	22.18	118.26	70.11	62.17	27.12	10.09	10.33	0.00	13.31	334	60	7
6	4607.05	23.68	135.80	79.95	71.48	29.23	11.34	11.91	0.00	14.12	377	68	8
7	5588.58	26.07	162.79	93.90	84.34	31.54	11.52	11.51	0.00	13.41	435	80	8

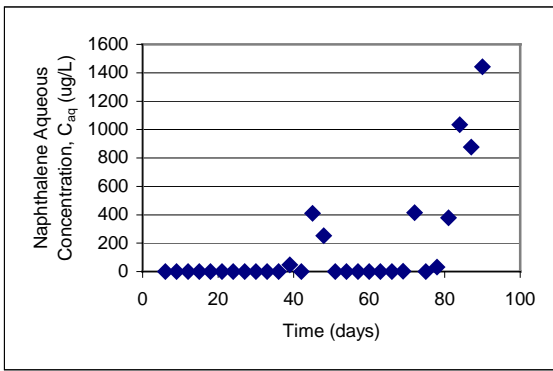
*\*indicates outlier*

**Table 7C Dissolution kinetics experiment samples - control A**  
**Average groundwater PAH concentrations (µg/L or ppb)**

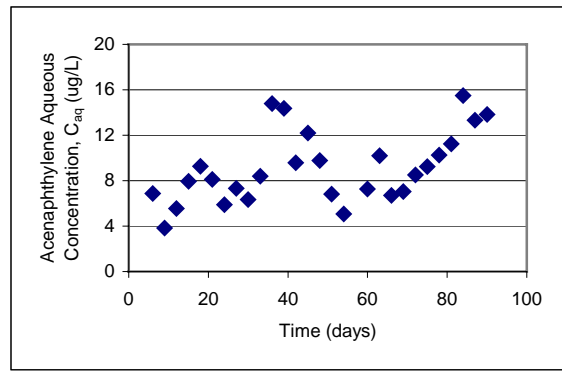
Sampling Event	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(b) fluoranthene	Total PAHs	Avg 3-Ring PAHs	Avg 4-Ring PAHs
1	0.00	4.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.20	10	1	0
2	0.00	3.69	0.00	0.00	0.00	0.00	0.00	1.32	0.00	4.34	9	1	0
3	0.00	7.50	0.00	0.00	1.53	2.51	7.24	6.58	18.23	23.17	67	2	11
4	0.00	5.92	0.00	0.00	0.00	0.00	2.40	0.00	0.00	13.53	22	1	1
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.22	25	0	0
6	0.00	6.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.15	20	1	0
7	0.00	7.24	0.00	0.00	0.00	0.00	0.00	5.73	0.00	13.79	27	1	2
8	0.00	6.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.41	20	1	0

**Table 8C Dissolution kinetics experiment samples - control B**  
**Average groundwater PAH concentrations (µg/L or ppb)**

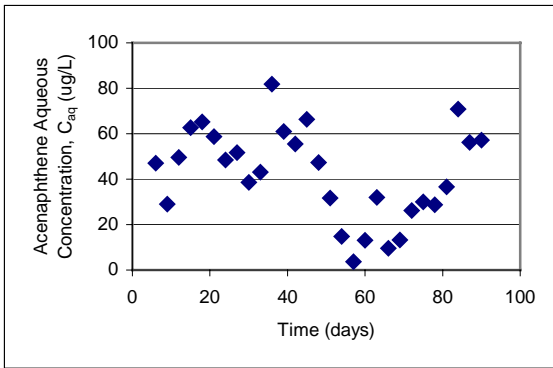
Sampling Event	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Chrysene	Benzo(b) fluoranthene	Total PAHs	Avg 3-Ring PAHs	Avg 4-Ring PAHs
1	0.00	3.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.55	9	1	0
2	0.00	6.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.38	21	1	0
3	0.00	6.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.10	21	1	0
4	0.00	7.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.50	33	2	0
5	0.00	7.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.56	21	1	0
6	0.00	7.34	0.00	0.00	0.00	0.00	0.00	5.68	0.00	13.71	27	1	2
7	1.61	6.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.28	20	1	0



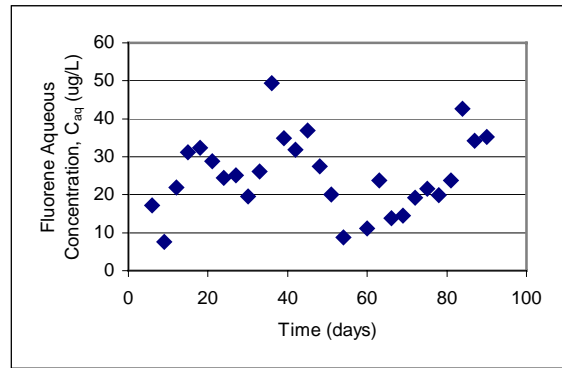
**Naphthalene**



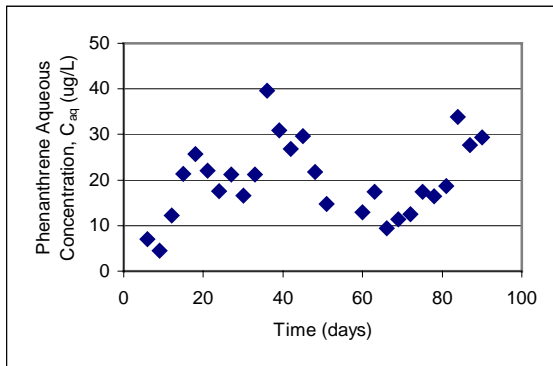
**Acenaphthylene**



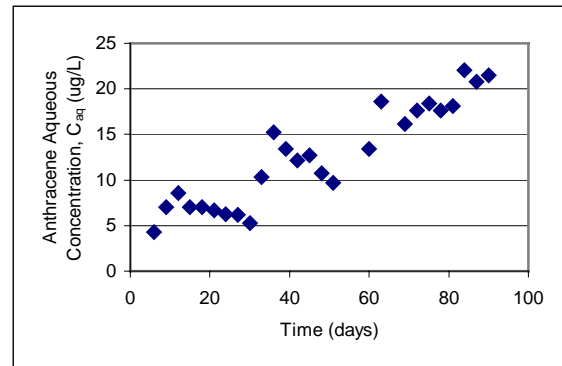
**Acenaphthene**



**Fluorene**



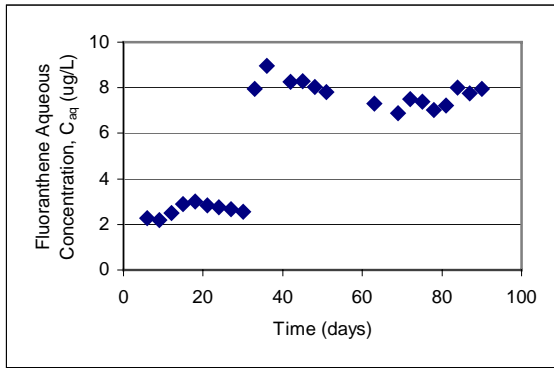
**Phenanthrene**



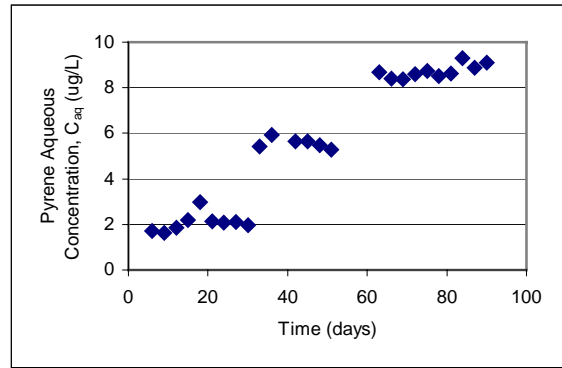
**Anthracene**

**Figure 1C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 3 days A**

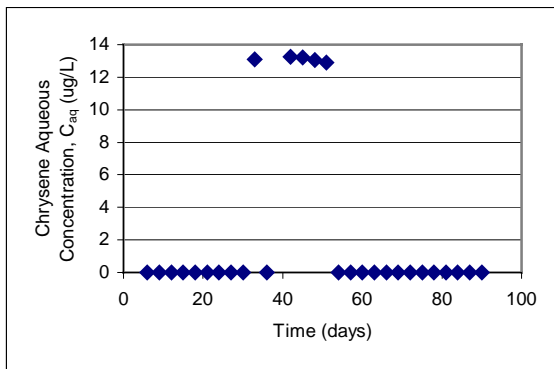




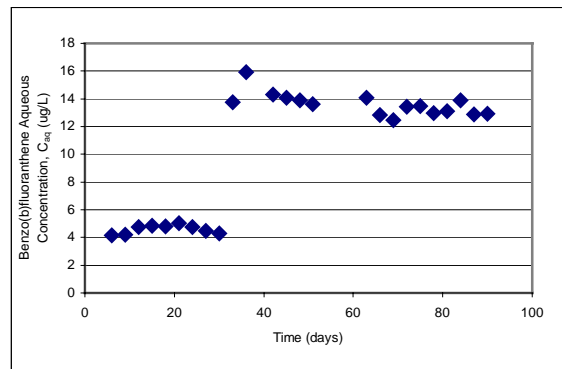
**Fluoranthene**



**Pyrene**

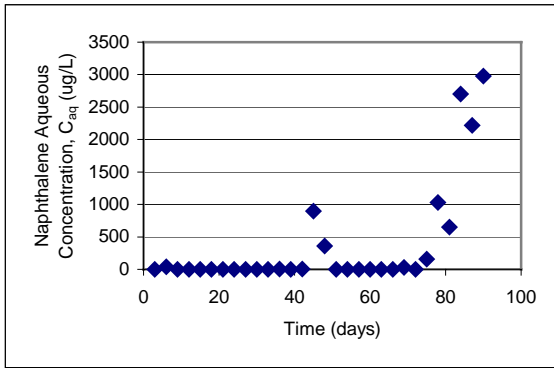


**Chrysene**

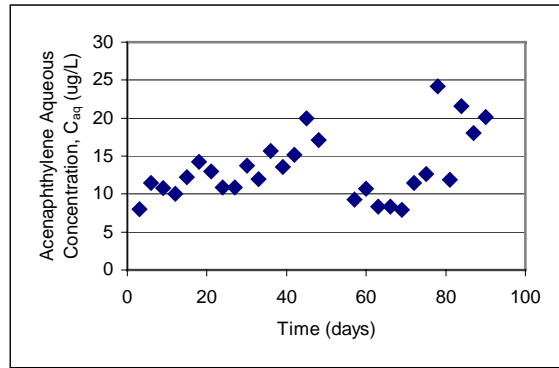


**Benzo(b)fluoranthene**

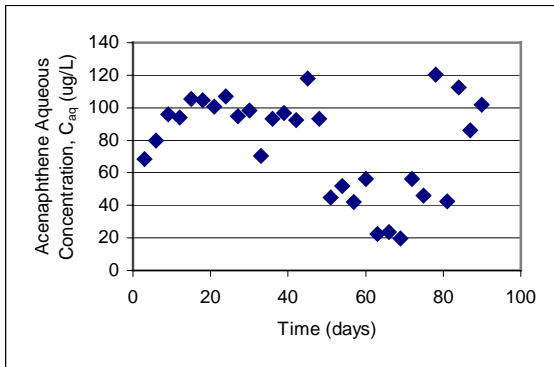
**Figure 2C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 3 days A**



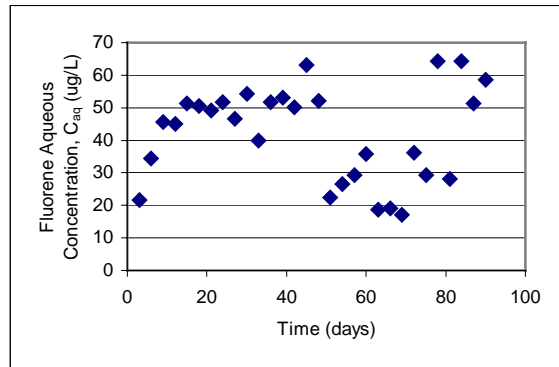
**Naphthalene**



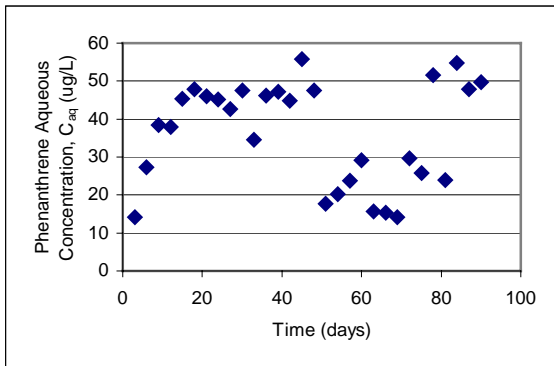
**Acenaphthylene**



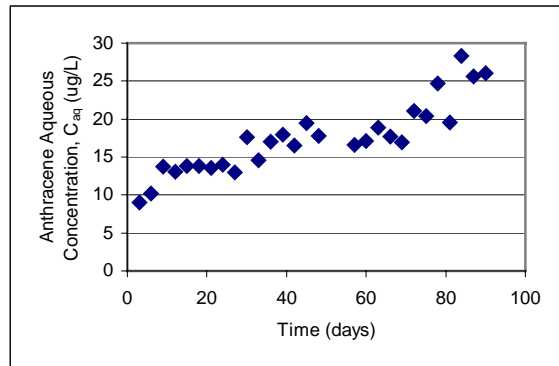
**Acenaphthene**



**Fluorene**

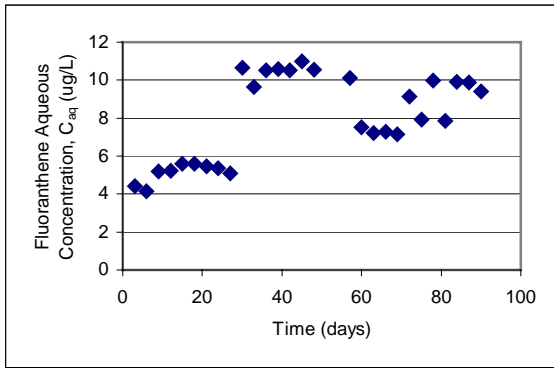


**Phenanthrene**

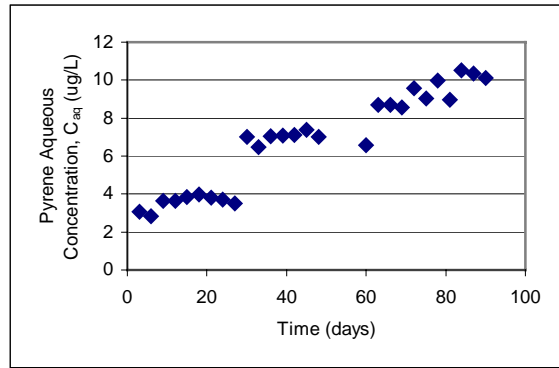


**Anthracene**

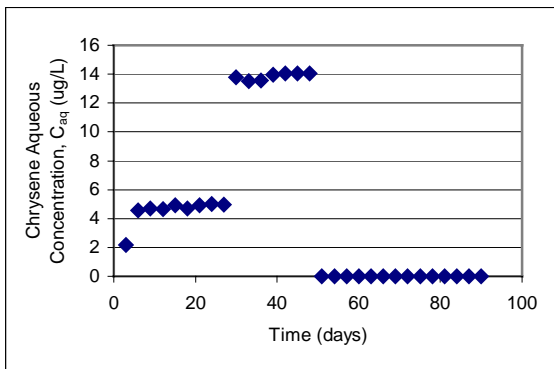
**Figure 3C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 3 days B**



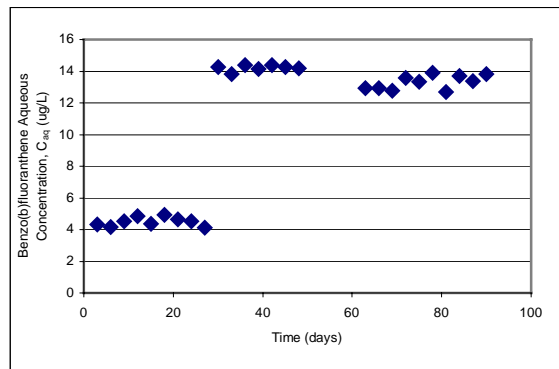
**Fluoranthene**



**Pyrene**

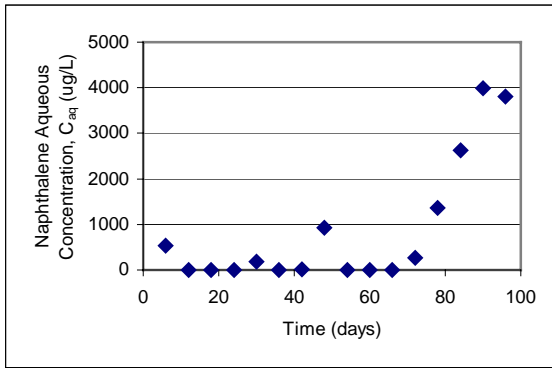


**Chrysene**

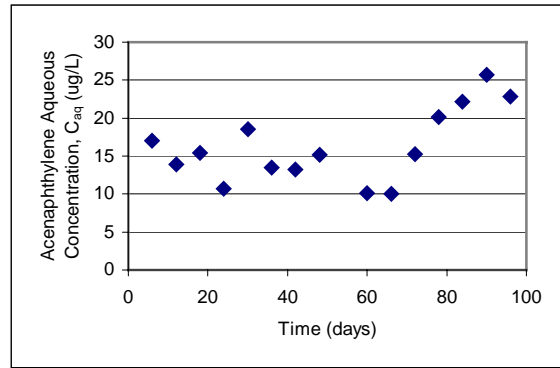


**Benzo(b)fluoranthene**

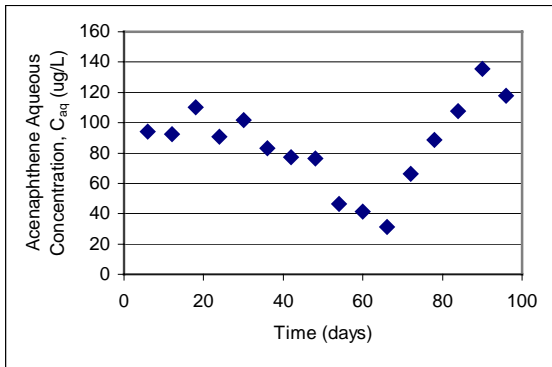
**Figure 4C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 3 days B**



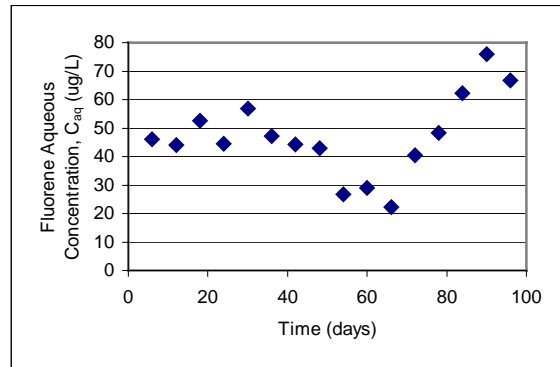
**Naphthalene**



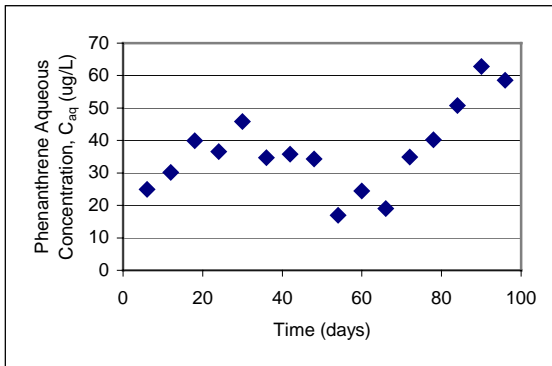
**Acenaphthylene**



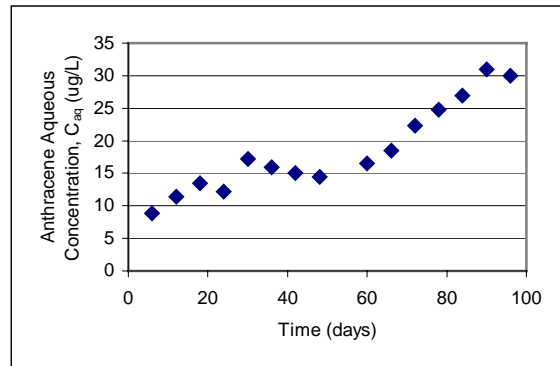
**Acenaphthene**



**Fluorene**

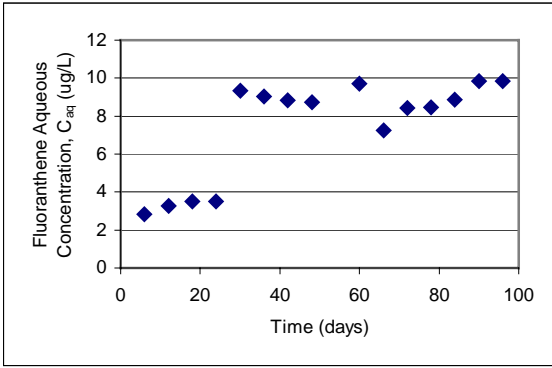


**Phenanthrene**

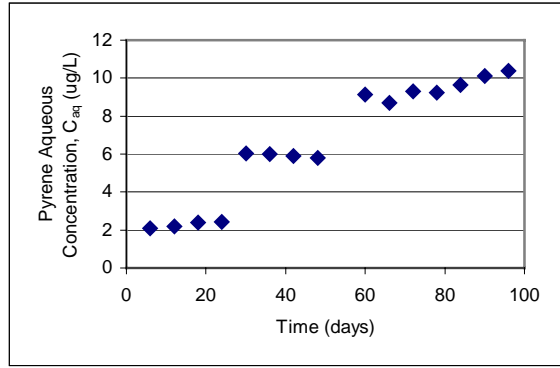


**Anthracene**

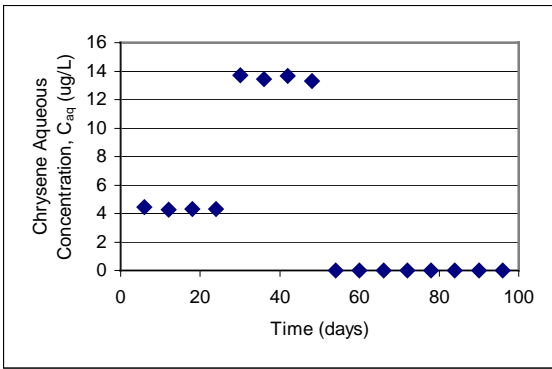
**Figure 5C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 6 days A**



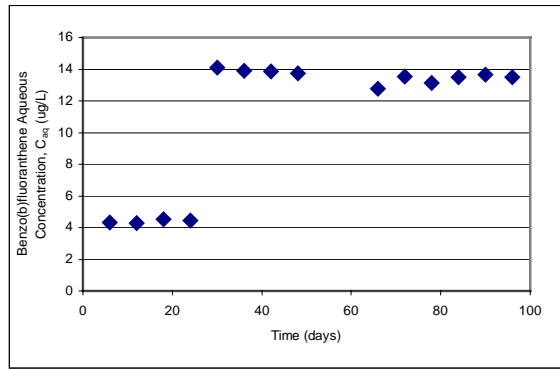
**Fluoranthene**



**Pyrene**

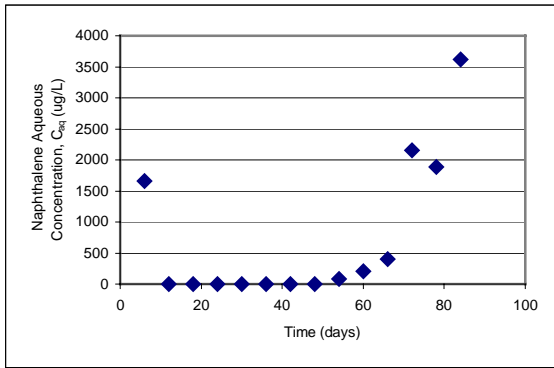


**Chrysene**

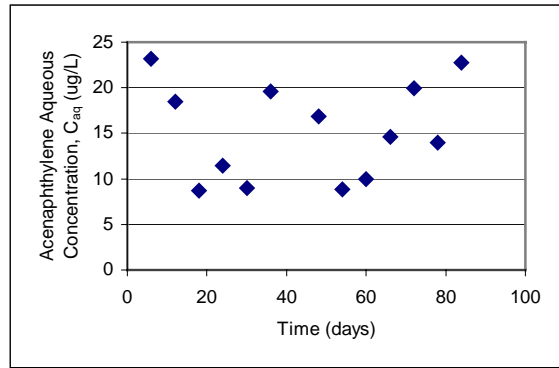


**Benzo(b)fluoranthene**

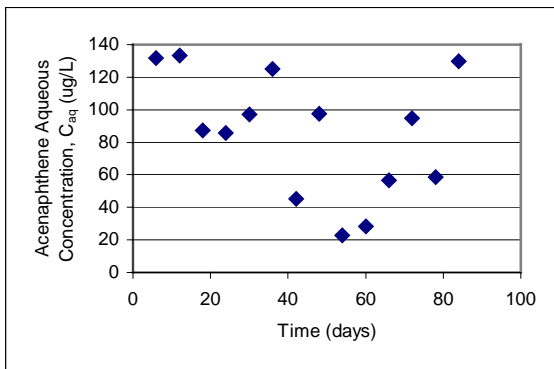
**Figure 6C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 6 days A**



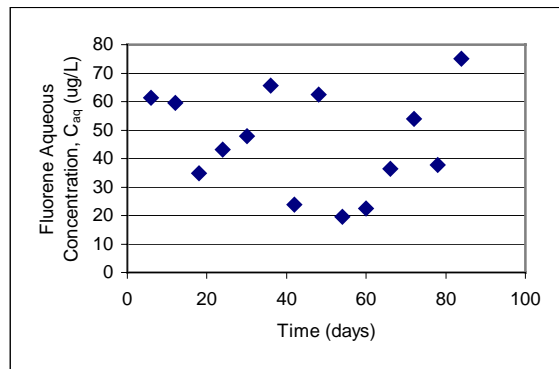
**Naphthalene**



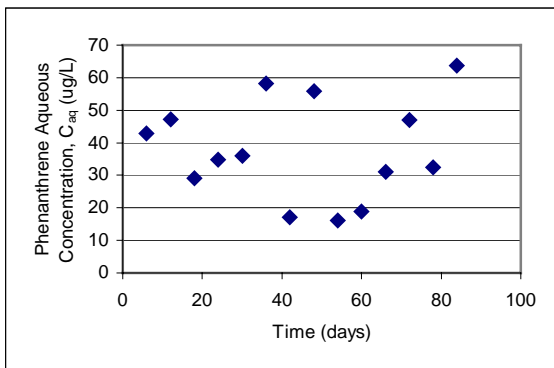
**Acenaphthylene**



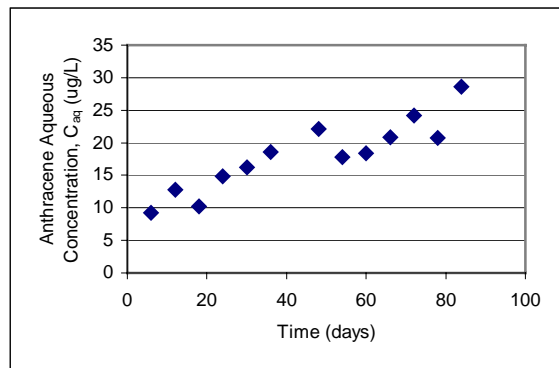
**Acenaphthene**



**Fluorene**

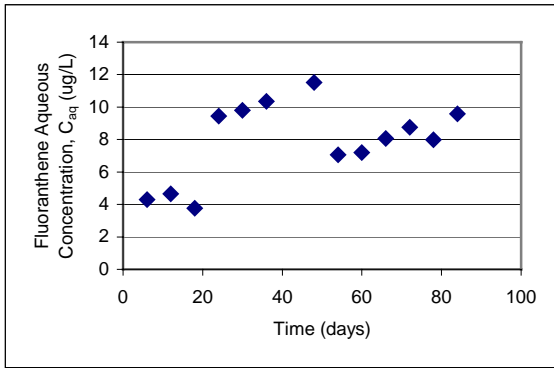


**Phenanthrene**

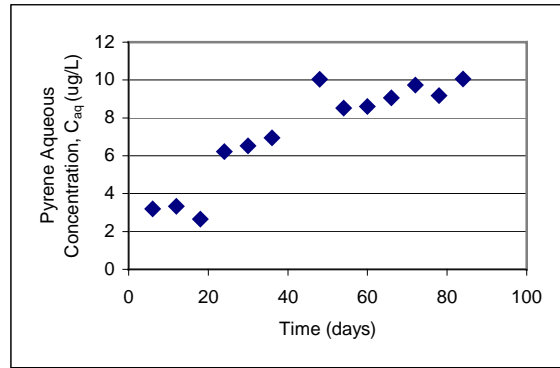


**Anthracene**

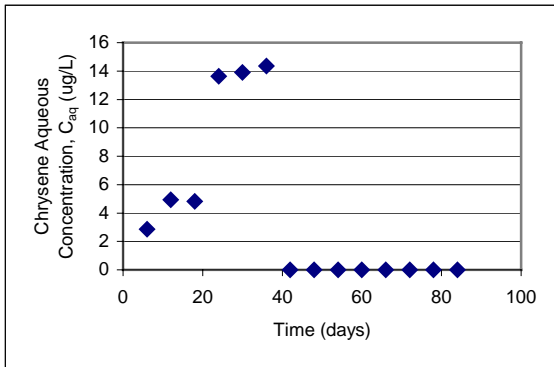
**Figure 7C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 6 days B**



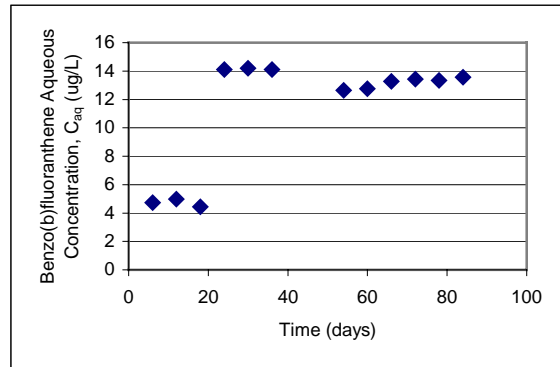
**Fluoranthene**



**Pyrene**

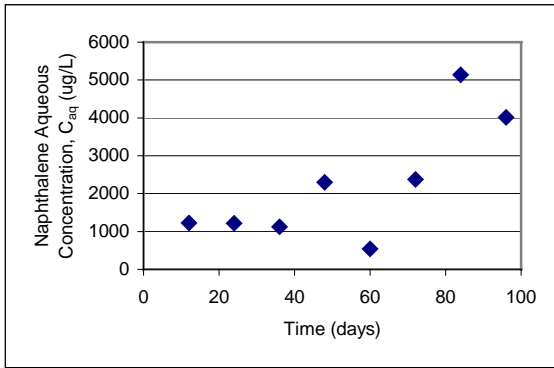


**Chrysene**

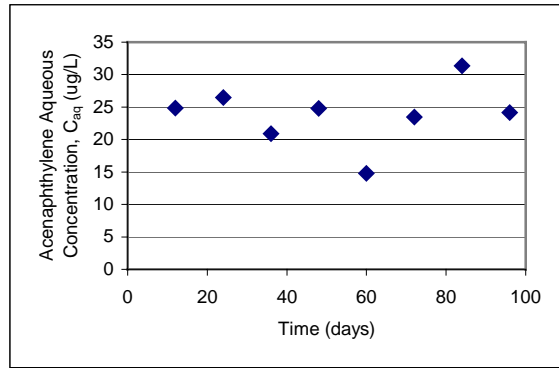


**Benzo(b)fluoranthene**

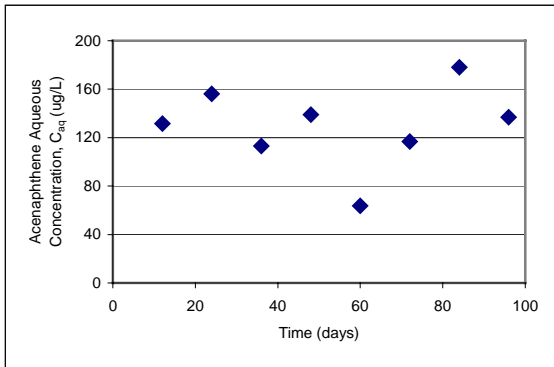
**Figure 8C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 6 days B**



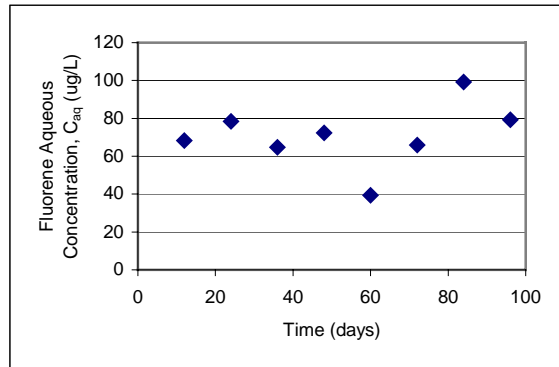
**Naphthalene**



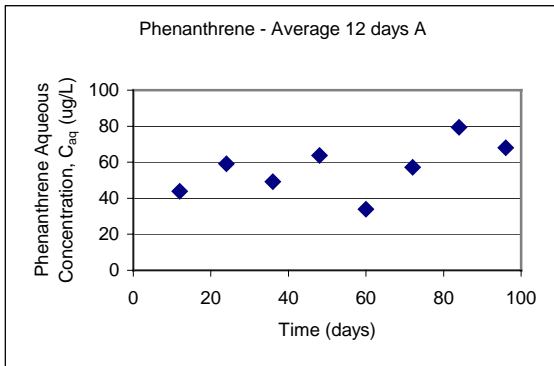
**Acenaphthylene**



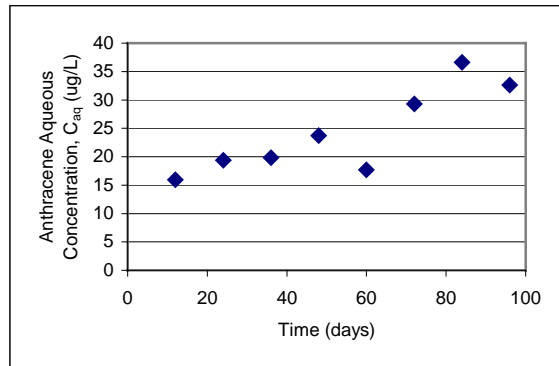
**Acenaphthene**



**Fluorene**



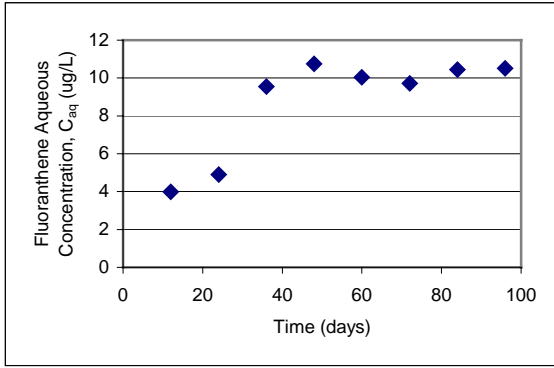
**Phenanthrene**



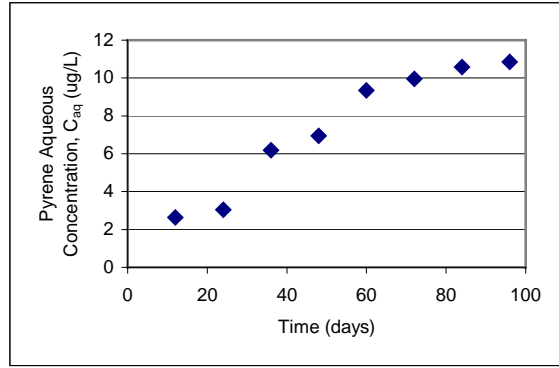
**Anthracene**

**Figure 9C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 12 days A**

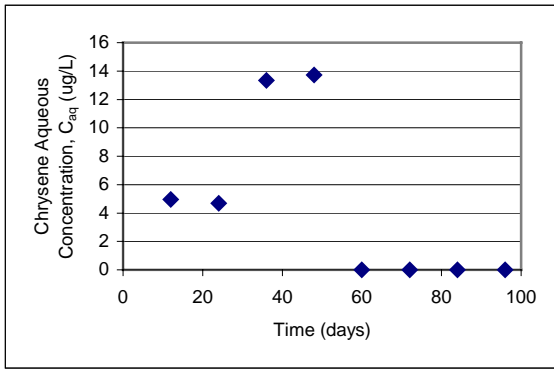




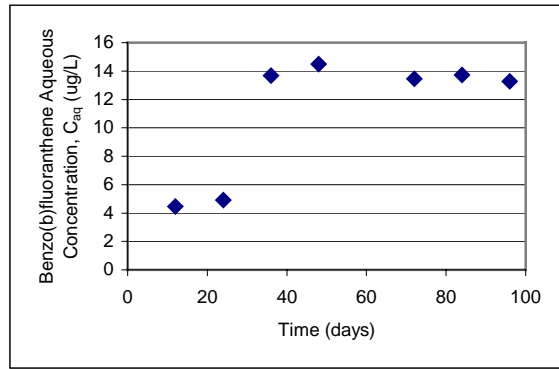
**Fluoranthene**



**Pyrene**

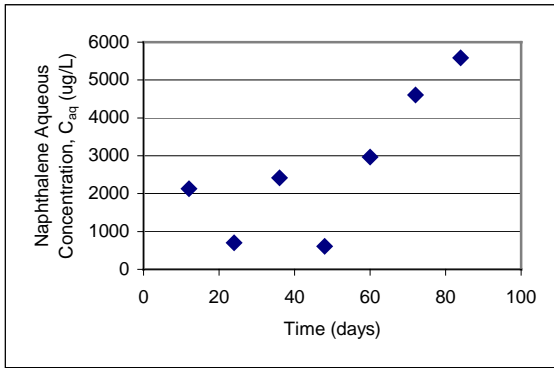


**Chrysene**

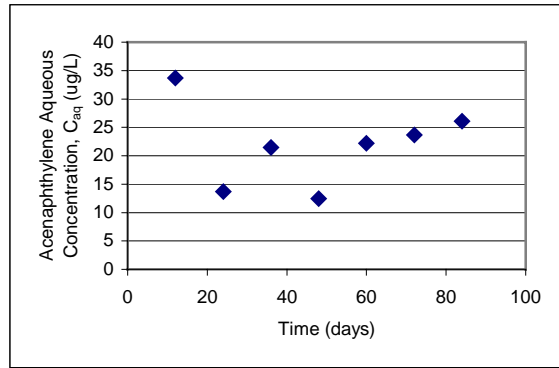


**Benzo(b)fluoranthene**

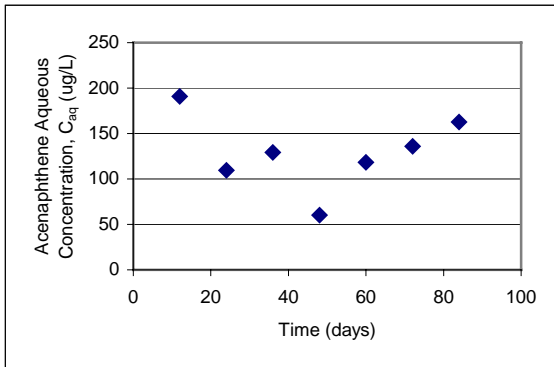
**Figure 10C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 12 days A**



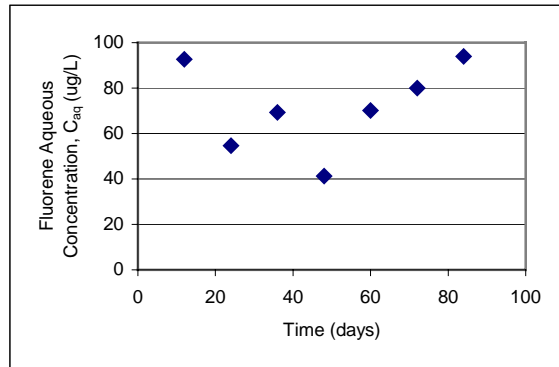
**Naphthalene**



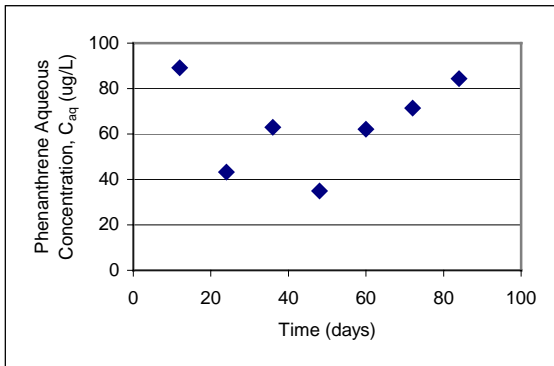
**Acenaphthylene**



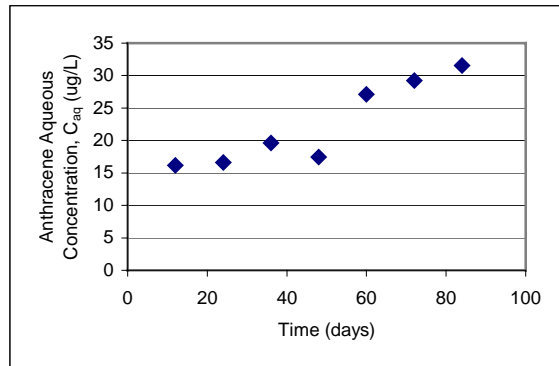
**Acenaphthene**



**Fluorene**

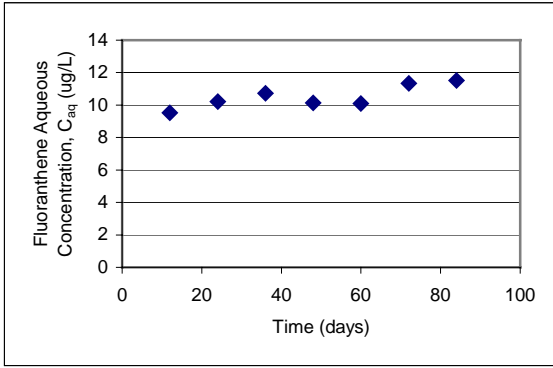


**Phenanthrene**

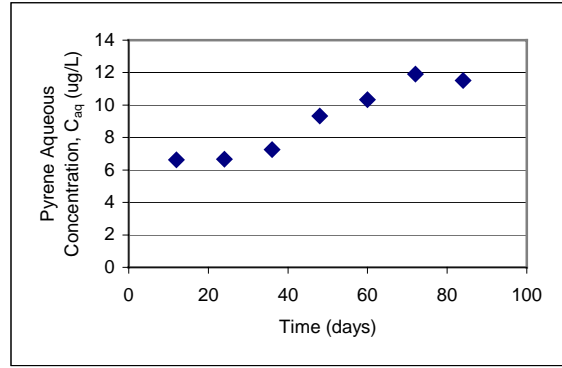


**Anthracene**

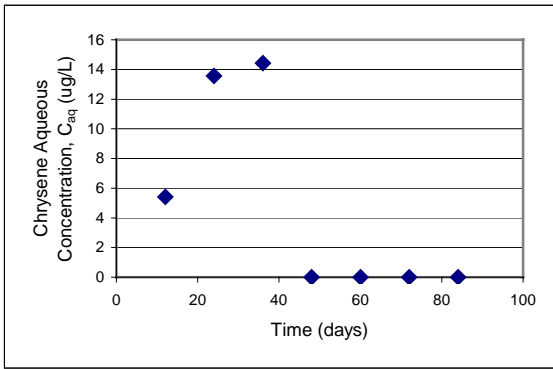
**Figure 11C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 12 days B**



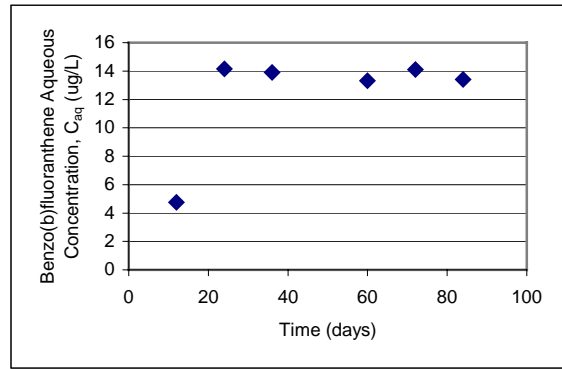
**Fluoranthene**



**Pyrene**

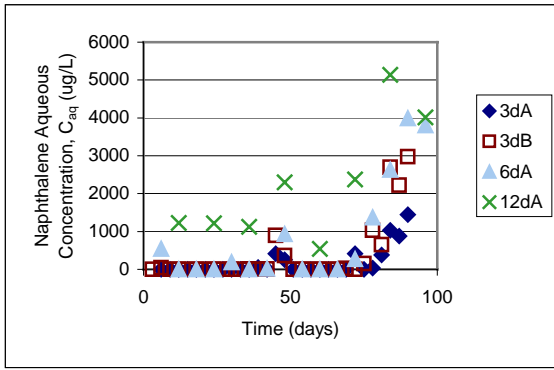


**Chrysene**

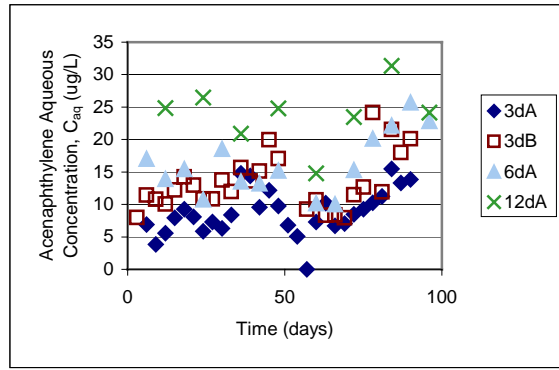


**Benzo(b)fluoranthene**

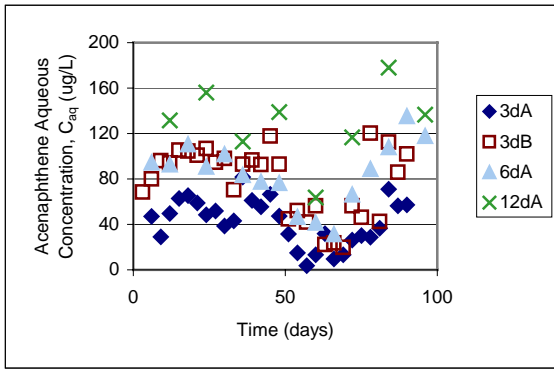
**Figure 12C Dissolution kinetics experiment  
Aqueous concentration versus sampling time, 12 days B**



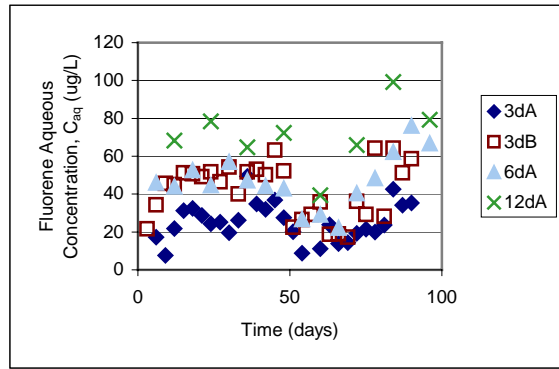
**Naphthalene**



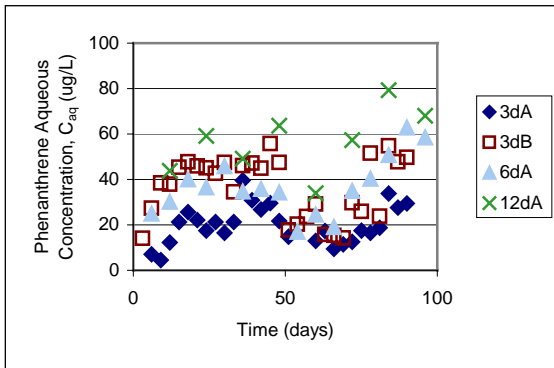
**Acenaphthylene**



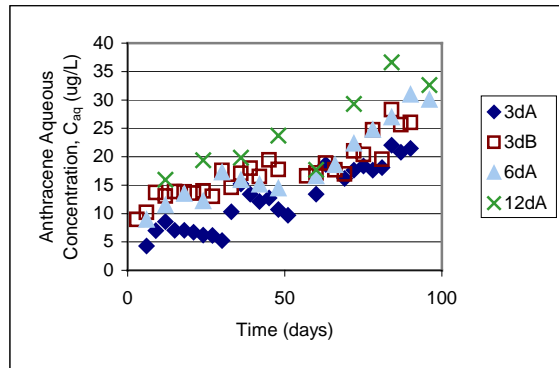
**Acenaphthene**



**Fluorene**

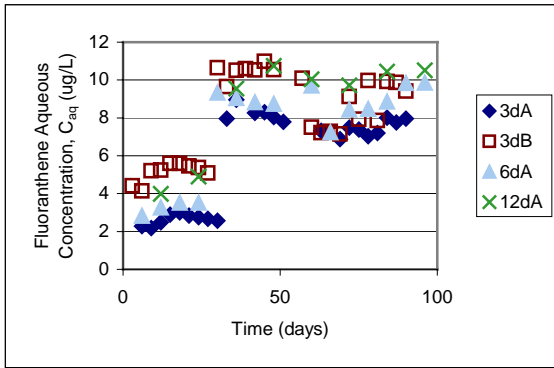


**Phenanthrene**

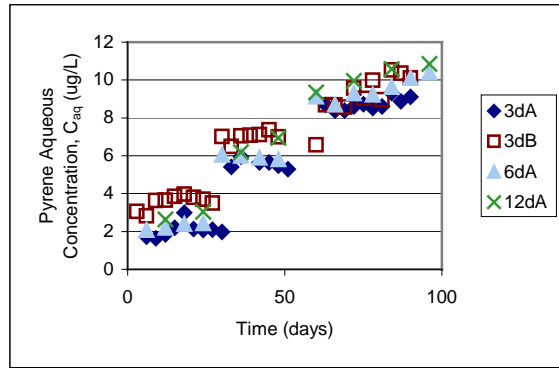


**Anthracene**

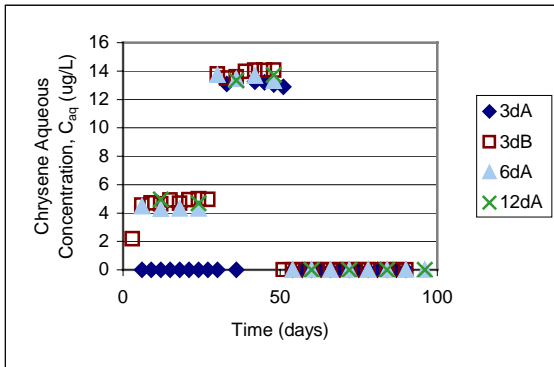
**Figure 13C Dissolution kinetics experiment  
Aqueous concentration versus sampling time for all A soil columns**



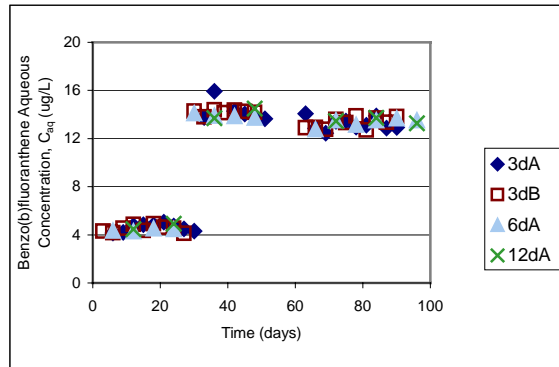
**Fluoranthene**



**Pyrene**

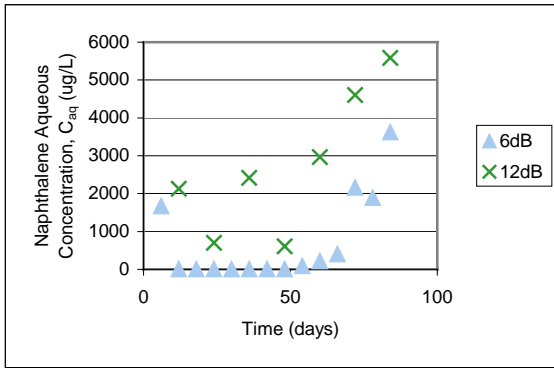


**Chrysene**

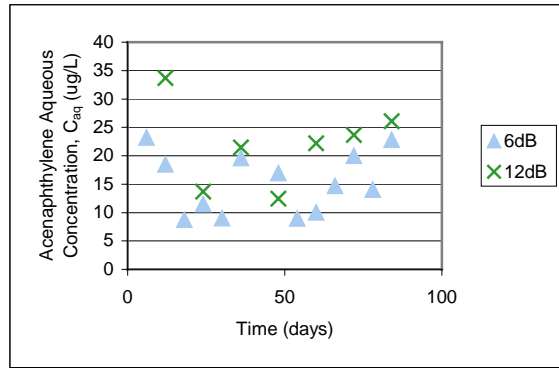


**Benzo(b)fluoranthene**

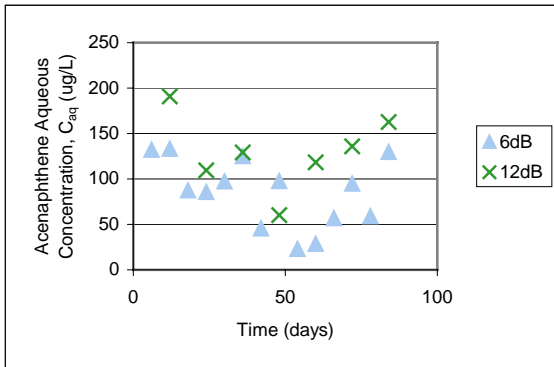
**Figure 14C Dissolution kinetics experiment**  
**Aqueous concentration versus sampling time for all A soil columns**



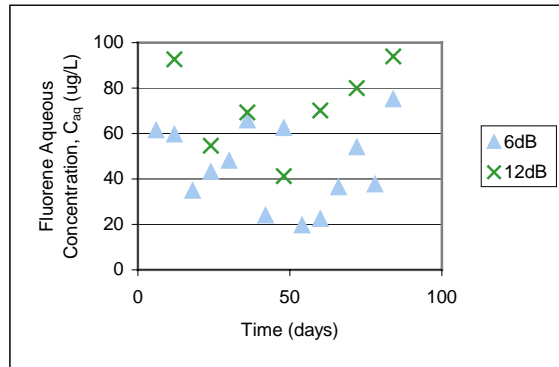
**Naphthalene**



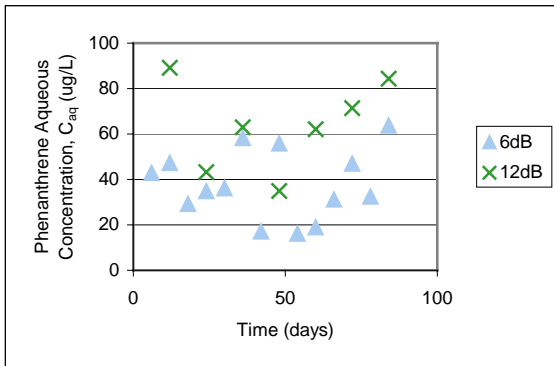
**Acenaphthylene**



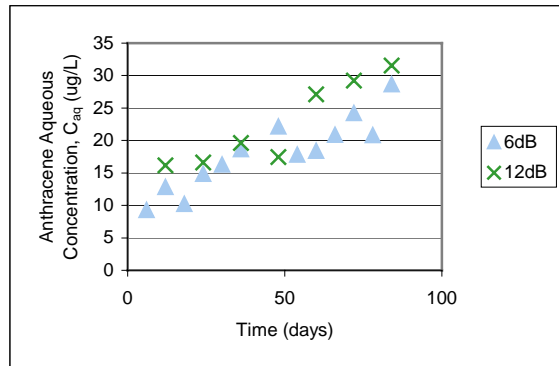
**Acenaphthene**



**Fluorene**

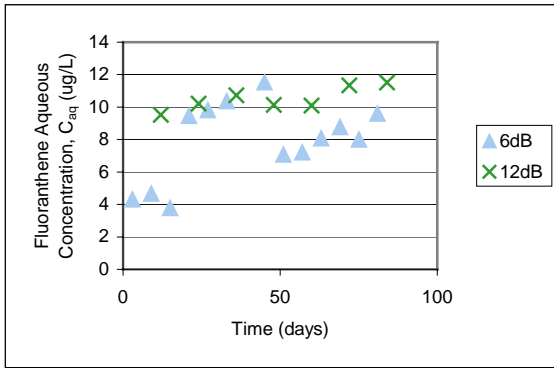


**Phenanthrene**

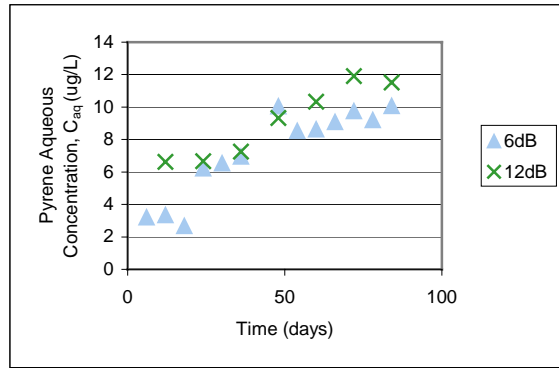


**Anthracene**

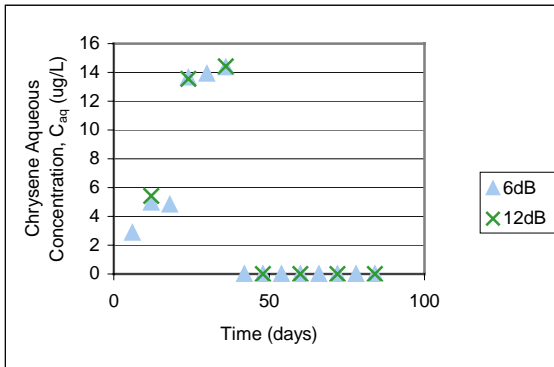
**Figure 15C Dissolution kinetics experiment  
Aqueous concentration versus sampling time for all B soil columns**



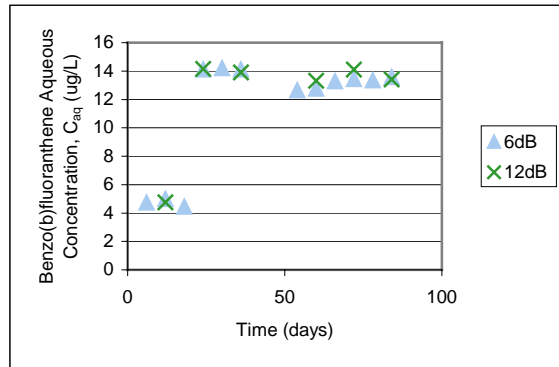
**Fluoranthene**



**Pyrene**



**Chrysene**



**Benzo(b)fluoranthene**

**Figure 16C Dissolution kinetics experiment**  
**Aqueous concentration versus sampling time for all B soil columns**