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The Partitioning of Phenanthrene and Benzo(a)pyrene
to Humic Acid: The Comparison of Sep-Pak and Empore Disk
C-18 Reverse Phase Materials Used in the Determination of
the Partitioning Coefficient and the Effect of pH and a
Solvent Phase on Partitioning Results
presented by

William H. Brunner

has been accepted towards fulfillment
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M.S. degree in Environmental Engineering



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THE PARTITIONING OF PHENANTHRENE AND
BENZO[A]PYRENE TO HUMIC ACID:
THE COMPARISON OF SEP-PAK® AND EMPORE™ DISK C-18 REVERSE
PHASE MATERIALS USED IN THE DETERMINATION OF THE
PARTITIONING COEFFICIENT AND THE EFFECT OF PH AND A SOLVENT
PHASE ON PARTITIONING RESULTS

By

William H. Brunner

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Civil and Environmental Engineering

1996

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ABSTRACT

THE PARTITIONING OF PHENANTHRENE AND
BENZO[A]PYRENE TO HUMIC ACID:
THE COMPARISON OF SEP-PAK® AND EMPORE™ DISK C-18 REVERSE
PHASE MATERIALS USED IN THE DETERMINATION OF THE
PARTITIONING COEFFICIENT AND THE EFFECT OF PH AND A SOLVENT
PHASE ON PARTITIONING RESULTS

By

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Reverse phase analysis, conducted with both Sep-Pak® Cartridge and Empore™ Disk C-18 materials, was used to determine the partitioning coefficient of phenanthrene and benzo[a]pyrene in Aldrich and Suwannee River humic acid solutions, respectively. Experimental results from both materials yielded similar K_p results.

PAH was dissolved in solvent and either spiked directly into humic acid solution or spiked into the experiment bottles, the solvent evaporated, and humic acid solution added. K_p values in evaporated solvent solutions were higher than in carrier solvent solutions. Also, opposite data trends in the K_p vs. humic acid content experiments were shown. The effect of pH was also studied. Decreasing pH in a PAH/humic acid solution increased K_p .

To my parents for their loving encouragement.

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CHAPTER 1

INTRODUCTION

1.1 Polycyclic Aromatic Hydrocarbons

Benzo[a]pyrene and phenanthrene are polycyclic aromatic hydrocarbons (PAHs). Physical properties are detailed in Figure 1-1. They are solids that exhibit low solubilities in water(1). Their octanol/water partitioning coefficients ($\log K_{ow}$) are high, meaning that in an octanol/water environment, they will exist primarily in octanol(2).

Benzo[a]pyrene is produced by both manmade and natural sources. Manmade sources include coal, coke, and coal tar processing; petroleum refining; road bed and asphalt leachate; and the combustion of fossil fuels and tobacco(2). In the environment, small quantities are produced by various bacteria and algae(2).

Phenanthrene is used in the production of dye, explosives, drugs, and in biochemical research(2). It is found in gasoline, oil, and coal tar and is produced during the combustion of fossil fuels(2).

Phenanthrene and benzo[a]pyrene have been shown to bioaccumulate in aquatic systems(3-7). Benzo[a]pyrene is a confirmed carcinogen(8). Human mutagenic and reproductive

Structure

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Benzo[a]p



Figure 1-

Polycyclic Aromatic Hydrocarbon Properties

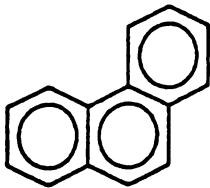
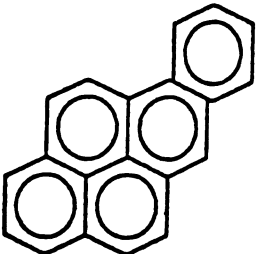
<u>Structure</u>	<u>Molecular Wt.</u>	<u>Solubility</u>	<u>LOG K_{ow}</u>
Phenanthrene 	178.24	0.816 ppm	4.46
Benzo[a]pyrene 	252.32	0.003 ppm	6.50

Figure 1-1 Polycyclic aromatic hydrocarbon properties.

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effects have also been reported. Phenanthrene is a suspected carcinogen with neoplastigenic and tumorigenic data reported(8). It is moderately toxic by ingestion.

1.2 Humic Acid

Humic substances are soluble organic macromolecules that are prevalent in natural aquatic systems. They are composed of a mixture of organic materials including the remains of woody plants, terrestrial organisms, and planktonic remains(1). Humic substances are composed of both fulvic and humic acids(1). Fulvic acids are soluble in both acidic and basic solutions. Humic acid dissolves at a high pH. Humic acid contains 40-50% carbon by weight, almost as many oxygens, and a few nitrogens(1,9,10). Suwannee River and Aldrich humic acids were used in this research. The composition details are listed in Table 1-1.

Table 1-1 Humic acid composition.

HA	C	H	O	N	S	P
Aldrich	58.39	4.24	33.13	.63	3.57	0.13
Suwannee	54.55	4.16	39.24	1.22	0.82	0.01

Note: All measurements in percent on a moisture-free basis, normalized to a 100% total. Information adapted from Chiou(9,10).

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1.3 Partitioning of PAH to Humic Acid

1.3.1 Solid Phase Sorption from an Aqueous Environment

Sorption of PAHs to humic acid in water is governed by free energy in the system(1,11). The chemical is driven to the solid surface because the free energy is lower at the solid surface than in the bulk water solution. Equilibrium distribution of the chemical between the solid and water phases is attained when the free energy in the system reaches a minimum.

A water system is a polar environment created by the electron affinities of the hydrogen and oxygen atoms(1). Hydrogen carries a slight positive charge and oxygen a slight negative charge. Water molecules orient themselves so that their positive and negative ends are near each other, thus lowering the system free energy. This is called hydrogen bonding between water molecules and dipole-dipole interaction between non-similar, polar molecules.

Nonpolar chemicals attract by inducing minute intramolecular polarity variations in each other(1,11). Nonpolar chemicals are much less stabilized in polar solutions than in nonpolar environments and will be driven to escape to these nonpolar environments.

The relationship between the concentration of sorbate in solid (C_s) and water (C_w) phases is

$$C_s = K \cdot C_w^n \quad (1)$$

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This is the Freundlich isotherm where K is the Freundlich constant and n is a measure of how difficult it is for multiple layers of molecules to bond to the solid surface(1,11). For constant concentrations of sorbate in solution, the equation can assumed to be linear (n=1) and can be expressed as

$$K_p = \frac{C_s}{C_w} \quad (2)$$

where K_p is the distribution or partitioning coefficient(1). K_p is a measure of how much sorbate partitions between solid and water phases. This equation was used to determine the partitioning coefficient of phenanthrene in Aldrich humic acid solution and benzo[a]pyrene in Suwannee River humic acid solution.

1.3.2 Humic Acid and PAH Interaction

Humic acid contains similar amounts of carbon and oxygen, elements that have a similar affinity for electrons(1). Therefore, a relatively nonpolar environment is presented into which PAHs can escape from water, thus increasing their solubility. PAH mobility in the environment is increased due to ingestion by organisms, settling with humic acid to the sediment, and infiltration into groundwater systems(1). However, humic bound PAHs have been shown to be less bioavailable, less likely to volatilize, and shielded from interaction with free radicals(1,3-7) (Figure 1-2).

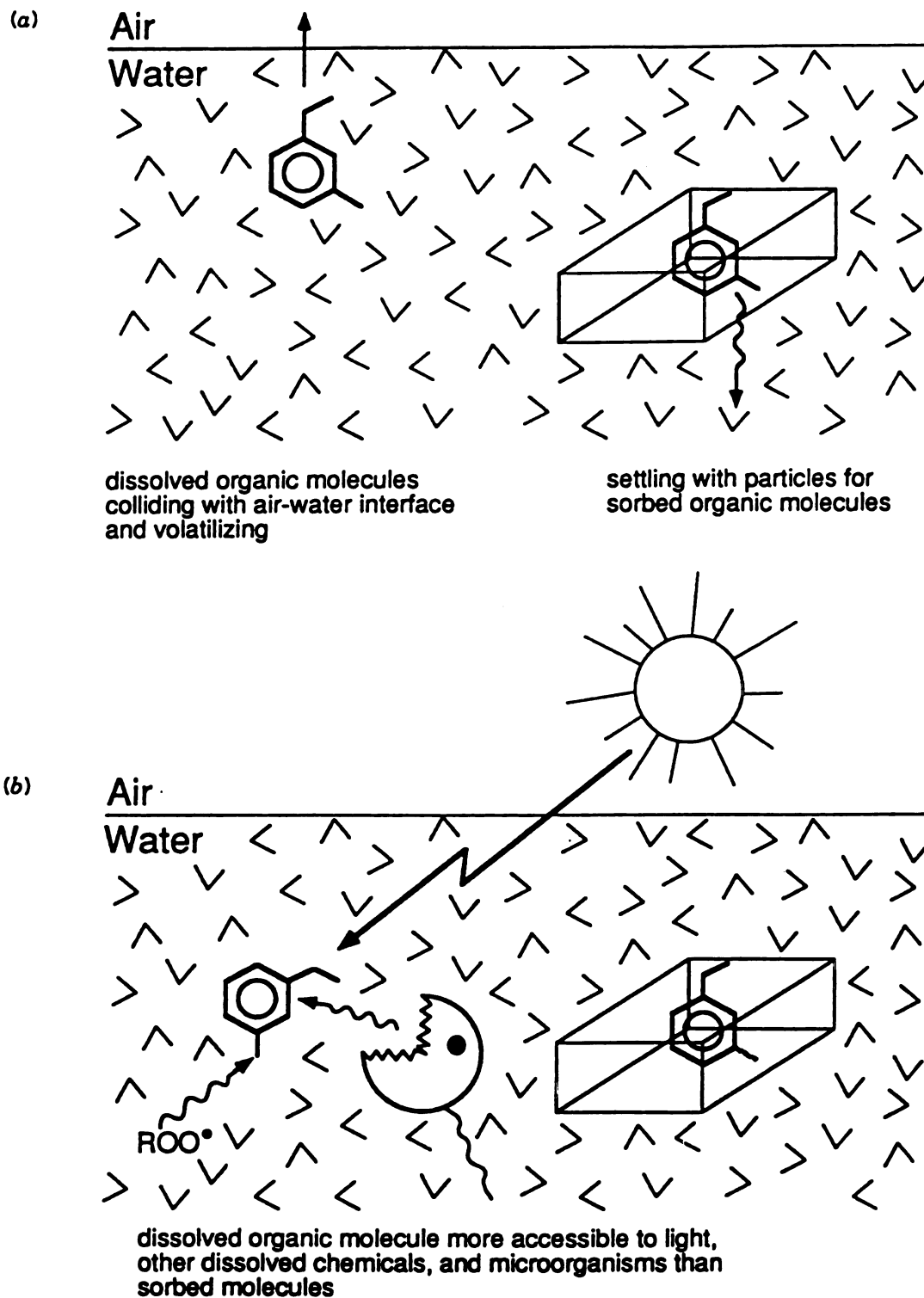


Figure 1-2 Behavior difference between dissolved and sorbed species(1). (a) Volatization and settling. (b) Rate of reaction.

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1.4 Determination of Partitioning Coefficient

1.4.1 Experimental Solution

The experimental solution is prepared by first dissolving dry humic acid into reagent water, then adjusting the pH to the desired value. Next, the PAH must be introduced into the system. The system must then be mixed for a time period sufficient enough for the PAH distribution between the solid and the water phases to reach equilibrium(12).

pH has been shown to have an effect on the partitioning of PAH to humic acid. Increasing the pH in a water system increases the number of charged sites in the humic acid polymer(13). This is due to the presence of phenolic and carboxylic functional groups in the molecule(14). Although the polymer expands, fewer sites are available for bonding; the polymer becomes more hydrophilic due to the increased number of charged sites. Reducing pH in a water system neutralizes the charges, the humic polymer coils and becomes more hydrophobic(15). Landrum found that decreasing the pH of benzo[a]pyrene in stream and well water increased the amount of benzo[a]pyrene trapped in a XAD-4 resin(16). Schlautman and Carter found that the K_p of hydrophobic organic chemicals decrease with increasing pH(15,17).

Introduction of PAH into humic acid solution can be done in a number of ways. Solvent is commonly used to dissolve PAH. A small amount of PAH/solvent solution can then be injected into humic acid solution. Also, the PAH/solvent solution can be injected into a glass bottle, then the solvent evaporated

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before humic acid solution is added. Finally, the PAH/solvent solution can be dispersed amongst a number of glass beads. After the solvent is evaporated, the humic acid solution is introduced and cycled through the glass beads until a equilibrium distribution of PAH in solution is attained. Solvents have been used by many researchers to introduce PAH to humic acid solution(7,12,18-22). Schlautman(23), Munz(24), and Morris(25) found that the addition of a small amount of methanol has no effect on the partitioning of perylene to Suwannee River humic acid.

1.4.2 Methods of Analysis

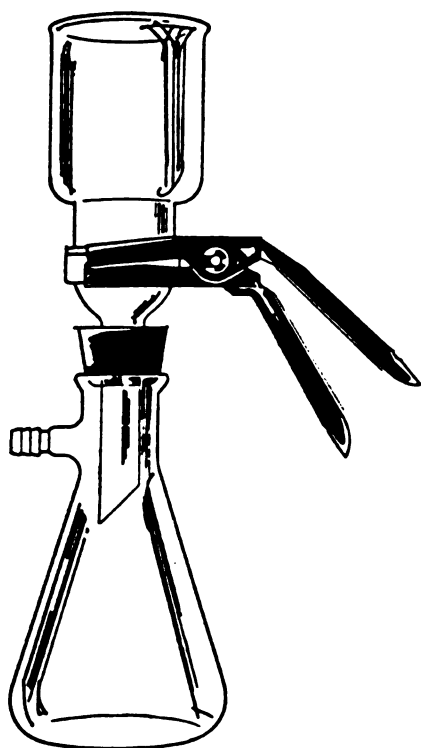
Florescence quenching(18,26), dialysis(5,27), and reverse phase analysis(27,28) have been used to determine PAH partitioning coefficients in humic acid solutions. In florescence quenching, the decrease in florescence intensity is directly proportional to the increase of florescent chemical binding to dissolved organic material(26). Dialysis bags allow PAH to move freely through the dialysis membrane; humic acid cannot. Water phase PAH is assumed to exist in the same concentration both inside and outside the bag. The humic bound PAH is the amount equal to the difference between PAH concentrations inside and outside the tube.

Reverse phase analysis with XAD-4 resins has been used to separate humic bound and dissolved PAHs(29). Reverse phase analysis with C-18 cartridges can be used to rapidly determine the partitioning of PAHs to humic acid(27,28). The cartridge

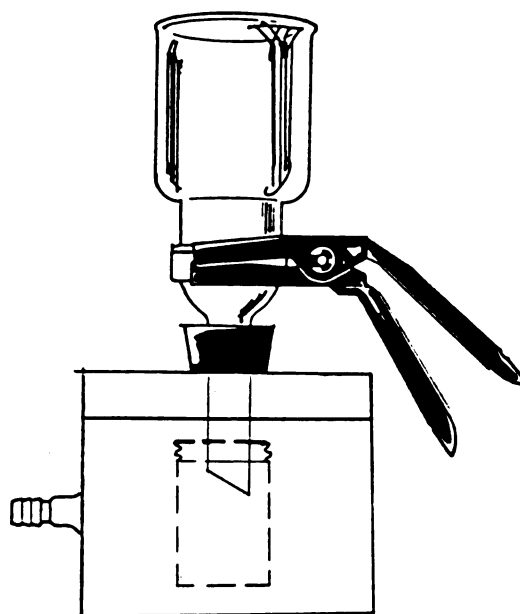
material is composed of $C_{18}H_{37}$, which is bonded to a silica matrix. It presents a nonpolar environment into which the water phase PAH escapes while PAH/humic acid solution is passed through the system. Humic acid passes quantitatively through C-18 reverse phase materials at a pH greater than 5(27). PAHs bound to the C-18 matrix can be eluted with a solvent solution.

The Waters Sep-Pak® C-18 Classic Cartridge, shown in Figure 1-3, is used in this research. The reverse phase material is contained in the 13 mm long, 11 mm diameter center section. It contains 360 mg Packing Material and has a 125 Å Pore Size. Fluid is passed through the cartridge with a syringe.

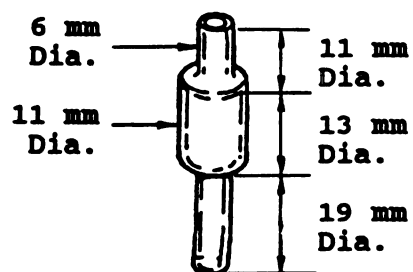
Use of a C-18 disk in reverse phase analysis holds interesting possibilities. Compared with the cartridge, the disk is thin and composed of a smaller amount of hydrophobic material with a smaller average pore size. The solution has less of a distance to travel through the medium, and therefore, the mass balance of the reverse phase process may be improved. A disadvantage of the C-18 cartridge is that the partitioning coefficient depends on the flow rate. Since the disk is much thinner than the cartridge, flow rate variations may be less likely to affect the partitioning coefficient. The J. T. Baker Empore™ 25 mm C-18 Extraction Disk was used in this research. It is 25 mm in diameter, 500 μ m Thick, and has a 60 Å pore size. Fluid is passed through the disk with an exterior vacuum source and the frit/funnel/clamp assembly



(a)



(b)



(c)

Figure 1-3 Experimental materials and setup. (a) Empore™ Disk Conditioning Assembly. (b) Empore Disk Vacuum Chamber. (c) Sep-Pak Cartridge.

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1.5 Research Objectives

The objective in this research was to investigate the use of the J. T. Baker Empore™ 25 mm C-18 Extraction Disk in the measurement of the partitioning coefficient of benzo[a]pyrene in Suwannee River humic acid and of phenanthrene in Aldrich humic acid. The research covered the following areas:

1. Comparison of Empore™ Disk and Sep-Pak® Cartridges in the measurement of K_p .
2. Investigation of the effect of pH on the K_p of phenanthrene in Aldrich humic acid solution and benzo[a]pyrene in Suwannee River humic acid.
3. Comparison of PAH introduction methods on the K_p of phenanthrene in Aldrich humic acid solution and benzo[a]pyrene in Suwannee River humic acid solution. Evaporated carrier solvent and solvent carrier methods were used.

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Chapter 2

A STUDY OF THE PARTITIONING OF PHENANTHRENE AND BENZO[A]PYRENE TO HUMIC ACID: COMPARISON OF THE SEP-PAK® C-18 CARTRIDGE AND THE EMPORE™ C-18 EXTRACTION DISK REVERSE PHASE TECHNIQUES

2.1 Introduction

Benzo[a]pyrene and phenanthrene are polycyclic aromatic hydrocarbons (PAHs) that are abundant in the environment. Manmade sources include oil, gasoline, coal tar, and the incomplete combustion of fossil fuels(2). They are hydrophobic, exhibit low solubilities in water(1), and have been to bioaccumulate in aquatic systems(3-7). They are also carcinogens and mutagens that have been shown to produce reproductive effects in animal life(8).

Dissolved humic acid increases PAH solubility in a water system. Humic bound PAHs are also less susceptible to bioaccumulation(3-7), reaction with other chemicals, and photolysis(1).

Floresence quenching(18,26) and dialysis(5,27) have been used to determine PAH partitioning coefficients in humic acid solutions. Also, XAD-4 resins have been used to separate humic bound and dissolved PAHs(29). It has been shown that C-18 cartridges can be used to rapidly determine the partitioning of PAHs to humic acid(27,28). Humic acid passes quantitatively

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through C-18 reverse phase materials at a pH greater than 5(27). Freely dissolved PAH sorbs to the C-18 material and the humic bound PAH passes through the medium.

Use of a C-18 disk in reverse phase analysis holds interesting possibilities. Compared with the cartridge, the disk is composed of a smaller amount of hydrophobic material with a smaller average pore size. Therefore, the mass balance of the reverse phase process may be improved. Also, since the disk is much thinner than the cartridge, flow rate variations may be less likely to affect the partitioning coefficient.

In this set of experiments, the performance of the Empore™ C-18 Extraction Disk is compared to that of the Sep-Pak® C-18 Classic Cartridge in the investigation of the partitioning of benzo[a]pyrene to Suwannee River humic acid and of phenanthrene to Aldrich humic acid.

2.2 Materials and Methods

Suwannee River Humic Acid Reference was obtained from the International Humic Substances Society, Colorado School of Mines, lot number 1R101H. Aldrich Humic Acid was obtained from Aldrich Chemical Company, lot number 01816HH. The humic acid solutions were created by dissolving the humic acid in reagent water at a pH of 10, reducing the pH to 7, then by passing the solution through a 0.45 μm glass filter.

Two lots of radiolabeled phenanthrene and one lot of benzo[a]pyrene were obtained from Sigma Chemical. The details are given in Table 2-1. Benzo[a]pyrene was dissolved in a 1:1

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Table 2.

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Purity

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Empore™

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40 µl

toluene:acetone solution and phenanthrene was dissolved in acetone. These solvent/PAH solutions were spiked into 250 ml glass bottles which were then placed in a hood in order to evaporate the solvent. After three days, humic acid solutions were added to the bottles and the bottles were placed in an orbital shaker for at least 16 hours before reverse phase tests were performed. The concentrations of phenanthrene and benzo[a]pyrene in solution ranged from 0.61-10.9 $\mu\text{g/L}$ and 32-91 $\mu\text{g/L}$, respectively.

Table 2-1 Radiolabeled PAH data.

	Phen 1	Phen 2	B[A]P
Product No.	31,528-1	31,528-1	B9776
Lot No.	049F9271	049F9271-1	080H9216
Activity, mCi/mmol	13.1	8.3	16.2
Purity	>98%	>98%	>98%

Waters Sep-Pak® C-18 Classic Cartridges and J. T. Baker Empore™ 25 mm C-18 Extraction Disks were used in reverse phase analysis. The Empore™ Disk was conditioned with 5 mL of 1:1 ethyl acetate:methyl chloride solution, followed by a 5 mL methanol rinse. 105 mL reagent water was then passed through the disk. Next, 5 mL of the PAH/humic acid solution was filtered through the disk on top of the water meniscus. The disk was eluted sequentially with 5 mL aliquots of ethyl acetate, methylene chloride, and 1:1 ethyl:methylene chloride. All filtering speeds were 24 mL/min. Both the bound and free

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PAH phase were counted in all experiments except in the filtering speed test. In this experiment, only the bound phase was counted.

The Sep-Pak® Cartridge was conditioned with 10 mL of methanol, followed by 100 mL of reagent water. 5 mL of the PAH/humic acid solution was then filtered through the cartridge. The cartridge was eluted sequentially with 5 mL aliquots of ethyl acetate, methylene chloride, and 1:1 ethyl:methylene chloride. All filtering speeds were 30 mL/min. Both the bound and free PAH phase were counted in all experiments except in the filtering speed test. In this experiment, only the bound phase was counted.

2.3 Results and Discussion

PAH binding to humic acid is easily reversible(12). When a PAH/humic acid solution is passed through a hydrophobic medium, free PAH will be adsorbed. Given enough contact time with the media, PAH will desorb from humic acid to reestablish equilibrium. Landrum has shown that an 8 cm column packed with Vydac 201SC will allow benzo[a]pyrene to desorb from the humic acid at low flow rates (0-3 ml/min) (27). Therefore, filtering speeds were chosen to minimize the contact time between the PAH/humic solution and the C-18 media. Figure 2-1 illustrates that percent bound and K_p for benzo[a]pyrene increase with increasing flow rate to an asymptotic value. Filtering speeds were chosen at the asymptotic point. In this way, the percent bound was maximized and the possibility of breakthrough was

avoided. The filtering speeds used were 30 ml/min and 24 ml/min for the Sep-Pak® Cartridge and the Empore™ Disk, respectively.

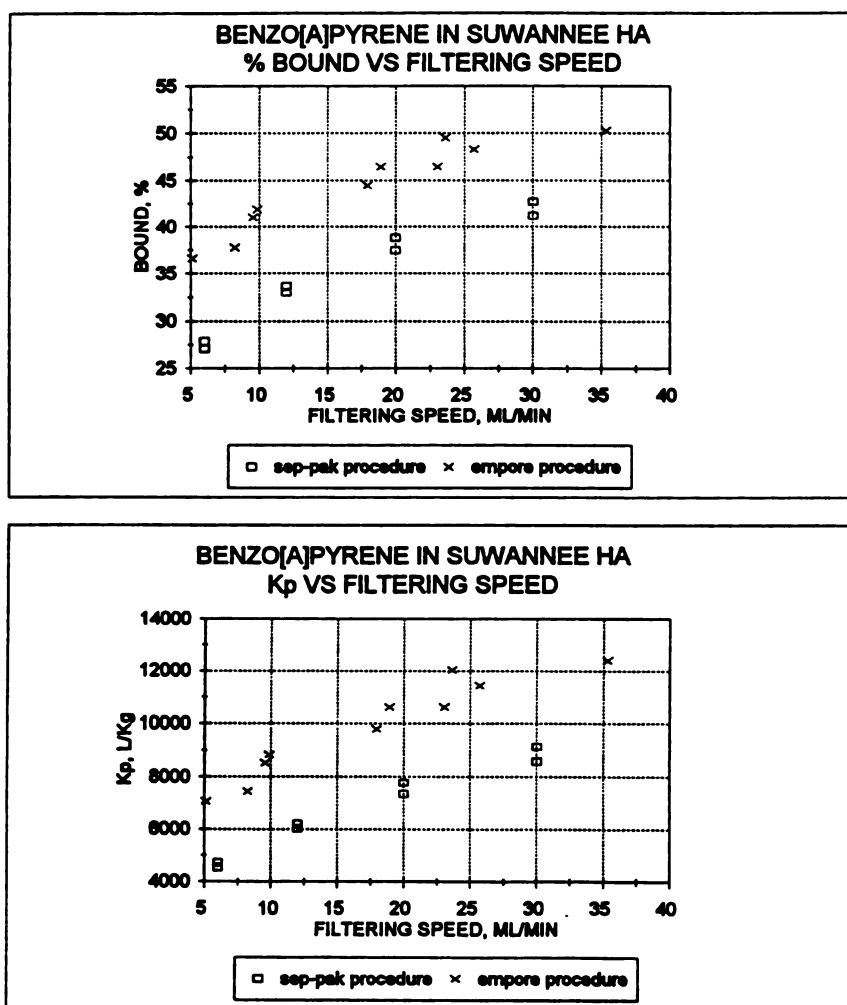


Figure 2-1 The effect of filtering speed on percent bound and K_p for benzo[a]pyrene in Suwannee River humic acid.

Any humic acid retained in the C-18 media will reduce the tested percent bound and the K_p of the PAH/humic acid solution. Figure 2-2 shows the TOC tested in both Suwannee River and Aldrich humic acid solutions before and after passing them through the Empore™ Disk and Sep-Pak® Cartridge.

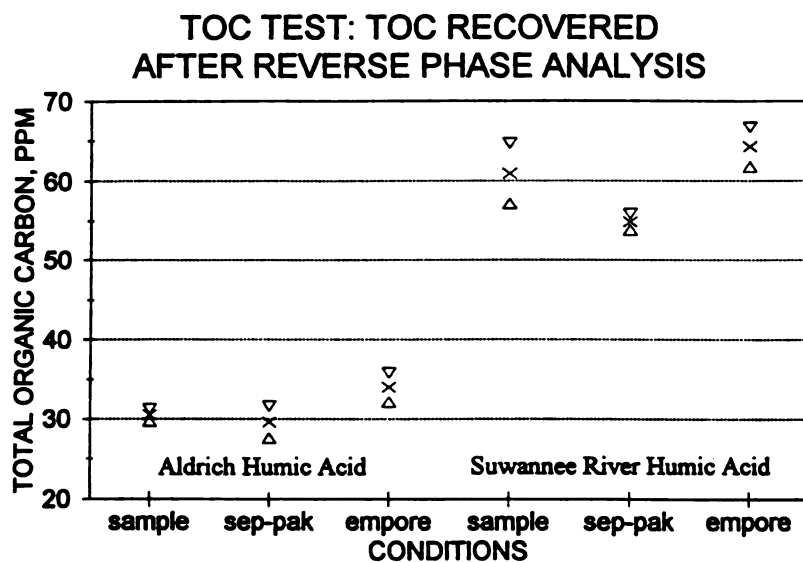


Figure 2-2 TOC recovered from humic acid solutions after reverse phase analysis. "Samples" were tested before reverse phase analysis.

The standard deviations show that 100% of the humic acid is recovered. The averages indicate that the Sep-Pak® retains a slight amount of Aldrich and Suwannee River humic acids (2.88% and 9.93%, respectively). These values are similar with those obtained by Landrum (98±3% n=8, avg±std) with Aldrich humic acid solutions and the Sep-Pak® Cartridge(27). Also, Gardner found that humic materials bind poorly to reverse phase

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Breakthrough of the PAHs through the C-18 media was tested by first preparing solutions of phenanthrene and benzo[a]pyrene in reagent water. Then the solutions were filtered through both the Sep-Pak® Cartridge and Empore™ Disk. The breakthrough percentages are shown in Table 2-2.

Table 2-2 Breakthrough of PAH through C-18 media.

PAH	Reverse Phase Technique	Average Breakthrough, % (avg ± std)
Benzo[a]pyrene	Empore™	2.59 ± 0.19 n=3
Benzo[a]pyrene	Sep-Pak®	10.71 ± 0.14 n=3
Phenanthrene	Empore™	5.95 ± 0.46 n=3
Phenanthrene	Sep-Pak®	15.97 ± 0.57 n=3

At these flow rates the Empore™ Disk is more efficient at removing free PAH from solution than the Sep-Pak® Cartridge. Landrum found no breakthrough for 0.5, 2, and 5 µg/L solutions of benzo[a]pyrene at a flow rate of 12 ml/min through the Sep-Pak® Cartridge(27). Maaret (Maaret 1992) used C-18 Cartridges to determine partitioning of 1 µg/L Benzo[a]pyrene to humic acid at flow rates of and 5-12 ml/min(28). No breakthrough was reported. The breakthroughs exhibited in this experimentation could be the result of the higher flow rate or of the larger amount of benzo[a]pyrene in solution (32-91 µg/L).

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The amount of free PAH that breaks through the C-18 material from a PAH/humic acid solution comes from the PAH that is free in solution. Therefore, in order to obtain the amount of PAH bound to humic acid, the breakthrough numbers obtained from the PAH/reagent water solution cannot be subtracted directly from the apparent bound PAH (total amount of PAH that passes through the C-18 material). Instead, breakthrough is a percentage of the PAH that is free in the water solution. The total bound amount for reverse phase analysis was adjusted as follows:

$$X_{TB} = 100\% - \frac{(100)X_F}{(100 - X_{BT})} \quad (1)$$

where X_{TB} = percent PAH bound to humic acid; X_F = percent PAH free in solution, measured by the reverse phase technique; and X_{BT} = percent PAH that broke through the C-18 material from the PAH/reagent water solution.

K_p , the coefficient that measures the equilibrium distribution of PAH in a humic acid/water solution, is denoted

$$K_p = \frac{C_s}{C_w} \quad (2)$$

where C_s = the PAH associated with humic acid (mol/kg) and C_w = the PAH in solution (mol/L). K_p was calculated as follows:

$$K_F = \frac{C_F}{C_M}$$

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Tables 2-3

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Table 2-4

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$$K_p = \frac{X_{TB}}{(C_{HA}) (10^{-6}) \left(\frac{L \cdot g}{mL \cdot mg} \right) (100 - X_{TB})} \quad (3)$$

where C_{HA} = concentration of humic acid solution (mg/L).

Mass balance was obtained by adding the PAH eluted from the C-18 material to the PAH that passed through the media and dividing this number by the amount of PAH obtained from an aliquot taken directly from the PAH/humic acid solution. Tables 2-3 and 2-4 contain mass balance results.

Table 2-3 Mass balance of PAH/reagent water solutions.

PAH	Reverse Phase Technique	Average Mass Balance, % (avg ± std)
Benzo[a]pyrene	Empore™	85.46 ± 2.52 n=3
Benzo[a]pyrene	Sep-Pak®	86.34 ± 0.24 n=3
Phenanthrene	Empore™	87.93 ± 0.79 n=3
Phenanthrene	Sep-Pak®	93.55 ± 0.47 n=3

Table 2-4 Mass balance of PAH/humic acid solutions.

PAH	Reverse Phase Technique	Average Mass Balance, % (avg ± std)
Benzo[a]pyrene	Empore™	86.53 ± 5.36 n=22
Benzo[a]pyrene	Sep-Pak®	88.66 ± 1.97 n=12
Phenanthrene	Empore™	90.48 ± 1.67 n=21
Phenanthrene	Sep-Pak®	90.33 ± 3.28 n=11

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The mass balance averages of the Empore™ Disk and Sep-Pak® Cartridge techniques are statistically similar, with one exception. In the phenanthrene/reagent water solution the Sep-Pak® technique exhibits a significantly higher recovery ($93.55 \pm 0.47\%$) than the Empore™ technique ($87.93 \pm 0.79\%$). The mass balances obtained in both reagent water and humic acid water were similar to that obtained by Landrum in humic acid solution ($92 \pm 8\%$) (27). In water containing no humic acid, Landrum obtained recovery of only $67 \pm 12\%$ by eluting the Sep-Pak® Cartridge with methanol (27). With ethyl acetate and methylene chloride used as elutants, the mass balance is improved to $86.34 \pm 0.24\%$ for benzo[a]pyrene and $90.48 \pm 1.67\%$ for phenanthrene.

Figure 2-1 shows that both the percent bound and K_p of benzo[a]pyrene in Suwannee River humic acid increase as the filtering speed is increased. There is a slope to both curves and they level off to an asymptotic level. This indicates that at slow filtering speeds, the PAH desorbs from the humic acid in order to replace some of the free PAH that sorbs to the C-18 material. Less of a slope was observed, however, than was reported for an 8 cm column (27).

The percent bound and K_p of phenanthrene in Aldrich humic acid curves are approximately level for the Empore™ Disk technique as filtering speed is increased (Figure 2-3). The curves exhibit a slight positive slope for the Sep-Pak® technique. For the analysis of phenanthrene in Aldrich humic

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acid, therefore, the choice of flow rate is not as critical as for the more hydrophobic benzo[a]pyrene in Suwannee River humic acid.

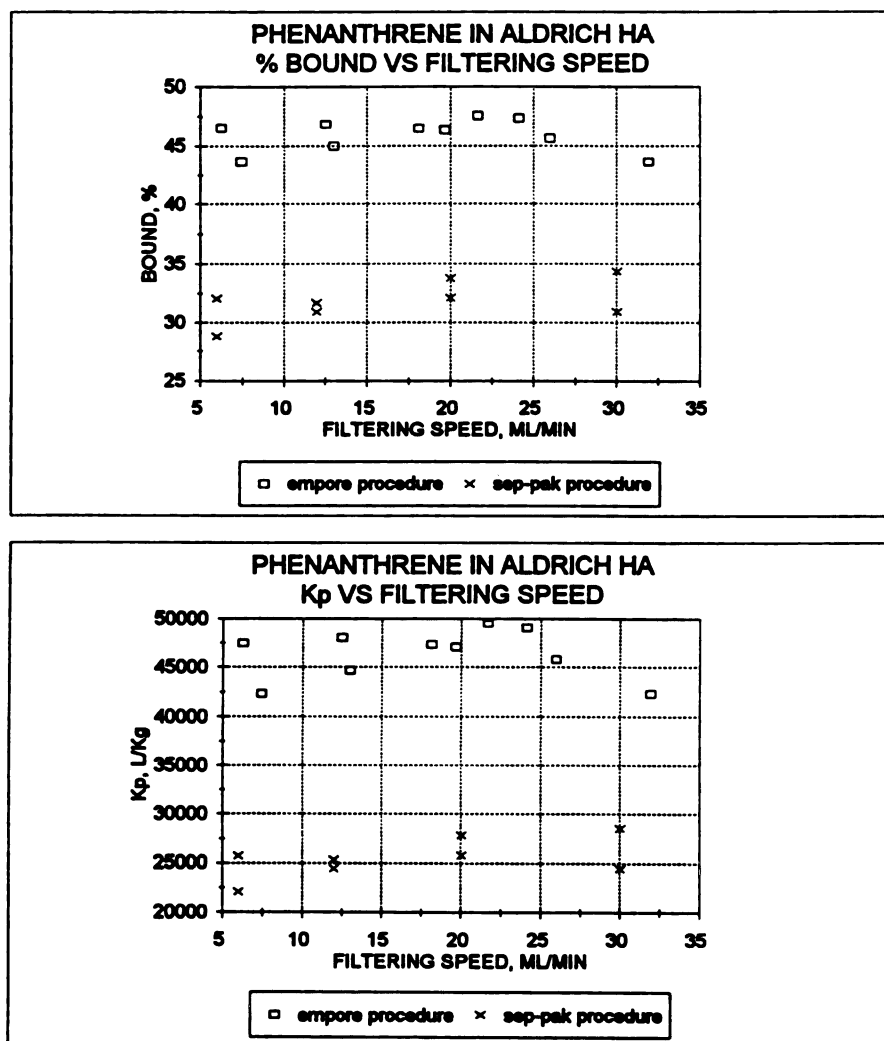


Figure 2-3 The effect of filtering speed on the % bound and K_p of phenanthrene in Aldrich humic acid.

There is a significant difference in the filtering test values between the Empore™ Disk and Sep-Pak® Cartridge methods. The tests were performed after 5 days for the phenanthrene solution and 19 days for the benzo[a]pyrene

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solution. According to Johnsen, the strength of the PAH/humic acid bond increases with time (0 to 70 days) (31). The larger amount of C-18 packing material in the Sep-Pak® Cartridge compared with the Empore™ Disk means that a larger amount of surface area is available for the PAH/humic acid solution to contact. This could enable some of the more tightly bonded PAH to be drawn out of solution by the Sep-Pak® along with the free PAH, leading to reduced percent bound and K_p figures. Alternately, the difference in values could be the result of a mass balance artifact, since only the bound phase was counted in the filtering speed experiments.

Figure 2-4 shows how percent bound and K_p of benzo[a]pyrene vary with increasing Suwannee River humic acid content. Percent PAH bound to humic acid increases and K_p decreases with increasing humic acid content. Sep-Pak® Cartridge and Empore™ Disk results are similar. These results compare to those obtained by Landrum(27) and McCarthy(12) in which K_p of benzo[a]pyrene in Aldrich humic acid decreased with increasing humic acid content.

Percent bound and K_p of phenanthrene in Aldrich humic acid vary with increasing humic acid content (Figure 2-5). Visual inspection shows that the Sep-Pak® and Empore™ results are similar. Both the percent bound and K_p increase with increasing humic acid content. No results are available from other authors for phenanthrene and increasing humic acid content. However, McCarthy found that the K_p of the PAH

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naphthalene in Aldrich humic acid increased with increasing humic acid content(12).

Figure 2-6 shows how percent bound and K_p change with increasing time for benzo[a]pyrene in Suwannee River humic acid. Both exhibit a slight decrease over a six day period.

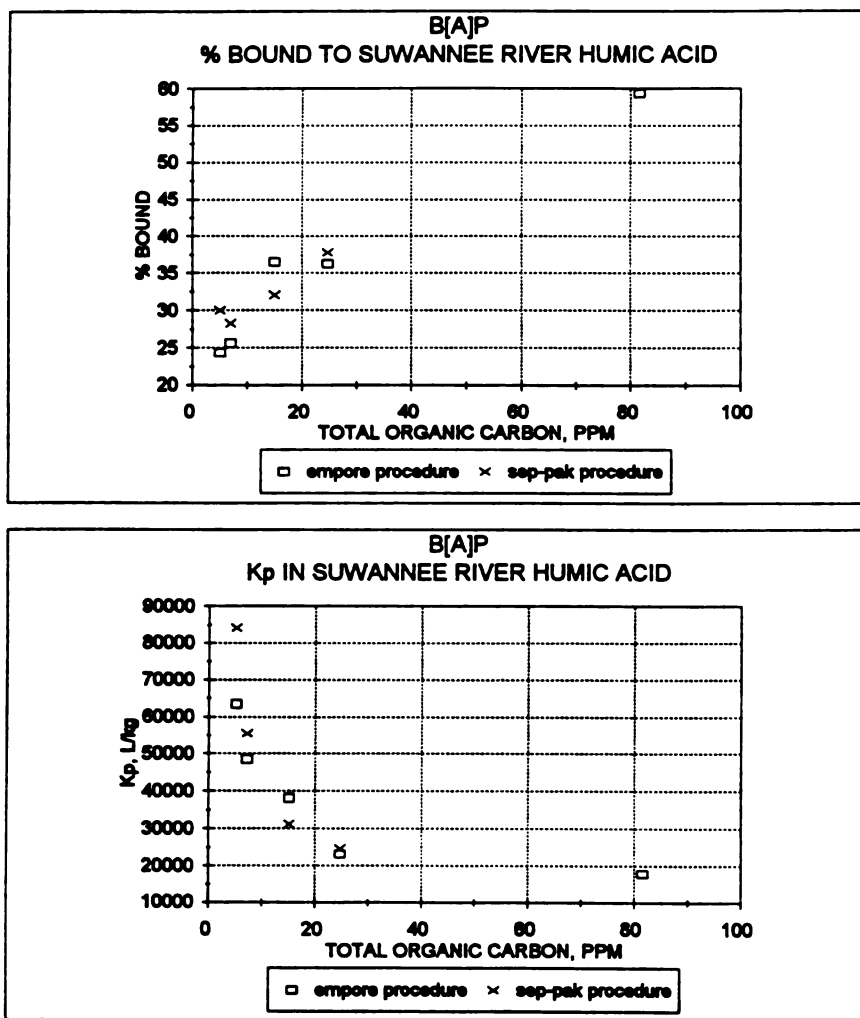


Figure 2-4 The effect of increasing humic acid content on the % bound and K_p of benzo[a]pyrene in Suwannee River humic acid.

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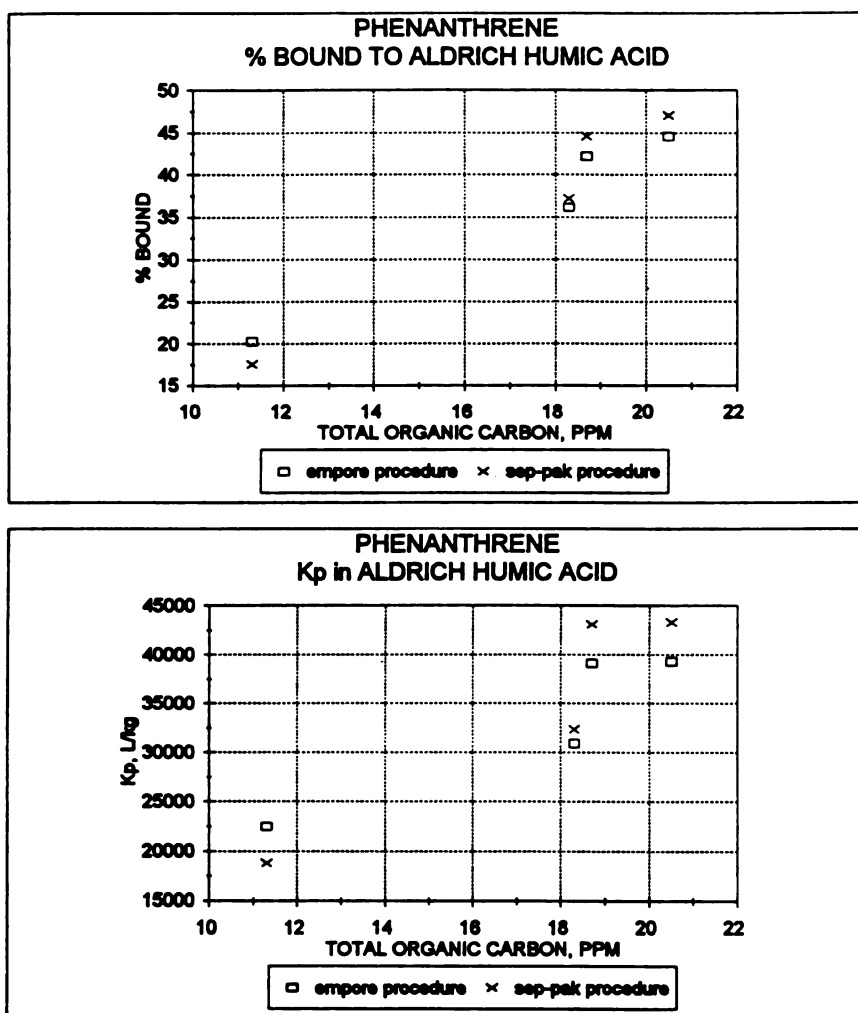


Figure 2-5 The effect of increasing humic acid content on the % bound and K_p of phenanthrene in Aldrich humic acid.

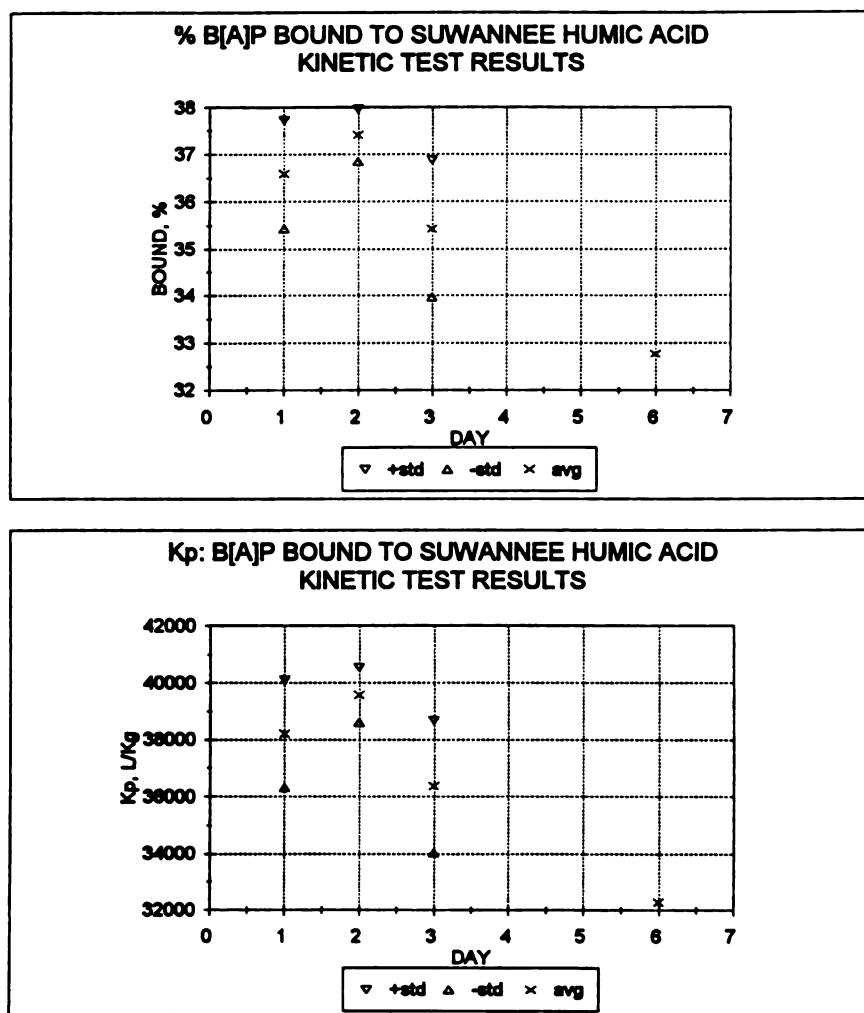


Figure 2-6 The effect of time on the % bound and K_p of benzo[a]pyrene in Suwannee River humic acid.

Figure 2-7 shows how percent bound and K_p for phenanthrene in Aldrich humic acid change with increasing time. Both exhibit an increase over a time span of ten days. The Empore™ Disk

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was used in the kinetic analysis for both phenanthrene and benzo[a]pyrene solutions.

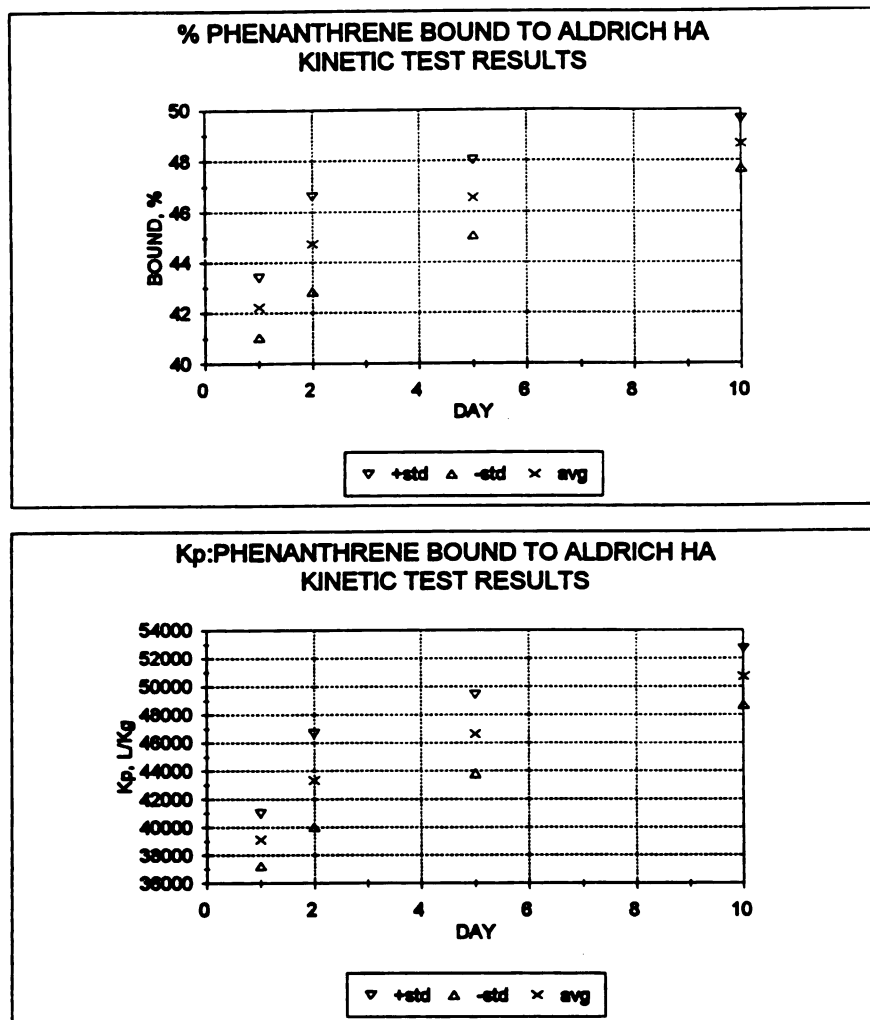


Figure 2-7 The effect of time on the % bound and K_p of phenanthrene in Aldrich humic acid.

2.4 Conclusions

The Sep-Pak® C-18 Cartridge and the Empore™ C-18 Extraction Disk give similar results when used to determine the distribution constants of phenanthrene and benzo[a]pyrene in humic acid. The mass balances, % bound, and K_p results were similar for both methods. Even though the results were significantly different for the Empore™ Extraction Disk and Sep-Pak® Cartridge techniques in the filtering speed tests, the data trends were similar.

The smaller breakthrough numbers obtained for the Empore™ Disk, however, may mean that the Empore™ Disk technique is more accurate than the Sep-Pak® Cartridge when determining the K_p of solutions in which the percent bound number is small. This occurs at low humic acid concentrations. Also, the Sep-Pak® retains small amounts of humic acid. This could lead to lower K_p estimations due to the retention of PAH-humic complexes in the C-18 matrix.

The K_p of benzo[a]pyrene in Suwannee River humic acid decreases with increasing humic acid content and decreases with time. The K_p of phenanthrene in Aldrich humic acid increases with increasing humic acid content and also increases with time.

Chapter 3

THE EFFECT OF pH AND THE ADDITION OF A SOLVENT PHASE ON THE PARTITIONING OF BENZO[A]PYRENE AND PHENANTHRENE TO HUMIC ACID

3.1 Introduction

Benzo[a]pyrene and phenanthrene are polycyclic aromatic hydrocarbons (PAHs) that are abundant in the environment. Manmade sources include oil, gasoline, coal tar, and the incomplete combustion of fossil fuels(2). They are hydrophobic, exhibit low solubilities in water(1), and have been to bioaccumulate in aquatic systems(3-7). They are also carcinogens and mutagens that have been shown to produce reproductive effects in animal life(8).

Dissolved humic acid increases PAH solubility in a water system. Humic bound PAHs are also less susceptible to bioaccumulation(3-7), reaction with other chemicals, and photolysis(1).

pH has been shown to have an effect on the partitioning of PAH to humic acid. Increasing the pH in a water system increases the number of charged sites in the humic acid polymer(13). This is due to the presence of many phenolic and carboxylic functional groups in the humic acid solution(14). Landrum found that decreasing the pH of benzo[a]pyrene in stream and well water increased the amount of benzo[a]pyrene

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trapped in a XAD-4 resin(16). Schlautman and Carter found that the K_p of hydrophobic organic chemicals decrease with increasing pH(15,17).

Solvents have been used by many researchers to introduce PAH to humic acid solution. Schlautman found that the addition of small amounts of methanol has no effect on the partitioning of perylene to Suwannee River humic acid(23). This series of experiments investigates the effect of pH and the use of a solvent carrier on the K_p of benzo[a]pyrene in Suwannee River humic acid solution and phenanthrene in Aldrich humic acid solution.

3.2 Materials and Methods

Suwannee River Humic Acid Reference was obtained from the International Humic Substances Society, Colorado School of Mines, lot number 1R101H. Aldrich Humic Acid was obtained from Aldrich Chemical Company, lot number 01816HH. The humic acid solutions were created by dissolving the humic acid in reagent water at a pH of 10. For some of the experiments, the pH was then reduced 7. Both types of solution were then passed through a 0.45 μm glass filter.

Two lots of radiolabeled phenanthrene and one lot of benzo[a]pyrene were obtained from Sigma Chemical. The details are given in Table 3-1. Benzo[a]pyrene was dissolved in a 1:1 toluene:acetone solution and phenanthrene was dissolved in acetone. For some of the solutions, the solvent was then injected directly into the water solution: 1.5 μL and 10 μL of

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the phenanthrene and benzo[a]pyrene, respectively. In the other series of experiments, the solvent PAH solutions were spiked into 250 ml glass bottles. Next, the bottles were placed in a hood for at least three days in order to evaporate the solvent. Humic acid solutions were then added.

Both the solvent carrier and the evaporated solvent solution bottles were placed in an orbital shaker for at least 16 hours before the reverse phase tests were performed. The concentrations of phenanthrene and benzo[a]pyrene in solution ranged from 0.61-312 $\mu\text{g/L}$ and 50-106 $\mu\text{g/L}$, respectively.

Table 3-1 Radiolabeled PAH data.

	Phen 1	Phen 2	B[A]P
Product No.	31,528-1	31,528-1	B9776
Lot No.	049F9271	049F9271-1	080H9216
Activity, mCi/mmol	13.1	8.3	16.2
Purity	>98%	>98%	>98%

J. T. Baker Empore™ 25 mm C-18 Extraction Disks were used in reverse phase analysis. The Empore™ Disk was conditioned with 5 mL of 1:1 ethyl acetate:methyl chloride solution, followed by a 5 mL methanol rinse. 105 mL reagent water was then passed through the disk. 5 mL of the PAH/humic acid solution was then filtered through the disk on top of the water meniscus. The disk was eluted sequentially with 5 mL aliquots of ethyl acetate, methylene chloride, and 1:1 ethyl/methylene chloride. All filtering speeds were 24 mL/min.

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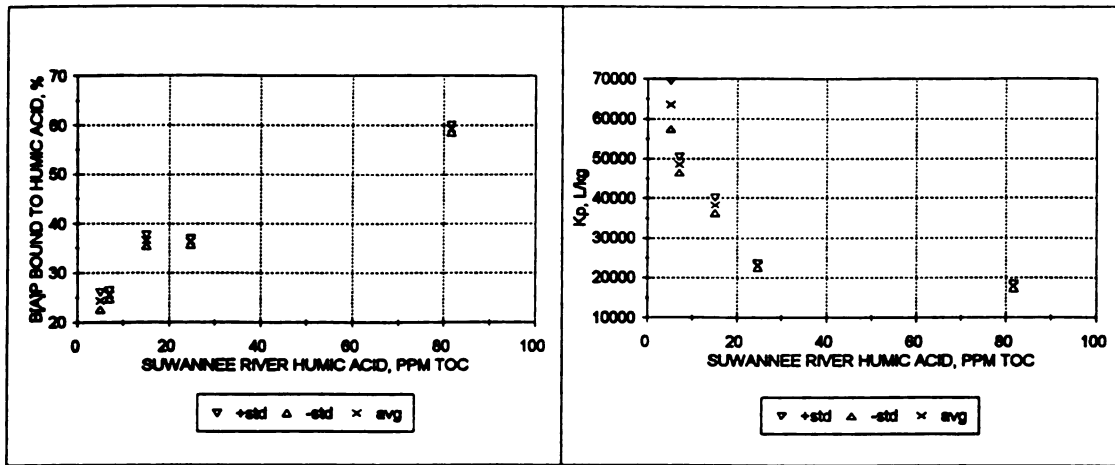
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3.3 Results and Discussion

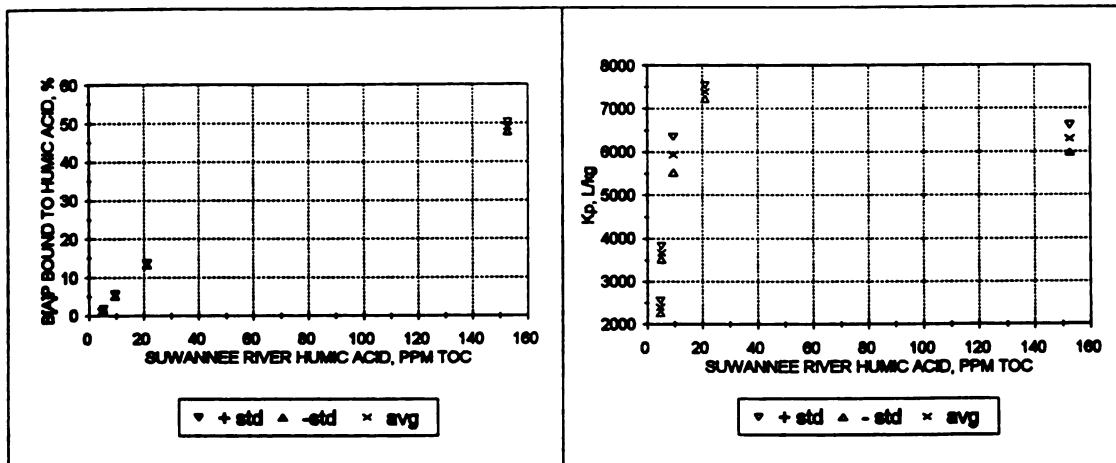
Reverse phase analysis was conducted on benzo[a]pyrene/Suwannee River humic acid solutions. These solutions were prepared with two different sets of conditions, as follows:

1. Benzo[a]pyrene Experimental Condition One (BEC-1)
 - a. Benzo[a]pyrene was dissolved in an acetone/toluene mixture.
 - b. Suwannee River humic acid solution was prepared and then adjusted to a pH of 10.
 - c. Approximately 10 μ L of the acetone/toluene mixture was spiked into the humic acid solution.
2. Benzo[a]pyrene Experimental Condition Two (BEC-2)
 - a. Benzo[a]pyrene was dissolved in an acetone/toluene mixture.
 - b. Suwannee River humic acid solution was prepared, adjusted to a pH of 10, and then adjusted to a pH of 7.
 - c. The acetone/toluene mixture was spiked into the mixing bottle, the solvent was evaporated, and then the humic acid solution added.

Figure 3-1 shows the results of the reverse phase analyses conducted on BEC-1 and BEC-2 solutions. The percent bound and the K_p were lower in BEC-1, indicating that these values decrease with increasing pH. Also, the BEC-1 K_p increases with increasing humic acid content. In BEC-2, however, K_p decreases



pH=7, Evaporated Solvent Solutions



Ph=10, Toluene/Acetone Carrier Solution

Figure 3-1 Partitioning results: benzo[a]pyrene in Suwannee river humic acid.

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with increasing humic acid content. The BEC-2 results compare to those obtained by Landrum and McCarthy in which K_p of benzo[a]pyrene decreased with increasing humic acid content(12,27).

Reverse phase analysis was conducted on phenanthrene/Aldrich humic acid solutions. These solutions were prepared with two different sets of conditions, as follows:

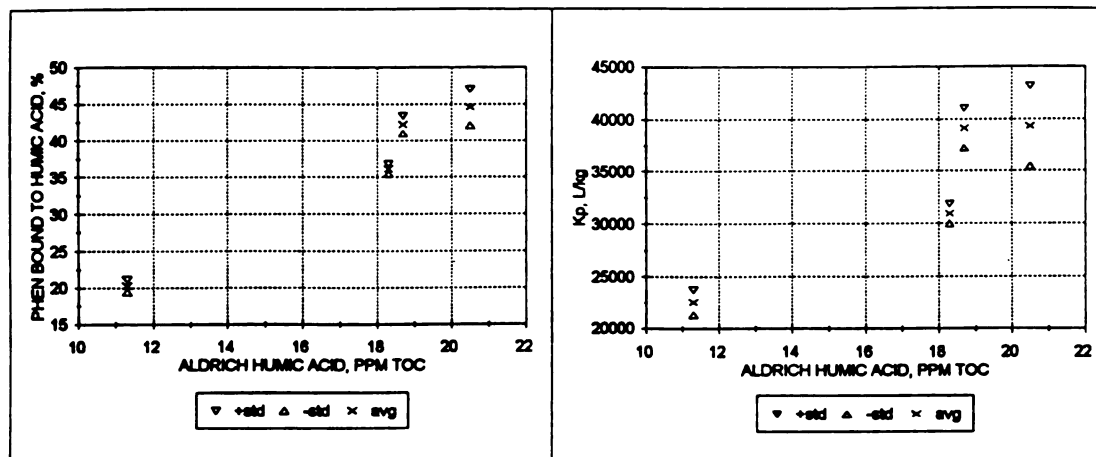
1. Phenanthrene Experimental Condition One (PEC-1)
 - a. Phenanthrene was dissolved in acetone.
 - b. Aldrich humic acid solution was prepared and then adjusted to a pH of 10.
 - c. Approximately 1.5 μ L of the acetone mixture was spiked into the humic acid solution.
2. Phenanthrene Experimental Condition Two (PEC-2)
 - a. Phenanthrene was dissolved in acetone.
 - b. Aldrich humic acid solution was prepared, adjusted to a pH of 10, and then adjusted to a pH of 7.
 - c. The acetone mixture was spiked into the mixing bottle, the solvent was evaporated, and then the humic acid solution added.

Figure 3-2 shows the K_p and percent bound results of reverse phase analysis conducted on PEC-1 and PEC-2 solutions. As in the BEC tests, the K_p and percent bound of PEC-1 are lower than in PEC-2. Also, the PEC-1 K_p decreases with increasing

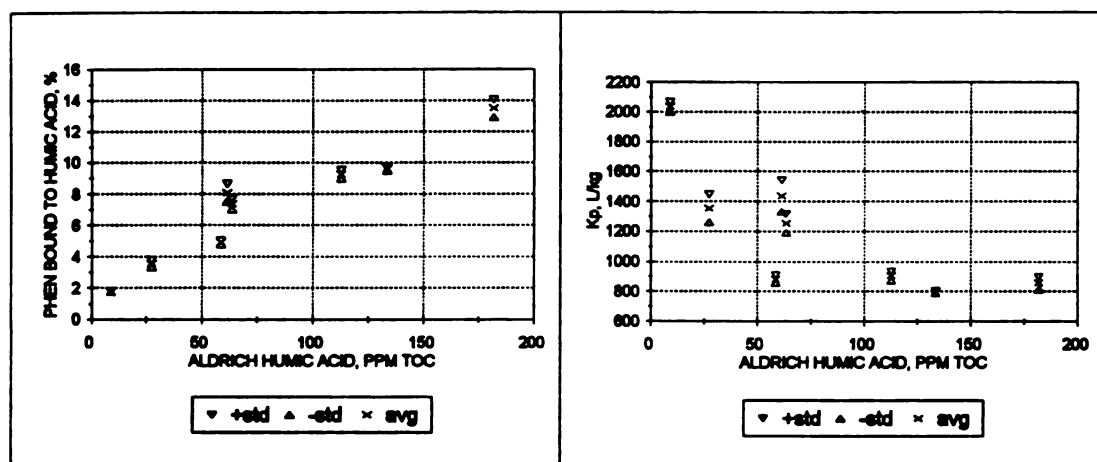
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pH=7, Evaporated Solvent Solutions



Ph=10, Acetone Carrier Solution

Figure 3-2 Partitioning results: phenanthrene in Aldrich humic acid.

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In order to determine the effect of pH alone on K_p , solvent carrier was used to introduce PAH into neutral solutions. The results are indicated in Table 3-2.

Table 3-2 pH=7 and PAH solvent carrier test results.

PAH	Humic Acid	Humic Acid Conc. (ppm TOC)	K_p^1 (L/kg)
B[A]P	Suwannee	68.9	8785 $\pm$ 334
Phen	Aldrich	46.6	2168 $\pm$ 38
Phen	Aldrich	50.6	3026 $\pm$ 3

(1) Average $\pm$ Standard Deviation

The Table 3-2 results are lower than those that can be visually interpolated from the neutral, solvent evaporated solution tests (BEC-2 and PEC-2). Also, the Table 3-2 results are higher than those that can be visually interpolated from the pH=10, solvent carrier solution tests (BEC-1 and PEC-1). These results indicate that increasing pH alone leads to decreasing K_p . Similarly, Schlautman found that the K_p of perylene dissolved in humic solutions decreased with increasing pH(17). Carter obtained the same results with DDT in Pakim Pond humic acid(15).

Figure 3-3 shows how different ratios of phenanthrene to acetone affect the K_p of the phenanthrene/Aldrich humic acid solutions. In each instance, 10 μ L of acetone was used to

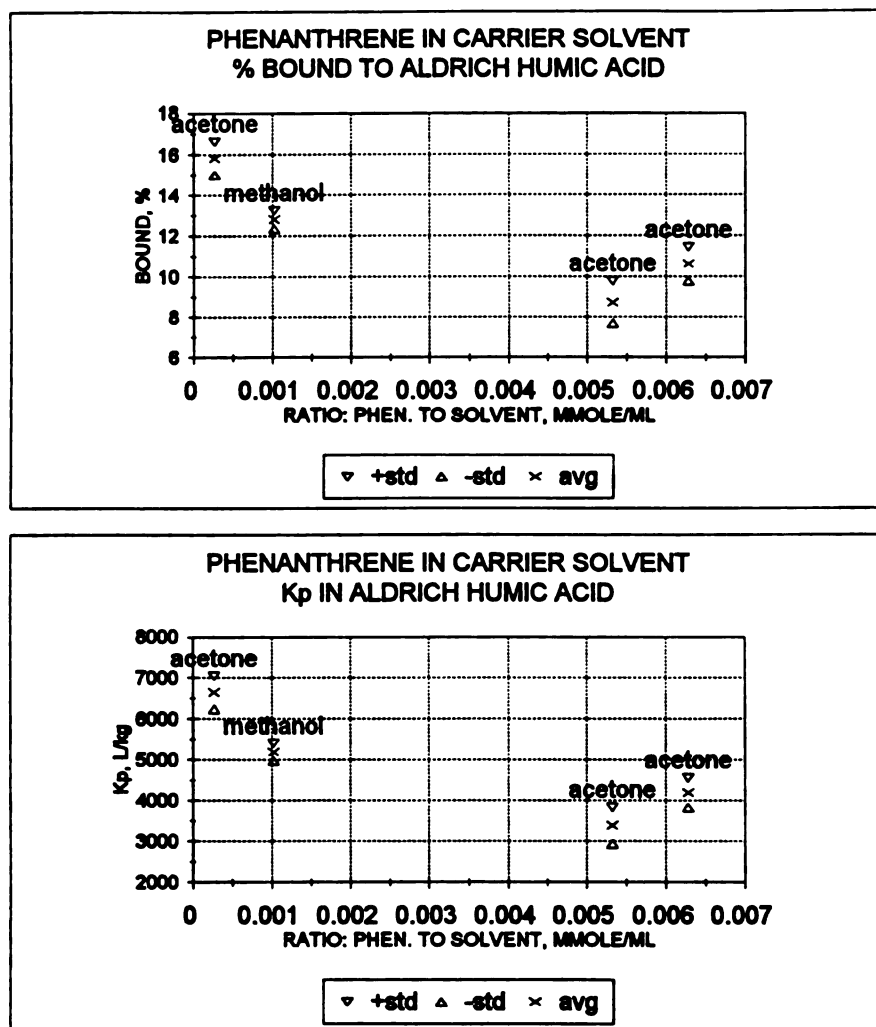


Figure 3-3 Partitioning results: phenanthrene in Aldrich humic acid. Different amounts of phenanthrene in 10 μ l acetone carrier solvent.

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spike phenanthrene into 250 mL, 28.3 ppm TOC Aldrich humic acid solutions. A larger phenanthrene to acetone ratio resulted in lower K_p values. Also, these values are lower than those obtained in the evaporated solvent solutions and higher than those obtained in the previous solvent carrier tests. Methanol was used as a comparison. A similar result was obtained.

Several researchers have determined that small amounts of methanol in solution have no effect on K_p results(23-25). Indeed, several researchers have used methanol(6,12,18,19) and acetone(3,20-22) as carrier solvents to dissolve PAH in humic solutions.

These results indicate that the affect of using acetone as a solvent carrier is not only to reduce the K_p of a solution but also to alter the trend of the K_p vs humic acid content graph. A model of the PAH-solvent-humic acid system can be constructed that will contain the components shown in Figure 3-4. The PAH first enters the humic acid solution dissolved in acetone. The following kinetic progression is assumed, setting up an equilibrium condition:

1. The PAH distributes between the water and the solvent phases. Simultaneously, humic acid will equilibrate between the water and the solvent.
2. PAH distributes between bound and free states in the water phase.
3. The HA-PAH complex equilibrates between the water and the solvent.

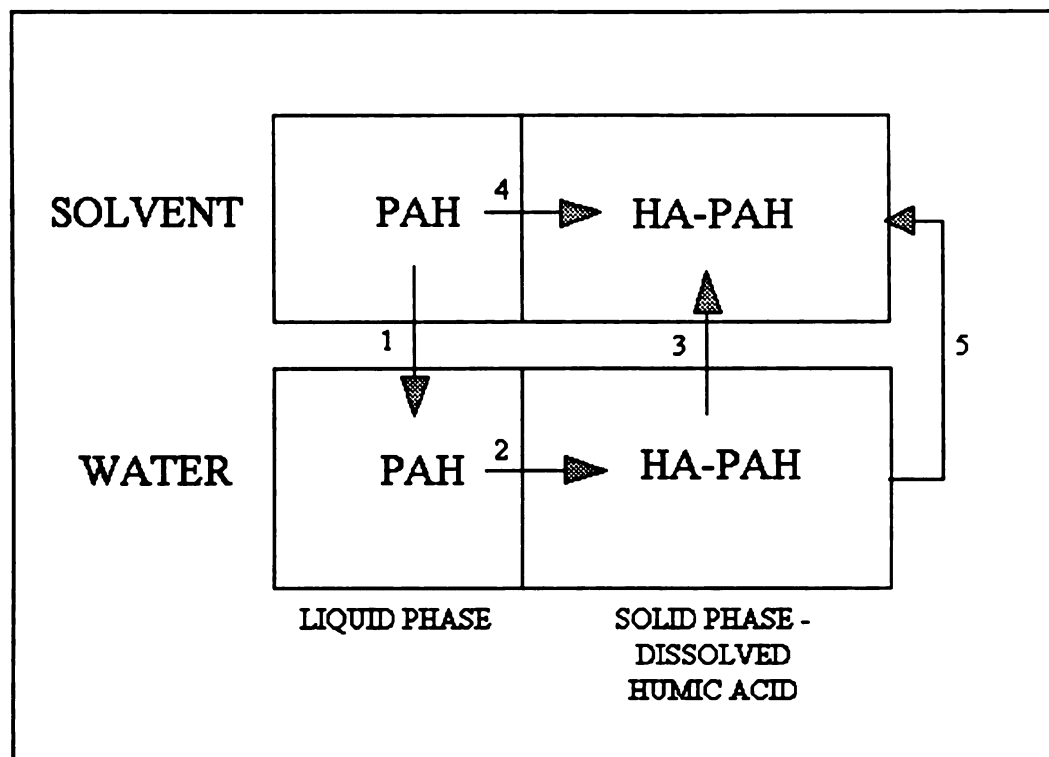


Figure 3-4 PAH/Humic Acid/Water/Solvent system. 1, 2, 3, and 4 are PAH distribution coefficients. 5 is the humic acid distribution coefficient.

4. PAH distributes between the bound and the free state in the solvent phase.

An extremely hydrophobic solution, like benzo[a]pyrene, will exhibit much higher distribution coefficients 1 ($\frac{\{\text{PAH}_{\text{acetone}}\}}{\{\text{PAH}_{\text{water}}\}}$), 2 ($\frac{\{\text{HA-PAH}\}}{\{\text{PAH}\}}$), and 4 ($\frac{\{\text{HA-PAH}\}}{\{\text{PAH}\}}$) than a pollutant with lower hydrophobicity like phenanthrene. The interaction of this system with the C-18 reverse phase material will determine the amount of PAH that remains in the filter and, subsequently, the apparent K_p (distribution constant 2 in Figure 2-4) of the solution. Understanding this interaction could help to explain the

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difference in data trends between the solvent carrier and evaporated solvent solutions.

3.4 Experimental Implications

This study indicates that there are difficulties associated with the use of a solvent carrier to introduce phenanthrene or benzo[a]pyrene into humic acid solutions. More studies must be conducted to determine the types and amounts of solvent which will not significantly affect the K_p of the PAH-humic acid solutions.

3.5 Summary

The percent bound and the K_p of benzo[a]pyrene in Suwannee River humic acid and phenanthrene in Aldrich humic acid decrease with increasing pH. The pH=7, evaporated solvent K_p of benzo[a]pyrene decreases with increasing humic acid content. The pH=7, evaporated solvent K_p of phenanthrene in Aldrich Humic acid increases with increasing humic acid content. The pH=10, solvent carrier solutions of both phenanthrene and benzo[a]pyrene exhibit the opposite data trends.

The K_p of carrier solvent, neutral humic acid solutions are lower than the value obtained in the neutral, evaporated solvent tests and higher than the results obtained in the carrier solvent, pH=10 solution. Increasing the phenanthrene to acetone ratio in the carrier solvent leads to decreasing K_p in the humic acid solution.

CHAPTER 4

FURTHER RESEARCH

The following are recommendations for future research which would further develop the topics addressed in this work. Research would be conducted using a reverse phase procedure with the Empore™ Disk.

1. Studies can be conducted to further investigate the effect of carrier solvent use on K_p . Different solvents, in varying amounts, can be used to spike PAH into humic acid solution.
2. K_p vs humic acid content tests can be conducted at various flow rates to more fully investigate the effect of flow rate on K_p .
3. The combined effect of pH and carrier solvent use on K_p can be researched. Tests can be run on solutions of benzo[a]pyrene and phenanthrene at a different pH values. Increasing amounts of humic acid in solution can be used at each pH.
4. The partitioning of other hydrophobic pollutants to

humic acid may be investigated.

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APPENDICIES

APPENDIX A

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1. <i>What is the purpose of this study?</i> 2. <i>What are the research questions or hypotheses?</i> 3. <i>What methods were used to collect data?</i> 4. <i>What data analysis techniques were employed?</i> 5. <i>What are the main findings or results?</i> 6. <i>What are the implications of the study?</i> 7. <i>What are the limitations of the study?</i> 8. <i>What are the conclusions?</i>

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APPENDIX A
MATERIALS AND METHODS

A.1 Materials

Suwannee River Humic Acid Reference was obtained from the International Humic Substances Society, Colorado School of Mines, lot number 1R101H. Aldrich Humic Acid was obtained from Aldrich Chemical Company, lot number 01816HH.

Two lots of radiolabeled phenanthrene and one lot of benzo[a]pyrene were obtained from Sigma Chemical. The details are given in Table A-1.

Table A-1 Radiolabeled PAH data.

	Phen 1	Phen 2	B[A]P
Product No.	31,528-1	31,528-1	B9776
Lot No.	049F9271	049F9271-1	080H9216
Activity, mCi/mmol	13.1	8.3	16.2
Purity	>98%	>98%	>98%

Waters Sep-Pak® C-18 Classic Cartridges and J. T. Baker Empore™ 25 mm C-18 Extraction Disks were used in reverse phase analysis.

Details on the various solutions used are given in Table A-2.

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Table A-2 Solutions used in experimentation.

Solution	Manufacturer
Hexanes	J.T. Baker
Xylenes	J.T. Baker
Methanol, Absolute	J.T. Baker
Acetone	J.T. Baker
Ethyl Acetate	Aldrich Chemical Company
Methylene Chloride	Mallinckrodt Chrom AR HPLC
Safety-Solve™ Aqueous Scintillation Cocktail	Research Products International Corporation

A.2 Methods

A.2.1 Glassware Preparation

A. Solution Preparation Glassware

Glassware was washed with Multi-Terge liquid alkaline soap (Em Diagnostic Systems) then rinsed thoroughly with deionized water. Next, the glassware was rinsed thoroughly in chromic acid then with ultra-pure deionized water.

B. Radiolabeled Experimentation Glassware

Glassware was first soaked in water with Multi-Terge alkaline soap. Next, the glassware was soaked in xylene. Then it was rinsed sequentially with xylene, methanol, and hexane. Finally, it was allowed to dry before use.

A.2.2 Reagent Water Preparation

Experimental reagent water was prepared by first cleaning a 5 gallon glass carboy. The carboy was rinsed with Multi-



Terge filled with ultra-pure deionized water and spiked with 200 mL of 50 g/L sodium persulphate solution. The carboy was allowed to set for 3 days then rinsed thoroughly with ultra-pure deionized water.

Ultra-pure deionized water was collected in the carboy and 90 μL of H_2O_2 was added in order to create a 60 μM solution.

The water in the carboy was ozonated for one hour at a rate of approximately 2.8 L/min ozone flow with a Polymetrics, Inc. Model T-408 Ozone Generator. The water was aerated with nitrogen for 15 minutes in order to drive out the carbon.

A.2.3 Humic Acid Preparation

The humic acid was mixed with reagent water and raised to a pH of about 10 with 0.15 N sodium hydroxide solution. For some of the experiments, the pH was then adjusted to about 7 with a 0.1 M sulfuric acid solution. Then the solution was then filtered through a Millipore 0.45 μm glass filter in a vacuum filter system.

A.2.4 Radiolabeled Humic Acid Solution Preparation

The radiolabeled PAHs were mixed with solvent in order to effectively deliver them into the humic acid solution. The carrier solvents acetone and an 1:1 acetone:toluene solution were used for phenanthrene and benzo[a]pyrene, respectively.

A glass syringe was used to deliver 1.5, 10, or 12 μL of the spiked carrier solvent into a glass 250 mL container half

full of humic acid solution. Then the bottle was filled with humic acid solution. In the evaporation tests, the spiked carrier solvent was delivered into an empty bottle and the solvent evaporated by setting the bottle in the hood for 3 days. Then, the humic acid solution was added to the bottle and the bottle was capped and put into an orbital shaker at room temperature for at least 18 hours.

The concentrations of PAH used in the partitioning experiments are listed in Table A-3.

Table A-3 PAH concentration in humic acid solutions.

PAH	Spiking Condition	pH	Concentration Range ($\mu\text{g/L}$)
Benzo[a]pyrene	Solvent	10	50-98.2
Benzo[a]pyrene	Solvent	7	106.4
Benzo[a]pyrene	Evaporated	7	32-91
Phenanthrene	Solvent	10	57-198
Phenanthrene	Solvent	7	152, 312
Phenanthrene	Evaporated	7	0.61-10.9

A.2.5 Empore™ Disk Reverse Phase Method

A.2.5.1 Normal Procedure

A. Conditioning

A 25 mm Empore™ C-18 Extraction Disk was first clamped in the funnel/frit vacuum assembly shown in Figure 1-3(a). It was then cleaned by using an automatic pipet with a new tip to

add 5 mL of 1:1 ethyl acetate:methylene chloride solution to the reservoir by rinsing the sides of the reservoir at least three times in a circular motion. Then the disk was allowed to soak for 3 minutes.

The vacuum was then started and the solution was drawn through the disk at a rate of 24 mL/min. The vacuum was continued for one minute in order to dry the disk.

Next, the disk was conditioned by delivering 5 mL methanol into the funnel in a circular motion and allowing the disk to soak for 3 minutes. Then, the vacuum was started and the solvent was drawn through the disk. When only a meniscus of methanol remained, about 15 mL organic-free water was added to the reservoir by rinsing the reservoir at least three times in a circular motion. The vacuuming was continued until a meniscus of water remained, then another aliquot of water was delivered in the same manner. 105 mL (7 aliquots) of water was filtered in this fashion. The vacuuming was continued again until a meniscus of water was left on top of the disk surface, then the vacuum was turned off.

B. Reverse Phase Procedure

A liquid scintillation vial was fitted into the vacuum chamber shown in Figure 1-3(b). The filtration assembly was then disengaged from the flask and fit into the vacuum chamber assembly with the end of the frit inside the vial. A 5 mL volumetric pipette was rinsed once with 5 mL methanol, twice with 5 mL ultra-pure deionized water, and once with 5 mL of the spiked humic acid solution. Then, the vacuum was turned on

to a vacuuming rate of 24 mL/min (400 mm Hg vacuum pressure). The sample was dispensed into the bottom of the reservoir during the filtration so that the disk remained covered by a meniscus of water. After all of the solution was filtered through, the vacuuming was continued for one minute in order to dry the disk.

The filtration assembly was lifted carefully from the vacuum chamber and set aside. The scintillation vial was then lifted out, capped, and weighed. Next, another empty vial was uncapped and placed onto the vacuum chamber. Then, the filtration assembly was fit into place as before.

C. Disk Extraction

First, the vacuum was started. Then, using the automatic pipet, 5 mL of ethyl acetate was slowly added to the reservoir, forming and maintaining a meniscus in the bottom. In order to dry the disk, vacuuming was continued for 1 minute after the solution was drawn through the frit. The filtration assembly was lifted carefully from the vacuum chamber and set aside. The scintillation vial was then lifted out, capped, and weighed. Another empty vial was uncapped and placed onto the vacuum chamber. Then, the filtration assembly was fit onto the chamber with the frit end inside the vial. Then, methylene chloride, and 1:1 methylene chloride:ethyl acetate solution were added sequentially to the reservoir, in the fashion described above. A new pipette tip was used for each solution. Each tip was first rinsed with the solution before withdrawing the aliquot. A new vial was used for each solution.

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Then, the funnel was unclamped from the frit and placed in a wash container. Using the forceps, the Empore™ disk was removed and rinsed thoroughly in the cocktail of a scintillation vial. The disk was disposed of and the vial was capped and set aside.

The frit was removed from the flask and set in a wash container. The scintillation vial was lifted out of the vacuum chamber with the removal cap, then, capped and weighed.

A 1 ml volumetric pipette was rinsed once with 1 mL methanol, twice with 1 mL ultra-pure deionized water, and once with 1 mL of the spiked humic acid solution. Then, 1 ml of the spiked humic acid solution was delivered to three different scintillation vials in order to determine mass balance. Aqueous type liquid scintillation cocktail was added to the vials: 10 mL to the solvent vials, 15 mL to the water filtrate vials, and 19 ml to the mass balance vials. The vials were capped, shaken, and analyzed in the liquid scintillation machine.

A.2.5.2 Filtering Speed Test Procedure

A. Conditioning

See Section A.2.5.1A.

B. Reverse Phase Procedure

A liquid scintillation vial was fitted into the vacuum chamber shown in Figure 1-3(b). The filtration assembly was then disengaged from the flask and fit into the vacuum chamber assembly with the end of the frit inside the vial. A 5 mL

volumetric pipette was rinsed once with 5 mL methanol, twice with 5 mL ultra-pure deionized water, once with 5 mL of the spiked humic acid solution, and filled with spiked humic acid solution. Then, the vacuum was turned on to a vacuuming rate of 24 mL/min (400 mm Hg vacuum pressure). The sample was dispensed into the bottom of the funnel during the filtration so that the disk remained covered by a meniscus of water. After all of the solution was filtered through except for a meniscus, the vacuum was turned off. Then, another 5 mL aliquot of the spiked humic acid solution was drawn into the pipette and filtered through the Empore™ Disk as before. The filtration assembly was lifted carefully from the vacuum chamber and set aside. The scintillation vial was then lifted out and another empty vial was uncapped and placed onto the vacuum chamber. Then, the filtration assembly was fit onto the chamber with the frit end inside the vial and another 5 mL aliquot filtered through the disk at a high vacuum pressure. This vial was removed as before and another (4)-5 mL aliquots were filtered through the disk in this fashion at decreasing vacuum speeds. Then after the final aliquot, the radiolabeled solution was filtered through the disk and the vacuum continued for one minute in order to dry the disk. The funnel was then unclamped from the frit and the disk removed. Both the funnel and the frit were placed in a wash container. The disk was placed in a waste container.

The above disk conditioning/reverse phase sequence was followed for a new disk using increasing vacuum speeds in the

reverse phase procedure. All experimental scintillation vials were capped and weighed. The filtered solution weights and the filtering times were used to determine the filtering speed in mL/min.

A 1 mL volumetric pipette was rinsed once with 1 mL methanol, twice with 1 mL ultra-pure deionized water, and once with 1 mL of the spiked humic acid solution. Then, 1 mL of the spiked humic acid solution was delivered to three separate scintillation vials in order to determine mass balance. Aqueous type liquid scintillation cocktail was added to the vials: 15 mL to the water filtrate vials and 19 mL to the mass balance vials. The vials were capped, shaken, and analyzed in the liquid scintillation machine.

A.2.6 Sep-Pak® Reverse Phase Method

A.2.6.1 Normal Procedure

A. Conditioning

Six new scintillation vials were uncapped and set aside. 2 mL of methanol was drawn into a 10 mL glass syringe. The syringe was then turned upside down and the plunger was pulled out in order to rinse the syringe. Then the methanol was discarded. This was repeated three times in order to clean the syringe.

10 mL of methanol was then drawn into the syringe, a Sep-Pak® Cartridge fitted onto the end, and the methanol was pushed through the cartridge at a constant rate of speed (12 mL/min or 30 mL/min). The setup was disassembled and the

cartridge was set in the first scintillation vial.

Next, the syringe was rinsed three times with three 2 mL aliquots of ultra-pure deionized water. Then, 10 mL of water was drawn into the syringe, the Sep-Pak® Cartridge was fitted onto the end of the syringe, and the water pushed through the cartridge at a constant rate of speed. In this manner, 100 mL of water was pushed through the cartridge. The cartridge was set in the first scintillation vial between aliquots.

B. Reverse Phase Procedure

A second syringe was conditioned by rinsing it three times with three 2 mL aliquots of methanol and another three times with 2 mL aliquots of water. Then it was set aside. Three other glass syringes were similarly cleaned but with solvent only: one with ethyl acetate, one with methylene chloride and the other with 1:1 ethyl acetate:methylene chloride.

Humic acid solution spiked with radiolabeled PAH was poured into a beaker. The first syringe was rinsed with 5 mL of solution. 5 mL of spiked humic acid solution was drawn into the syringe, the conditioned Sep-Pak® Cartridge fitted onto the end, and the solution pushed through at a constant rate of speed into the second scintillation vial. The vial was capped and set aside. The cartridge was set in the third vial.

The second syringe was then filled with 5 mL of water, the Sep-Pak® fitted on to the end, and the water pushed through at a constant speed into the third scintillation vial. Then, the cartridge was placed into the fourth vial. The third

vial was capped and set aside.

C. Cartridge Extraction

5 mL of ethyl acetate was drawn into the third syringe, the Sep-Pak® cartridge fitted onto the end, and the solution pushed through at a constant speed into the fourth vial. The cartridge was placed into the fifth vial and the fourth vial was capped and set aside. Similarly, methylene chloride and 1:1 ethyl acetate:methylene chloride were used sequentially to elute the cartridge.

A 1 mL volumetric pipette was rinsed once with 1 mL methanol, twice with 1 mL ultra-pure deionized water, and once with 1 mL of the spiked humic acid solution. Then, 1 mL of the spiked humic acid solution was delivered to three separate scintillation vials in order to determine mass balance. Aqueous type liquid scintillation cocktail was added to the scintillation vials: 10 mL to the solvent vials, 15 mL to the water vials, and 19 mL to the mass balance vials. The vials were capped, shaken, and analyzed in the liquid scintillation machine. The syringes were disassembled and placed in the wash container.

A.2.6.2 Filtering Speed Test Procedure

A. Conditioning

See Section A.2.6.1A.

B. Reverse Phase Procedure

Humic acid solution spiked with radiolabeled PAH was poured into a beaker. The syringe was rinsed with 5 mL of

solution. 10 mL of spiked humic acid solution was drawn into the syringe, the conditioned Sep-Pak® Cartridge fitted onto the end, and the solution pushed through at a constant rate of speed into the second scintillation vial. The vial was capped and set aside. The cartridge was set in the third vial.

The syringe was then filled with 5 mL of spiked humic acid solution, the Sep-Pak® fitted on to the end, and the water pushed through at 6 mL/min into the third scintillation vial. Then, the cartridge was placed into the fourth vial. The third vial was capped and set aside. (3)-5 mL aliquots were delivered in this manner at increasing speeds of 12 mL/min, 20 mL/min, and 30 mL/min. After the last aliquot was filtered through the cartridge, the syringe was disconnected from the cartridge. The syringe was placed in a wash container and the cartridge discarded.

The previously described filtering speed test was repeated using a new cartridge and syringe. Filtering speeds were started high and then decreased in the following sequence: 30 mL/min, 20 mL/min, 12 mL/min, and 6 mL/min. After the last aliquot was filtered through the cartridge, the syringe and the cartridge were disconnected. The syringe was placed in a wash container and the cartridge discarded.

A 1 mL volumetric pipette was rinsed once with 1 mL methanol, twice with 1 mL ultra-pure deionized water, and once with 1 mL of the spiked humic acid solution. Then, 1 mL of the spiked humic acid solution was delivered to three separate scintillation vials in order to determine mass balance.

Aqueous type liquid scintillation cocktail was added to the scintillation vials: 15 mL to the water vials and 19 mL to the mass balance vials. The vials were capped, shaken, and analyzed in the liquid scintillation machine. The syringes were disassembled and placed in the wash container.

A.2.7 Total Organic Carbon Analysis

50 g/L sodium persulfate and 5% phosphoric acid solutions were used in the total organic carbon analyzer. The 50 g/L sodium persulfate solution was prepared by first dissolving 50 g of $\text{Na}_2\text{S}_2\text{O}_8$ into enough ultra-pure deionized water in order to make 1 liter solution. Then the solution was purified by placing it in a reagent bottle with the cap loosely on top and heated until it just began to boil. The cap was tightened and the bottle placed in water to cool. The O.I. Corporation Model 700 Total Organic Carbon (TOC) Analyzer provides reagent bottle purge lines in order to purge the solution of CO_2 present from the oxidation of organics with nitrogen automatically during machine operation.

The 5% phosphoric acid solution was prepared by adding 59 mL of 85% H_3PO_4 to enough ultra-pure deionized water to create 1 liter of reagent solution. The acid solution was purified by placing it in a reagent bottle, adding 10 mL of the persulfate solution, placing the cap loosely on top, and placing it in boiling water for 2 hours. As before, the solution was purged during TOC machine operation.

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in an oven at 100°C. 1,000 mg/L carbon standards were prepared by adding 2.128 g of KHP and enough reagent water in order to create 1 liter of solution. Dilutions were made with reagent water from this solution.

The machine curve was set by injecting 20 μ l of 1,000 mg/L into the machine. 5 standards were injected into the machine in order to create a standard curve. The amount of liquid injected was calculated in order to obtain 5 to 30 μ g range of carbon in the machine. The samples were injected first to roughly determine the range needed for the standards.

A.2.8 Liquid Scintillation Analysis

Background values were determined by running one each of the Sep-Pak® and Empore™ Disk reverse phase experiments with 5 mL of unspiked humic acid solution. All solutions were collected in scintillation vials as was normal, combined with the amounts of liquid scintillation cocktail previously indicated, and counted in the Packard 1500 Tri-Carb® Liquid Scintillation Analyzer (LSA). These values were subtracted from their corresponding experimental raw scintillation counts (before quench adjustment).

The LSA efficiency was determined by counting a standard for five minutes and dividing the number of counts by the standard value. The efficiency was 94.5%.

In order to determine the quenching of the humic acid solutions, Aldrich Humic Acid was used to create 12 solutions increasing in humic acid content from 0 to 180 ppm total

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organic content (TOC). 1 mL aliquots were mixed in a scintillation vial with 19 mL cocktail and 10 μ L of radiolabeled acetone/phenanthrene. 5 mL aliquots were mixed in a scintillation vial with 15 mL cocktail and 10 μ L of radiolabeled acetone/phenanthrene. The standard was prepared with 20 mL of cocktail and 10 μ L of radiolabeled acetone/phenanthrene. The vials were each counted for 5 minutes each. Each vial was counted three times. The average regression lines are shown in Figure A-1. The r^2 values of the 1 mL and the 5 mL regression lines are 0.975 and 0.997, respectively.

Suwannee River Humic Acid quench was determined by using the log of the TSIE values obtained by the Packard 1500 Tri-Carb® LSA. For Aldrich Humic Acid, a curve was prepared of the % quench vs the log TSIE and is shown in Figure A-2. The r^2 value was 0.9924. The log TSIE obtained from the Suwannee River Humic Acid water samples was applied to the curve in order to obtain the quench value.

In order to determine the ethyl acetate, methylene chloride, and 1:1 ethyl acetate:methylene chloride solution quenchings, 0, 1, 2, 3, 4, and 5 mL aliquots of ethyl acetate were added separately to 10 μ L radiolabeled acetone/phenanthrene solution and 10 mL of cocktail in scintillation vials. The resultant curves are shown in Figure 3.5. Since the r^2 value of the ethyl acetate quench regression curve was less than 0.50, the curve was used in the raw form to interpolate the data. The r^2 value of the methylene

Figure
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solution
solution

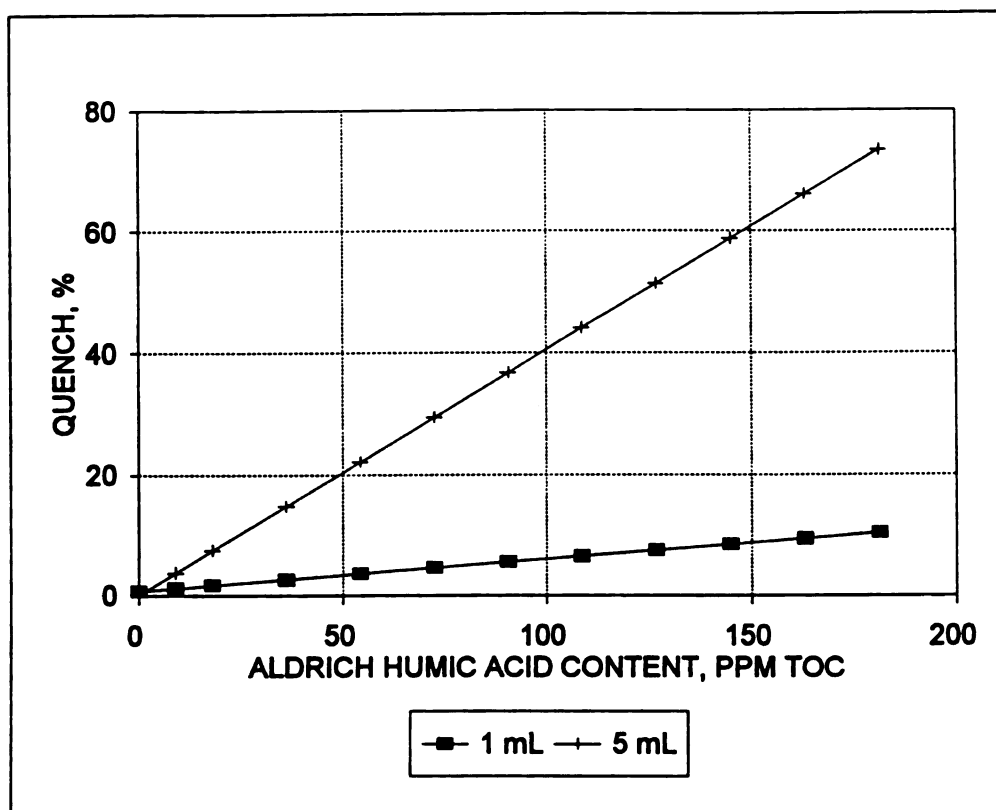


Figure A-1 The quenching effect of Aldrich humic acid content in liquid scintillation. Regression lines are shown. 20 mL solutions were created with either 1 mL or 5 mL humic acid solution and liquid scintillation cocktail.

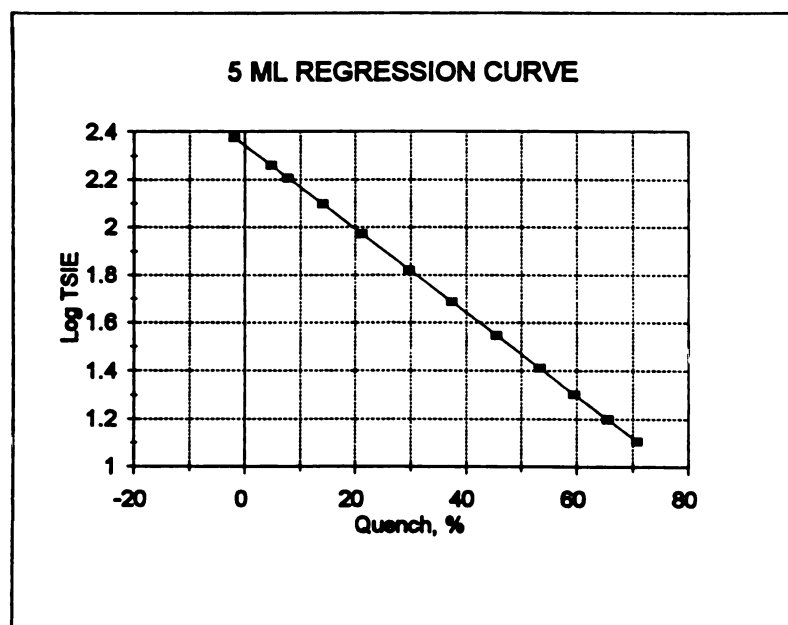
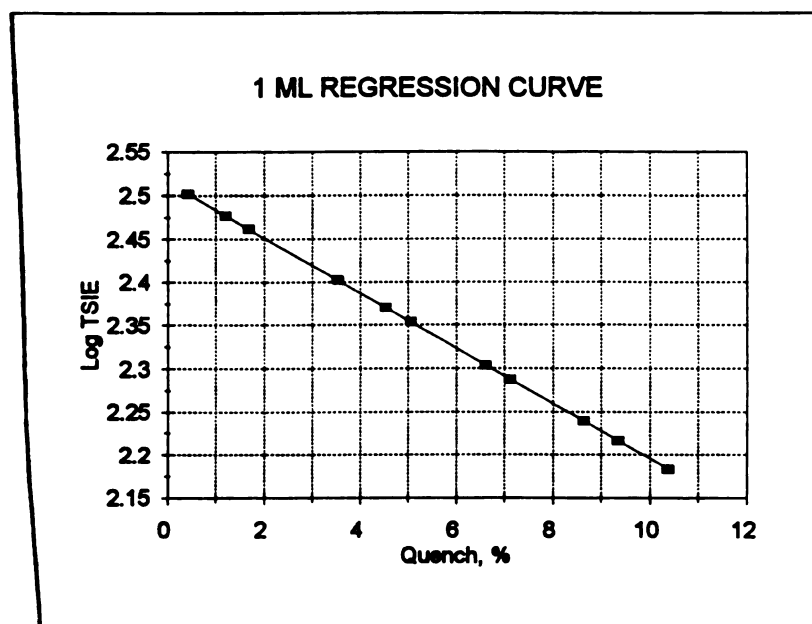


Figure A-2 Log TSIE values compared to solution quench.

chloro

chloro

quene

times

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aceto

A-4.

Table

Solu
ethy
meth
1:1 meth

chloride and 1:1 solution are 0.999 and 0.995, respectively.

In order to determine the ethyl acetate, methylene chloride, and 1:1 ethyl acetate:methylene chloride solution quenchings for the Sep-Pak® by running the procedure three times and collecting the solvents. These solutions were combined with 10 μ L of radiolabeled acetone/phenanthrene solution and 10 mL scintillation cocktail. The counts were compared with the value obtained by counting a solution of 15 mL scintillation cocktail with 10 μ L of radiolabeled acetone/phenanthrene solution. The results are shown in Table A-4.

Table A-4 Quench of Sep-Pak® solvent solutions.

Solution	Quench, %
ethyl acetate	102.1
methylene chloride	79.2
1:1 ethyl acetate: methylene chloride	76.6

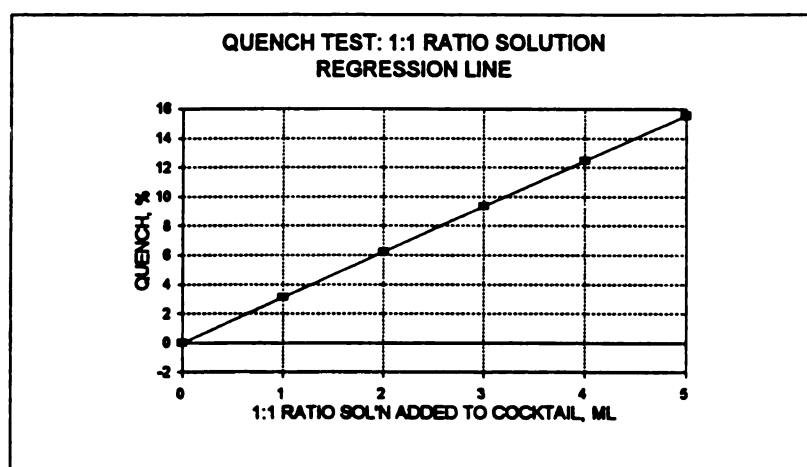
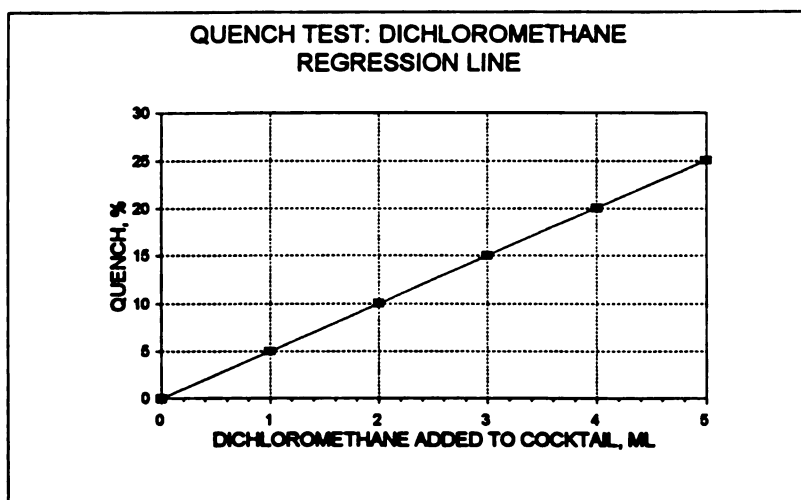
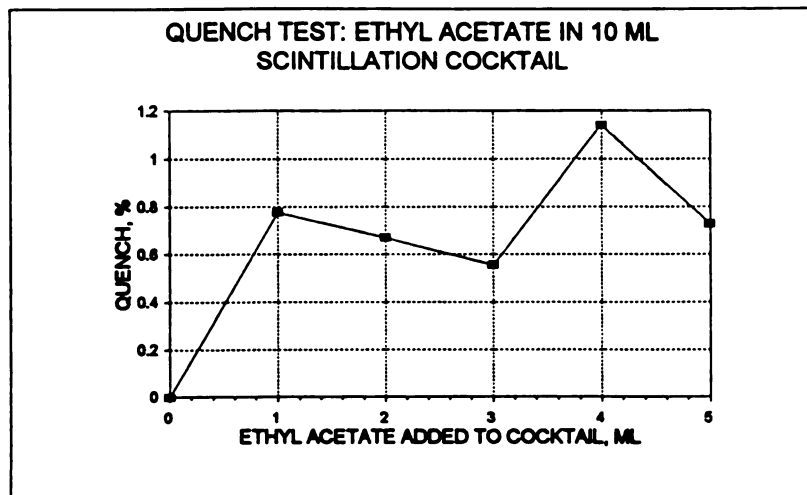


Figure A-3 The effect of solvent on liquid scintillation quenching

APPENDIX B

APPENDIX B

RAW DATA

TABLE B1 - DATA FOR FIGURE 2-1

Breakthrough (bt) Adjustment: used table B3 numbers for bap in adjustment equation.

Humic Acid TOC Test, 3/31/95		File: bnevp82	pH=7
Suwannee River Humic Acid			
Standard Run on TOC			
PPM	mv	avg	
20	64.2311		
	57.4383		
	57.7036		
		59.791	
30	100.426		
	98.6058		
	99.1163		
		99.3827	
50	154.461		
	150.909		
	153.862		
		153.0773	
80	232.287		
	228.289		
	225.188		
		228.588	
100	271.912		
	273.83		
	277.939		
		274.5603	

Regression Output:

Constant

Std Err of Y Est

R Squared

No. of Observations

Degrees of Freedom

X Coefficient(s)

Std Err of Coef.

Value

AVG

STD

-5.58111

2.702969

0.995151

5

3

0.377613

0.015219

229.845

237.278

225.347

230.8233

6.025367

81.21139

84.01819

79.51289

81.58083

2.275258

TABLE B1. CONTINUED

Filtering Speed Test 4/18/95 81.6 ppm Suwannee River Humic Acid
 BENZO-A-PYRENE DATA Ph=7 File:bnevac

Empore Disk Technique

Tsie Values

vial	1	2	3	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
1	284	279	281	130	132	136	134	132	143	128	132	133	131
2	284	280	280	130	132	135	133	132	143	129	131	133	132
3	282	280	279	131	131	136	134	133	142	128	132	133	133
4	285	280	280	132	131	134	133	132	142	129	132	133	132
avg	283.75	279.75	280	130.75	131.5	135.25	133.5	132.25	142.5	128.5	131.75	133	132

log(Tsie) Values

vial	1	2	3	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
1	2.453318	2.445604	2.448706	2.113943	2.120574	2.133539	2.127105	2.120574	2.155336	2.10721	2.120574	2.123852	2.117271
2	2.453318	2.447158	2.447158	2.113943	2.120574	2.130334	2.123852	2.120574	2.155336	2.11059	2.117271	2.123852	2.120574
3	2.450249	2.447158	2.445604	2.117271	2.117271	2.133539	2.127105	2.123852	2.152288	2.10721	2.120574	2.123852	2.123852
4	2.454845	2.447158	2.447158	2.120574	2.117271	2.127105	2.123852	2.120574	2.152288	2.11059	2.120574	2.123852	2.120574
avg	2.452933	2.44677	2.447157	2.116433	2.118923	2.131129	2.125478	2.121393	2.153812	2.1089	2.119748	2.123852	2.120568
% quench	2.008827	2.198539	2.186624	12.36696	12.29032	11.91458	12.08853	12.21427	11.21635	12.59885	12.26491	12.1386	12.23969

Background Counts: typical values used, this run

vial	Tot Act	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10

5 min count

1
2
3
4

avg	30	30	30	30	30	30	30	30	30	30	30

Total Phenanthrene

vial number	1	2	3

sample wt, ml

1	0.9945	1.01	0.9838

5 min count

1	18242.6	16732.2	18465
2	18154.2	16802.6	16556.2
3	18275	16705.4	16641.8
4	18212.8	16700.6	16494

mach.

TABLE B1. CONTINUED

avg	19221 15	19735 2	19539 25 total	effno.
	191115	16205 2	16509 25 avg	adjust

avg ml. 5 ml sheet

TABLE B1. CONTINUED

TABLE B1. CONTINUED

2	2.139879	2.136721	2.136721	2.139879	2.146128	2.143015	2.127105	2.130334	
3	2.139879	2.139879	2.133539	2.139879	2.143015	2.139879	2.130334	2.130334	
4	2.139879	2.139879	2.133539	2.139879	2.146128	2.143015	2.133539	2.130334	
avg	2.139879	2.1383	2.135919	2.139879	2.14535	2.142231	2.130328	2.130334	
% quench	11.64524	11.69385	11.76713	11.64524	11.47684	11.57285	11.93925	11.93907	
Background Counts: typical values used, this run									
vial	S1	S2	S3	S4	S5	S6	S7	S8	
5 min count									
1									
2									
3									
4									
avg	30	30	30	30	30	30	30	30	
81.6 ppm, sep-pak vacuum speed test									
vial	S1	S2	S3	S4	S5	S6	S7	S8	
wt through, mg	5.0538	5.0343	5.0679	5.0487	5.0633	5.0061	5.079	5.0289	
speed, ml per min	30	20	12	6	6	12	20	30	
wt counted, mg	5.0538	5.0343	5.0679	5.0487	5.0633	5.0061	5.079	5.0289	
5 min count	filter	filter	filter	filter	filter	filter	filter	filter	
1	32717.8	29655.8	26731.6	22175	21641.6	25931	30925.8	33637.2	
2	32788	29833.6	26865.2	22248.2	21635	26076.2	30913.4	33740.4	
3	32813.8	29606.2	26799.2	22071.2	21679.2	26085.4	31001.8	33784.8	
4	32836.4	29668	26705	22084	21760.2	25984.4	31114.6	33945.4	
avg	32773.2	29698.53	26798.67	22164.8	21651.93	26030.87	30947	33720.8	
bkgd adjust	32743.2	29668.53	26768.67	22134.8	21621.93	26000.87	30917	33690.8	
vial quench adjust	36354.1	33086.16	29678.95	24600.64	23915.76	29119.43	34270.23	37716.84	
% bound	41.20695	37.50278	33.64075	27.88454	27.10824	33.00654	38.84491	42.7516	
breakthrough adjust	30.49695	26.79278	22.93075	17.17454	16.39824	22.29654	28.13491	32.0416	
Kp	8589.232	7353.812	6212.609	4738.544	4557.564	6037.782	7784.152	9151.639	
log Kp	3.933954	3.868513	3.793274	3.675645	3.658733	3.780877	3.891211	3.961499	

TABLE B-2 - DATA FOR FIGURE B-2

TCC Aftering test	B/4/95	Fiber treated
Polyethylene Glycol	-0.86	-0.72
Succinic Acid & Succinonitrile	-0.77	-0.88

TOC metering test 8/4/95 Film: toctm1

TABLE B-2 - DATA FOR FIGURE 2-2

[illegible]

TABLE B3 - DATA FOR TABLE 2-2

Breakthrough Test		5/19/95		File: bevp0		Empore @24 ml/min, 400mm Hg	
BENZO-A-PYRENE DATA				no pH adjustment		Sep-Pak @30 ml/min	
evaporated carrier solvent						0 ppm Suwannee River Humic Acid	
Empore Disk Technique							
Tsie Values							
vial	1	2	3	A1a	B1a	C1a	
1	328	326	329	253	259	257	
2	330	329	329	251	257	257	
3	329	328	330	252	257	255	
4	325	325	329	252	257	256	
avg	328	327	329.25	252	257.5	256.25	
log(Tsie) Values							
vial	1	2	3	A1a	B1a	C1a	
1	2.515874	2.513218	2.517196	2.403121	2.4133	2.409933	
2	2.518514	2.517196	2.517196	2.399674	2.409933	2.409933	
3	2.517196	2.515874	2.518514	2.401401	2.409933	2.40654	
4	2.511883	2.511883	2.517196	2.401401	2.409933	2.40824	
avg	2.515867	2.514543	2.517525	2.401399	2.410775	2.408662	
% quench	0	0	0	0	0	0	
Background Counts							
vial	Tot Act	A1a	A2	A3	A4	A5	
5 min count							
1	32.4	41.6	38.4	34.6	33	30.6	
2	29.6	37.2	38	35.2	36.2	28	
3	35.2	35.2	41.6	37.4	39.4	30.2	
4	33.6	38.6	37	36.4	37.4	31	
avg	32.7	38.15	38.75	35.9	36.5	29.95	
Total Phenanthrene							
vial	1	2	3				
sample wt, ml	0.9984	0.998	0.9953				
5 min count							
1	2079.6	2149.8	2150.8				
2	2098	2133.6	2139.4				
							avg

avg ml, 5 ml pipet

TABLE B3. CONTINUED

3	2080	2146.2	2117	4.9577
4	2090.6	2135.4	2145.8	avg mil, 5 mil syringe
avg	2086.55	2141.25	2138.25	5.0189
bkgd adjust	2053.85	2108.55	2105.55	tot avg activity, syringe
vial quench adjust	10219.16	10474.51	10487.98	10522.19
0 ppm, test one empore				
vial A1	A1a	A2	A3	A4
wt, mg	7.0494	5.0558	4.3032	4.6874
				4.3583
5 min count	filter	ethyl ace	MeCl2	1:1
1	218.2	7862.4	203.6	120.2
2	211.8	7818.2	202.6	128.8
3	219.8	7776.2	212.8	121
4	216.8	7747.4	198.4	131.2
avg	216.6	7818.933	206.3333	123.3333
bkgd adjust	178.45	7780.183	170.4333	86.83333
vial quench adjust	248.8163	7842.927	207.4123	98.97888
0 ppm, test two empore				
vial B1	B1a	B2	B3	B4
wt, mg	7.2162	5.0351	4.4236	4.5141
				4.4212
5 min count	filter	ethyl ace	MeCl2	1:1
1	222.8	7477.4	143.6	143.4
2	226	7520.6	147.2	153.8
3	228.6	7499.6	149.4	146.2
4	217	7543.8	158.4	162.8
vial avg	225.8	7499.2	146.7333	147.8
bkgd adjust	187.65	7462.7	107.9833	147.8
vial quench adjust	288.9361	7515.307	130.3668	168.8139
0 ppm, test three empore				
vial C1	C1a	C2	C3	C4
wt, mg	7.4307	4.9546	4.3119	4.7101
				4.4391
5 min count	filter	ethyl ace	MeCl2	1:1
				disk

TABLE B3. CONTINUED

	1	2	3	avg	std	+std	-std
1	237	8323.8	148.6	144.8	400.8		
2	221.2	8267.6	149.6	146.8	404.2		
3	233.4	8297.6	146.6	146.2	391		
4	235.4	8306	154.4	167.6	393.8		
vial avg	230.5333	8296.333	148.2667	145.9333	398.6667	elutant	
bkgd adjust	192.3833	8257.583	112.3667	109.4333	368.7167	total	
vial quench adjust	288.5284	8324.177	136.8908	125.0843	368.7167	8954.848	9243.377
TOC, HA	% BOUND					9689.074	88.93094
	1	2	3	avg	std	+std	-std
0	2.393873	2.587446	2.775944	2.585754	0.191042	2.776796	2.394713

Sep-Pak Technique

Tsle Values

vial	D1	D2	E1	E2	F1	F2
1	255	253	255	254	255	251
2	255	253	257	255	255	251
3	258	252	255	253	255	250
4	254	252	254	255	254	249

avg

log(Tsle) Values

vial	D1	D2	E1	E2	F1	F2
1	2.40854	2.403121	2.40854	2.404834	2.40854	2.398674
2	2.40854	2.403121	2.408933	2.40854	2.40854	2.398674
3	2.40824	2.401401	2.40854	2.403121	2.40854	2.39794
4	2.404834	2.401401	2.404834	2.40854	2.404834	2.398199
avg	2.408539	2.402281	2.408962	2.405259	2.408114	2.398372
% quench	0	0	0	0	0	0

Background Counts

Background Counts

vial	D1	D2	D3	D4	D5
5 min count					
1	35.2	33.4	38	54.8	
2	40.8	38.2	30.8	56	
3	31.8	33.2	35.2	54.8	
4	37	34	33.2	52.8	

TABLE B3. CONTINUED

avg	742.7333	472.15	filter	7340.667	580.4	158.5333	elutant	phen	effic.	% mass
bkgd adjust	706.8	437.2167	total	7306	525.2	118.7333	total	total	adjust	bal
quench adjust	706.80	437.22		7156.774	662.8057	155.025	7974.605	9118.621	9558.303	86.66
TOC, HA	% BOUND									
	1	2	3	AVG	STD	95% CI	+95% CI	-95% CI		
0	10.66571	10.60663	10.87242	10.71492	0.139559	0.424339	11.13926	10.29058		

Breakthrough Test 7/12/95 0 ppm Aldrich Humic Acid PHENANTHRENE DATA
evaporated solvent pH=7 File: pne0 Empore @24 ml/min, 400mm Hg

Empore Disk Technique

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5

5 min count

1	34.6	28	29	34.2	32.4	35.4
2	32.4	28.8	31	35.8	32.4	32
3	27.6	32.2	34.4	39.6	32.6	35.2
4	32.4	32.8	27.8	40.8	31.6	32.8
avg	31.75	30.45	30.55	37.6	32.25	33.85

Total Phenanthrene

vial	1	2	3
sample wt, ml	0.9931	0.9952	0.9995

5 min count

1	463.6	480.2	446.2
2	434.8	459.6	454.8
3	455.4	442.2	454.6
4	452	483.6	461.4
avg	451.45	466.4	454.25 total

bkgd adjust	419.7	434.65	422.5 avg
vial quench adjust	2095.20	2165.26	2095.68
			2118.71
			2220.87

0 ppm, test one empore

vial	A1	A1a	A2	A3	A4	A5
wt, mg	7.2881	4.9835	4.2679	5.1328	4.7821	

elution

avg ml, 5 mil pipet
4.9577
avg ml, 5 mil syringe
5.0189
tot avg activity, syringe
2144.867

[illegible]

TABLE B3. CONTINUED

quench adjust	279.75	68.15	347.90	1421.951	200.028	34.86104	1656.84	2004.74	2101.405	93.47
0 ppm, test three sepac	F1	F2	F3	F4	F5					
vial										
wt, mg	5.0189	5.0189								
5 min count	filter 1	filter 2	elution							
1	303.8	91	EthAcet	MeCl2	1:1					
2	313.4	83		1460	226.4	68.4				
3	302.4	84.8		1456	226.2	78				
4	298.8	90.4		1444.6	227	72.8				
avg	304.6	87.3 filter		1463.8	230.6	71.4				
bkgd adjust	272.85	55.75 total		1456.1	227.55	72.65 elutant				
quench adjust	272.85	55.75		1455.125	227.8375	73.7125 total				
TOC, HA	% BOUND			1425.404	287.5323	96.24323	1809.179	2137.779	2240.859	99.67
	1	2	3	AVG	STD	95% CI	+95% CI	-95% CI		
0	16.36932	16.22012	15.3203	15.96991	0.567505	1.725534	17.69545	14.24438		

TABLE B4 - DATA FOR TABLE 2-3

Mass Balance: Benzo-a-pyrene in 0 ppm toc solution													
Evaporated solvent, pH=7													
File: escompar, Sheet: bap_evp07													
Empore disk method results					Sep-pak method results								
Average	Standard	Number of			Average	Standard	Number of						
Recovery, %	Deviation	Data points, n			Recovery, %	Deviation	Data points, n						
85.46	2.52	3			86.34	0.24	3						
Empore disk method details					Sep-pak method details								
Toc	B[a]P				Toc	B[a]P							
ppm	Recovery, %				ppm	Recovery							
File	bnev0	0	84.41		File	bnev0	0	86.26					
			83.03					86.1					
			88.93					86.68					
			Avg, n=3	85.46				Avg, n=3	86.34				
			Std	2.52				Std	0.24				
Mass Balance: Phenanthrene in 0 ppm toc solution													
Evaporated solvent, pH=7													
File: escompar, Sheet: phen_evp07													
Empore disk method results					Sep-pak method results								
Average	Standard	Number of			Average	Standard	Number of						
Recovery, %	Deviation	Data points, n			Recovery, %	Deviation	Data points, n						
87.93	0.79	3			93.55	0.47	3						
Empore disk method details					Sep-pak method details								
Toc	B[a]P				Toc	B[a]P							
ppm	Recovery, %				ppm	Recovery							
File	pne0	0	87.59		File	pne0	0	92.9					
			87.18					93.8					
			89.03					93.96					
			Avg, n=3	87.93				Avg, n=3	93.55				
			Std	0.79				Std	0.47				

Mass Balance: Benzo-a-pyrene in Suwannee River humic acid

Evaporated solvent, pH=7

Empore disk method results

Empire disk method results						Sep-pak method results					
Average Recovery,	Standard Deviation,	Number of Data points, n	Toc ppm	Phen Recovery, %		Average Recovery,	Standard Deviation,	Number of Data points, n	Toc ppm	Phen Recovery, %	
86.53	5.36	22				88.66	1.97	12			
File			Toc ppm	Phen Recovery, %		File			Toc ppm	Phen Recovery, %	
bnevp82			81.6	98.73		bnevp15			15.1	86.93	
				99.26						86.99	
				100.28						88.36	
bnevp15			15.1	86.27		bnevp5			5.08	91.65	
				86.88						91.22	
				85.43						90.83	
bne15k2			15.1	85.67		bnevp7			7.09	86.15	
				85.8						86.58	
				86.24						86.18	
bne15k3			15.1	86.57		bne25			24.7	89.55	
				83.6						89.28	
				85.62						90.23	
bne15k6			15.1	81.07						88.66	
bnevp5			5.08	82.27						1.97	
				84.77							
bnevp7			7.09	83.91							
				82.35							
				82.88							
				82.9							
bne25			24.7	83.05							
				84.55							
				85.62							
				avg, n=22							
				std							
				5.36							

TABLE B5 . CONTINUED

Mass Balance: Phenanthrene In Aldrich humic acid									
Evaporated solvent, pH=7									
File:escompar, Sheet: phen_evpa1d7									
Empore disk method results					Sep-pak method results				
Average	Standard	Number of	Recovery, %	Deviation	Average	Standard	Number of	Recovery, %	Deviation
90.48	1.67	21	123.51	121.94	90.33	3.28	11	91.77	92.68
Empore disk method					Sep-pak method				
File	Toc	ppm	Phen	Recovery, %	File	Toc	ppm	Phen	Recovery, %
pnevp51	50.6	11.3	88.68	94.39	pne11	11.3	11.3	91.77	92.68
This file results not included in results					pne20	20.5	18.7	91.69	90.84
pne11	11.3	88.68	94.39	92.75	pne19	18.7	18.3	85.07	85.04
pne20	20.5	89.37	87.92	88.9	pne18	18.3	84.53	90.33	3.28
pne19	18.7	89.22	88.55	90.69	avg, n=11				
pne19_3	18.7	91.47	91.78	91.37	std				
pne19_6	18.7	87.81	89.33	90.12					
pne19_11	18.7	91.38	91	90.61					
pne18	18.3	92.35	90.34						

TABLE B5. CONTINUED

	92.12
avg, n=21	90.48
std	1.67

TABLE B6 - DATA FOR FIGURE 2-3

Breakthrough (b) Adjustment: used table B3 numbers for phenanthrene in adjustment equation.

Humic Acid TOC Test, 7/18/95		File: pnevac		pH=7	
Aldrich Humic Acid		evaporated carrier solvent			
Standard Run on TOC					
PPM	mv	avg			
10	138.586				
	144.453				
	156.514				
		146.5177			
15	192.048				
	187.45				
	190.821				
		190.1063			
20	242.036		Sample		
	233.981		HA soln	MV	
	240.385			PPM	
25	294.757		238.8007		
	269.75				
	280.515				
		281.674			
30	349.633				
	353.874				
	347.99				
		350.499			
Filtering Speed Test 7/18/95		Phenanthrene Data			
evaporated carrier solvent		File: pnevac		pH=7	
		Aldrich Humic Acid		18.3 ppm	
Empore Disk Technique					
Background Counts					
vial	Tot Act	E1 through E10			

Regression Output:

Constant	-3.97109
Std Err of Y Est	0.837705
R Squared	0.991579
No. of Observations	5
Degrees of Freedom	3
X Coefficient(s)	0.099251
Std Err of Coef.	0.005281

	Value	AVG	STD
MV	224.887	221.208	228.145
PPM	18.3492	17.98406	18.47406
		18.26911	0.254631

TABLE B6 - DATA FOR FIGURE 2-3. CONTINUED

Kp	42343.82	44707.13	47390.05	49533.16	49091.57	42310.4	45880.96	47140.77	48086.19	47493.14
log Kp	4.62679	4.650377	4.675687	4.694896	4.691007	4.626447	4.661633	4.673397	4.68202	4.676631
ml/min	7.43505	13.0165	18.126	21.65271	24.104	31.89764	25.9685	19.6468	12.5	6.253696
Sep-Pak Technique										
Background Counts										
vial	S1									
5 min count										
	1	30.2								
	2	31.2								
	3	34.2								
	4	32.8								
avg		32.1								
18.3 ppm, sep-pak vacuum speed test										
vial	S1	S2	S3	S4	S5	S6	S7	S8		
speed, ml per min	6	12	20	30	30	20	12	6		
wt through, mg	5.0736	5.0377	5.0381	5.0145	4.8847	5.0406	5.0244	5.0281		
5 min count	filter	filter	filter	filter	filter	filter	filter	filter		
	1	872	921	966.6	976.2	880.6	937.4	913.8	934.4	
	2	890	909.6	977	967.2	893.2	917.6	916.8	911.8	
	3	879.6	909.6	952	969.2	882.6	951	943.6	949.6	
	4	889.2	899.6	957.6	1004.8	872	918	932.4	934.8	
avg		880.5333	913.4	965.2	970.8667	885.4667	935.3333	924.7333	931.9333	
bkgd adjust		880.5333	913.4	965.2	970.8667	885.4667	935.3333	924.7333	931.9333	
vial quench adjust		940.76	982.83	1038.49	1049.50	982.62	1005.86	997.66	1004.69	
% bound		40.15841	41.95422	44.32998	44.80009	41.94511	42.93695	42.58722	42.88722	
breakthrough adjust		28.78545	30.92255	33.74982	34.30929	30.91171	32.09205	31.67585	32.03287	
Kp		22087.84	24461.78	27837.7	28540.18	24449.35	25824.13	25333.96	25754.07	

tot avg activity, syringe
2342.634

<u>TABLE B6 - DATA FOR FIGURE 2-3. CONTINUED</u>								
log Kp	4.344153	4.388488	4.444633	4.455457	4.388267	4.412028	4.403703	4.410848

TABLE B7 - DATA FOR FIGURE 2-4

Breakthrough (b) Adjustment: used table B3 numbers for bap in adjustment equation.

Humic Acid TOC Test, 5/22/95			pH=7		
evaporated carrier solvent			File: bnevp5		
5.08 ppm Suwannee River Humic Acid					
Standard TOC Run					
PPM	mv	avg	Regression Output:		
3	43.389		Constant	-1.19642	
	43.6178		Std Err of Y Est	0.196853	
	42.9601		R Squared	0.999378	
		43.3223	No. of Observations	5	
6	71.0396		Degrees of Freedom	3	
	69.2916				
	71.6438		X Coefficient(s)	0.101137	
		70.65833	Std Err of Coef.	0.001457	
10	108.354		Value	AVG	STD
	108.192	Sample	60.225	61.8239	64.172
	107.674	HA soln	60.225	61.8239	64.172
			4.894574	5.056282	5.293763
		108.0733	5.056282	5.293763	5.08154
15	161.517				0.200789
	160.52				
	160.378				
		160.805			
20	210.461				
	211.042				
	209.148				
		210.217			
Partitioning Test, 5/22/95			pH=7		
5.08 ppm Suwannee River Humic Acid			File: bnevp5		
evaporated carrier solvent			Empore @24 ml/min, 400mm Hg		
			Sep-Pak @30 ml/min		
BENZO-A-PYRENE DATA					
Empore Disk Technique					

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

Tsie Values									
vial	1	2	3	A1a	B1a	C1a			
1	328	325	323	288	285	283			
2	325	323	321	282	284	280			
3	328	323	322	259	283	259			
4	324	324	325	280	281	258			
avg	325.75	323.75	322.75	281.75	283.25	259.5			
log(Tsie) Values									
vial	1	2	3	A1a	B1a	C1a			
1	2.515874	2.511883	2.509203	2.424882	2.423246	2.419958			
2	2.511883	2.508203	2.506505	2.418301	2.421804	2.414973			
3	2.513218	2.508203	2.507856	2.4133	2.418958	2.4133			
4	2.510545	2.510545	2.511883	2.414973	2.418641	2.40824			
avg	2.51288	2.510208	2.508862	2.417864	2.420362	2.414117			
% quench	0.183528	0.245786	0.287219	0	0	0			
Background Counts									
vial	Tot Act	A1a	A2	A3	A4	A5			
5 min count									
1	31.6	35.4	35.6	42.6	33.8	48.4			
2	34.8	36.8	32.6	35.8	35.6	37.8			
3	33	39	36.2	34.6	32.8	53.4			
4	34.2	33.8	29.4	31.4	34.6	44.6			
avg	33.4	36.25	33.45	36.1	34.2	46.05			
Total Phenanthrene									
vial	1	2	3						
sample wt, ml									
5 min count									
1	0.9804	0.9988	0.9989						
2	3546.6	3628.8	3577.6						
3	3557	3648.2	3541.8						
4	3527.8	3593.4	3588.4						
avg	3532.2	3619.8	3537.2						
	3540.9	3622.55	3558.25	total					
bkgd adjust	3507.5	3589.15	3522.85	avg					
vial quench adjust	17586.45	17859.20	17534.83	17680.16	18511.70				
avg ml, 5 ml pipet 4.9577 avg ml, 5 ml syringe 5.0189 tot avg activity, syringe 17878.16									

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

5.08 ppm, test one empore									
vial	A1	A1a	A2	A3	A4	A5			
wt, mg	7.3493	4.9712	4.3679	4.6975	4.48				
5 min count	filter	ethyl ace	elution	MeCl2	1:1	disk			
1	2955.8	9254.8	244.2	240.8	240.8	495.2			
2	2969	9226.2	238.6	232.4	232.4	512.6			
3	2965.6	9185.8	242.8	231.8	231.8	507			
4	2952.4	9295.4	257.4	224.8	224.8	474.8			
avg	2963.467	9222.267	241.8667	235	504.9333	elutant	phen	mach.	% mass
bkgd adjust	2927.217	9188.817	205.7667	200.8	458.8833	total	total	adjust	bal
vial quench adjust	4327.525	9262.92	250.5291	229.7838	458.8833	10202.12	14529.64	15230.23	82.27358
5.08 ppm, test two empore									
vial	B1	B1a	B2	B3	B4	B5			
wt, mg	7.3148	4.8702	4.2805	4.627	4.491				
5 min count	filter	ethyl ace	elution	MeCl2	1:1	disk			
1	3286.6	9213.8	207.2	176.8	176.8	411.8			
2	3319.8	9288	196.2	190.8	190.8	411.6			
3	3334.6	9177.8	208	179.6	179.6	412.6			
4	3286.2	9111	202.2	180.2	180.2	403.6			
vial avg	3313.667	9226.533	203.8	182.4	182.4	412	elutant	phen	mach.
bkgd adjust	3277.417	9192.333	170.35	182.4	182.4	365.95	total	total	% mass
vial quench adjust	4922.518	9266.465	206.7329	208.8019	365.95	10047.95	14970.47	15692.31	84.76973
5.08 ppm, test three empore									
vial	C1	C1a	C2	C3	C4	C5			
wt, mg	7.27	4.951	4.2223	4.458	4.4585				
5 min count	filter	ethyl ace	elution	MeCl2	1:1	disk			
1	3238.8	9205.2	201	235	235	494.4			
2	3239.2	9221.6	189	246.2	246.2	497.4			
3	3233.6	9171.2	193.4	226.8	226.8	519.6			
4	3243.4	9150.6	195	228.6	228.6	490.2			
vial avg	3237.2	9199.333	194.4667	236	503.8	elutant	phen	mach.	% mass

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

bkqd adjust	3200.95	9165.883	158.3867	201.8	457.75	total	adjust	bal
vial quench adjust	4700.244	9239.802	190.7026	230.7683	457.75	10119.02	14819.27	83.91355
TOC, HA	1	2	3	AVG	STD	+std	-std	
5.08	24.50445	27.87358	28.61496					
bt adjust	22.49713	25.95583	24.66375	24.37224	1.747683	26.11992	22.62455	
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+std	-std	
5.08	57140.71	69004.98	64445.32	63530.34	5984.827	69515.16	57545.51	
TOC, HA				AVG		+std	-std	
5.08			log Kp	4.802981		4.84208	4.760011	
Sep-Pak Technique								
Tsle Values								
vial	D1	D2	E1	E2	F1	F2		
1	260	267	261	270	258	269		
2	257	264	256	267	256	266		
3	256	264	256	267	254	266		
4	255	262	255	267	254	264		
avg	257	264.25	257	267.75	255.5	266.25		
log(Tsle) Values								
vial	D1	D2	E1	E2	F1	F2		
1	2.414973	2.426511	2.416841	2.431364	2.41162	2.429752		
2								
3								
4								
avg	2.414973	2.426511	2.416841	2.431364	2.41162	2.429752		
% quench	0	0	0	0	0	0		
Background Counts								
vial	D1	D2	D3	D4	D5			
5 min count								
1	36.6	36.4	34	35.2	40.8			
2	36.4	34	33.6	36.2	37.8			

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

[illegible]

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

	32.5	33.3	32.85	36.2	34.3	32.35	
<i>avg</i>							
Total Phenanthrene							
vial	1	2	3				
sample wt, ml	1.0083	0.9983	1.0146				
5 min count							
1	7372.2	7378.2	7492.2				avg ml, 5 ml pipet
2	7470.8	7373.8	7472.2				4.9577
3	7460.4	7349.2	7473.2				avg ml, 5 ml syringe
4	7418	7378	7485.8				5.0189
avg	7430.35	7369.8	7480.85				tot avg activity, syringe
bkqd adjust	7397.85	7337.3	7448.35				36969.72
vial quench adjust	36482.93	36527.93	36545.87				
7.09 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3322	5.0259	4.3073	4.7807	4.426		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7157.4	18087	364	386	819		
3	7165.4	18059.2	343	387.8	810.4		
4	7071	17950.2	340.8	391.2	828.4		
avg	7144.2	17990.6	365.4	371.6	798.8		
bkqd adjust	7131.267	18032.13	349.2667	388.3333	819.2667		
vial quench adjust	7097.967	17999.28	313.0667	354.0333	786.9167		
7.09 ppm, test two empore	10355.1	18144.44	382.6454	404.4314	786.9167		
vial	B1	B2	B3	B4	B5		
wt, mg	7.0982	4.9611	4.2677	4.5164	4.3837		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7059.8	18693.2	548.4	351.2	478.6		
3	7078.6	18631.4	551	334.2	494.8		
4	6982.6	18658.6	538.8	337	497.6		
avg	7053.4	18638	543.8	335.8	481.6		
bkqd adjust	7040.333	18661.07	546.0667	340.8	490.3333		
vial quench adjust							
7.09 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3322	5.0259	4.3073	4.7807	4.426		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7157.4	18087	364	386	819		
3	7165.4	18059.2	343	387.8	810.4		
4	7071	17950.2	340.8	391.2	828.4		
avg	7144.2	17990.6	365.4	371.6	798.8		
bkqd adjust	7131.267	18032.13	349.2667	388.3333	819.2667		
vial quench adjust	7097.967	17999.28	313.0667	354.0333	786.9167		
7.09 ppm, test two empore	10355.1	18144.44	382.6454	404.4314	786.9167		
vial	B1	B2	B3	B4	B5		
wt, mg	7.0982	4.9611	4.2677	4.5164	4.3837		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7059.8	18693.2	548.4	351.2	478.6		
3	7078.6	18631.4	551	334.2	494.8		
4	6982.6	18658.6	538.8	337	497.6		
avg	7053.4	18638	543.8	335.8	481.6		
bkqd adjust	7040.333	18661.07	546.0667	340.8	490.3333		
vial quench adjust							
7.09 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3322	5.0259	4.3073	4.7807	4.426		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7157.4	18087	364	386	819		
3	7165.4	18059.2	343	387.8	810.4		
4	7071	17950.2	340.8	391.2	828.4		
avg	7144.2	17990.6	365.4	371.6	798.8		
bkqd adjust	7131.267	18032.13	349.2667	388.3333	819.2667		
vial quench adjust	7097.967	17999.28	313.0667	354.0333	786.9167		
7.09 ppm, test two empore	10355.1	18144.44	382.6454	404.4314	786.9167		
vial	B1	B2	B3	B4	B5		
wt, mg	7.0982	4.9611	4.2677	4.5164	4.3837		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7059.8	18693.2	548.4	351.2	478.6		
3	7078.6	18631.4	551	334.2	494.8		
4	6982.6	18658.6	538.8	337	497.6		
avg	7053.4	18638	543.8	335.8	481.6		
bkqd adjust	7040.333	18661.07	546.0667	340.8	490.3333		
vial quench adjust							
7.09 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3322	5.0259	4.3073	4.7807	4.426		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7157.4	18087	364	386	819		
3	7165.4	18059.2	343	387.8	810.4		
4	7071	17950.2	340.8	391.2	828.4		
avg	7144.2	17990.6	365.4	371.6	798.8		
bkqd adjust	7131.267	18032.13	349.2667	388.3333	819.2667		
vial quench adjust	7097.967	17999.28	313.0667	354.0333	786.9167		
7.09 ppm, test two empore	10355.1	18144.44	382.6454	404.4314	786.9167		
vial	B1	B2	B3	B4	B5		
wt, mg	7.0982	4.9611	4.2677	4.5164	4.3837		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7059.8	18693.2	548.4	351.2	478.6		
3	7078.6	18631.4	551	334.2	494.8		
4	6982.6	18658.6	538.8	337	497.6		
avg	7053.4	18638	543.8	335.8	481.6		
bkqd adjust	7040.333	18661.07	546.0667	340.8	490.3333		
vial quench adjust							
7.09 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3322	5.0259	4.3073	4.7807	4.426		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7157.4	18087	364	386	819		
3	7165.4	18059.2	343	387.8	810.4		
4	7071	17950.2	340.8	391.2	828.4		
avg	7144.2	17990.6	365.4	371.6	798.8		
bkqd adjust	7131.267	18032.13	349.2667	388.3333	819.2667		
vial quench adjust	7097.967	17999.28	313.0667	354.0333	786.9167		
7.09 ppm, test two empore	10355.1	18144.44	382.6454	404.4314	786.9167		
vial	B1	B2	B3	B4	B5		
wt, mg	7.0982	4.9611	4.2677	4.5164	4.3837		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7059.8	18693.2	548.4	351.2	478.6		
3	7078.6	18631.4	551	334.2	494.8		
4	6982.6	18658.6	538.8	337	497.6		
avg	7053.4	18638	543.8	335.8	481.6		
bkqd adjust	7040.333	18661.07	546.0667	340.8	490.3333		
vial quench adjust							
7.09 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3322	5.0259	4.3073	4.7807	4.426		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7157.4	18087	364	386	819		
3	7165.4	18059.2	343	387.8	810.4		
4	7071	17950.2	340.8	391.2	828.4		
avg	7144.2	17990.6	365.4	371.6	798.8		
bkqd adjust	7131.267	18032.13	349.2667	388.3333	819.2667		
vial quench adjust	7097.967	17999.28	313.0667	354.0333	786.9167		
7.09 ppm, test two empore	10355.1	18144.44	382.6454	404.4314	786.9167		
vial	B1	B2	B3	B4	B5		
wt, mg	7.0982	4.9611	4.2677	4.5164	4.3837		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7059.8	18693.2	548.4	351.2	478.6		
3	7078.6	18631.4	551	334.2	494.8		
4	6982.6	18658.6	538.8	337	497.6		
avg	7053.4	18638	543.8	335.8	481.6		
bkqd adjust	7040.333	18661.07	546.0667	340.8	490.3333		
vial quench adjust							
7.09 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3322	5.0259	4.3073	4.7807	4.426		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7157.4	18087	364	386	819		
3	7165.4	18059.2	343	387.8	810.4		
4	7071	17950.2	340.8	391.2	828.4		
avg	7144.2	17990.6	365.4	371.6	798.8		
bkqd adjust	7131.267	18032.13	349.2667	388.3333	819.2667		
vial quench adjust	7097.967	17999.28	313.0667	354.0333	786.9167		
7.09 ppm, test two empore	10355.1	18144.44	382.6454	404.4314	786.9167		
vial	B1	B2	B3	B4	B5		
wt, mg	7.0982	4.9611	4.2677	4.5164	4.3837		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7059.8	18693.2	548.4	351.2	478.6		
3	7078.6	18631.4	551	334.2	494.8		
4	6982.6	18658.6	538.8	337	497.6		
avg	7053.4	18638	543.8	335.8	481.6		
bkqd adjust	7040.333	18661.07	546.0667	340.8	490.3333		
vial quench adjust							
7.09 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3322	5.0259	4.3073	4.7807	4.426		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7157.4	18087	364	386	819		
3	7165.4	18059.2	343	387.8	810.4		
4	7071	17950.2	340.8	391.2	828.4		
avg	7144.2	17990.6	365.4	371.6	798.8		
bkqd adjust	7131.267	18032.13	349.2667	388.3333	819.2667		
vial quench adjust	7097.967	17999.28	313.0667	354.0333	786.9167		
7.09 ppm, test two empore	10355.1	18144.44	382.6454	404.4314	786.9167		
vial	B1	B2	B3	B4	B5		
wt, mg	7.0982	4.9611	4.2677	4.5164	4.3837		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	7059.8	18693.2	548.4	351.2	478.6		
3	7078.6	18631.4	551	334.2	494.8		
4	6982.6	18658.6	538.8	337	497.6		
avg	7053.4	18					

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

bkgd adjust	7007.033	18626.77	513.2167	340.8	457.9833	total	adjust	bal
vial quench adjust	10025.46	18778.98	619.6846	368.7853	457.9833	20243.42	30288.88	31728.38
7.09 ppm, test three empore								82.88549
vial C1	C1a	C2	C3	C4	C5			
wt, mg	7.3454	5.0441	4.4724	4.5749	4.3834			
5 min count	filter	ethyl ace	MeCl2	1:1	disk			
1	6784.6	18346.8	629.2	472.6	958.6			
2	6811.2	18326.2	584.4	506.4	937			
3	6860.2	18149.6	597.6	484.8	944			
4	6747.8	18198.8	595.6	484	958.2			
vial avg	6752	18274.2	603.7333	487.9333	946.5333	elutant	phen	% mass
bkgd adjust	6718.7	18241.35	587.5333	453.6333	914.1833	total	total	bal
vial quench adjust	9784.013	18369.94	687.0934	517.5008	914.1833	20488.72	30272.73	31732.42
TOC, HA	1	2	3	AVG	STD	+std	-std	
7.09	28.35545	27.4528	26.79163					
bt adjust	26.45052	25.52387	24.84512	25.6065	0.805884	26.41239	24.80062	
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+std	-std	
7.09	50723.41	48337.38	46627.03	48562.6	2057.456	50620.06	46505.15	
TOC, HA	log Kp			AVG		+std	-std	
7.09				4.686302		4.704323	4.667501	
Sep-Pak Technique								
Tsie Values								
vial	D1	D2	E1	E2	F1	F2		
1	256	271	254	272	255	274		
2	254	269	254	270	253	271		
3	233	249	235	250	234	252		
4	231	246	235	248	233	252		
avg	243.5	258.75	244.5	260	243.75	262.25		
log(Tsie) Values								

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

51.4912		Std Err of Y Est		0.242232			
		<i>R Squared</i>		0.999058			
6	54.35523	No. of Observations	5				
		Degrees of Freedom	3				
		X Coefficient(s)	0.093842				
		Std Err of Coef.	0.001664				
		Value		AVG	STD		
10	81.4448	Sample HA soln	179.402	178.409	182.059	179.9567	1.887158
	82.6809		15.02507	14.93189	15.27441	15.07712	0.177094
15	78.6127	PPM					
	80.9128						
20	124.204	MV					
	122.601						
20	124.638	PPM					
	180.655						
20	179.034	PPM					
	178.961						
20	238.289	PPM					
	232.407						
20	229.087	PPM					
	233.261						

Partitioning Test BENZO-A-PYRENE DATA
 evaporated carrier solvent 5/10/95 pH=7
 15.1 ppm Suwannee River Humic Acid File: bnevp15 Empore @24 ml/min, 400mm Hg
 Sep-Pak @30 ml/min

Empore Disk Technique									
Tsie Values									
vial	1	2	3	A1a	B1a	C1a			
1	315	312	316	247	246	246			
2	313	313	314	246	244	247			
3	316	314	314	245	244	246			
4	318	313	316	245	244	247			
avg	315.5	313	315	245.75	244.5	246.5			
log(Tsie) Values									
vial	1	2	3	A1a	B1a	C1a			

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

1 2.498311 2.494155 2.498687 2.392897 2.390935 2.390935 2 2.495544 2.495544 2.49893 2.390935 2.38739 2.392897									
1	2.498687	2.49693	2.49693	2.389186	2.38739	2.390935	2.390935		
2	2.502427	2.495544	2.498687	2.389186	2.38739	2.392897			
3	2.498992	2.495543	2.498308	2.390491	2.388276	2.391816			
4	0.59102	0.697188	0.612072	0	0	0			
Background Counts									
vial	Tot Act	A1a	A2	A3	A4	A5			
5 min count									
1	34.4	40.2	36	40.4	33	42			
2	35.8	39.2	41.2	38.4	35.2	45.6			
3	39	35.2	34.6	37	36.4	30.6			
4	34.2	41.8	33.4	32.8	35.6	36.6			
avg	35.85	39.1	36.3	37.15	35.05	36.7			
Total Phenanthrene									
vial	1	2	3						
sample wt, ml	0.9902	0.9869	0.9959						
5 min count									
1	9018	8995.6	9130						
2	9006.4	8970.2	9040.4						
3	9106.2	9014.6	9054						
4	8996.6	9022.2	9093.8						
avg	9031.8	9000.65	9079.55	total					
bkgd adjust	8995.95	8964.8	9043.7	avg					
vial quench adjust	45308.40	45350.93	45297.79	45319.04	47504.23				
15.1 ppm, test one empore									
vial	A1	A1a	A2	A3	A4	A5			
wt, mg	7.3702	5.0125	4.0699	4.2639	4.2116				
elution									
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	12221.6	19336	539.4	368	844.6				
2	12146.4	19378.2	526.6	374.8	867.2				
3	12098	19331	542	374.6	908				
4	12108	19368.6	538.4	373.4	860.4				
mach.									

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

avg	12155.33	19348.4	536	372.4667	873.2667	elutant	phen	effic.	% mass
bkgd adjust	12119.23	19312.1	498.85	337.4167	834.5887	total	total	adjust	bal
vial quench adjust	17815.27	19467.84	595.4139	382.8085	834.5867	21280.63	39085.91	40981.03	86.26817
15.1 ppm, test two empore									
vial B1	B1a	B2	B3	B4	B5				
wt, mg	7.2423	5.0022	4.196	4.2366	4.2106				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	11988.2	19417.2	765.4	327.4	1259.2				
2	12069	19435.8	755.8	333.8	1281				
3	12009.4	19443.8	742.4	334	1286.6				
4	11954.4	19574	753	329.8	1273				
vial avg	12022.2	19432.27	754.5333	331.7333	1275.6	elutant	phen	mach.	% mass
bkgd adjust	11983.1	19397.22	718.2333	331.7333	1236.9	total	total	effic.	bal
vial quench adjust	17349.41	19553.65	856.2027	376.3496	1236.9	22023.1	39372.51	41270.97	86.87851
15.1 ppm, test three empore									
vial C1	C1a	C2	C3	C4	C5				
wt, mg	7.168	5.0347	4.1898	4.2091	4.1226				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	11842.8	20000.4	331.2	489.6	935				
2	11831.8	19881.6	343.4	493.8	949				
3	11849.8	20018.2	346.2	485.6	976.4				
4	11834.2	20117.6	329	487.6	967.4				
vial avg	11841.47	20000.07	340.2667	489.6667	953.4667	elutant	phen	mach.	% mass
bkgd adjust	11802.37	19963.77	303.1167	454.6167	914.7667	total	total	effic.	bal
vial quench adjust	16803.26	20124.76	360.894	514.3143	914.7667	21914.74	38718	40584.9	85.43429
TOC, HA	% BOUND								
1	2	3	AVG	STD	+std	-std			
15.1	39.31079	38.28262	37.0777						
bt adjust	37.69715	36.64185	35.40468	36.58123	1.147435	37.72866	35.43379		
TOC, HA	Kp1	Kp2	Kp3	AVG	STD				
15.1	40070.4	36299.92	36298	38222.77	1887.381	40110.16	36335.39		

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

TOC, HA		AVG		+std		-std	
15.1		log Kp		4.582322		4.603254 4.58033	
Sip-Pak Technique							
Tsie Values							
vial	D1	D2	E1	E2	F1	F2	
1	243	269	240	269	244	269	
2	242	269	238	269	242	268	
3	241	267	238	268	242	269	
4	241	267	238	265	244	267	
avg	241.75	268	238.5	267.25	243	268.25	
log(Tsie) Values							
vial	D1	D2	E1	E2	F1	F2	
1	2.385606	2.429752	2.380211	2.429752	2.38739	2.429752	
2	2.383815	2.429752	2.376577	2.429752	2.383815	2.428135	
3	2.382017	2.426511	2.376577	2.424882	2.383815	2.429752	
4	2.382017	2.426511	2.376577	2.423246	2.38739	2.426511	
avg	2.383384	2.428132	2.377486	2.426908	2.385603	2.428538	
% quench	0	0	0	0	0	0	
Background Counts							
vial	D1	D2	D3	D4	D5		
5 min count							
1	33.6	33.6	39	37.2	40.4		
2	34.2	33.6	31	33.4	39.8		
3	38.8	34.8	38.8	34	38.4		
4	37	37.6	30	40	34.4		
avg	35.53	34.00	36.27	34.87	39.53		
15.1 ppm, test one sepac							
vial	D1	D2	D3	D4	D5		
wt, mg	5.0481	5.0086					
syringe total							
45878.48							
5 min count							
1	filter 1	filter 2	EthAcet	MeCl2	1:1		
	14845.4	2913.6	20744.8	1372.6	384.8		

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

Humic Acid TOC Test, 6/14/95							
evaporated carrier solvent				File: bne25			
24.7 ppm Suwannee River Humic Acid				pH=7			
Standard Run on TOC							
PPM	mv	avg	Regression Output:				
10	42.442		Constant			-0.08019	
	61.7456		Std Err of Y Est			0.635231	
	54.0692		R Squared			0.998789	
		52.75227	No. of Observations			5	
20	92.4305		Degrees of Freedom			3	
	102.924		X Coefficient(s)		0.204166		
	89.5058		Std Err of Coef.		0.004104		
		94.95343					
30	130.88		Value		AVG	STD	
	154.601		120.852	126.042	117.931	121.6083	4.108054
	150.56		24.59363	25.65325	23.99726	24.74804	0.838723
		145.347					
40	193.455						
	193.717						
	205.491						
		197.5543					
50	237.785						
	254.482						
	245.897						
		246.0547					

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

Partitioning Test 24.7 ppm Suwannee River Humic Acid
 evaporated carrier solvent 6/14/85 pH=7 Empore @24 ml/min, 400mm Hg
 BENZO-A-PYRENE DATA File: bne25 Sep-Pak @30 ml/min

Empore Disk Technique

Tsle Values

vial	1	2	3	A1a	B1a	C1a
1	311	309	310	228	231	227
2	311	308	307	225	227	224
3	310	307	309	224	228	224
4	311	310	310	224	228	224
avg	310.75	308.5	309	225.25	228.5	224.75

log(Tsle) Values

vial	1	2	3	A1a	B1a	C1a
1	2.49276	2.489958	2.491362	2.357935	2.363612	2.356026
2	2.49276	2.488551	2.487138	2.352183	2.356026	2.350248
3	2.491362	2.487138	2.489958	2.350248	2.357935	2.350248
4	2.49276	2.491362	2.491362	2.350248	2.357935	2.350248
avg	2.492411	2.489252	2.489955	2.352653	2.358877	2.351692
% quench	0.793613	0.890835	0.869203	0	0	0

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	28.4	34.8	29.8	31.8	32.2	26.6
2	27	26.6	25	37.4	35.2	30
3	26.8	32.2	37.2	30.2	33.4	31.2
4	29.2	30.6	29.6	34.8	29.8	27.6
avg	27.85	31.05	30.4	33.55	32.65	28.85

Total Phenanthrene

vial	1	2	3
sample wt, ml	1.0024	1.005	1.0034
5 min count			
1	8548.8	8521.2	8566.6
2	8456.8	8587.4	8613.2

avg ml, 5 mil pipet

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

3	8528.4	8528.2	8643.6	4.9577
4	8596.6	8558	8625.2	avg mil, 5 mil syringe
avg	8532.15	8548.7	8612.15 total	5.0189
bkqd adjust	8504.3	8520.85	8584.3 avg	tot avg activity, syringe
vial quench adjust	42387.29	42411.47	42786.07	42531.61
24.7 ppm, test one empore				44582.40
vial A1	A1a	A2	A3	A4
wt, mg	6.6018	4.9822	4.3937	4.5756
			4.3448	
5 min count	filter	ethyl ace	elution	disk
1	12399.6	17148.4	467.8	271.2
2	12390.2	17077.4	456.2	286
3	12494.4	17158.8	447.4	280.2
4	12475.8	17212.4	460.4	273.4
avg	12440	17148.75	457.95	277.7
bkqd adjust	12408.95	17118.35	424.4	245.05
vial quench adjust	16442.82	17256.4	513.8233	279.2047
24.7 ppm, test two empore				829 18878.43 35321.25 37024.37 83.04705
vial B1	B1a	B2	B3	B4
wt, mg	7.1398	4.9911	5.6345	3.7928
			4.5878	
5 min count	filter	1:1	1:1	1:1
1	11126.8	8776	7612.2	352.4
2	11213.2	8764.8	7627.8	352.6
3	11146.8	8824.8	7680.2	373
4	11258.2	8792.8	7588.8	353
vial avg	11185.75	8789.6	7617.25	357.75
bkqd adjust	11154.7	8758.95	7586.85	357.75
vial quench adjust	15956.42	10408.09	8493.831	410.815
24.7 ppm, test three empore				689.25 20001.99 35958.41 37692.25 84.54513
vial C1	C1a	C2	C3	C4
wt, mg	7.0678	4.9907	4.3427	4.497
			4.3133	
5 min count	filter	ethyl ace	elution	disk
			MeCl2	1:1

Background Counts

Background Counts									
vial	D1	D2	D3	D4	D5				
5 min count									
1	31.4	33	36.4	33.8	30.8				
2	28.8	34.6	39	34.4	35.4				
3	28.2	32.4	30.8	39.4	37.6				
4	34.8	37.6	41	33	40.6				
avg	30.8	34.4	36.8	35.15	36.1				
24.7 ppm, test one sepac									
vial	D1	D2	D3	D4	D5				
wt, mg	5.022	5.0405				syringe total 43056.64			
5 min count									
1	filter 1	filter 2	elution						
			EthAc	MeCl2	1:1				
1	16273.4	3389.4	18118.6	727	171				
2	16337.8	3367.6	18124.2	733	167.8				
3	16261	3361.8	18057.8	774.8	175.8				
4	16216.2	3354.2	18100.2	752.2	168.4	mach.			
avg	16272.1	3368.25	18100.2	746.75	170.75	elutant	phen	% mass	
bkgd adjust	16241.3	3333.85	18063.4	711.6	134.65	total	total	adjust	bal
vial	18453.55	3333.85	19787.40	17694.45	175.8067	18768.3	38555.7	40414.78	89.55
24.7 ppm, test one sepac									
vial	E1	E2	E3	E4	E5				
wt, mg	4.991	5.0374							
5 min count									
1	filter 1	filter 2	elution						
			EthAc	MeCl2	1:1				
1	15847.4	3274	18555.4	828.4	153.2				
2	15746.4	3259	18467	833.4	152.8				
3	15761.4	3289.4	18540.4	831.6	142.8				
4	15845.8	3221.6	18511.2	834	170.6				
avg	15805.25	3261	18518.5	831.85	154.85	elutant	phen	effic.	% mass
bkgd adjust	15774.45	3226.6	18481.7	796.7	118.75	total	total	adjust	bal
quench adjust	15947.71	3226.60	19174.31	1005.44	155.0468	19264.7	38439.01	40292.46	89.28
24.7 ppm, test one sepac									
vial	F1	F2	F3	F4	F5				

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

wt, mg		5.0764		5.0583											
5 min count		filter 1		filter 2		EthAce1		elution		MeCl2		1:1			
1		15377		3006.6		18786.2		1305		285.2					
2		15419.2		2980.6		18873.8		1333.6		276.4					
3		15323		2995		18881		1294.8		279.4					
4		15452.2		3022.4		18870.8		1283.2		279					
avg		15392.85		3001.15		filter		18852.95		1304.15		280		elutant	
bkgd adjust		15362.05		2988.75		total		18816.15		1269		243.9		total	
quench adjust		15530.74		2988.75		18497.49		18431.83		1601.486		318.4497		20351.76	
TOC, HA		1		2		3		AVG		STD		+std		-std	
24.7		45.95688		44.53276		42.96083									
bt adjust		39.47439		37.87968		36.11919		37.82442		1.678278		39.5027		36.14614	
toc, HA		Kp1		Kp2		Kp3		AVG		STD		+std		-std	
24.7		26404.58		24687.41		22891.31		24661.1		1756.78		26417.88		22904.32	
toc, HA								AVG		+std		-std			
24.7						log Kp		4.392012		4.421898		4.359917			
Humic Acid TOC Test, 3/31/95 File: bnevp82															
81.6 ppm Suwannee River Humic Acid pH=7															
Standard Run on TOC															
PPM		mv		avg											
20		64.2311				Regression Output:				Constant		-5.58111			
		57.4383								Std Err of Y Est		2.702869			
		57.7036								R Squared		0.995151			
										No. of Observations		5			
										Degrees of Freedom		3			
30		100.426								X Coefficient(s)		0.377613			
		98.6058								Std Err of Coef.		0.015219			
		99.1163													
				59.791											

	Sample	MV	Value	AVG	STD
50	154.461				
	150.909				
	153.862		228.945	237.278	225.347
		153.0773	81.21139	84.01819	79.51289
80	232.287				
	228.289				
	225.188				
		228.588			
100	271.912				
	273.83				
	277.939				
		274.5803			
				230.8233	6.025367
				81.58083	2.275258

Partitioning Test, 3/31/95
evaporated carrier solvent
81.6 ppm Suwannee River Humic Acid

Empore Disk Technique

Tsls Values						
vial	1	2	3	A1a	B1a	C1a
1	283	285	281	170	172	163
2	283	283	281	170	172	163
3	282	283	280	169	171	163
4	282	284	284	169	172	163
avg	282.5	283.75	281.5	169.5	171.75	163
log(Tsls) Values						
vial	1	2	3	A1a	B1a	C1a
1	2.451786	2.454845	2.448708	2.230449	2.235528	2.212188
2	2.451786	2.451786	2.448708	2.230449	2.235528	2.212188
3	2.450249	2.451786	2.447158	2.227887	2.232986	2.212188
4	2.450249	2.453318	2.453318	2.227887	2.235528	2.212188
avg	2.451018	2.452934	2.449472	2.229168	2.234895	2.212188
% quench	2.067771	2.006785	2.115345	8.896756	8.720451	9.419441
Background Counts						

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

vial	Tot Act	A1a	A2	A3	A4	A5	
5 min count							
1	24	37.2	38.6	38.8	41.6	35.6	
2	29.2	35.6	36.4	37.8	37.2	36	
3	29	38.4	31.6	35	37.2	38	
4	32.4	34.2	36.2	32	36	37.2	
avg	28.65	36.35	35.7	35.9	38	36.7	
Total Phenanthrene							
vial	1	2	3				
sample wt, ml	0.9918	0.9887	0.9901				
5 min count							
1	4722	4771.2	4684				avg ml, 5 mil pipet
2	4654.4	4692	4702.8				4.9577
3	4697.6	4671.8	4701.8				avg ml, 5 mil syringe
4	4662.6	4679.6	4667.6				5.0189
avg	4684.15	4703.65	4689.05				tot avg activity, syringe
bkgd adjust	4655.5	4675	4660.4				24136.2
vial quench adjust	23762.76	23922.70	23840.19				
81.6 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.3302	4.9917	4.2153	4.4498	4.3234		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		
3	8933.4	8702.4	130	108.6	286.2		
4	8957.8	8745	129	109.4	300.8		
avg	8979	8705	129.2	113.2	306.4		
bkgd adjust	8935.533	8711.6	128.6	108.0667	294.4667		
vial quench adjust	8899.183	8675.9	92.7	70.06667	257.7667		
81.6 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.4389	5.012	4.2576	4.3273	4.2494		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	8915.4	8687.4	126.8	106.2	296.4		

TABLE B7 - DATA FOR FIGURE 2-4. CONTINUED

5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	8776.2	8521.6	320.6	83.2	449.4				
2	8795	8562.2	314.2	90	451.6				
3	8864.6	8447.6	317.4	90.6	466.2				
4	8854.6	8519.8	312.4	92.8	454.2				
-vial avg	8811.933	8510.467	317.4	87.93333	455.7333	elutant	phen	mach.	% mass
bkgd adjust	8775.583	8472.467	281.7	87.93333	419.0333	total	total	effic.	bal
vial quench adjust	14269.22	8540.793	337.2	98.88365	419.0333	9396.91	23666.13	adjust	24807.26
81.6 ppm, test three empore						9396.91	23666.13	24807.26	99.26283
vial C1	C1a	C2	C3	C4	C5				
wt, mg	6.7816	5.0154	4.478	4.283	4.3605				
			elution						
5 min count	filter	1:1	1:1	1:1	disk				
1	9799	4037.6	3831	126.4	337				
2	9835.2	4057.4	3844.6	134.4	337				
3	9814.8	4060.8	3832	123	310				
4	9808	4088	3826.8	127.4	345.2				
vial avg	9816.333	4051.933	3835.867	127.9333	328	elutant	phen	mach.	% mass
bkgd adjust	9779.983	4016.233	3799.967	89.93333	291.3	total	total	effic.	bal
vial quench adjust	14599.22	4595.846	4321.033	102.5197	291.3	9310.499	23909.72	adjust	25062.6
TOC, HA	% BOUND					25062.6	100.2845		
1	2	3	AVG	STD	+std	-std			
81.6	60.16489	59.84937	61.23351						
bt adjust	59.10573	58.78182	60.20276	59.36344	0.7447	60.10814	58.61874		
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+std	-std		
81.6	17712.38	17476.89	18538.45	17909.24	557.4865	18466.72	17351.75		
TOC, HA				log Kp	AVG	+std	-std		
81.6				4.253077	4.26639	4.239343			

TABLE B8 - DATA FOR FIGURE 2-5
Breakthrough (bt) Adjustment: used table B3 numbers for phenanthrene in adjustment equation.

Humic Acid TOC Test, 6/16/95		File: pne11	
evaporated carrier solvent		pH=7	
11.3 ppm Aldrich Humic Acid			
Standard Run on TOC			
PPM	mv	avg	
10	42.442		
	61.7456		
	54.0692		
20	92.4305	52.75227	
	102.924		
	89.5058		
30	130.88	94.95343	
	154.601		
	150.56		
40	193.455	145.347	
	193.717		
	205.491		
50	237.785	197.5543	
	254.482		
	245.897		
		246.0547	
PHENANTHRENE DATA			
Partitioning Test, 6/16/95		File: pne11	
11.3 ppm Aldrich Humic Acid		Empore @24 ml/min, 400mm Hg	
evaporated solvent carrier		Sep-Pak @30 ml/min	
Empore Disk Technique		Sep-Pak @30 ml/min	

Regression Output:			
Constant		-0.08019	
Std Err of Y Est		0.635231	
R Squared		0.988789	
No. of Observations		5	
Degrees of Freedom		3	
X Coefficient(s)			
Std Err of Coef.	0.204166		
	0.004104		
Value			
27.0508	55.7522	46.3072	93.0549
5.442655	11.30249	9.374148	18.91842
			11.25943
			2.986437
AVG			
STD			

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

Background Counts						
vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	33.2	29.2	38.6	36.2	34.8	29.2
2	33.4	37.4	40.6	36.2	37.8	28.4
3	34.8	38.8	37	37.4	33.8	30.6
4	28	33.2	32.8	34.4	34.8	29.6
avg	32.35	34.65	37.25	36.05	35.3	28.95
Total Phenanthrene						
vial	1	2	3			
sample wt, ml	0.9952	0.998	0.9986			
5 min count						
1	1971.6	1962.6	1965.6			
2	1906.6	1939.2	1923.4			
3	1978.2	1951.4	1941			
4	1979.4	1969	1932			
avg	1958.95	1955.55	1940.5 total			
bkgd adjust	1926.6	1923.2	1908.15 avg			
vial quench adjust	9661.60	9617.50	9536.50	9605.20	10068.34	
11.3 ppm, test one empore						
vial	A1	A2	A3	A4	A5	
wt, mg	6.837	4.9802	4.355	4.5973	4.1193	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
1	1582	5651	269.6	93.2	339.2	
2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
vial	B1	B2	B3	B4	B5	
wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
1	1582	5651	269.6	93.2	339.2	
2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
vial	B1	B2	B3	B4	B5	
wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
1	1582	5651	269.6	93.2	339.2	
2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
vial	B1	B2	B3	B4	B5	
wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
1	1582	5651	269.6	93.2	339.2	
2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
vial	B1	B2	B3	B4	B5	
wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
1	1582	5651	269.6	93.2	339.2	
2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
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5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
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avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
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wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
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2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
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wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
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2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
vial	B1	B2	B3	B4	B5	
wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
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2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
vial	B1	B2	B3	B4	B5	
wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
1	1582	5651	269.6	93.2	339.2	
2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
vial	B1	B2	B3	B4	B5	
wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
1	1582	5651	269.6	93.2	339.2	
2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1585.467	5647.8	270.2	91.26667	348.1333	
bkgd adjust	1550.817	5610.55	234.15	55.96667	319.1833	
vial quench adjust	2202.095	5650.101	283.7702	63.30923	319.1833	
11.3 ppm, test two empore						
vial	B1	B2	B3	B4	B5	
wt, mg	6.1737	4.9864	4.2584	4.5932	4.4024	
5 min count						
	filter	ethyl ace	MeCl2	1:1	disk	
1	1582	5651	269.6	93.2	339.2	
2	1587.4	5625.8	269	93.2	350.8	
3	1587	5666.6	272	87.4	354.4	
4	1589	5615	260.2	82.8	345.8	
avg	1588					

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

5 min count	elution				
	filter	ethyl ace	MeCl2	1:1	disk
1	1755.6	6613.8	154.2	90.6	54.8
2	1741.2	6642.2	155	89.4	53.4
3	1736.8	6615.6	150	87	56.8
4	1715.2	6719.6	154.4	87.4	61.4
vial avg	1744.533	6623.867	153.0667	89	55
bkgd adjust	1709.883	6586.617	117.0167	53.7	26.05
vial quench adjust	2197.79	6639.735	141.7876	61.29788	26.05
11.3 ppm, test three empore					6868.87
vial C1	C1a	C2	C3	C4	C5
wt, mg	7.2131	4.9839	4.3198	4.716	4.3567
5 min count	elution				
	filter	ethyl ace	MeCl2	1:1	disk
1	1554.8	6251	148.8	83.6	216.2
2	1538.6	6320.4	150	97.2	228.6
3	1488.2	6269.2	144	83.8	209.6
4	1489.2	6241.4	140.8	84	229
vial avg	1527.2	6280.2	147.6	88.2	218.1333
bkgd adjust	1492.55	6242.95	111.55	52.9	189.1833
vial quench adjust	2230.292	6293.296	135.933	60.29613	189.1833
TOC, HA	% BOUND				6678.709
1	2	3	AVG	STD	+std
11.3	25.85086	24.24035	25.03415		-std
bt adjust	21.15988	19.44748	20.29149	20.29861	0.856229
TOC, HA	Kp1	Kp2	Kp3	AVG	STD
11.3	23751.3	21365.14	22528.42	22548.29	1193.206
TOC, HA					+std
11.3				log Kp	4.353114
					+std
					4.375508
					4.329501

Sep-Pak Technique
Background Counts

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

5 min count									
	filter 1	filter 2	EthAce1	MeCl2	1:1	elution			
1	1906.6	804	5741	453.8	105				
2	1894.4	799.4	5760.4	444	101.8				
3	1933.2	812.6	5727.8	440.2	102.6				
4	1930.4	833	5785.6	443.4	113.6				
avg	1911.4	812.25 filter	5743.067	446	103.1333	elutant	phen	effic.	% mass
bkgd adjust	1878.2	780.45 total	5713	411.4	72.73333	total	total	adjust	bal
quench adjust	1952.05	786.69	5596.311	519.1894	94.96478	6210.465	8949.206	9380.719	92.03
TOC, HA									
	1	2	3	AVG	STD	+std	-std		
11.3	30.91635	30.61824	30.60317						
bt adjust	17.78693	17.43215	17.41422	17.54443	0.210196	17.75463	17.33424		
toc, HA									
	Kp1	Kp2	Kp3	AVG	STD	+std	-std		
11.3	19146.16	18683.65	18660.37	18830.06	273.9952	19104.05	18556.06		
toc, HA									
	log Kp	AVG	+std	-std					
11.3		4.274852	4.281126	4.268486					
Humic Acid TOC Test, 7/14/95									
evaporated carrier solvent File: pne18									
18.3 ppm Aldrich Humic Acid pH=7									
Standard Run on TOC									
PPM	mv	avg							
10	138.586								
	144.453								
	156.514								
Regression Output:									
			Constant	-3.97109					
			Std Err of Y Est	0.837705					
			R Squared	0.991579					
			No. of Observations	5					
			Degrees of Freedom	3					
X Coefficient(s) 0.099251									
Std Err of Coef. 0.005281									

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

20	242.036	Sample	Value	AVG	STD
	233.981	HA soln	224.887	226.145	224.08
	240.385	MV	18.3492	17.98406	18.26911
25	238.8007	PPM			0.254631
	294.757				
	269.75				
	280.515				
	281.674				
30	349.633				
	353.874				
	347.99				
	350.499				

Partitioning Test, 7/14/95 PHENANTHRENE DATA

18.3 ppm Aldrich Humic Acid pH=7 File: pne18
evaporated solvent Empore @24 ml/min, 400mm Hg
Sep-Pak @30 ml/min Sep-Pak @30 ml/min

Empore Disk Technique

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	31	34	31	39.2	34.2	34.6
2	30.6	29.6	29	33.8	36.8	30.2
3	29.4	34.2	28	36.8	33.4	35.2
4	35.8	33.2	30.2	35.2	35.6	42.6

avg

Total Phenanthrene

vial	1	2	3	
sample wt, ml	0.9981	1.0006	0.9987	
5 min count				
1	459.8	447.8	467	avg mil, 5 mil pipet 4.9577
2	437.8	463.2	457	avg mil, 5 mil syringe 5.0189
3	447.2	470.8	448.6	
4	449	444.8	448.4	tot avg activity, syringe mach.

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

avg	448.45	456.65	455.25	total	effic.	2304.041
bkgd adjust	448.45	456.65	455.25	avg	adjust	
vial quench adjust	2251.68	2287.12	2289.03	2275.95	2385.69	
18.3 ppm, test one empore						
vial A1	A1a	A2	A3	A4	A5	
wt, mg	6.8499	5.009	4.182	4.4541	4.3027	
5 min count	filter	ethyl ace	MeCl2	1:1	disk	
1	580	1040.4	51.4	44.8	86.6	
2	584.4	1022.8	58.8	48.4	85.6	
3	598.8	1038.6	50.4	51.6	78.2	
4	595.8	1049.6	56.2	47.8	83.4	
avg	589.75	1037.85	54.2	48.15	83.45	mach. effic. % mass
bkgd adjust	589.75	1037.85	54.2	48.15	83.45	adjust bal
vial quench adjust	852.2079	1046.22	65.25511	54.78707	83.45	2203.27 92.35368
18.3 ppm, test two empore						
vial B1	B1a	B2	B3	B4	B5	
wt, mg	7.018	4.9982	4.2531	4.3974	4.1507	
5 min count	filter	ethyl ace	MeCl2	1:1	disk	
1	537.2	995.2	59.8	53.4	117.6	
2	563	1019.8	60.6	51.8	116.8	
3	540	991.4	55.2	54.4	112.8	
4	538.2	989.2	57.4	46	112.8	
vial avg	544.6	998.9	58.25	51.4	115	mach. effic. % mass
bkgd adjust	544.6	998.9	58.25	51.4	115	adjust bal
vial quench adjust	806.9238	1005.942	69.94956	58.20165	115	2155.154 90.3368
18.3 ppm, test three empore						
vial C1	C1a	C2	C3	C4	C5	
wt, mg	7.3888	5.0378	4.3111	5.0587	4.2793	
5 min count	filter	ethyl ace	MeCl2	1:1	disk	
1	546.6	1027.4	38.2	40	110.6	
2	542.6	1041.6	41.2	47.2	122.2	

[illegible]

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

avg	674.2	275.7	filter	984.6	107.95	50.2	elutant	phen	effic.	% mass
bkgd adjust	642.25	244.6	total	934.35	70.65	18.05	total	total	adjust	bal
vial quench adjust	684.17	247.78		931.95	915.2658	89.16074	23.58711	1027.994	1959.944	2054.449
18.3 ppm, test two sepac										85.07
vial	E1	E2		E3	E4	E5				
wt, mg	4.9941	5.0275								
5 min count	filter 1	filter 2		EthAce1	MeCl2	1:1				
1	698.8	255.4		948.2	123.2	50.4				
2	681.2	269		950	119.4	46.2				
3	686.2	263		939.2	117.2	50.2				
4	690.4	255.2		957.8	126	45.2				
avg	689.15	260.65	filter	948.8	121.45	48	elutant	phen	effic.	% mass
bkgd adjust	657.2	229.55	total	918.55	84.15	15.85	total	total	adjust	bal
quench adjust	700.09	232.54		932.63	899.7885	106.1978	20.69466	1026.681	1959.311	2053.786
18.3 ppm, test three sepac										85.04
vial	F1	F2		F3	F4	F5				
wt, mg	5.0401	5.0457								
5 min count	filter 1	filter 2		EthAce1	MeCl2	1:1				
1	645.6	265.2		972	122	55.6				
2	658	265.4		967.2	121.2	52.6				
3	665.8	266		944.4	111.6	53.6				
4	668.8	263.6		948.8	119.2	60.6				
avg	659.55	265.05	filter	958.1	118.5	55.6	elutant	phen	effic.	% mass
bkgd adjust	627.6	233.95	total	927.85	81.2	23.45	total	total	adjust	bal
quench adjust	668.56	236.99		905.56	908.8986	102.4749	30.61765	1041.991	1847.547	2041.454
TOC, HA	% BOUND									84.53
	1	2	3	AVG	STD	+std	-std			
18.3	47.54985	47.59991	46.49725							
bt adjust	37.58164	37.64121	36.32899	37.18395	0.741011	37.92496	36.44294			
toc, HA	Kp1	Kp2	Kp3	AVG	STD	+std	-std			
18.3	32901.24	32984.87	31178.89	32355	1019.404	33374.4	31335.6			

TABLE B8 - DATA FOR FIGURE 2-5, CONTINUED

log Kp	AVG	+std	-std
4.509941	4.523414	4.496038	
Humic Acid TOC Test, 6/28/95 18.7 ppm Aldrich Humic Acid evaporated carrier solvent Standard Run on TOC File: pne19 pH=7 Day two kinetic			
PPM	mv	avg	
6	92.3355		
	83.8683		
	80.6024		
Regression Output: Constant -1.00158 Std Err of Y Est 1.197839 R Squared 0.98135 No. of Observations 5 Degrees of Freedom 3			
10	134.503		
	135.42		
	128.986		
	132.963		
15	219.468		
	224.421		
	211.487		
	218.458		
20	269.623		
	270.851		
	269.575		
	276.683		
25	322.537		
	312.715		
	302.801		
	312.6643		
Partitioning Test, 6/28/95 18.7 ppm Aldrich Humic Acid evaporated solvent Empore File: pne19 pH=7 Day two kinetic Sep-Pak @30 ml/min			

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

Empore Disk Technique									
Background Counts									
vial	Tot Act	A1a	A2	A3	A4	A5			
5 min count									
1	37.2	37	29	36.6	31.6	38.4			
2	33.6	33.2	28.4	32	30.8	36.6			
3	26	35.8	29.2	39	31.2	36.2			
4	34.4	29.8	28.4	35	34.8	34.4			
avg	32.8	33.95	28.75	35.65	32.1	36.4			
Total Phenanthrene									
vial	1	2	3						
sample wt, ml	0.9911	0.9983	0.99						
5 min count									
1	332.6	331.8	344.6						
2	337	334	332.4						
3	334.2	359.6	329.4						
4	334.6	345.8	345.8						
avg	334.6	342.8	338.05	mach.					
bkgd adjust	301.8	310	305.25	effic.					
vial quench adjust	1526.41	1555.02	1545.58	1542.33	1616.70				
18.7 ppm, test one empore									
vial	A1	A2	A3	A4	A5				
wt, mg	6.631	4.9438	4.6824	4.5169	4.3345				
5 min count									
	filter	ethyl ace	MeCl2	1:1	disk				
1	474.8	730.8	57.4	47.6	62.4				
2	460.4	708.8	51.2	52.2	60				
3	464.8	728.8	54.4	47.2	61				
4	458.6	717.4	51.6	45.2	64				
avg	464.65	721.45	53.65	48.05	61.85	elutant	phen	mach.	% mass
bkgd adjust	430.7	692.7	18	15.95	25.45	total	total	adjust	bal
vial quench adjust	612.3617	698.2863	21.73394	18.16708	25.45	763.6373	1375.999	1442.347	89.21532
18.7 ppm, test two empore									

avg mil, 5 mil pipet
4.9577
avg mil, 5 mil syringe
5.0189
tot avg activity, syringe
1581.374

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

vial	B1	B1a	B2	B3	B4	B5
wt, mg	7.2344	4.9393	4.434	5.2892	4.878	
5 min count	filter	ethyl ace	MeCl2	1:1	disk	
1	456.2	697.4	47.8	40	74.8	
2	448	695.8	47.6	44.2	70.8	
3	448.8	668.2	48.4	43.8	72.4	
4	434.4	688.2	47.8	48.2	71.6	
vial avg	446.85	687.4	47.4	44.05	72.4	mach. efffc.
bkgd adjust	412.9	658.65	11.75	11.95	36	elutant total
vial q adjust	637.8842	663.2931	14.70914	13.85251	36	727.8547 1365.719 1431.571 88.54879
18.7 ppm, test three empore						
vial	C1	C1a	C2	C3	C4	C5
wt, mg	7.2281	4.952	4.3405	4.3017	4.3565	
5 min count	filter	ethyl ace	MeCl2	1:1	disk	
1	454.4	710.8	47.6	45.6	60.8	
2	444.4	731.8	48.6	48.6	58.6	
3	449	751	40	47.4	61.2	
4	452.4	731.8	40.6	47	55	
vial avg	450.05	731.35	44.2	47.15	58.9	mach. efffc.
bkgd adjust	416.1	702.6	8.55	15.05	22.5	elutant total
vial quench adjust	640.6314	708.2661	10.22259	17.15408	22.5	758.1428 1398.774 1466.22 90.69199
TOC, HA	1	2	3	AVG	STD	+std -std
18.7	44.50306	46.70538	45.79948			
bt adjust	40.99209	43.33374	42.37053	42.23212	1.176943	43.40906 41.05518
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+std -std
18.7	37149.1	40894.04	39316.76	39119.98	1880.209	41000.17 37239.75
TOC, HA			log Kp	AVG		+std -std
18.7				4.592398		4.612786 4.571007

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

Sep-Pak Technique		Sep-Pak @30 ml/min				
Background Counts		Day two kinetic				
vial	D1	D2	D3	D4	D5	
5 min count						
1	35.6	29.8	26.8	32.2	32.4	
2	33	32.6	29	33	38.6	
3	33.6	35.2	31	33.4	31.8	
4	33.6	34	27.8	32	32.8	
avg	33.95	32.9	28.65	32.65	33.9	
18.7 ppm, test one sepac						
vial	D1	D2	D3	D4	D5	
wt, mg	4.9893	5.0524				syringe total 1561.374
5 min count						
1	filter 1	filter 2	elution			
2	595.8	205.4	EthAce1	MeCl2	1:1	
3	602	216.8	655	62.4	41.8	
4	583.6	226.6	649.8	65.6	39.8	
avg	594.4	213.2	640.2	68.2	44.2	
bkgd adjust	593.95	215.5	641.4	69.6	43	
vial quench adjust	560	182.6	646.6	66.45	42.2	mach. effc.
18.7 ppm, test two sepac	597.40	185.03	617.95	33.8	8.3	phen total
vial	E1	E2	E3	E4	E5	total
wt, mg	5.0359	5.0532				1441.252
5 min count						
1	filter 1	filter 2	elution			
2	579.4	203.4	EthAce1	MeCl2	1:1	
3	590.6	199.8	656	66.8	49	
4	577.8	197.6	650.6	72.8	51.4	
avg	585.2	208.6	650	71	50	
bkgd adjust	578.25	202.35	657.6	69.2	46.8	
quench adjust	544.3	169.45	653.55	69.95	49.3	phen total
18.7 ppm, test three sepac	580.65	171.70	624.9	37.3	15.4	total
			752.36	612.1363	20.10712	679.3163
			47.07283	1500.706	91.69	

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

vial	F1	F2	F3	F4	F5
wt, mg	5.0109	5.0488			
5 min count	filter 1	filter 2	EthAce1	MeCl2	1:1
1	587	199.4	642	68.8	39.4
2	577.4	203	647	61.4	45.8
3	595.6	191	643.2	66.4	43
4	589.4	205	646.6	70.6	45.8
avg	587.35	199.6	644.7	66.8	43.5
bkgd adjust	553.4	filter	616.05	34.15	9.6
quench adjust	590.36	total	759.28	43.09751	12.53431
TOC, HA	% BOUND	168.92	603.4671	659.0989	1418.377
	1	2	3	AVG	STD
18.7	54.28827	52.55088	53.53147		-std
bt adjust	45.6007	43.53312	44.70008	44.6113	1.036841
				45.64794	43.57466
toc, HA	Kp1	Kp2	Kp3	AVG	STD
18.7	44826.68	41227.26	43225.71	43093.21	1803.362
				44896.58	41289.85
toc, HA		log Kp	AVG	+std	-std
18.7			4.634409	4.652213	4.615843
Humic Acid TOC Test	20.5 ppm Aldrich Humic Acid				
evaporated carrier	6/21/95	File: pne20			
Standard Run on TOC	pH=7				
solvent	mv	avg	Regression Output:		
PPM	10	67.8486	10	63.76507	-2.28285
	20	62.8826	20	115.1097	Constant
	30	60.564	30	156.2553	Std Err of Y Est
	40		40	215.1503	R Squared
	50	63.76507	50	265.9793	No. of Observations
					Degrees of Freedom
20	117.81				5
	112.933				3
				phen	total
				total	1418.377
				effic.	adjust
				adjust	1486.768
				% mass	bal
					90.84

TABLE B8 - DATA FOR FIGURE 2-5, CONTINUED

		X Coefficient(s)				Value		AVG		STD		
		Std Err of Coef.										
30	114.586	115.1097		Sample HA soln	MV	119.019	112.124	114.132	115.0917	3.546262	0.197749	
	170.645											0.005622
	151.203											
	146.918											
40	156.2553	158.2553		PPM	21.253	19.88952	20.2866	20.47637	0.701269			
	210.84											
	219.768											
	214.843											
50	215.1503	215.1503										
	267.052											
	266.216											
	264.67											
	265.9793	265.9793										

Partitioning Test, 6/21/95 PHENANTHRENE DATA
20.5 ppm Aldrich Humic Acid File: pne20
evaporated solvent Empore @24 ml/min, 400mm Hg

Sep-Pak @30 ml/min

Empore Disk Technique

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	35.2	38.6	30.4	37.2	34.6	32
2	28.8	30.6	33.8	32.2	31.8	31
3	33.4	35.8	25	30	31.4	34
4	31.6	32.2	32.2	35.4	36.4	33
avg	32.25	34.3	30.35	33.7	33.55	32.5

Total Phenanthrene

vial	1	2	3

sample wt, ml

5 min count	1	1	1

1	98.2	96.6	106.2

2	91.4	110.2	101

avg ml, 5 mil pipet

4.9577

avg ml, 5 mil syringe

3		91	104.2	110.8					5.0189
4		92.2	96.6	96.2					tot avg activity, syringe
avg		92.7	101.9	103.55	total				341.0358
bkgd adjust		60.45	69.65	71.3	avg				
vial quench adjust		303.34	349.51	357.79	336.88				
20.5 ppm, test one empore									
vial	A1	A1a	A2	A3	A4	A5			
wt, mg	6.4111	5.0307	4.1854	4.5809	4.5733				
5 min count									
	filter	ethyl ace	MeCl2	1:1	disk				
1	132.6	174.6	34.8	35.4	42.2				
2	150.2	159.6	35.6	38.4	43.8				
3	153.2	173	35	35.6	34.2				
4	136.8	169.8	36	37	38.8				
avg	143.2	169.25	35.35	36.6	39.75	elutant	phen		% mass
bkgd adjust	108.9	138.9	1.85	3.05	7.25	total	total		adjust
vial quench adjust	148.3032	140.0202	1.986312	3.500765	7.25	152.7672	301.0704	315.5874	89.37094
20.5 ppm, test two empore									
vial	B1	B1a	B2	B3	B4	B5			
wt, mg	7.1681	5.0433	4.5026	5.218	4.4983				
5 min count									
	filter	ethyl ace	MeCl2	1:1	disk				
1	131.2	186	42.8	38.2	40				
2	123.8	177.8	39.2	36.4	42.2				
3	118.8	165.4	36.4	34.6	40				
4	118.2	173.6	37	33.8	36.2				
vial avg	123	175.7	38.85	35.75	39.6	elutant	phen		% mass
bkgd adjust	88.7	145.35	5.15	2.2	7.1	total	total		adjust
vial quench adjust	133.7507	146.3746	6.425204	2.519036	7.1	162.4189	286.1695	310.4503	87.91615
20.5 ppm, test three empore									
vial	C1	C1a	C2	C3	C4	C5			
wt, mg	7.0045	5.0507	4.3264	4.6755	4.4025				
5 min count									
	filter	ethyl ace	MeCl2	1:1	disk				

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

Sep-Pak Technique												
Background Counts												
vial	D1	D2	D3	D4	D5	Sep-Pak @30 ml/min						
5 min count												
1	36.4	34	32.6	35.8	34							
2	32.6	32.4	27.8	38	28.8							
3	33	37	35.4	29.6	35.6							
4	33	34	31.4	34.2	29							
avg	33.75	34.35	31.8	34.4	31.85							
20.5 ppm, test one sepac												
vial	D1	D2	D3	D4	D5							
wt, mg	5.0299	5.0608										
5 min count												
1	filter 1	filter 2	EthAce1	MeCl2	1:1							
2	149.4	83	163.2	38.6	35.6							
	161.6	81.2	169.2	42.2	34.8							
syringe total												
341.0358												

3	149.8	78	162.4	42.2	34				
4	153.6	82.8	168.2	38.2	40.2				
avg	153.6	81.25 filter	165.75	40.3	36.15 elutant	phen			
bkgd adjust	119.85	46.9 total	133.95	5.9	4.3 total	total	mach. eff.		% mass
vial quench adjust	128.68	47.58	176.27	131.2141	7.445837	5.614325	144.2742	320.5409	335.9967
20.5 ppm, test two sepac									93.99
vial	E1	E2	E3	E4	E5				
wt, mg	5.0165	5.0287							
5 min count	filter 1	filter 2	EthAce1	MeCl2	1:1				
1	157.2	70	164.4	40	35.8				
2	161.4	81.2	165.2	41.8	38.8				
3	156.2	69.8	157.2	40	32.6				
4	154.8	75.8	149	37.6	32.2				
avg	157.4	74.2 filter	158.95	39.85	34.85 elutant	phen			% mass
bkgd adjust	123.65	39.85 total	127.15	5.45	3 total	total	effic. adjust		bal
quench adjust	132.76	40.43	173.19	124.5529	6.877934	3.916971	135.3479	308.5416	323.4189
20.5 ppm, test three sepac									90.47
vial	F1	F2	F3	F4	F5				
wt, mg	5.0786	5.0145							
5 min count	filter 1	filter 2	EthAce1	MeCl2	1:1				
1	156.4	84.6	161.4	45.2	34				
2	155.8	80	167.2	41.2	31.6				
3	152.4	75.6	163.8	45.2	35.4				
4	158.8	76.2	165	42.2	30				
avg	155.85	79.1 filter	164.35	43.45	32.75 elutant	phen			% mass
bkgd adjust	122.1	44.75 total	132.55	9.05	0.9 total	total	effic. adjust		bal
quench adjust	131.10	45.40	176.50	129.8427	11.42116	1.175091	142.4389	318.94	334.3186
TOC, HA	% BOUND								93.52
1	2	3	AVG	STD	+std	-std			
20.5	54.99038	56.13303	55.3399						
bt adjust	46.43625	47.79606	46.8522	47.02817	0.696773	47.72494	46.3314		

TABLE B8 - DATA FOR FIGURE 2-5. CONTINUED

toc, HA	Kp1	Kp2	Kp3	AVG	STD	+std	-std
20.5	42289.48	44661.67	43002.22	43317.79	1217.171	44534.96	42100.62
toc, HA			log Kp	AVG		+std	-std
20.5				4.636666		4.648701	4.624288

TABLE B9 - DATA FOR FIGURE 2-9

Breakthrough (bt) Adjustment: used table B3 numbers for bap in adjustment equation.

Humic Acid TOC Test, 5/10/95			File: bnevp15		pH=7	
15.1 ppm Suwannee River Humic Acid						
Standard Run on TOC						
PPM	mv	avg	Regression Output:			
3	60.9273		Constant	-1.81034		
	50.6472		Std Err of Y Est	0.242232		
	51.4912		R Squared	0.999058		
		54.35523	No. of Observations	5		
6	81.4448		Degrees of Freedom	3		
	82.6809		X Coefficient(s)	0.093842		
	78.6127		Std Err of Coef.	0.001684		
		80.9128				
10	124.204		Value	AVG		
	122.601	Sample	179.402	178.409		
	124.638	HA soln	15.02507	14.93189		
		123.8143	MV	182.059		
15	180.655		PPM	179.9567		
	179.034			15.07712		
	178.961			0.177094		
		179.55				
20	238.289					
	232.407					
	229.087					
		233.261				
Partitioning Test, 5/10/95			BENZO-A-PYRENE DATA			
evaporated carrier solvent			pH=7			
15.1 ppm Suwannee River Humic Acid			File: bnevp15			
Empore Disk Technique			Empore @24 ml/min, 400mm Hg			
Tsle Values			Sep-Pak @30 ml/min			

vial	1	2	3	A1a	B1a	C1a
1	315	312	316	247	246	246
2	313	313	314	246	244	247
3	316	314	314	245	244	246
4	318	313	316	245	244	247
avg	315.5	313	315	245.75	244.5	246.5
log(Ts/e) Values						
vial	1	2	3	A1a	B1a	C1a
1	2.498311	2.494155	2.498687	2.392697	2.390935	2.390935
2	2.495544	2.495544	2.49693	2.390935	2.38739	2.392697
3	2.498687	2.49693	2.49693	2.389166	2.38739	2.390935
4	2.502427	2.495544	2.498687	2.389166	2.38739	2.392697
avg	2.498992	2.495543	2.498308	2.390491	2.388276	2.391816
% quench	0.59102	0.697188	0.612072	0	0	0
Background Counts						
vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	34.4	40.2	36	40.4	33	42
2	35.8	39.2	41.2	38.4	35.2	45.6
3	39	35.2	34.6	37	36.4	30.6
4	34.2	41.8	33.4	32.8	35.6	36.6
avg	35.85	39.1	36.3	37.15	35.05	38.7
Total Phenanthrene						
vial	1	2	3			
sample wt, ml	0.9902	0.9869	0.9959			
5 min count						
1	9018	8995.6	9130			
2	9006.4	8970.2	9040.4			
3	9106.2	9014.6	9054			
4	8986.6	9022.2	9093.8			
avg	9031.8	9000.65	9079.55	total		
bkgd adjust	8995.95	8984.8	9043.7	avg		
vial quench adjust	45308.40	45350.93	45297.79	45319.04	adjust	47504.23
15.1 ppm, test one empore						
				avg mil, 5 mil pipet		
				4.9577		
				avg mil, 5 mil syringe		
				5.0189		
				tot avg activity, syringe		
				45878.48		

TABLE B9 - DATA FOR FIGURE 2-6. CONTINUED

vial	A1	A1a	A2	A3	A4	A5	
wt, mg	7.3702	5.0125	4.0699	4.2639	4.2116		
5 min count				elution			
1		filter	ethyl ace	MeCl2	1:1	disk	
2		12221.6	19336	539.4	368	844.6	
3		12146.4	19378.2	526.6	374.8	867.2	
4		12098	19331	542	374.6	908	
		12108	19368.6	538.4	373.4	860.4	
avg		12155.33	19348.4	536	372.4667	873.2667	mach. efflc. adjust
bkgd adjust		12116.23	19312.1	498.85	337.4167	834.5667	phen total
vial quench adjust		17815.27	19467.84	595.4139	382.8095	834.5667	21280.63 39095.91 40981.03 86.26817
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.2423	5.0022	4.196	4.2366	4.2106		
5 min count				elution			
1		filter	ethyl ace	MeCl2	1:1	disk	
2		11988.2	19417.2	765.4	327.4	1259.2	
3		12069	19435.8	755.8	333.8	1281	
4		12009.4	19443.8	742.4	334	1286.6	
		11954.4	19574	753	329.8	1273	
vial avg		12022.2	19432.27	754.5333	331.7333	1275.6	mach. efflc. adjust
bkgd adjust		11983.1	19397.22	718.2333	331.7333	1236.9	phen total
vial quench adjust		17349.41	19553.65	856.2027	376.3496	1236.9	22023.1 39372.51 41270.97 86.87851
15.1 ppm, test three empore							
vial	C1	C2	C3	C4	C5		
wt, mg	7.168	5.0347	4.1898	4.2091	4.1226		
5 min count				elution			
1		filter	ethyl ace	MeCl2	1:1	disk	
2		11842.8	20000.4	331.2	489.6	935	
3		11831.8	19981.6	343.4	493.8	949	
4		11849.8	20018.2	346.2	485.6	976.4	
		11834.2	20117.6	329	487.6	967.4	
vial avg		11841.47	20000.07	340.2667	489.6667	953.4667	mach. efflc. adjust
bkgd adjust		11802.37	19963.77	303.1167	454.6167	914.7667	phen total

TABLE B9 - DATA FOR FIGURE 2-6. CONTINUED

vial q adjust	16803.26	20124.76	360.894	514.3143	914.7667	21914.74	38718	40584.9	85.43429
TOC, HA	% BOUND								
	1	2	3	AVG	STD	+std	-std		
15.1	39.31079	38.28282	37.0777						
BT adjust	37.69715	36.64185	35.40468	36.58123	1.147435	37.72866	35.43379		
TOC, HA	Kp1	Kp2	Kp3	AVG	STD				
15.1	40070.4	38299.92	36298	38222.77	1887.381	40110.16	36335.39		
TOC, HA									
15.1			log Kp	AVG	+std	-std			
				4.582322	4.603254	4.56033			
Partitioning Test, 5/11/95									
evaporated carrier solvent									
pH=7 File:bne15k2									
day two kinetic test 15.1 ppm Suwannee River Humic Acid									
Tsie Values									
vial	1	2	3	A1a	B1a	C1a			
1	325	321	320	246	244	240			
2	322	320	319	244	240	240			
3	325	319	320	243	239	237			
4	324	319	320	242	240	238			
avg	324	319.75	319.75	243.75	240.75	238.75			
log(Tsie) Values									
vial	1	2	3	A1a	B1a	C1a			
1	2.511883	2.506505	2.50515	2.390935	2.38739	2.380211			
2	2.507856	2.50515	2.503791	2.38739	2.380211	2.380211			
3	2.511883	2.503791	2.50515	2.385606	2.378398	2.374748			
4	2.510545	2.503791	2.50515	2.383815	2.380211	2.376577			
avg	2.510542	2.504809	2.50481	2.386937	2.381553	2.377937			
% quench	0.235499	0.411966	0.411934	0	0	0			
Background Counts									
vial	Tot Act	A1a	A2	A3	A4	A5			
5 min count	1	34.6	35.8	38.6	40.2	37.2	38.2		

Empore @24 ml/min, 400mm Hg

TABLE B9 - DATA FOR FIGURE 2-8. CONTINUED

2	33	35.2	34	37.8	33.4	29.6	
3	32.8	37	39.4	40.8	35.4	31.6	
4	33.2	36	35.4	40	31.2	33.8	
avg	33.4	36	36.85	39.7	34.3	33.3	
Total Phenanthrene							
vial	1	2	3				
sample wt, ml	0.9934	0.9969	0.9946				
5 min count							
1	9978.4	10045.6	10088.4				avg mil, 5 mil pipet
2	9865.2	10018.8	10055.6				4.9577
3	9866.2	10087	10040.4				avg mil, 5 mil syringe
4	10008.8	10061.2	10123.2				5.0189
avg	9879.65	10053.15	10076.9	total			tot avg activity, syringe
bkgd adjust	9846.25	10019.75	10043.5	avg			50637.77
vial quench adjust	49755.31	50035.52	50270.08	50020.30	52432.18		
15.1 ppm, test one empore							
vial	A1	A2	A3	A4	A5		
wt, mg	7.2675	4.9363	4.2048	4.3416	4.515		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13194.2	21129.2	525.6	518	1112		
3	13226	21113.4	516.6	498.8	1092		
4	13143.8	21236.2	526.2	537.2	1090.2		
avg	13118.4	21111.2	509.2	522.8	1084.4		
bkgd adjust	13188	21159.6	522.8	518	1098.067	elutant	
vial quench adjust	13152	21122.75	483.1	483.7	1084.767	total	
15.1 ppm, test two empore	19363.12	21293.09	578.6563	554.1429	1084.767	23490.66	42853.78
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							
1	filter	ethyl ace	MeCl2	1:1	disk		
2	13626.6	21534.4	342.8	344.2	695.6		
avg	13669	21530.4	336.6	332	729.6		
bkgd adjust							
vial quench adjust							
15.1 ppm, test two empore							
vial	B1	B2	B3	B4	B5		
wt, mg	7.3855	5.0709	4.2757	4.5704	4.3371		
5 min count							

TABLE B9 - DATA FOR FIGURE 2-6. CONTINUED

2	317	319	318	229	234	229
3	317	318	318	228	235	228
4	316	320	318	229	234	227
avg	317.25	319.25	318.25	229.5	234.75	228.75
log(Tsle) Values						
vial	1	2	3	A1a	B1a	C1a
1	2.503791	2.50515	2.503791	2.365488	2.372912	2.363612
2	2.501059	2.503791	2.502427	2.359835	2.369216	2.359835
3	2.501059	2.502427	2.502427	2.357935	2.371088	2.357935
4	2.499887	2.50515	2.502427	2.359835	2.369216	2.358026
avg	2.501399	2.504129	2.502768	2.360773	2.370803	2.359352
% quench	0.516934	0.432888	0.474795	0	0	0
Background Counts						
vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	30.8	37.2	37.4	33.6	31	35.6
2	37	35.4	37.6	43.2	38.4	37.6
3	36.6	33.6	46.4	42	37.2	37
4	33.2	28.2	41.2	38.6	34.8	40.2
avg	34.4	33.6	40.65	39.35	35.35	37.6
Total Phenanthrene						
vial	1	2	3			
sample wt, ml	1.0001	0.9697	0.9988			
5 min count						
1	10797.2	10391.8	10805.8			
2	10811	10428	10756.6			
3	10813	10422.6	10759			
4	10825.4	10470.4	10618.8			
avg	10811.65	10428.2	10735.05			
bkgd adjust	10777.25	10393.8	10700.65			
vial quench adjust	53702.64	53370.50	53367.74			
15.1 ppm, test one empore						
vial	A1	A2	A3	A4	A5	
wt, mg	7.26	5.1722	4.2319	4.4304	4.2893	

avg ml, 5 ml pipet

4.9577

avg ml, 5 ml syringe

5.0189

tot avg activity, syringe

54140.48

mach.

efflc.

adjust

56059.01

15.1 ppm, test three empore									
5 min count	filter	ethyl ace	elution MeCl2	1:1	disk				
1	14780.8	23673	525.6	383.6	784.2				
2	14738.6	23676.8	522.6	384.4	772.4				
3	14829.2	23837	526	383.4	760.4				
4	14765.4	23759.6	531	374.6	773				
avg	14782.93	23728.93	524.7333	383.8	772.3333	elutant	phen	% mass	
bkgd adjust	14749.33	23688.28	485.3833	348.45	734.7333	total	total	adjust	bal
vial quench adjust	20703.02	23879.32	583.7529	396.3108	734.7333	25594.11	46297.13	48529.49	86.56859
15.1 ppm, test two empore									
vial	B1	B2	B3	B4	B5				
wt, mg	7.181	5.1062	4.3787	4.5098	4.3958				
15.1 ppm, test three empore									
5 min count	filter	ethyl ace	elution MeCl2	1:1	disk				
1	13897.4	23006.2	380.4	361.8	1232.6				
2	13925.2	23090.2	372.6	362.4	1235.2				
3	13913.6	22962.4	397.4	345.4	1242.6				
4	13968	22864.8	401.2	367.2	1268				
vial avg	13912.07	23019.6	383.4687	356.5333	1236.8	elutant	phen	% mass	
bkgd adjust	13878.47	22984.25	342.8167	356.5333	1199.2	total	total	adjust	bal
vial quench adjust	19517.7	23169.61	413.7961	406.892	1199.2	25189.49	44707.19	46862.89	83.59584
15.1 ppm, test three empore									
vial	C1	C2	C3	C4	C5				
wt, mg	7.2941	5.1593	4.2195	4.233	4.2292				
15.1 ppm, test three empore									
5 min count	filter	ethyl ace	elution MeCl2	1:1	disk				
1	13718.2	24516.2	585.4	324.6	750.2				
2	13680.6	24760.8	583.6	336.8	742.2				
3	13662	24584	597.2	333.2	774.8				
4	13575.4	24661	605.8	332	741.2				
vial avg	13686.93	24620.33	588.7333	331.5333	755.7333	elutant	phen	% mass	
bkgd adjust	13653.33	24579.68	549.3833	296.1833	718.1333	total	total	adjust	bal
vial quench adjust	19302.77	24777.91	654.8105	336.218	718.1333	26487.07	45789.84	47997.73	85.62002
TQC, HA									

TABLE B9 - DATA FOR FIGURE 2-6. CONTINUED

Total Phenanthrene									
vial	1	2	3						
sample wt, ml	0.9834	1.0093	1.0123						
5 min count									
4	30.8	39.8	31.2	34.2	38.2	27.8			
avg	31.45	36.95	32.2	34.8	34.95	31.15			
avg mil, 5 mil pipet 4.9577									
avg mil, 5 mil syringe 5.0189									
tot avg activity, syringe 68907.16									
mach. eff. % mass 56424.4 79.0823									
vial	B1	B2	B3	B4	B5				
wt, mg	7.181	4.92	4.1707	4.3582	4.2853				
vial B1 not weighed, data no good this rep									
5 min count									
1	15004.8	30443.6	692.6	368	529.4				
2	14924.4	30588.4	715.2	364.6	497.2				
3	15012	30415.6	720	353	510				
4	15020.8	30597.8	702.6	362	511.8				
mach. eff. % mass 56424.4 79.0823									

TABLE B9 - DATA FOR FIGURE 2-6. CONTINUED

vial avg	14980.4	30482.53	709.2667	361.2	512.2	elutant	phen	effic.	% mass
bkgd adjust	14943.45	30447.58	677.0667	361.2	481.05	total	total	adjust	bal
vial quench adjust	21810.75	30693.13	811.603	410.7594	481.05	32398.54	54207.3	56821.06	79.63825
15.1 ppm, test three empore									
vial	C1	C1a	C2	C3	C4	C5			
wt, mg	7.4609	4.941	4.1947	4.4713	4.3089				
5 min count	elution								
	filter	ethyl ace	MeCl2	1:1	disk				
1	15657.4	29066.2	525.2	340.6	1429.4				
2	15626.8	28975	539.4	341	1410.4				
3	15499.6	29363.8	527.2	342	1471.8				
4	15585.8	29109.8	514.4	333.6	1454.8				
vial avg	15594.6	29135	530.6	341.2	1437.2	elutant	phen	mach.	% mass
bkgd adjust	15557.65	29102.8	495.8	306.25	1406.05	total	total	effic.	bal
vial quench adjust	23492.02	29337.5	597.3983	348.5332	1406.05	31689.48	55181.5	57842.24	81.0695
TOC, HA	% BOUND								
	1	2	3	AVG					
15.1			34.51313						
BT adjust			32.77192	32.77192					
1,2 no good. see previous notes									
TOC, HA	Kp1	Kp2	Kp3	AVG					
15.1			32283.03	32283.03					
TOC, HA	AVG								
15.1			log Kp	4.508974					

TABLE B10 - DATA FOR FIGURE 2-7

Breakthrough (bt) Adjustment: used table B3 numbers for phenanthrene in adjustment equation.

Humic Acid TOC Test, 6/26/95 18.7 ppm Aldrich Humic Acid

evaporated carrier file: pne19

Day two kinetic pH=7

Standard Run on TOC

PPM	mv	avg	Regression Output:				
6	92.3355		Constant		-1.00158		
	83.8663		Std Err of Y Est		1.197839		
	80.6024		R Squared		0.98135		
		85.6014	No. of Observations		5		
10	134.503		Degrees of Freedom		3		
	135.42						
	128.966						
		132.963					
15	219.466		X Coefficient(s)	0.078925			
	224.421		Std Err of Coef.	0.006262			
	211.487						
		218.458	Value		AVG	STD	
20	269.623		231.688	256.348	261.552	249.8627	15.95335
	270.851		17.28442	19.23071	19.64144	18.71885	1.25912
	289.575						
		276.683					
25	322.537						
	312.715						
	302.801						
		312.6843					

Partitioning Test, 6/26/95 PHENANTHRENE DATA

18.7 ppm Aldrich Humic Acid File: pne19

evaporated solvent pH=7

Day one kinetic Empore @24 ml/min, 400mm Hg

Background Counts

TABLE B10 - DATA FOR FIGURE 2-7. CONTINUED

5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	456.2	697.4	47.8	40	74.8				
2	448	695.8	47.6	44.2	70.8				
3	448.8	688.2	46.4	43.8	72.4				
4	434.4	688.2	47.8	48.2	71.6				
vial avg	446.85	687.4	47.4	44.05	72.4	elutant	phen		
bkgd adjust	412.9	658.65	11.75	11.95	36	total	total	mach. efffc.	% mass
vial quench adjust	637.8642	663.2931	14.70914	13.85251	36	727.8547	1365.719	1431.571	88.54879
18.7 ppm, test three empore									
vial C1	C1a	C2	C3	C4	C5				
wt, mg	7.2281	4.952	4.3405	4.3017	4.3565				
			elution						
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	454.4	710.8	47.6	45.6	60.8				
2	444.4	731.8	48.6	48.6	58.6				
3	449	751	40	47.4	61.2				
4	452.4	731.8	40.6	47	55				
vial avg	450.05	731.35	44.2	47.15	58.9	elutant	phen		
bkgd adjust	416.1	702.6	8.55	15.05	22.5	total	total	mach. efffc.	% mass
vial quench adjust	640.6314	708.2661	10.22259	17.15408	22.5	758.1428	1398.774	1466.22	90.69199
TOC, HA	% BOUND								
	1	2	3	AVG	STD	+std	-std		
18.7	44.50308	46.70536	45.79948						
bt adjust	40.99209	43.33374	42.37053	42.23212	1.176943	43.40906	41.05518		
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+std	-std		
18.7	37149.1	40894.04	39316.76	39119.96	1880.209	41000.17	37239.75		
TOC, HA				log Kp					
18.7				4.592398		4.612786	4.571007		

Partitioning Test, 6/27/95 PHENANTHRENE DATA
 Aldrich Humic Acid pH=7 6/27/95 File: pne19_3
 evaporated solvent Empore @24 ml/min, 400mm Hg

TABLE B10 - DATA FOR FIGURE 2-7. CONTINUED

Day two kinetic										
Background Counts										
vial	Tot Act	A1a	A2	A3	A4	A5				
5 min count										
1	34.4	36.8	29.8	36	37.2	36.4				
2	34.4	34.2	31.6	33.8	30.8	35.8				
3	31.8	30.8	27	33.6	34.4	39				
4	34.2	32.8	30.4	34.2	31.8	35.8				
avg	33.7	33.65	29.7	34.4	33.55	36.75				
Total Phenanthrene										
vial	1	2	3							
sample wt, ml	0.9995	1.0015	0.9931							
5 min count										
1	381.4	362	368.2							
2	366.6	373.6	370.8							
3	373.4	369.8	385.8							
4	373.6	374.4	369							
avg	373.75	369.95	373.45 total							
bkgd adjust	340.05	336.25	339.75 avg							
vial quench adjust	1705.41	1682.99	1714.89	1701.10	1783.12					
18.7 ppm, test one empore										
vial	A1	A2	A3	A4	A5					
wt, mg	7.1289	4.9971	4.2501	4.5015	4.3403					
5 min count										
1	filter	ethyl ace	MeCl2	1:1	disk					
2	524.4	701.4	50.4	47.6	121.4					
3	534.8	713.4	54.4	52	126.2					
4	532.8	724.2	50.6	39	126.8					
avg	512	726.8	50.8	47	120.2					
bkgd adjust	492.35	686.75	51.55	46.4	123.65					
vial quench adjust	741.4411	692.2883	20.69298	14.6389	86.9	814.5202	1555.961	1630.987	91.4681	
18.7 ppm, test two empore										
vial	B1	B1a	B2	B3	B4	B5				
mach. effc. % mass										
effc. adjust bal										

avg ml, 5 mil pipet
4.9577

TABLE B10 - DATA FOR FIGURE 2-7, CONTINUED

wt, mg	7.2485	4.0116	4.6334	4.6049	4.7107	
5 min count						
1	408.6	802.8	49.6	49.4	69.2	
2	420.8	770.4	47	46	77.8	
3	412.8	788.6	50.8	45.4	76.8	
4	415.2	804.4	46.8	42.2	74.8	
vial avg	414.35	791.05	48.55	45.75	74.65	mach. efficc. % mass
bkgd adjust	380.7	761.35	14.15	12.2	37.9	adjust bal
vial quench adjust	725.4599	766.717	17.15462	14.06551	37.9	835.8372 1561.297 1636.58 91.78177
18.7 ppm, test three empore						
vial C1	C1a	C2	C3	C4	C5	
wt, mg	6.9001	4.8927	4.865	4.377	4.3896	
5 min count						
1	555.2	350.8	341.2	46.6	77	
2	538.4	357.6	349.8	48	76	
3	553.4	348.2	338.6	41.8	74.4	
4	569.4	348	343.8	46.4	77.6	
vial avg	554.1	351.15	343.35	45.7	76.25	mach. efficc. % mass
bkgd adjust	520.45	321.45	308.95	12.15	39.5	adjust bal
vial quench adjust	776.221	372.4688	352.3749	13.86337	39.5	778.2071 1554.428 1629.38 91.37798
TOC, HA	1	2	3	AVG	STD	+std -std
18.7	47.65164	46.46521	49.93612			
bt adjust	44.33986	43.07837	46.76886	44.72903	1.875774	46.60481 42.85326
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+std -std
18.7	42599.89	40470.66	46983.94	43351.5	3321.055	46672.55 40030.44
TOC, HA						
18.7				AVG		+std -std
				log Kp	4.637004	4.669062 4.60239

Partitioning Test, 6/30/95

TABLE B10 - DATA FOR FIGURE 2-7. CONTINUED

18.7 ppm Aldrich Humic Acid pH=7 File: pne19_6									
evaporated solvent Empore @24 ml/min, 400mm Hg									
Day five kinetic									
Background Counts									
vial	Tot Act	A1a	A2	A3	A4	A5			
5 min count									
1	28.8	34	30.2	33.2	33.8	29.6			
2	29.6	30	27.2	34.8	31.4	35.8			
3	28.8	35.6	27.6	31.6	30.2	33.8			
4	27	32.6	30.2	31	32.4	33.4			
avg	28.55	33.05	28.8	32.65	31.95	33.15			
Total Phenanthrene									
vial	1	2	3						
sample wt, ml	0.9888		0.9928	0.9922					
5 min count									
1	378.2	382	395						
2	378.2	376.6	376.8						
3	382.6	373	379.8						
4	396.6	374.2	374.6	mach.					
avg	383.9	376.45	381.55	total					
bkgd adjust	355.35	347.9	353	avg					
vial quench adjust	1801.43	1756.56	1783.39	1780.46	1866.31				
18.7 ppm, test one empore									
vial	A1	A2	A3	A4	A5				
wt, mg	7.1582	5.0223	4.5793	3.9542	4.5204				
5 min count									
	filter	ethyl ace	MeCl2	1:1	disk				
1	543.6	755.2	48.4	37.6	77.4				
2	541.8	758.8	41	46.8	82.2				
3	552.4	743.6	43.8	45.2	74.4				
4	514	760.4	50	38.2	80.6	mach.			
avg	537.95	754.5	45.8	41.95	78.65	elutant	phen	effic.	% mass
bkgd adjust	504.9	725.7	13.15	10	45.5	total	total	adjust	bal
vial quench adjust	759.4618	731.5524	15.47787	11.45833	45.5	803.9886	1563.45	1638.837	87.81171

avg ml, 5 ml pipet
4.9577

mach.
effic.
adjust
% mass
bal

TABLE B10 - DATA FOR FIGURE 2-7. CONTINUED

18.7 ppm, test two empore									
vial	B1	B1a	B2	B3	B4	B5			
wt, mg	6.9275	4.9378	4.1737	4.6567	4.5541				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	552	736.6	42.2	46.4	91.4				
2	561.4	765.8	46.2	46.4	82.2				
3	564	744.8	43	42.4	93.2				
4	571	738.4	44.2	45	83.2				
vial avg	562.1	746.4	43.9	45.05	87.5	mach. efficc. adjust	elutant phen total	% mass bal	
bkgd adjust	529.05	717.6	11.25	13.1	54.35		total		
vial quench adjust	784.7666	722.6586	13.67149	15.02675	54.35	805.7068	1590.473	1667.163	89.32946
18.7 ppm, test three empore									
vial	C1	C1a	C2	C3	C4	C5			
wt, mg	6.802	5.0127	4.5022	4.7249	4.416				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	597.4	766.4	37.8	43	68.6				
2	607.8	736.8	43	39	67.6				
3	607.4	756	40.8	39.4	65.4				
4	611.4	753.4	38.4	40.4	65.4				
vial avg	606	753.15	40	40.45	66.75	mach. efficc. adjust	elutant phen total	% mass bal	
bkgd adjust	572.95	724.35	7.35	8.5	33.6		total		
vial quench adjust	822.8901	729.4562	8.960287	9.706887	33.6	781.7234	1604.613	1681.985	90.12364
TOC, HA	1	2	3	AVG	STD	+std	-std		
18.7	48.57601	49.3417	51.28276						
bt adjust	45.32271	46.13684	48.2007	46.55342	1.483531	48.03695	45.06989		
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+std	-std		
18.7	44326.89	45805.16	49760.86	46630.97	2809.534	49440.5	43821.44		
TOC, HA				AVG	+std	-std			
18.7				log Kp	4.668674	4.694083	4.641687		

TABLE B10 - DATA FOR FIGURE 2-7, CONTINUED

bkgd adjust	584.95	723.65	15.45	21.3	28.05	total	adjust	bal
vial quench adjust	894.0204	729.4859	18.85859	24.10797	28.05	800.5024	1694.523	91.3798
18.7 ppm, test two empore								
vial	B1	B1a	B2	B3	B4	B5		
wt, mg	7.2376	5.0351	4.3596	4.7835	4.4482			
5 min count								
1	filter	ethyl ace	MeCl2	1:1	disk			
2	605.6	780.8	59.4	48.4	65.4			
3	595.4	782	52.2	49	64			
4	601.4	767.4	50	43.6	67.8			
vial avg	606	774.8	59.8	47.2	66.2			
bkgd adjust	602.1	776.25	55.35	47.05	65.85	elutant	phen	% mass
vial quench adjust	571.45	749.35	22.65	15.45	21.15	total	total	bal
18.7 ppm, test three empore								
vial	C1	C1a	C2	C3	C4	C5		
wt, mg	7.1912	5.0253	4.3829	4.6816	4.686			
5 min count								
1	filter	ethyl ace	MeCl2	1:1	disk			
2	607.2	779.4	50	56.4	77			
3	588.6	770.8	51.4	44.6	80.6			
4	593.8	764.2	50.6	48.6	79.6			
vial avg	605.8	762	52.6	40	79.2			
bkgd adjust	598.85	769.1	51.15	47.4	79.1	elutant	phen	% mass
vial quench adjust	568.2	742.2	18.45	15.8	34.4	total	total	bal
TOC, HA	1	2	3	AVG	STD	+std	-std	
18.7	52.75942	51.34021	51.05351					
bt adjust	49.77078	48.26179	47.95695	48.66317	0.97125	49.63442	47.69192	
TOC, HA								
18.7	52987.87	49882.76	49277.33	50715.99	1990.657	52708.64	48725.33	

TABLE B10 - DATA FOR FIGURE 2-7. CONTINUED

TOC, HA 18.7	log Kp	AVG	+std	-std
		4.705145	4.721865	4.687755

TABLE B11 - DATA FOR FIGURE 3-1

Data for pH=7 portion of Figure 3-1 are located in Table B7.

Breakthrough Test for All Partitioning Data Points in this Table

PHENANTHRENE DATA , 10/29/84 File: b0 Empore @24 ml/min, 400mm Hg

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	30.8	33.8	27.8	36.2	36.2	39.2
2	31.6	35.8	37.6	36.4	36	38.8
3	28.4	32.6	33.8	38.8	36.2	34.4
4	32.6	36.4	32.6	32.4	36.2	42.8
avg	30.85	34.65	32.95	35.95	36.15	38.8

Total Phenanthrene

vial	1	2	3
sample wt, ml	1.0006	0.9995	0.9983
5 min count			

avg ml, 5 mil pipet
4.9577

1	10118.6	13330	11890.4
2	10174	13314.6	11929.4
3	10157.6	13399	11901.2
4	10082.8	13455.6	11860.2
avg	10133.25	13374.8	11895.3
bkqd adjust	10102.4	13343.95	11864.45
vial q adjust	50054.64	66188.40	58920.55
0 ppm, test one empore			58387.86
			61203.21

vial	A1	A2	A3	A4	A5
wt, mg	6.9204	5.0507	4.2068	4.4892	4.3283

5 min count	filter	ethyl ace	MeCl2	1:1	disk
1	1684.6	59835.4	1794	284.2	1162.6
2	1669.8	59635	1775.6	268	1175
3	1672	59702	1804.4	296.8	1177
4	1659.8	59453.4	1805.8	275.8	1186.8
avg	1668.8	59724.13	1791.333	283	1171.533
bkqd adjust	1634.15	59691.18	1755.383	246.85	1132.733

phen
total

mach.
effic.
adjust

% mass
bal

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

vial quench adjust	2239.09	60172.56	2116.829	281.1067	1132.733	63703.23	65942.32	69121.93	112.9384
0 ppm, test two empore									
vial B1	B1a	B2	B3	B4	B5				
wt, mg	6.9553	4.9817	4.2249	4.5757	4.2945				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	1594.8	11317.4	592.6	1621	456.2				
2	1598.8	11322.8	593	1608	446.4				
3	1601.8	11265.8	574.6	1582.6	455.8				
4	1595.8	11299.2	585	1587	448				
vial avg	1598.467	11302	586.7333	1603.867	452.8	elutant	phen	% mass	
bkgd adjust	1563.817	11269.05	550.7833	1567.717	414	total	adjust	bal	
vial quench adjust	2183.354	11359.93	666.8393	1763.345	414	14224.11	16407.47	17198.6	28.10082
0 ppm, test three empore									
vial C1	C1a	C2	C3	C4	C5				
wt, mg	7.1632	4.9634	4.2764	4.7416	4.4122				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	1567.2	45992	3136.8	607	349.2				
2	1555.2	46168	3181.4	603.8	351.8				
3	1534.4	46178.2	3137.8	586.8	346.8				
4	1573.8	45951	3164.4	603.4	334				
vial avg	1552.267	46112.73	3152	599.2	349.2667	elutant	phen	% mass	
bkgd adjust	1517.617	46079.78	3116.05	563.05	310.4667	total	adjust	bal	
vial quench adjust	2190.231	46451.39	3801.679	642.917	310.4667	51206.46	53396.69	55971.37	91.4517
TOC, HA	1	2	3	AVG	STD	95% CI	+95% CI	-95% CI	
0	3.834855	3.739397	3.751175	3.775142	0.052047	0.158252	3.933395	3.61689	

*Calculated based on amount of BAP that broke through the filter divided by the total amount of BAP added. Mass balance amounts not used.

Humic Acid TOC Test, 10/12/94
Ph=10 File: b5 4.77 ppm Suwannee River humic acid

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

Benzo[a]pyrene Data				Regression Output:			
Standard Run on TOC				Constant	-1.78826		
PPM	mv	avg		Std Err of Y Est	0.270715		
3	78.4861			R Squared	0.993297		
	74.6854			No. of Observations	5		
	77.6628			Degrees of Freedom	3		
		78.94477		X Coefficient(s)	0.058956		
4	104.799			Std Err of Coef.	0.002796		
	108.437						
	100.932						
		104.7227					
6	131.326						
	127.835						
	134.739						
		131.3					
8	168.031						
	165.7						
	160.711						
		164.814					
10	197.799						
	205.056						
	196.215						
		199.69					
Partitioning Test, 10/12/94 BENZO-A-PYRENE DATA							
4.77 ppm Suwannee River Humic Acid Ph=10 File: b5							
Empore @24 ml/min, 400mm Hg							
Tsle Values							
vial	1	2	3	A1a	B1a	C1a	
1	321	324	322	270	269	267	
2	322	323	322	267	267	267	
3	323	323	322	265	265	265	
4	322	323	322	264	263	262	

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

avg	322	323.25	322	266.5	266	265.25
log tsie Values						
vial	1	2	3	A1a	B1a	C1a
	1	2.506505	2.510545	2.507856	2.431364	2.429752
	2	2.507856	2.509203	2.507856	2.426511	2.426511
	3	2.509203	2.509203	2.507856	2.423246	2.423246
	4	2.507856	2.509203	2.507856	2.421604	2.419956
avg		2.507855	2.509538	2.507856	2.425681	2.424868
% quench		0.318213	0.266397	0.318181	0	0
Background Counts						
vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
	1	31	35	30.2	38.6	33.8
	2	36.8	35.4	31.2	34.2	35.8
	3	33.6	32.4	28.4	35.6	39.2
	4	28.2	30.6	38.2	32	36
avg		32.4	33.35	32	35.1	36.2
Total Phenanthrene						30.55
vial	1	2	3			
sample wt, ml		0.9916	0.9895	0.9911		
5 min count						
	1	6064.4	5397	5435.6		
	2	6019.4	5369	5387.2		
	3	6054.2	5441	5411.6		
	4	6014.4	5419.4	5400.2		
avg		6038.1	5406.6	5408.65	total	mach.
bkgd adjust		6005.7	5374.2	5376.25	avg	effic.
vial quench adjust		30122.54	26996.32	26979.03	28033.29	adjust
4.77 ppm, test one empore						29385.00
vial	A1	A1a	A2	A3	A4	A5
wt, mg	6.9356	5.0022	4.1241	4.4559	4.373	
5 min count						
	1	filter	ethyl ace	MeCl2	1:1	disk
		1035.8	25191.6	308	78.4	670.2

avg ml, 5 mil pipet
4.9577

	2	1047.4	25197.8	306	68.4	673.2			
	3	1065	25127	281.4	79	695			
	4	1055.4	25280.4	308.4	75.6	682.4			
avg		1049.4	25172.13	301.8	75.26667	679.4667	elutant total	phen total	% mass adjust
bkgd adjust		1016.05	25140.13	266.7	39.06667	648.9167	total		bal
vial quench adjust		1408.763	25368.45	321.125	44.55202	648.9167	26383.04	27791.81	29131.87
4.77 ppm, test two empore									99.13857
vial B1	B1a	B2	B3	B4	B5				
wt, mg	7.3704	5.0273	4.2322	4.6228	4.3597				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1		946.4	24354.2	625.8	89.6	505			
2		941.8	24329.8	635.2	99.4	493.8			
3		941	24438.8	621.2	89	501.2			
4		949.6	24339.2	624.2	91.2	513			
vial avg		943.0667	24374.27	627.4	92.66667	500	elutant total	phen total	% mass adjust
bkgd adjust		909.7167	24342.27	592.3	58.46667	469.45	total		bal
vial quench adjust		1333.713	24538.58	718.6627	64.36766	469.45	25791.06	27124.77	28432.67
4.77 ppm, test three empore									96.75912
vial C1	C1a	C2	C3	C4	C5				
wt, mg	7.1764	4.9929	4.1632	4.5148	4.3256				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1		976.6	23918.4	242.6	412	513.2			
2		964.6	23976.4	221.4	429.6	545.2			
3		982.4	24000.4	228.4	416	510			
4		970.6	23993.8	228.8	400.8	522.2			
vial avg		974.5333	23965.07	230.8	419.2	522.8	elutant total	phen total	% mass adjust
bkgd adjust		941.1833	23933.07	195.7	383	492.25	total		bal
vial quench adjust		1352.783	24150.42	236.2735	436.1133	492.25	25315.06	26667.84	27953.71
TOC, HA	1	2	3	AVG	STD	+STD	-STD		
4.77	5.025322	4.757604	4.825628						
adjust	1.299228	1.021006	1.091699	1.137311	0.14461	1.281922	0.992701		

	2	1047.4	25197.8	306	68.4	673.2	
	3	1065	25127	281.4	79	695	
	4	1055.4	25280.4	308.4	75.6	682.4	
avg		1049.4	25172.13	301.8	75.26667	679.4667	mach.
bkgd adjust		1016.05	25140.13	266.7	39.06667	648.9167	effic.
vial quench adjust		1408.763	25368.45	321.125	44.55202	648.9167	adjust bal
4.77 ppm, test two empore							% mass
	B1	B1a	B2	B3	B4	B5	
vial	7.3704	5.0273	4.2322	4.6228	4.3597		
wt, mg							
5 min count		filter	ethyl ace	MeCl2	1:1	disk	
1		946.4	24354.2	625.8	89.6	505	
2		941.8	24329.8	635.2	99.4	493.8	
3		941	24438.8	621.2	89	501.2	
4		949.6	24339.2	624.2	91.2	513	
vial avg		943.0667	24374.27	627.4	92.66667	500	mach.
bkgd adjust		909.7167	24342.27	592.3	58.46667	469.45	effic.
vial quench adjust		1333.713	24538.58	718.6627	64.36766	469.45	adjust bal
4.77 ppm, test three empore							% mass
	C1	C1a	C2	C3	C4	C5	
vial	7.1764	4.9929	4.1632	4.5148	4.3256		
wt, mg							
5 min count		filter	ethyl ace	MeCl2	1:1	disk	
1		976.6	23918.4	242.6	412	513.2	
2		984.6	23976.4	221.4	429.6	545.2	
3		982.4	24000.4	228.4	416	510	
4		970.6	23993.8	228.8	400.8	522.2	
vial avg		974.5333	23965.07	230.8	419.2	522.8	mach.
bkgd adjust		941.1833	23933.07	195.7	383	492.25	effic.
vial quench adjust		1352.783	24150.42	236.2735	436.1133	492.25	adjust bal
TOC, HA	1	2	3	AVG	STD	+STD	-STD
4.77	5.025322	4.757604	4.825628				
adjust	1.299228	1.021006	1.091699	1.137311	0.14461	1.281922	0.992701

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+STD	-STD
4.77	2759.602	2162.554	2313.939	2412.032	310.3759	2722.408	2101.658
TOC, HA				AVG		+STD	-STD
4.77			log Kp	3.382383		3.434953	3.322562
Humic Acid Test, 11/10/94							
5.19 ppm Suwannee River humic acid							
Standard Run on TOC							
PPM	mv	avg	Regression Output:				
3	36.2603		Constant			-0.75007	
	40.7038		Std Err of Y Est			0.172703	
	38.2336		R Squared			0.999521	
		38.39923	No. of Observations			5	
6	81.2513		Degrees of Freedom			3	
	71.4388		X Coefficient(s)		0.092571		
	67.662		Std Err of Coef.		0.00117		
	77.434	74.44653					
10	118.097		Sample				
	116.498		HA soln				
	117.364		MV				
		117.3197	PPM				
15	171.16						
	172.81						
	168.566						
		170.8453					
20	224.628						
	223.95						
	219.934						
		222.8373					

Partitioning Test, 11/10/94 BENZO-A-PYRENE DATA

TABLE B11 - DATA FOR FIG				
avg adjust	10881.05	10389.8	10847.2	avg adjust
vial quench adjust	54155.59	52130.63	54374.81	53553.68
5.19 ppm, test one empore				56135.93

	A1	A1a	A2	A3	A4	A5
vol						
wt, mg	7.3612	4.9394	4.1571	4.3777	4.3913	

5 min count	filter	ethyl ace	MeCl ₂	1:1	disk	
1	1996.8	35714.2	301.4	160.8	1711	
2	2043.6	35647.2	304	149	1735.6	
3	2007.4	35557.8	304.4	154.4	1725.6	
4	2054.2	35634.4	300.4	157.6	1746	mach.
avg	2015.933	35639.73	303.2867	154.7333	1724.067	effic.
bkgd adjust	1980.783	35608.53	285.9167	119.0833	1690.517	phen total
vial quench adjust	2951.966	35931.92	319.0392	135.8837	1690.517	adjust bal
5.19 ppm, test two empore					38077.36	43007.68
						76.61346

vial	B1	B1a	B2	B3	B4	B5
wt, mg	7.276	4.9761	4.2742	4.7147	4.4227	

5 min count	filter	ethyl ace	MeCl2	1:1	disk			
1	2085.6	35384.6	481	102.2	1208.6			
2	2113.8	35535.6	483.4	92	1198.8			
3	2118.4	35453.2	481.4	93	1199.8			
4	2134.4	35302.4	491.6	93.4	1228.4			
vial avg	2105.933	35451.13	481.9333	95.73333	1201.733	elutant	phen	
bkgd adjust	2070.783	35419.93	444.5833	60.08333	1168.183	total	total	
vial quench adjust	3027.877	35705.58	541.7294	68.62915	1168.183	37484.12	40512	42465.41
5.19 ppm, test three empore								75.64746

	C1	C1a	C2	C3	C4	C5
vial						
wt, mg	7.472	5.0089	4.2899	4.5403	4.3389	

5 min count	filter			elution		disk
	2034.4	ethl ace	MeCl2	1:1		
1	38145.8		374	144.6	1270	
2	38188.8		359.8	145.4	1293.8	
3	35957.6		356.4	143.2	1280.2	

4

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

vial avg	2009.4	36217.2	349.8	134.2	1253.2				
bkgd adjust	2029.4	36090.73	363.4	144.4	1274.667	elutant	phen		
	1994.25	36059.53	326.05	108.75	1241.117	total	total		
vial quench adjust	2974.912	36387.02	394.1098	123.8839	1241.117	38146.13	41121.04	43103.81	76.78471
TOC, HA	% BOUND								

	1	2	3	AVG	STD
5.19	5.512163	5.653911	5.555008		
adjust	1.805169	1.952478	1.849896	1.869114	0.07555

TOC, HA	Kp1	Kp2	Kp3	AVG	STD
5.19	3542.109	3836.914	3631.128	3670.05	151.2077

TOC, HA		log Kp	AVG
5.19		3.584672	

Humic Acid TOC Test, 11/14/94

9.59 ppm Suwannee River humic acid File: b9

Standard Run on TOC

PPM	mv	avg			
3	70.2092				
	68.5197				
	66.4621				
6		68.397			
	119.802				
	116.556				
	120.323				
10		118.827			
	193.807				
	191.981				
	191.71				
15		192.4993			
	289.984				
	287.431				

Regression Output:

Constant	-0.63657
Std Err of Y Est	0.146976
R Squared	0.999653
No. of Observations	5
Degrees of Freedom	3
X Coefficient(s)	0.054798
Std Err of Coef.	0.000589

	Value	AVG	STD
	182.78	189.349	187.806
	186.645	3.43495	
	9.379466	9.739437	9.654883
	9.591262	0.18823	

	Sample	MV	PPM
	HA soln		

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED									
287.386	288.267	373.403	377.413	375.757	375.5243				
20									
Partitioning Test, 11/14/94 BENZO-A-PYRENE DATA									
9.59 ppm Suwannee River Humic Acid File: b9									
Empore @24 ml/min, 400mm Hg									
Tsie values									
vial	1	2	3	A1a	B1a	C1a			
1	313	311	316	254	253	252			
2	313	312	313	248	248	248			
3	316	313	314	249	247	247			
4	315	314	313	248	245	248			
avg	314.25	312.5	314	249.75	248.25	248.25			
Log tsie values						Suwannee River Humic Acid			
vial	1	2	3	A1a	B1a	C1a			
1	2.495544	2.49276	2.498887	2.404834	2.403121	2.401401			
2	2.495544	2.494155	2.495544	2.394452	2.394452	2.394452			
3	2.498687	2.495544	2.49893	2.396199	2.392697	2.392697			
4	2.498311	2.49893	2.495544	2.394452	2.389166	2.390935			
avg	2.497272	2.494847	2.498926	2.397484	2.394859	2.394871			
% quench	0.643986	0.718612	0.654613	0	0	0			
Background Counts									
vial	Tot Ad	A1a	A2	A3	A4	A5			
5 min count									
1	33	37.2	36.8	31.4	35.6	32.2			
2	38.4	39	29.6	34.2	31.4	34.4			
3	35.2	33.8	32	40	34.6	31			
4	28.4	40	34.6	33.8	33.6	31			
avg	33.75	37.5	33.25	34.85	33.8	32.15			
Total Phenanthrene						5 ml			

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

vial	3	T2	T3	
wt, ml	0.9884	1	1	
5 min count				
1	9683.8	9765	9820.2	
2	9683.8	9821.6	9812	
3	9723.2	9766.8	9840.8	
4	9752.6	9861.2	9805.4	
avg	9710.85	9803.65	9819.6	total
bkgd adjust	9677.1	9769.9	9785.85	avg
vial quench adjust	48853.83	48786.82	48834.99	48825.21
9.59 ppm, test one empore				51179.47
vial A1	A1a	A2	A3	A4 A5
wt, mg	7.3731	4.9726	4.2529	4.6248 4.4253
5 min count	filter	ethyl ace	MeCl2	1:1 disk
1	3002	41378.6	447.4	95.6 499.2
2	2913.8	41383.2	454.8	94.6 486
3	2908.4	41491.8	447	90.4 476.2
4	2899.4	41544.4	461.8	91 473.6
avg	2941.4	41417.87	449.7333	93.53333 487.1333
bkgd adjust	2903.9	41384.62	414.8833	59.73333 454.9833
vial quench adjust	4305.744	41718.36	503.442	68.23507 454.9833
9.59 ppm, test two empore				42745.02 47050.77 49319.46 96.36572
vial B1	B1a	B2	B3	B4 B5
wt, mg	7.3315	4.9687	4.2363	4.3432 4.3304
5 min count	filter	ethyl ace	MeCl2	1:1 disk
1	2914.2	37889	487.4	174.6 1734
2	2925	37800.8	495.2	189.2 1753.4
3	2915.2	37922.4	484.4	180 1753
4	2975.6	38095.4	503.8	174 1724.2
vial avg	2918.133	37870.73	489	181.2867 1746.8
bkgd adjust	2880.633	37837.48	454.15	147.4667 1714.65
vial quench adjust	4250.481	38142.62	544.0197	167.9427 1714.65 40569.24 44819.72 46980.84 91.79826

avg ml, 5 mill pipet
4.9577

mach.

efffic.

adjust

bal

% mass

phen

total

elutant

total

42745.02

47050.77

49319.46

96.36572

mach.

efffic.

adjust

bal

% mass

phen

total

elutant

total

44819.72

46980.84

91.79826

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

TABLE B11 - DATA FOR FIGURE 3-1, CONTINUED											
9.59 ppm, test three empore											
vial	C1	C1a	C2	C3	C4	C5					
wt, mg	7.3132	4.9991	4.1939	4.5808	4.2881						
5 min count	filter	ethyl ace	MeCl2	1:1	disk						
1	3173.8	39765.4	615.2	82.8	633.8						
2	3158.2	39872.8	599.4	81.4	638.8						
3	3136.4	39796.6	597.8	73	659.4						
4	3196.4	39917.6	600	78.4	631.8						
vial avg	3158.133	39811.6	604.1333	79.08667	644	elutant	phen				
bkgd adjust	3118.633	39778.35	589.2833	45.28667	611.85	total	total				
vial quench adjust	4562.259	40139.61	689.393	51.48222	611.85	41492.33	46054.59	48275.25	94.32543		
TOC, HA	1	2	3	AVG	STD						
9.59	8.818691	8.705504	9.344064								
adjust	5.24142	5.123792	5.787405	5.384206	0.354099						
TOC, HA	Kp1	Kp2	Kp3	AVG	STD						
9.59	5767.821	5631.39	6405.548	5934.92	413.2452						
TOC, HA	log Kp			AVG							
9.59	3.773415										
Humic Acid TOC Test, 11/22/94											
21.2 ppm Suwannee River humic acid File: b21											
Standard Run on TOC											
PPM	mv	avg									
10	95.8447										
	91.5108										
	91.9361										
		93.0972									
20	182.475										
	183.241										
Regression Output:											
		Constant	-0.91207								
		Std Err of Y Est	0.985519								
		R Squared	0.997203								
		No. of Observations	5								
		Degrees of Freedom	3								

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

184.815		183.5103		X Coefficient(s)		Std Err of Coef.	
30	279.485					0.1128	
	281.616					0.003449	
	284.02						
Sample		Value		AVG		STD	
	HA soln						
	281.707						
	MV	198.286	193.133	195.67	195.6997	2.581628	
	PPM	21.45577	20.87338	21.15956	21.16291	0.291208	
40	371.212						
	empore						
	369.067						
	369.865						
	370.048						
50	439.826						
	442.699						
	443.025						
	441.85						

Partitioning Test, 11/22/84 BENZO-A-PYRENE DATA

21.2 ppm Suwannee River Humic Acid File: b21

Empore @24 ml/min, 400mm Hg

Tsle values

vial	1	2	3	A1a	B1a	C1a
1	309	305	306	232	233	234
2	309	306	307	232	233	233
3	306	308	306	229	230	232
4	308	307	306	227	228	229
avg	308.25	306.5	306.25	230	231	232

Log tsle values Suwannee River Humic Acid

vial	1	2	3	A1a	B1a	C1a
1	2.489958	2.4843	2.485721	2.365488	2.367356	2.369216
2	2.489958	2.485721	2.487136	2.365488	2.367356	2.367356
3	2.485721	2.488551	2.485721	2.359835	2.361728	2.365488
4	2.489958	2.487136	2.485721	2.356026	2.357935	2.359835
avg	2.488899	2.486428	2.486076	2.361709	2.363594	2.365474

% quench 0.901704

Background Counts

0.977786	0.988619	4.816863	4.758861	4.700985

vial	Tot Act	A1a
5 min count		

Total Phenanthrene										A5			
vial	1	2	3										
sample wt, ml	0.992	0.9892	0.9892										
5 min count													
1	39.6	36.4	35.6	37	40.2	36.6							
2	31.8	39.4	33.4	33.6	32	32.2							
3	31	38	34.6	31.8	37.2	33.8							
4	32.8	33	39	39.4	32.6	31.2							
avg	33.8	36.7	35.65	35.45	35.5	33.45							
Total Phenanthrene													
sample wt, ml	0.992	0.9892	0.9892										
5 min count													
1	9876.4	10001.6	10130										
2	9913.8	9982.8	10085										
3	9902.8	9955.6	10065.2										
4	9869.2	9957	9982.8										
avg	9890.55	9974.25	10065.75	total									
bkgd adjust	9856.75	9940.45	10031.95	avg									
vial quench adjust	49709.13	50311.76	50780.43	50267.11	52690.89								
21.2 ppm, test one empore													
vial	A1	A1a	A2	A3	A4	A5							
wt, mg	6.8949	4.9935	4.152	4.6232	4.2806								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.93333	678.3333	elutant	phen						
vial quench adjust	5866.367	37350.35	278.2167	29.43333	644.8833	total	total						
21.2 ppm, test two empore													
vial	B1	B1a	B2	B3	B4	B5							
wt, mg	7.4382	5.0053	4.211	4.4237	4.3851								
5 min count													
1	filter	ethyl ace	MeCl2	1:1	disk								
2	5915.2	37535.8	321	71	697.8								
3	5903.8	37370	307	64.2	657.2								
4	5890.2	37252.2	313	59.6	680								
avg	5835.4	37483.4	311.8	60.8	692								
bkgd adjust	5903.067	37386	313.6667	64.									

TABLE B11 - DATA FOR FIGURE 3-1, CONTINUED

5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	5507.6	38545.2	238.2		68.4	676.8			
2	5536.2	38481.4	250.8		72	667			
3	5472	38507.6	233.6		66.2	671.4			
4	5516.6	38467.2	234		79.6	686.6			
vial avg	5505.267	38511.4	240.8667		68.86667	671.7333	elutant	phen	
bkqgd adjust	5468.567	38475.75	205.4167		33.36867	638.2833	total	total	% mass
vial quench adjust	8532.704	38825.18	246.9715		38.06847	638.2833	39748.5	48281.2	50609.23
21.2 ppm, test three empore									96.04929
vial	C1	C2	C3	C4	C5				
wt, mg	7.328	4.9793	4.2547	4.5246	4.3186				

5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	5458.8	37461.6	543.8	185	1240.6				
2	5358.8	37287.6	570.4	181.4	1231.4				
3	5430.8	37383	551.6	178.8	1218				
4	5350	37496.8	550	179.8	1231.2				
vial avg	5416.133	37377.4	555.2667	181.7333	1230	elutant	phen		
bkgd adjust	5379.433	37341.75	519.8167	146.2333	1196.55	total	total		
vial quench adjust	8307.403	37642.89	627.8701	166.4752	1196.55	39633.79	47941.19	50252.82	95.37289
TOC, HA	% BOUND								
	1	2	3	AVG	STD				
21.2	16.92968	16.97473	16.52652						
adjust	13.6706	13.71744	13.25165	13.54656	0.258476				

TOC, HA	Kp1	Kp2	Kp3	AVG	STD
21.2	7469.526	7499.185	7205.643	7391.451	161.597

TOC, HA	AVG
21.2	3.86873

Humic Acid TOC Test, 11/30/84
152.7 ppm Suwannee River Humic Acid File: b153
Standard Run on TOC

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

PPM	mv	avg	Regression Output:			
100	203.642		Constant	-9.17283		
	200.619		Std Err of Y Est	1.647012		
	201.93		R Squared	0.998698		
		202.0637	No. of Observations	5		
125	252.167		Degrees of Freedom	3		
	250.325					
	254.746					
		252.4127				
150	291.326					
	292.959					
	293.959					
		Sample				
		HA soln				
		292.748				
175	345.63					
	343.637	empore				
	346.166	sep-pak				
		345.1443				
200	389.63					
	388.244					
	385.787					
		387.887				

Partitioning Test, 11/30/94 BENZO-A-PYRENE DATA
152.7 ppm Suwannee River Humic Acid File: b153
Empore @24 ml/min, 400mm Hg

Tsie values							
vial	1	2	3	A1a	B1a	C1a	
1	248	250	251	107	113	109	
2	250	253	251	107	111	109	
3	251	251	253	108	113	108	
4	250	251	250	108	112	108	
avg	249.75	251.25	251.25	107.5	112.25	108.5	
Log tsie values							

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

		Suwanee River Humic Acid			
vial	1	2	3	A1a	B1a C1a
1	2.394452	2.39794	2.399674	2.029384	2.053078 2.037426
2	2.39794	2.403121	2.399674	2.029384	2.045323 2.037426
3	2.399674	2.399674	2.403121	2.033424	2.053078 2.033424
4	2.39794	2.399674	2.39794	2.033424	2.049218 2.033424
avg	2.397501	2.400102	2.400102	2.031404	2.050174 2.035425
% quench	3.715113	3.63506	3.63506	17.97685	16.90923 17.74813
Background Counts					
vial	Tot Act	A1a	A2	A3	A4 A5
5 min count					
1	32.2	36.6	37.4	38.2	32.8 32.4
2	36.4	33.2	34.2	35.4	39.6 32.4
3	29.2	33.2	40.2	38.8	35.6 35
4	33	34.6	38.2	41.2	36.6 34.4
avg	32.7	34.4	37.5	38.4	36.15 33.55
Total Phenanthrene					
vial	1	2	3		
wt, ml	0.9984	0.9856	0.993		
5 min count					
1	10530.2	10238.2	10391.4		
2	10482	10248.4	10428.4		
3	10536	10248	10362.4		
4	10510	10188.4	10514.4		
avg	10514.55	10230.75	10424.15	total	
bkgd adjust	10481.85	10198.05	10391.45	avg	
vial quench adjust	54057.44	53232.59	53837.90	53709.31	56299.07
152.7 ppm, test one empore					
vial	A1	A2	A3	A4	A5
wt, mg	6.9852	4.9891	4.1329	6.7191	6.3662
elution					
5 min count	filter	ethyl ace	1:1	1:1	disk
1	16429.4	24695.4	153	157.4	410.6
2	16423.6	24717.4	169.8	166.2	399.6
3	16526.6	24641.6	158	151	404

avg ml, 5 ml pipet
4.9577

TABLE B11 - DATA FOR FIGURE 3-1. CONTINUED

152.7 6634.987 6289.581 6000.018 6301.529 318.6878

TOC, HA

152.7

AVG

log Kp 3.799446

TABLE B12 - DATA FOR FIGURE 3-2, CONTINUED

Humic Acid TOC Test, 105/84			
9.0 ppm Aldrich humic acid			
Standard Run on TOC			
PPM	mv	avg	pH=10 File: ps9
6	82.0036		
	78.4976		
	77.1696		
	85.4392		
	80.7775		
7.5	88.3929		
	83.7133		
	87.5114		
	89.87253		
10	109.016		
	111.708		
	111.741		
	110.8217		
15	149.323		
	153.36		
	147.741		
	150.138		
20	200.147		
	191.655		
	195.753		
	195.8517		
PHENANTHRENE DATA			
Partitioning Test, 105/84			
9.0 ppm Aldrich humic acid			
Empore Disk Technique			
Background Counts			
vial	Tot Act	A1a	A2 A3 A4 A5
5 min count			
1	33.4	38.4	35.2 39 34.2 35.8
2	34	35.2	30.4 31.2 37.8 35.8
3	34.4	32.8	29 38.2 33.2 37.2
4	34	34	31.8 35.2 33.6 33.4
avg	33.95	34.6	31.6 35.9 34.7 35.55
Total Phenanthrene			
vial	1	2	3
sample wt, ml	0.996	0.9962	0.9916
5 min count			

avg ml, 5 ml pipet

AVG STD
103.8114 3.70437
9.074837 0.448531

Regression Output:
Constant -3.49482
Std Err of Y Est 0.287586
R Squared 0.998132
No. of Observations 5
Degrees of Freedom 3

X Coefficient(s) 0.121082
Std Err of Coef. 0.003024

Value
101.859 105.296 108.231 99.8594
8.638443 9.254601 9.609976 8.596328

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

vial	Tot Act	A1a	A2	A3	A4	
5 min count						
1	34.2	28.8	44.6	36.2	56.2	
2	34.6	30.8	34.4	39.6	31	
3	34	31.6	35	37.4	39.8	
4	33.4	32	31.8	34.8	31.8	
avg	34.05	30.8	36.45	37	39.7	
Total Phenanthrene						
vial		1	2	3		
sample wt, ml		4.9582	4.9589	4.9417		
5 min count						
1	75592.1	75994.7	75712.1			
2	75726.9	76152.7	75835.9			
3	75702.7	75983.5	76244.1			
4	75777.7	76112.3	76004.5			
avg	75699.85	76060.8	75949.15	total		
bkld adjust	75665.8	76026.75	75915.1	avg		
vial quench adjust	85110.51	85516.52	85390.93	85339.32	89454.22	
27.4 ppm, test one empore						
vial		A1a	A2	A3	A4	A5
wt, mg	6.5439	5.0076	4.4023	4.4456	4.3141	
5 min count						
1	2131.4	7335.5	810.8	97.4	1316.6	
2	2138.6	73203.7	824	99.8	1348.6	
3	2152.6	73275.3	813.6	96.2	1282	
4	2123.8	73305.5	797	92.2	1322.2	
avg	2140.667	73271.5	816.1333	97.8	1315.733	
bkld adjust	2110.067	73235.05	779.1333	58.1	1281.683	
vial quench adjust	3010.521	73751.31	937.6873	66.13275	1281.683	
27.4 ppm, test two empore						
vial		B1a	B2	B3	B4	B5
wt, mg	7.2272	4.982	4.2042	4.6453	4.3208	
5 min count						
1	1839	72286.5	269.2	66.6	4277.4	
2	1920.6	72347.1	261.2	61.8	4264.4	
3	1953	72555.9	279.2	70.2	4203	
4	1878	72507.7	263.2	65.6	4287.8	
avg	1870.867	72396.5	269.8667	66.2	4248.267	
bkld adjust	1840.067	72360.05	232.8667	26.5	4214.217	
vial quench adjust	2883.466	72980.38	282.8407	30.1703	4214.217	
				77507.61	80391.08	
				84267.38	94.20168	

avg ml, 5 ml pipet
4.9577
avg ml, 5 ml syringe
5.0189
tot avg activity, syringe
86392.79

mech.
effic.
adjust
% mass
total
bal
82858.84
92.62709

mech.
effic.
adjust
% mass
total
bal
84267.38
94.20168

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

155.857	156.2753										
80	181.905										
	177.139										
	178.171										
	179.0717										
PHENANTHRENE DATA											
Partitioning Test, 10/7/94											
58.7 ppm Aldrich humic acid											
Empore @24 ml/min, 400mm Hg											
Background Counts											
vial	Tot Act	A1a	A2	A3	A4	A5	File: pa58				
5 min count											
1	31.2	32	36	37.4	36.6	34					
2	30.2	34.6	35.2	31.6	37.8	34.2					
3	37.6	29.8	31.2	40	32.2	29					
4	30.2	36.8	32.6	36.6	35.4	29.2					
avg	32.3	33.25	33.75	36.4	35.5	31.6					
Total Phenanthrene											
vial	1	2	3								
sample wt, ml	0.9833	0.9963	0.992								
5 min count											
1	16048.4	16181.8	16198.6								
2	16179	16134.8	16300.8								
3	16155.2	16272.6	16289.8								
4	16089.6	16183.8	16351.4	mach.							
avg	16118.05	16193.25	16285.15	efflic.							
bkgd adjust	16085.75	16160.95	16252.85	adjust							
vial quench adjust	83148.85	83286.02	84122.71	87546.33							
58.7 ppm, test one empore											
vial	A1	A2	A3	A4	A5						
wt, mg	6.7087	4.9778	4.2889	4.5582	4.3643						
5 min count											
1	filler	ethyl ace	elution	MeCl2	1:1	diak					
2	2456.6	72440.1	1037	104.6	2944.2						
3	2483.2	72316.7	1063.8	106.2	2947.6						
4	2460.6	72337.5	1069.8	114	3012						
avg	2468.8	72364.77	1056.867	108.2867	2957.8	mach.					
bkgd adjust	2433.55	72331.02	1020.467	72.76867	2936.333	phen					
vial quench adjust	3978.763	72914.33	1234.552	82.98066	2936.333	total					
58.7 ppm, test two empore											
avg ml, 5 ml pipet											
4.9577											
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avg ml, 5 ml pipet
4.9577mach.
effic.
adjust
avg
87546.33mach.
effic.
adjust
phen
total
81146.94
85059.69
97.15963

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

viai	B1	B1a	B2	B3	B4	B5
wt, mg	7.4342	4.9496	4.2586	4.6738	4.401	
5 min count						
1	filter	ethl ace	MeC12	1:1	disk	
2	2259.6	73678.9	738.8	139	3230.6	
3	2226.2	73724.7	752.2	142.6	3227	
4	2274.2	73615.3	707	144.4	3229.6	
	2286.6	73659.9	730	138.4	3267.2	
viai avg	2253.333	73673.3	732.6667	142	3229.067	elutant
bkgd adjust	2220.083	73639.55	696.2667	106.5	3197.467	total
viai quench adjust	3962.78	74233.42	846.8029	121.563	3197.467	total
58.7 ppm, test three emprore						
viai C1	C1a	C2	C3	C4	C5	
wt, mg	7.3619	4.9983	4.199	4.5017	4.2589	
5 min count						
1	filter	ethl ace	MeC12	1:1	disk	
2	2398.6	71698.1	3052.8	76.8	1926.4	
3	2383.6	71466.3	3022.6	81.6	1959.8	
4	2448	71673.5	3064.4	81.8	1954.8	
	2428.4	71643.9	3049.8	77	1936.2	
viai avg	2410.067	71612.63	3046.6	80.0667	1947	elutant
bkgd adjust	2376.817	71578.88	3010.2	44.5667	1915.4	total
viai quench adjust	4168.062	72156.13	3632.104	50.63875	1915.4	total
TOC, HA	% BOUND					
1	2	3	AVG	STD	+STD	-STD
58.7	4.903158	4.811416	5.067821	4.934132	0.140782	5.074914
bt adjust	4.787558	4.686816	4.972221			
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+STD
58.7	878.3583	861.0928	913.2124	884.2212	26.54982	910.771
						857.6714
TOC, HA				AVG	+STD	-STD
58.7				2.946561	2.959409	2.933321
Humic Acid TOC Test						
Standard Run on TOC						
PPM	mv	avg				
50	62.4703					
	55.7261					
	55.8711					
	54.4515	57.12975				
Regression Output:						
Constant						-3.57643
Std Err of Y Est						1.455474
R Squared						0.99955
No. of Observations						5

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

80	87.0594	Degrees of Freedom										3
84.8143		X Coefficient(s)										1.037053
87.2135	86.3624	Std Err of Coef.										0.012705
100	109.024											
	106.812											
	108.479	108.105	Value								AVG	STD
150	157.891		HA soln	MV	67.402	59.0724	59.0141	65.2699	62.6896	4.299539		
158.684			PPM	66.32304	57.6848	57.62434	64.11194	61.43603	4.458851			
154.95	158.5017		empore	18034	18718	18891	18984	18722	18255	18600.67		
200	208.676		sep-pac	27850	28832	28097	28869	27412	28424.13			
	206.92											
	204.56	208.7187										
PHENANTHRENE DATA												
Partitioning Test, 9/20/84												
61.4 ppm Aldrich humic acid File: pe61												
Empore @ 24 ml/min, 400mm Hg												
Total Phenanthrene												
5 ml												
vial	1	1a	1b	1c	2	2a	2b	2c	3	3a	3b	3c
wt, ml	4.9628	0.9854	0.9902	0.9904	4.9651	0.9851	0.9861	0.983	4.9621	0.9855	0.9823	0.9878
5 min count												
1	15128.6	15474	15458.6	15553	15483.6	15550.6	15512.6	15510	15613			
2	15174.7	15432.5	15362.5	15515.1	15537.5	15596.3	15603.7	15473.7	15611.9			
3	15130	15438.6	15467.6	15528.6	15518	15519.4	15558.8	15563.4	15594.6			
4	15144.43	15448.37	15429.57	15532.23	15513.03	15555.43	15558.37	15515.7	15606.5			
avg	15125.44	15429.38	15410.58	15513.24	15494.04	15536.44	15539.38	15496.71	15587.51			
bkgd adjust	79019.23	80216.31	80102.39	79779.31	81110.72	80928.18	80874.89	81165.31	81206.14			
vial quench adjust	61.4 ppm, test one empore						avg ml, 5 ml pipet					
vial	A1	A1a	A1b	A1c	A2	A3	A4	A5				
wt, mg	7.4498	0.9919	0.993	0.998								
5 min count												
1	filter	filter	filter	filter	ethl ace	MeCl2	1:1	disk	tot avg activity, syringe			
2	800.8	810.6	804.8	56004.6	10285.2	420.8	3324.4	81613.09				
3	763.1	799.5	774.9	55848.5	10286.3	377.3	3294.9					
4	770.2	799.6	777.2	55825.2	10225.2	375.6	3335					
avg	767.4	777.8	771.6	55928.1	10258.9	391.2333	3318.1	elutant	phen			
bkgd adjust	778.0333	803.2333	785.6333	55914.1	10234.1	368.3083	3300.085	total	total			
vial quench adjust	5848.376	6035.598	5870.754	5918.242	56421.9	13120.64	426.7767	3300.085	73269.4	79187.64	83005.91	98.22587
61.4 ppm, test two empore												
vial	B1	B1a	B1b	B1c	B2	B3	B4	B5				
wt, mg	7.1221	0.9942	0.9944	0.9943								

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

5 min count	filter	filter	filter	ethl ace	MeCl2	1:1	disk
1	960.8	943.4	1065.8	68921.7	1743.4	139.8	1629.8
2	939.3	895.3	905.7	68748.8	1728.9	118.9	1629.3
3	932.8	923	928.8	68964.3	1726.8	110	1610
4	940.8	931.2	909 total		1717.4	107.6	1635.4
vial avg	944.3	920.5667	966.7667 filter	68878.27	1733.367	122.9	1623.033
bkgd adjust	928.285	902.5517	948.7517 avg	68866.27	1709.542	99.975	1605.018
vial quench adjust	6806.194	6630.472	6802.413	68491.69	2191.72	115.8459	1605.018
61.4 ppm, test three empores							
vial C1	C1a	C1b	C1c	C2	C3	C4	C5
wt, mg	7.3469	0.9935	0.9931				
5 min count	filter	filter	filter	ethl ace	elution	MeCl2	1:1
1	953.4	928.2	943.8	73624.3	999.2	135.8	45
2	908.1	901.7	913.3	73557.8	959.7	113.3	16.1
3	927	924.6	938.8	73344.1	969.8	119.2	21
4	920.4	919	923.4 total		966.8	102	23.2
vial avg	928.8333	918.1667	931.9667 filter	73508.73	976.2333	122.7667	27.36667
bkgd adjust	910.8183	900.1517	913.9517 avg	73496.73	952.4083	99.84167	14.12667
vial quench adjust	6903.222	6825.126	6926.273	6984.874	74164.21	1221.036	115.6914
% BOUND	1	2	3	AVG	STD	+STD	-STD
TOC, HA	61.4	7.473694	8.481105	8.355436	8.103412	0.548959	8.652371
bt adjust	7.358084	8.365505	8.239836				
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+STD	-STD
61.4	1315.533	1509.292	1484.889	1436.571	105.5301	1542.101	1331.041
TOC, HA	log Kp			AVG		+STD	-STD
61.4				3.157327		3.188113	3.124192
Humic Acid TOC Test, 10/8/94							
63.5 ppm Alkatch humic acid							
Standard Run on TOC							
PPM	inv	avg					
40	107.306						
	96.7111						
	107.859						
	106.039						
	104.4788						
50	123.849						
Regression Output:							
Constant							-13.3224
Std Err of Y Est							1.816231
R Squared							0.990104
No. of Observations							5
Degrees of Freedom							3

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

Humic Acid TOC Test									
112.8 ppm Aldrich humic acid									
Standard Run on TOC									
PPM	mv	avg	Regression Output:						
50	62.4703		Constant	-7.33061					
	56.7261		Std Err of Y Est	0.783182					
	55.8711		R Squared	0.99987					
	54.4515	57.12975	No. of Observations	5					
			Degrees of Freedom	3					
80	87.0594		X Coefficient(s)	1.002986					
	84.8143		Std Err of Coef.	0.006611					
100	87.2135	86.3624							
	109.024								
	106.812								
	108.479	108.105	Value	AVG	STD				
150	157.891	HA soln	MV						
	156.684		PPM						
	154.95	156.5017							
200	208.676								
	206.92								
	204.56	206.7187							

Partitioning Test, 9/22/94									
112.8 ppm Aldrich humic acid									
Empore @24 ml/min, 400mm Hg									
Total Phenanthrene									
vial	1	1a	1b	1c	2	2a	2b	2c	3
sample wt,	4.972	0.9668	0.9664	0.8328	4.9589	0.9685	0.9696	0.9636	4.9536
5 min count									
1	17311.8	17339.8	14685.8		17456.8	17528.8	17422.2		17298.6
2	17263.9	17322.3	14687.9		17523.5	17518.1	17490.1		17358.9
3	17254.1	17243.3	14678.3		17573.3	17548.7	17493.5		17391.9
4	17252.3	17287.7	14801.3		17436.7	17531.1	17541.7		17406.7
avg	17270.53	17298.28	14713.33	total	17497.58	17531.68	17486.88	total	17364.03
blgd adjust	17258.46	17286.21	14701.26	avg	17486.51	17519.61	17474.81	avg	17351.96
vial quench adjust	93117.27	93304.82	93987.74	93469.94	93931.92	94010.49	93675.43	93872.62	93265.83
112.8 ppm, test one empore									
vial A1	A1a	A1b	A1c	A2	A3	A4	A5		
wt, mg	7.1919	0.9697	0.9697	0.9934					
5 min count									
	filter	filter	filter	filter	ethl ace	MeCl2	1:1	disk	

File: pa112									
3a	3b	3c	3a	3b	3c	3a	3b	3c	3a
0.9875	0.9875	0.9887	0.9875	0.9875	0.9887	0.9875	0.9875	0.9887	0.9875
17309	17309	17479.8	17309	17309	17479.8	17309	17309	17479.8	17309
17348.3	17348.3	17413.1	17348.3	17348.3	17413.1	17348.3	17348.3	17413.1	17348.3
17230.5	17230.5	17230.5	17230.5	17230.5	17230.5	17230.5	17230.5	17230.5	17230.5
17317.9	17317.9	17260.5	17317.9	17317.9	17260.5	17317.9	17317.9	17260.5	17317.9
17362.13	17362.13	17345.98	17362.13	17362.13	17345.98	17362.13	17362.13	17345.98	17362.13
17350.06	17350.06	17333.91	17350.06	17350.06	17333.91	17350.06	17350.06	17333.91	17350.

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

Humic Acid TOC Test, 9/27/94		File: pa133	
Standard Run on TOC			
PPM	mv	avg	
50	65.2878		
	59.322		
	54.4518		
	59.233		
80	85.7576		
	86.2259		
	85.4769		
100	108.887		
	105.11		
	102.045		
150	154.936		
	150.388		
	147.237		
200	200.893		
	197.157		
	195.98		
			198.01
Partitioning Test, 10/4/94		PHENANTHRENE DATA	
133.4 ppm Aldrich humic acid		pH=10 9/27/94 Run	
Empore @24 ml/min, 400mm Hg		File: pa133	
Background Counts			
vial	Tot Act	A1a	A2 A3 A4
5 min count			
1	29	35.8	36.8 40.6 40.4
2	30.8	34.8	38.8 39.2 38.2
3	31.2	33.2	38 36.2 36.6
4	30.6	33.4	37.4 38.4 39.2
avg	30.4	34.3	37.75 38.35 38.6
Total Phenanthrene		5 ml	
vial		2	3
sample wt, ml		4.9544	4.953 4.9478
5 min count			
1		42858.8	43698.8 43631.2
			avg ml, 5 ml pipet 4.9577

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

TOC, HA	1	% BOUND	2	3	AVG	STD	+STD	-STD
133.4	9.664698	9.668387	9.487382	9.806823	9.806823	0.103455	9.710277	9.503368
bl adjust	9.549098	9.552787	9.371782					
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+STD	-STD	
133.4	802.0011	802.34	785.7447	796.6953	9.48501	806.1803	787.2102	
TOC, HA	AVG	+STD	-STD					
133.4	2.901292	2.906432	2.896091					
Humic Acid TOC Test								
Standard Run on TOC								
PPM	mv	avg						
50	54.8339							
	51.2194							
	50.8738							
	49.0917							
80	52.5177	51.7073						
	80.9978							
	81.2116							
100	80.1131	80.77417						
	101.389							
	102.31							
	96.3187	100.6726	Sample					
150	144.894	HA soln						
	146.856							
	146.374	146.0413						
200	199.583							
	198.571							
	195.286							
	197.849	197.3248						
Regression Output:								
	Constant							
	Std Err of Y Est							
	R Squared							
	No. of Observations							
	Degrees of Freedom							
	X Coefficient(a)							
	Std Err of Coef.							
	Value							
	162.771	180.908	178.081	191.038	181.696	178.8984	10.24681	
	165.2258	184.0328	181.1031	194.5402	184.852	181.9508	10.62848	
	AVG	STD						
	3a	3b	3c					
	4.953	0.9914	0.9907					
	0.9962	0.9938						
	2a	2b	2c					
	0.988	0.9939	0.9962					
	4.9782	0.9919	0.9916					
	1a	1b	1c					
	0.9925	0.9916	0.9919					
	4.9502	0.9925	0.9916					
	5 min count							
Partitioning Test, 9/22/94								
181.9 ppm Aldrich humic acid								
Empore @24 ml/min, 400mm Hg								
Total Phenanthrene								
1	1a	1b	1c	2a	2b	2c	3a	3b
1	4.9502	0.9925	0.9916	4.9782	0.988	0.9939	4.953	0.9914
5 ml								
5 min count								

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

181.9 ppm, test one empiric									
vial		A1	A1a	A1b	A1c	A2	A3	A4	A5
wt, mg		6.8004	0.9854	0.986	0.9886	avg ml, 5 ml pipet 4.9577			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1539	1537.2	1565		69511.9	720	184	1171.8	
3	1531.8	1551.6	1579.2		69322.5	706	166.4	1162.2	
4	1565.2	1553	1565.8		69329.7	738.6	174.4	1171.8	
avg	1568.1	1531.1	1610.3	total	69326	735.1	172.7	1168.5	mach.
bkcd adjust	1545.333	1547.267	1570	filter	69388.03	721.5333	174.9333	1168.6	elutant
vial quench adjust	1531.918	1533.852	1556.585	avg	69381.61	702.3083	156.6083	1155.185	total
181.9 ppm, test two empiric									
vial		B1	B1a	B1b	B1c	B2	B3	B4	B5
wt, mg		7.4533	0.988	0.9782	0.9871	phen total 84136.46			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1382.2	1385.4	1396.4		75142	867.6	144	877.6	
3	1385.6	1388.2	1417		75307.1	861	147.6	868.4	
4	1416	1383.8	1390.6		75264.3	860.6	137.6	847.2	
avg	1421.9	1372.7	1417.5	total	75078	862.1	146.9	842.9	mach.
bkcd adjust	1394.6	1385.8	1398	filter	75237.8	863.0667	143.0667	864.4	elutant
vial quench adjust	1381.185	1372.385	1384.585	avg	75231.38	843.8417	124.7417	850.985	total
181.9 ppm, test three empiric									
vial		C1	C1a	C1b	C1c	C2	C3	C4	C5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test four empiric									
vial		D1	D1a	D1b	D1c	D2	D3	D4	D5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test five empiric									
vial		E1	E1a	E1b	E1c	E2	E3	E4	E5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test six empiric									
vial		F1	F1a	F1b	F1c	F2	F3	F4	F5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test seven empiric									
vial		G1	G1a	G1b	G1c	G2	G3	G4	G5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test eight empiric									
vial		H1	H1a	H1b	H1c	H2	H3	H4	H5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test nine empiric									
vial		I1	I1a	I1b	I1c	I2	I3	I4	I5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test ten empiric									
vial		J1	J1a	J1b	J1c	J2	J3	J4	J5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test eleven empiric									
vial		K1	K1a	K1b	K1c	K2	K3	K4	K5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test twelve empiric									
vial		L1	L1a	L1b	L1c	L2	L3	L4	L5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test thirteen empiric									
vial		M1	M1a	M1b	M1c	M2	M3	M4	M5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test fourteen empiric									
vial		N1	N1a	N1b	N1c	N2	N3	N4	N5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4	144.8	1877.8	
avg	1475.5	1476.9	1484.9	total	77505.2	936.5	129.9	1855.5	mach.
bkcd adjust	1473.533	1454.067	1479.4	filter	77671.3	918.6667	136.3333	1889.933	elutant
vial quench adjust	1460.118	1440.652	1465.985	avg	77684.88	899.4417	118.0083	1876.518	total
181.9 ppm, test fifteen empiric									
vial		O1	O1a	O1b	O1c	O2	O3	O4	O5
wt, mg		7.5861	0.9881	0.9772	0.9924	phen total 89682.8			
5 min count									
1	filter	filter	filter		ethl ace	elution	1:1	disk	
2	1461	1470	1482.4		77715.7	919.8	137.8	1880.6	
3	1490.2	1466.6	1484		77596.7	936.8	126.4	1911.4	
4	1469.4	1425.6	1471.8		77701.5	899.4</			

TABLE B12 - DATA FOR FIGURE 3-2. CONTINUED

vid quench adjust	12548.76	12519.56	12544.59	12537.64	78370.21	1153.13	136.742	1876.518	81536.6	94074.23	98610.31	92.29479
TOC, HA	1	2	3	AVG	STD	+STD	-STD					
181.9	14.12906	13.03574	13.32739	13.4974	0.566142	14.06354	12.93125					
bt adjust	14.01346	12.92014	13.21179									
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+STD	-STD					
181.9	904.5539	824.0663	845.338	857.986	41.70783	899.6939	816.2782					
TOC, HA				AVG		+STD	-STD					
181.9				2.93348		2.954095	2.911838					

TABLE B13 - DATA FOR TABLE 3-2

Breakthrough Test (bt) for the Benzo[a]pyrene Partitioning Data Point in this Table is located in Table B11

Breakthrough Test (bt) for the Phenanthrene Partitioning Data Points in this Table is located in Table B12

Humic Acid TOC Test, 3/9/95			File: bn69		pH=7	
68.9 ppm Suwannee River Humic Acid						
Standard Run on TOC						
PPM	mv	avg				
10	67.9471					
	67.3459					
	65.5167					
66.93657			Regression Output:			
20	123.135		Constant		-1.75284	
	124.739		Std Err of Y Est		1.605663	
	129.95		R Squared		0.997489	
			No. of Observations		5	
			Degrees of Freedom		3	
30	187.52		X Coefficient(s)	0.16991		
	186.104		Std Err of Coef.	0.004922		
	181.541			Value	AVG	STD
		Sample				
		HA soln				
		MV	401.367	422.557	424.633	416.1857
		PPM	68.44327	70.04365	70.39638	68.9611
50	322.555	185.055				2.187629
	322.189					
	310.858					
80	465.694	318.534				
	471.537					
	482.838					
		473.3563				

Partitioning Test, 3/9/95 BENZO-A-PYRENE DATA

Carrier solvent File: bn69 pH=7

68.9 ppm Suwannee River Humic Acid

TABLE B13 - DATA FOR TABLE 3-2, CONTINUED

Empore @24 ml/min, 400mm Hg									
QUENCH ADJUSTED DATA									
Tsie Values									
vial	1	2	3	A1a	B1a	C1a			
1	286	285	285	175	172	173			
2	285	284	283	175	173	172			
3	287	284	286	175	173	174			
4	288	285	284	173	172	173			
avg	286.5	284.5	284.5	174.5	172.5	173			
log(Tsie) Values									
vial	1	2	3	A1a	B1a	C1a			
1	2.456366	2.454845	2.454845	2.243038	2.235528	2.238046			
2	2.454845	2.453318	2.451786	2.243038	2.238046	2.235528			
3	2.457882	2.453318	2.456366	2.243038	2.238046	2.240549			
4	2.459392	2.454845	2.453318	2.238046	2.235528	2.238046			
avg	2.457121	2.454082	2.454079	2.24179	2.236787	2.238042			
% quench	1.879892	1.97346	1.973543	8.508218	8.662214	8.623577			
Background Counts									
vial	Tot Act	A1a	A2	A3	A4	A5			
5 min count									
1	33.4	36	36.4	39.8	35.8	38.6			
2	33.8	38.4	36.8	38	36.6	32.6			
3	36.6	36	38.6	37.8	38.8	31.4			
4	31.8	35.8	35.6	40.6	34.6	33.8			
avg	33.9	36.55	36.85	39.05	36.45	34.1			
Total Phenanthrene									
vial	1	2	3						
sample wt, ml									
5 min count	0.9956	0.9875	0.995						
1	14187	14096.6	14317.2						
2	14313	14284.2	14264.4						
3	14291.2	14115.8	14233.8						
4	14276	14142.6	14340						
avg	14266.8	14159.8	14288.85	total					

avg ml, 5 mil pipet
4.9577

mach.
effic.

TABLE B13 - DATA FOR TABLE 3-2. CONTINUED

bkgd adjust															14232.9	14125.9	14254.95	avg	adjust	
vial quench adjust															72232.18	72346.18	72456.87	72345.08	75833.41	
68.9 ppm, test one empore																				
vial A1															A1a	A2	A3	A4	A5	
wt, mg															7.2137	4.9868	4.4944	4.6703	4.38	
5 min count															filter	ethyl ace	elution	MeCl2	1:1	disk
1															17943.8	40902.4		287	92	953.8
2															17964.6	40927		282.2	99.2	892.6
3															17810.4	40760.4		268.6	94.6	929.8
4															17840	40690.2		287.4	96.2	921
avg															17906.27	40863.27		279.2667	95.26667	925.4
bkgd adjust															17869.72	40826.42		240.2167	58.81667	891.3
vial quench adjust															28253.46	41134.93		276.5857	67.09019	891.3
68.9 ppm, test two empore																				42369.9
vial B1															B1a	B2	B3	B4	B5	
wt, mg															7.4564	5.0248	4.6897	3.9367	4.6907	
5 min count															filter	1:1	ethyl ace	MeCl2	disk	
1															18162.6	33010.2		490.4	89	2051.6
2															18067.4	32936		513.8	88	2006.2
3															18146.8	33024.4		506.8	97.8	2017.8
4															18111.8	32803.6		496.8	83.4	2030.2
vial avg															18125.6	32990.2		503.6667	91.6	2025.2
bkgd adjust															18089.05	32953.75		466.8167	55.15	1991.1
vial quench adjust															29388.38	37966.86		471.532	63.54179	1991.1
68.9 ppm, test three empore																				40493.03
vial C1															C1a	C2	C3	C4	C5	
wt, mg															7.1843	4.9936	4.4504	4.7041	4.3668	
5 min count															filter	ethyl ace	elution	MeCl2	1:1	disk
1															18641.2	40408.4		270.4	98.2	1013.2
2															18594.8	40481.8		259.2	94.2	999.6
3															18659.8	40284.2		261	98.8	1014.8

310.858	318.534
80	
485.694	
471.537	
482.838	
	473.3563

Partitioning Test, 3/16/95
46.6 ppm Aldrich humic acid

Empore @24 mL/min, 400mm Hg

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	34	35.6	37.4	34.2	36	33.2
2	32.2	32.2	37	36	33.2	32.8
3	31.6	34.4	34.8	37.4	38.4	30.8
4	37	35.6	34.2	41.6	33.6	31
avg	33.7	34.45	35.85	37.3	35.3	31.95

Total Phenanthrene

vial	1	2	3
sample wt, ml	0.9932	0.9904	0.9919
5 min count			
1	29851.6	29938.6	30023.4
2	29932.4	29911.6	30026.6
3	29944.4	29929.4	30161.2
4	29891.8	29990	29914.6
avg	29905.05	29942.4	30031.45 total
bkgd adjust	29871.35	29908.7	29997.75 avg
vial quench adjust	153296.9	153922.5	154147.3
46.6 ppm, test one	empore		153788.9
161204.3			
vial	A1	A2	A3
wt, mg	7.2922	5.0502	4.1618
			4.6074
			4.2972
			elution
			A4
			A5

avg mil, 5 mil pipet
4.9577

TABLE B13 - DATA FOR TABLE 3-2, CONTINUED

46.6 ppm, test two empore									
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	8448.4	128457	1041	89.8	5329.2				
2	8408.2	128398	1039.2	93.2	5375.4				
3	8462	128691	1036	90	5386.2				
4	8525.4	128597	1014	92.8	5389.6	mach.			
avg	8439.533	128515.7	1038.733	91	5363.6	elutant	phen	% mass	
bkgd adjust	8405.083	128479.8	1001.433	55.7	5331.65	total	total	adjust	bal
vial quench adjust	13922.92	129581.3	1214.219	63.36661	5331.65	136190.5	150113.4	157351.6	97.61006
46.6 ppm, test two empore									
vial	B1	B2	B3	B4	B5				
wt, mg	7.8461	5.0051	4.3025	4.5736	4.2403				
46.6 ppm, test three empore									
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	7795	127386	1019.2	129.6	7069				
2	7777.2	127721	1012.4	132.6	6956.8				
3	7728.2	127612	1002.2	128.6	6991				
4	7795.4	127602	976	132	6978.4	mach.			
vial avg	7766.8	127573	1011.267	130.2667	7005.6	elutant	phen	% mass	
bkgd adjust	7732.35	127537.2	973.9667	94.96667	6973.65	total	total	adjust	bal
vial quench adjust	13762.62	128565.7	1179.076	107.8414	6973.65	136826.2	150588.9	157850	97.91922
46.6 ppm, test three empore									
vial	C1	C2	C3	C4	C5				
wt, mg	7.4707	5.0068	4.47	4.2911					
46.6 ppm, test three empore									
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	8319.6	125879	3941	110.4	3804.2				
2	8332.4	126249	3948.4	112.8	3774.8				
3	8293.2	126044	3946.8	111.4	3811.4				
4	8303.2	126488	3951	104.4	3787	mach.			
vial avg	8315.067	126057.3	3945.4	111.5333	3796.8	elutant	phen	% mass	
bkgd adjust	8280.617	126021.5	3908.1	76.23333	3764.85	total	total	adjust	bal
vial quench adjust	14124.63	127101.8	4708.659	86.70924	3764.85	135662.1	149786.7	157009.1	97.39762
TOC, HA	% BOUND	1	2	3	AVG	STD	+95% CI	-95% CI	

TABLE B13 - DATA FOR TABLE 3-2. CONTINUED

46.6	9.274933	9.139202	9.429832	9.281322	0.14542	0.442159	9.723482	8.839163	
bt adjust	9.169833	9.034045	9.325012	9.166522	0.145589	0.442671	9.609193	8.723851	
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	95% CI	+95% CI	-95% CI	
46.6	2166.46	2131.167	2206.866	2168.164	37.87832	115.1713	2283.336	2052.993	
TOC, HA				AVG			+95% CI	-95% CI	
46.6			log Kp	3.336092			3.35857	3.312387	
Humic Acid TOC Test, 3/23/95									
50.6 ppm Aldrich humic acid				File: pan51	Ph=7				
Standard Run on TOC									
PPM	mv	avg							
20	75.8875								
	85.0688								
	71.024								
		77.32677							
30	99.0524								
	97.8092								
	96.4102								
		97.75727							
40	115.777								
	111.156								
	113.183								
		113.372							
50	151.295								
	162.096								
	152.559								
		155.3167							
80	237.48								
	230.405								
	234.576								
Regression Output:									
			Constant	-5.96266					
			Std Err of Y Est	2.924152					
			R Squared	0.9879					
			No. of Observations	5					
			Degrees of Freedom	3					
			X Coefficient(s)	0.368496					
			Std Err of Coef.	0.023546					
			Value	AVG	STD				
			155.026	151.681	153.65	153.4523	1.681238		
			51.16383	49.93121	50.65678	50.58394	0.61953		
			PPM						
			Sample						
			HA soln						
			MV						

TABLE B13 - DATA FOR TABLE 3-2. CONTINUED

234.1537

Partitioning Test, 3/23/95 PHENANTHRENE DATA
 50.6 ppm Aldrich Humic Acid Ph=7 File: pan51
 Solvent carrier

Empore @24 ml/min, 400mm Hg

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	34.6	33.8	48	43.8	39.8	34.6
2	32.6	36.4	38.6	37.8	33.8	43.8
3	36.2	35	38.2	34	37.4	33.2
4	35.2	36	33.8	34	35.4	34.4
avg	34.65	35.3	39.65	37.4	36.6	36.5

Total Phenanthrene

vial	1	2	3
sample wt, ml	0.9887	0.9825	0.9848

avg ml, 5 mil pipet
4.9577

5 min count						
1	14585.4	14522.2	14489.6			
2	14392	14493.2	14576.8			
3	14476.2	14455.2	14482.6			
4	14446	14509.8	14633.4			
avg	14469.9	14495.1	14545.6	total		
bkgd adjust	14435.25	14460.45	14510.95	avg		
vial quench adjust	74597.39	75199.18	75285.56	75027.38	adjust	
50.6 ppm, test one empore				78845.05		

mach.

effic.

adjust

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

50.6 ppm, test one empore

mach.

TABLE B13 - DATA FOR TABLE 3-2, CONTINUED

avg	5729.267	56963.47	3370.733	322.2667	1453.867	elutant	phen	effic.	% mass
bkgd adjust	5693.967	56923.82	3333.333	285.6667	1417.367	total	total	adjust	bal
vial quench adjust	9629.96	57382.88	4025.969	323.5849	1417.367	63149.8	72779.76	76289.06	97.00427
50.6 ppm, test two empore									
vial	B1	B1a	B2	B3	B4	B5			
wt, mg	7.3058	4.9811	4.2059	4.4929	4.2623				
5 min count									
1	filter	ethyl ace	MeCl2	1:1	disk				
2	5846.8	59433.2	415.2	112.4	2720				
3	5802.6	59534	429.8	106.6	2653				
4	5795.6	59526.8	446.6	110.2	2666.4				
vial avg	5810.8	59536.8	441.4	115.8	2668	mach.			
bkgd adjust	5815	59498	430.5333	109.7333	2679.8	elutant	phen	effic.	% mass
vial quench adjust	5779.7	59458.35	393.1333	73.13333	2643.3	total	total	adjust	bal
50.6 ppm, test three empore									
vial	C1	C1a	C2	C3	C4	C5			
wt, mg	7.3212	4.9754	4.1986	4.4047	4.0613				
5 min count									
1	filter	ethyl ace	MeCl2	1:1	disk				
2	5687	56920.6	2654.6	234.4	1275.8				
3	5620.8	56765.2	2722.4	228.6	1282.4				
4	5643.4	57010.4	2669	213.2	1278.8				
vial avg	5659.2	56993	2683.2	200.2	1262.8	mach.			
bkgd adjust	5650.4	56898.73	2682	225.4	1279	elutant	phen	effic.	% mass
vial quench adjust	5615.1	56859.08	2644.6	188.8	1242.5	total	total	adjust	bal
TOC, HA	9593.871	57317.62	3176.829	213.1759	1242.5	61950.13	71544	74993.71	95.35719
% BOUND									
1	2	3	AVG	STD	95% CI	+95% CI	-95% CI		
50.6	13.23165	13.49102	13.40975						
bt adjust	13.13123	13.3909	13.30954	13.27722	0.132821	0.40385	13.68107	12.87337	
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	95% CI	+95% CI	-95% CI	
50.6	2987.384	3055.596	3034.178	3025.719	34.88373	106.066	3131.785	2919.653	

TABLE B13 - DATA FOR TABLE 3-2. CONTINUED

TOC, HA 50.6	log Kp	AVG 3.480828	+95% CI -95% CI	
			3.495782	3.465331

TABLE B14 - DATA FOR FIGURE 3-3

Breakthrough (bt) test - used for the two following partitioning tests: files pna28 and pna28_3
 0 ppm Aldrich humic acid

File: pna0_#4 pH=7 7/28/85 PHENANTHRENE DATA

Empore @24 ml/min, 400mm Hg acetone carrier solvent

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	32.2	31.2	32.2	44.2	36.6	39.6
2	29.4	24.4	34	37	34	32
3	32	33	28	34.6	37	42
4	26.6	32.2	30	35.4	31.6	38.6
avg	30.05	30.2	30.55	37.8	34.8	38.05

Total Phenanthrene

vial	1	2	3
wt, ml	1.0064	1.0021	1.0019
5 min count			
1	3613.4	3721	3742.6
2	3613.2	3678	3671.2
3	3609	3664.8	3695.4
4	3612	3749.2	3680.6
avg	3611.9	3703.25	3697.45 total
bkgd adjust	3581.85	3673.2	3667.4 avg
vial quench adjust	17644.81	18172.46	18147.39 17988.22 18655.58

0 ppm, test one empore			
vial A1	7.0714	4.9847	4.3545
wt, mg	A1a	A2	A3 A4 A5
			4.5989 4.4122

5 min count	filter	ethyl ace	MeCl2	1:1	disk
1	42.4	16073.8	165.2	62.2	1705.6
2	35.4	16119.2	173.8	57.4	1731.4
3	38.4	16063.8	171.8	61.8	1736
4	33	16115.2	177.6	61.2	1698.4
avg	37.3	16093	172.1	60.65	1717.85
bkgd adjust	7.1	16062.45	134.3	25.85	1679.8

phen total
 elutant total
 mach. efflc. adjust
 % mass bal

TABLE B14 - DATA FOR FIGURE 3-3. CONTINUED

vial quench adjust	10.07221	16175.88	162.7723	29.51675	1679.8	18047.77	18057.84	18928.55	100.387
0 ppm, test two empore									
vial B1	B1a	B2	B3	B4	B5				
wt, mg	7.3414	4.9772	4.4112	4.686	4.4958				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	35	16645.8	137.6	48.8	1430.2				
2	35.4	16658.6	148.4	47.8	1445.4				
3	36.8	16603.8	137.6	44.4	1430.2				
4	39	16720.2	140.2	51.2	1472.8				
vial avg	36.55	16657.1	140.95	48.05	1444.65	elutant	phen	mach. efficc.	% mass
bkgd adjust	6.35	16626.55	103.15	13.25	1406.6	total	total	adjust	bal
vial quench adjust	9.366288	16760.64	125.5224	15.17025	1406.6	18307.93	18317.29	19200.52	101.8294
0 ppm, test three empore									
vial C1	C1a	C2	C3	C4	C5				
wt, mg	7.1097	5.0009	4.5188	4.6808	4.7611				
5 min count	filter	ethyl ace	MeCl2	1:1	disk				
1	36	16842	276.2	103.2	1089.4				
2	37	16722.2	288.6	102.2	1080.8				
3	35.4	16678.2	278.8	105	1100.8				
4	39	16728.2	255.4	103.4	1078.2				
vial avg	36.85	16742.9	274.75	103.45	1087.3	elutant	phen	mach. efficc.	% mass
bkgd adjust	6.65	16712.35	236.95	68.65	1049.25	total	total	adjust	bal
vial quench adjust	9.454199	16847.13	288.0066	79.27704	1049.25	18263.66	18273.11	19154.21	101.5838
TOC, HA	1	2	3	AVG	STD	95% CI	+95% CI	-95% CI	
0	0.055993	0.052069	0.052558	0.05354	0.002139	0.008503	0.060043	0.047037	

Humic Acid TOC Test, 7/21/95: used for all partitioning tests in this table

phenanthrene solution #2

acetone carrier solvent

28.3 ppm Aldrich humic acid

Standard Run on TOC

File: pna28

pH=7

TABLE B14 - DATA FOR FIGURE 3-3. CONTINUED

PPM	mv	avg	Regression Output:				
10	138.586		Constant	-3.97109			
	144.453		Std Err of Y Est	0.837705			
	158.514		R Squared	0.991579			
		146.5177	No. of Observations	5			
15	192.048		Degrees of Freedom	3			
	187.45						
	190.821		X Coefficient(s)	0.099251			
		190.1063	Std Err of Coef.	0.005281			
20	242.036						
	233.981		Value		AVG	STD	
	240.385	Sample	320.505	332.442	323.04	325.329	6.289088
		HA soln	27.8384	29.02416	28.091	28.31818	0.624199
25	284.757		MV				
	269.75		PPM				
	280.515						
		238.8007					
30	349.633						
	353.874	281.674					
	347.99						
		350.499					

Partitioning Test, 7/21/95 phenanthrene solution #2
 28.3 ppm Aldrich Humic Acid pH=7 File: pna28
 Empore @24 ml/min, 400mm Hg acetone carrier solvent

Background Counts						
Vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	31	26.6	28.4	36.2	33.4	39.8
2	34.2	30.6	32	36.4	31	37.6
3	30	35.4	30	36.4	27.4	34.2
4	35.6	35.2	30.2	32	36.8	37
avg	32.7	31.95	30.15	35.25	32.15	37.15

Total Phenanthrene									
vial	a1	a2	a3						
sample wt, ml	0.9979	0.994	1.0005						
5 min count									
1	4357	4384	4531						
2	4334	4365.6	4484.4						
3	4343.2	4357.2	4508.4						
4	4362.6	4341.8	4493.8						
avg	4349.2	4357.15	4504.4	total					
bkgd adjust	4316.5	4324.45	4471.7	avg					
vial quench adjust	21806.90	21932.78	22532.26	22090.64	23155.81	0.000251	0.006283		
28.3 ppm, test one empore									
vial	A1a	A2	A3	A4	A5				
wt, mg	7.0777	4.9867	4.3134	4.7096	4.4048				
5 min count									
1	filter	ethyl ace	elution		MeCl2	1:1	disk		
2	1637.2	18759.4	271.2	67.4	585				
3	1642.2	18786.8	271.6	68.8	555.4				
4	1653.4	18679.2	257.2	69.6	558.6				
avg	1633.6	18771	246.2	64.6	559.6				
bkgd adjust	1641.6	18749.1	261.55	67.1	559.65	elutant	phen	% mass	
vial quench adjust	1609.65	18718.95	226.3	34.95	522.5	total	total	adjust	bal
Total Phenanthrene	2484.029	18669.91	275.6837	39.89807	522.5	19707.99	22192.02	23262.08	100.4589
vial									
sample wt, ml	b1	b2	b3						
5 min count	0.9981	1.0006	0.9967						
1	4437.4	4474	4492.8						
2	4465.6	4467.6	4498.4						
3	4451.6	4517.8	4500						
4	4473	4432.8	4488.8						
avg	4456.9	4473.05	4495	total					
bkgd adjust	4424.2	4440.35	4462.3	avg					
vial quench adjust	22346.52	22372.05	22570.62	22429.73	23511.25				

TABLE B14 - DATA FOR FIGURE 3-3. CONTINUED

28.3 ppm, test two empore									
vial	B1	B1a	B2	B3	B4	B5			
wt, mg	7.018	4.9982	4.2531	4.3974	4.1507				
5 min count	elution								
	filter	ethyl ace	MeCl2	1:1	disk				
1	1548.8	18788.4	390.4	154.6	709.6				
2	1475.8	18612.2	377.8	160.8	728.2				
3	1500	18553.8	414	147.4	720.6				
4	1521.4	18750.2	398.4	153	735				
vial avg	1511.5	18676.15	395.15	153.95	723.35	elutant	phen	mach.	% mass
bkgd adjust	1479.55	18846	359.9	121.8	686.2	total	total	adjust	bal
vial quench adjust	2280.468	18777.44	432.1862	137.9175	686.2	20033.75	22284.21	23369.2	99.39582
TOC, HA	1	2	AVG	STD	+std	-std			
28.3	11.24471	10.078							
bt adjust	11.19717	10.02983	10.6135	0.825433	11.43893	9.788065			
TOC, HA	Kp1	Kp2	AVG	STD	+std	-std			
28.3	4455.484	3939.204	4197.344	365.0646	4562.409	3832.279			
TOC, HA	AVG								
28.3	log Kp		3.622975	+std		-std	3.659194 3.583457		
used phen#4 soln Oppm numbers for breakthrough since phen:acetone ratio is similar: file pna0_#4									
Partitioning Test, 7/28/95 phenanthrene solution 4									
28.3 ppm Aldrich humic acid pH=7 File: pna28_3									
Empore @24 ml/min, 400mm Hg acetone carrier solvent									
Background Counts									
vial	Tot Act	A1a	A2	A3	A4	A5			
5 min count									
1	33.2	32.6	32.2	44.2	36.6	39.6			
2	32.4	32.8	34	37	34	32			
3	33.4	26.8	26	34.6	37	42			
4	29.2	35.4	30	35.4	31.6	38.6			

avg	32.05	31.9	30.55	37.8	34.8	38.05	
Total Phenanthrene							
vial		1a	2a	3a			
sample wt, ml		0.9957	0.9966	0.9951			
5 min count							
1		3722.4	3736	3709			
2		3703.2	3717	3718.2			
3		3746.4	3450.2	3779.2			
4		3696.8	3699.8	3785			
avg		3717.2	3650.75	3747.85			
bkgd adjust		3685.15	3618.7	3715.8			
vial quench adjust		18658.46	18305.47	18824.99			
28.3 ppm, test one empore							
vial	A1	A1a	A2	A3	A4	A5	
wt, mg	7.0067	4.9704	4.4229	5.299	4.5105		
5 min count							
1		filter	ethyl ace	MeCl2	1:1	disk	
2		1168	15979.8	221.6	49.6	627.6	
3		1199	16043.4	223	52.6	628.2	
4		1197.8	15981.1	221	53.2	632.2	
avg		1180.6	16074.4	218.4	54	652.6	
bkgd adjust		1186.35	16019.68	221	52.35	635.15	
vial quench adjust		1154.45	15989.13	183.2	17.55	597.1	
Total Phenanthrene							
vial	1b	2b	3b				
sample wt, ml		0.9964	0.9984	0.9958			
5 min count							
1		3724	3870	3771.8			
2		3741.2	3830.6	3810.8			
3		3775.6	3760.6	3760.4			
4		3733	3814.4	3791			
avg		3743.45	3818.9	3783.5			
bkgd adjust		3711.4	3786.85	3751.45			

TABLE B14 - DATA FOR FIGURE 3-3, CONTINUED

vial quench adjust	18778.17	19121.53	18992.24	18963.98	19878.38
28.3 ppm, test two empore					
vial B1	B1a	B2	B3	B4	B5
wt, mg	7.2051	5.0797	4.4638	4.7727	4.64
5 min count					
1	filter	ethyl ace	MeCl2	1:1	disk
2		1179	15135.2	188	63
3		1160.4	15107.8	199.2	59.8
4		1147.8	15108.4	196.4	58.8
vial avg		1205.6	15148.6	198.4	65.4
bkgd adjust		1173.2	15125	195.5	1338.1
Total Phenanthrene		1141.3	15094.45	157.7	1300.05
vial	1c	2c	3c		
sample wt, ml	0.9993	1.004	1.0053		
5 min count					
1	3807.8	3828.6	3805		
2	3759.4	3823.6	3807.4		
3	3783.4	3884.6	3807		
4	3787.8	3857.2	3832		
avg	3784.6	3848.5	3812.85	total	
bkgd adjust	3752.55	3816.45	3780.8	avg	
vial quench adjust	18931.27	19163.51	18959.95	19018.24	19935.26
0 ppm, test two empore					
vial C1	C1a	C2	C3	C4	C5
wt, mg	7.2817	5.0729	4.5473	4.7116	4.5498
5 min count					
1	filter	ethyl ace	MeCl2	1:1	disk
2		961.4	16297.4	189	87.2
3		967.4	16231.6	184	82.2
4		949.8	16170.8	179.8	81
vial avg		954.2	16128.6	182.6	90
		958.2	16207.1	183.85	85.1
				elutant	phen
				614.8	19373.18
					% mass

TABLE B14 - DATA FOR FIGURE 3-3. CONTINUED

bkgd adjust	928.3	16176.55	146.05	50.3	576.75	total	adjust	bal
vial quench adjust	1442.161	16280.58	177.9379	57.69011	576.75	17102.96	18545.12	19439.33
TOC, HA	% BOUND							97.51229
	1	2	3	AVG	STD	+std	-std	
28.3	9.523603	9.267206	7.583039					
bt adjust	9.475136	9.218601	7.533533	8.742423	1.054758	9.797181	7.687665	
TOC, HA	Kp1	Kp2	Kp3	AVG	STD	+std	-std	
28.3	3698.547	3588.242	2878.908	3388.566	444.8081	3833.374	2943.758	
TOC, HA				AVG		+std	-std	
28.3		log Kp		3.530016		3.583581	3.468902	

Breakthrough (bt) test - used for the following partitioning test: file pna28_2

0 ppm Aldrich humic acid phenanthrene solution #3 pH=7

Empore @24 ml/min, 400mm Hg 7/27/95 File: pna0_#3

acetone carrier solvent

Background Counts

vial	Tot Act	A1a	A2	A3	A4	A5
5 min count						
1	31.4	31.4	28.6	35.4	34.4	41.8
2	30.8	27.8	24.4	36	33	39.2
3	28.4	31.8	29.6	33.4	31	41.2
4	30.2	29.6	30.2	28.6	31.4	37.6
avg	30.2	30.15	28.2	33.35	32.45	39.95

Total Phenanthrene

vial	1	2	3
sample wt, ml	1.0028	1.0102	0.9984

avg ml, 5 mill pipet
4.9577

5 min count						
1	376.6	392	376.8			
2	385.6	376.8	394.6			
3	382.4	387.8	393.2			
4	376.2	389.8	371.8			
avg	380.7	386.6	384.1	total		
					mach.	effic.

TABLE B14 - DATA FOR FIGURE 3-3. CONTINUED

bkgd adjust	350.5	356.4	353.9	avg	adjust
vial quench adjust	1732.82	1749.08	1757.34	1746.42	1830.62
0 ppm, test one empore					
vial A1	A1a	A2	A3	A4	A5
wt, mg	7.1978	5.0008	4.5119	4.6353	4.4819
5 min count	filter	ethyl ace	MeCl2	1:1	disk
1	43.4	1532.6	48.2	38.6	158.2
2	39.8	1518.4	47.4	34.8	155.6
3	45.4	1534.8	46.2	33.6	152.8
4	40.2	1507.4	46.8	34.8	148.8
avg	42.2	1523.3	47.15	35.45	153.85
bkgd adjust	12.05	1495.1	13.8	3	113.9
vial quench adjust	17.34392	1505.639	16.75379	3.433235	113.9
0 ppm, test two empore					
vial B1	B1a	B2	B3	B4	B5
wt, mg	7.3558	4.9999	4.3864	4.5818	4.4063
5 min count	filter	ethyl ace	MeCl2	1:1	disk
1	41.2	1655.6	43.4	35.6	115
2	39.6	1665.6	41.6	37.6	123.8
3	48	1678.4	42.4	32.2	113.4
4	43.2	1694.2	39	38	118.8
vial avg	43	1673.45	41.6	35.85	117.75
bkgd adjust	12.85	1645.25	8.25	3.4	77.8
vial quench adjust	18.90478	1658.518	9.99117	3.881544	77.8
0 ppm, test three empore					
vial C1	C1a	C2	C3	C4	C5
wt, mg	7.251	5.0287	4.371	4.6898	4.4526
5 min count	filter	ethyl ace	MeCl2	1:1	disk
1	41.2	1673.8	50.8	39.8	135.2
2	35.8	1681	48.8	33.4	131.8
3	36.6	1625.2	48.6	34.2	133.4

mach. efffc. phen mach. efffc. phen
adjust total adjust total
1736.971 1657.07 1736.971 1657.07
94.88407 94.88407

mach. efffc. phen mach. efffc. phen
adjust total adjust total
1854.398 1769.096 1854.398 1769.096
101.2987 101.2987

TABLE B14 - DATA FOR FIGURE 3-3. CONTINUED

4		38.6	1658	52.8	37.4	133.2			
vial avg		38.05	1659.5	50.25	36.2	133.4	elutant	phen	
bkgd adjust		7.9	1631.3	16.9	3.75	93.45	total	total	% mass
vial quench adjust	11.39119	1644.456	20.56909	4.287495	93.45	1762.762	1774.153	1859.7	101.5883
TOC, HA	% BOUND								
1	2	3	AVG	STD	95% CI	+95% CI	-95% CI		
0	0.993115	1.08249	0.652261	0.909289	0.227034	0.69031	1.599599	0.218979	

Partitioning Test, 7/26/95 phenanthrene solution 3
 acetone carrier solvent
 28.3 ppm Aldrich Humic Acid File: pna28_2 pH=7
 Empore @24 ml/min, 400mm Hg

Background Counts

vial Tot Act A1a A2 A3 A4 A5

5 min count

1	31.4	36	27.8	34.6	35.6	35
2	27.4	28	29.2	32.4	30.4	38.6
3	32.8	28.6	31	37.8	33.2	36.6
4	29.6	29.8	29.6	34.8	35.8	42.6
avg	30.3	30.6	29.4	34.9	33.75	38.2

Total Phenanthrene

vial a1 a2 a3

sample wt, ml 0.9938 0.9995 0.998

5 min count

1	330	329.4	310.8
2	321.6	313.6	328.8
3	315.8	322.6	342.8
4	327.6	330	334.2
avg	323.75	323.9	329.15 total
bkgd adjust	293.45	293.6	298.85 avg
vial quench adjust	1488.62	1480.89	1509.63
28.3 ppm, test one empore			1493.05
			1565.04
			1.1E-05
			0.000269

vial A1 A2 A3 A4 A5

wt, mg 6.7182 5.0439 4.3876 4.5938 4.4282

avg ml, 5 ml pipet
4.9577mach. phen
effic. mmole/L
adjust ha water mmole phen/ml acetone

TABLE B14 - DATA FOR FIGURE 3-3. CONTINUED

5 min count	filter	ethyl ace	elution MeCl2	1:1	disk				
1	194.2	1268.2	44.8	35.8	42.4				
2	190.2	1255	49.6	35.8	36.2				
3	187.4	1304.6	46.6	39.4	36.2				
4	192.8	1260.4	43.4	35.4	34.6				
avg	191.15	1272.05	46.1	36.6	37.35	elutant	phen		
bkgd adjust	180.55	1242.65	11.2	2.85	-0.85	total	total	mach. efffc.	% mass
vial quench adjust	233.602	1252.671	13.57127	3.255939	-0.85	total	total	adjust	bal
Total Phenanthrene								1574.686	100.6163
vial	b1	b2	b3						
sample wt, ml	0.9946	0.9946	0.9925						
5 min count									
1	301.6	314.6	311.4						
2	321.2	299.2	295.4						
3	297.8	316.2	301.2						
4	313.6	318.4	298.8						
avg	308.55	312.1	301.7	total					
bkgd adjust	278.25	281.8	271.4	avg					
vial quench adjust	1410.38	1428.37	1378.57	1405.77	1473.56				
28.3 ppm, test two empore									
vial	B1	B2	B3	B4	B5				
wt, mg	7.4396	5.0175	4.3035	4.6216	4.3933				
5 min count	filter	ethyl ace	elution MeCl2	1:1	disk				
1	180.6	1112.6	34.4	33.2	91.2				
2	189.2	1115.6	33.8	34.8	90				
3	180.8	1101.2	35.8	34	100.6				
4	170.2	1116.2	36.4	35.2	90.6				
vial avg	180.2	1111.4	35.1	34.3	93.1	elutant	phen		
bkgd adjust	149.6	1082	0.2	0.55	54.9	total	total	mach. efffc.	% mass
vial q adjust	240.1595	1089.627	0.242655	0.627635	54.9	total	total	adjust	bal
Total Phenanthrene								1452.366	98.5619
vial	c1	c2	c3						

TABLE B15 - DATA FOR FIGURE A1-1

Humic Acid TOC Test, 8/28/94									
Standard Run on TOC									
PPM	MV1	MV2	MV3	MV4	MV5	MV6	AVG	REAL PPM	
50	50.298	51.6177	45.3086	39.7782	56.3509	49.6987	48.84168		
80	76.9405	74.6216	73.811				75.12437		
100	93.7806	89.3107	85.9217	95.2166			91.0574		
150	131.493	129.091	132.497				131.027		
200	193.52	190.288	198.457	197.144	188.586		193.599		
1/2 QTEST	80.1802	77.9677	88.6929	88.3843			83.80628	90.72508	
DILUTION									
Regression Output:									
Constant			2.919023						
Std Err of Y Est			7.104292						
R Squared			0.989277						
No. of Observations			5						
Degrees of Freedom			3						
X Coefficient(s)									
Std Err of Coef.		1.047726							
		0.062979							

QUENCH TEST, AQUEOUS, 8/28/94, FILE: QUEAQ2									
1 mL Humic Acid Solution Added to 19 mL Aqueous Based Scintillation Cocktail									
DILUTION	PPM	DPM							
		1 MIL	1 MIL	1 MIL	AVG	STD	+STD	-STD	
1	181.4501	51900.8	51458.2	51853.8	51737.6	243.106	51980.71	51494.49	
0.9	163.3051	52110.4	51972	52928.4	52336.93	516.8784	52853.81	51820.05	
0.8	145.1601	52900	52904	52433	52745.67	270.7847	53016.45	52474.88	
0.7	127.0151	53865.8	53644.4	53355	53621.73	256.1533	53877.89	53365.58	
0.6	108.8701	54487.2	54162.8	53088.4	53912.8	732.1444	54844.94	53180.66	
0.5	90.72506	54990	54781.4	54668.8	54813.4	162.9735	54976.37	54650.43	
0.4	72.58004	55205.8	54717.4	55417.6	55113.6	359.09	55472.69	54754.51	
0.3	54.43503	56106.6	55640.6	55332.4	55693.2	389.7711	56082.97	55303.43	

	0.2	0.1	0.05	0	CONTROL
36.29002	55239.2	55920.6	55888.8	55682.87	384.5554
18.14501	58928.2	56790.2	56547.6	56754.67	191.7849
9.072508	57084.2	57337.8	56869.2	57033.73	338.3785
0	57407.8	57255.8	57801	57488.2	281.3519
	56880.8	57645	58670.4	57732.07	897.9713
					58630.04
					58834.1
					57208.85
					57769.55
					57372.11
					58895.36
					58562.88
					58067.42
					55298.31

DILUTION	PPM	QUENCH					100-AVG	STD	+STD	-STD
		1 MIL	1 MIL	1 MIL	AVG	100-AVG				
1	181.4501	89.89943	89.13279	89.81802	89.61675	10.38325	0.421094	10.80435	9.96216	
0.9	163.3051	90.26249	90.02276	91.67938	90.65488	9.345124	0.895308	10.24043	8.449819	
0.8	145.1601	91.63019	91.63711	90.82128	91.36286	8.637141	0.469037	9.106178	8.168104	
0.7	127.0151	93.30309	92.91959	92.41831	92.88033	7.119671	0.443693	7.563364	6.675978	
0.6	108.8701	94.37944	93.81753	91.95852	93.3845	6.615503	1.268176	7.883679	5.347327	
0.5	90.72508	95.25036	94.88903	94.69399	94.94446	5.055538	0.282293	5.337831	4.773245	
0.4	72.58004	95.62415	94.77818	95.99102	95.48445	4.53555	0.621994	5.157544	3.913556	
0.3	54.43503	97.18446	96.37729	95.84344	96.4684	3.531602	0.675138	4.20674	2.858464	
0.2	36.29002	95.68201	96.86229	96.8072	96.4505	3.549501	0.666104	4.215604	2.883397	
0.1	18.14501	98.60413	98.36856	97.94834	98.30701	1.692993	0.332198	2.025192	1.360795	
0.05	9.072508	98.89513	99.31708	98.15897	98.79039	1.209611	0.586115	1.795728	0.623495	
0	0	99.43832	99.17504	100.1194	99.57759	0.422411	0.487341	0.909752	-0.08493	
CONTROL		98.52549	99.84919	101.6253	100	0	1.555412	1.555412	-1.55541	

5 mL Humic Acid Solution Added to 15 mL Aqueous Based Scintillation Cocktail

DILUTION	PPM	5 MIL	5 MIL	5 MIL	AVG	STD	+STD	-STD
5	181.4501	16993.4	16751.6	16658.4	16800.47	173.7332	16974.2	16626.73
4.5	163.3051	19748.2	19886	20023.8	19886	137.8	20023.8	19748.2
4	145.1601	23484.4	23340.8	23222.2	23349.13	131.2985	23480.43	23217.83
3.5	127.0151	27033	26540.4	27258	26943.8	367.0217	27310.82	26576.78
3	108.8701	30973.2	31605.8	31759.8	31446.27	416.861	31863.13	31029.41
2.5	90.72508	35910	35983.8	36325.8	36068.53	226.1372	36292.67	35840.4
2	72.58004	40047.8	40895	40600.2	40514.33	430.0776	40944.41	40084.28

TABLE B15 - DATA FOR FIGURE A1-1. CONTINUED

DILUTION	PPM	PERCENT OF REAL VALUE										QUENCH		
		5 MIL	5 MIL	5 MIL	5 MIL	AVG	100-AVG	STD	+STD	-STD				
1.5	54.43503	45442.8	45051	45818	45437.27	383.5299	45820.8	45053.74						
1	36.29002	49668.6	49410.8	49737.4	49605.6	172.1733	49777.77	49433.43						
0.5	18.14501	53150.6	53101.8	53425.4	53225.93	174.4579	53400.39	53051.48						
0.25	9.072506	54722	55527.8	54709.4	54986.4	468.9085	55455.31	54517.49						
0	0	58990	58847.8	58568.8	58802.2	214.2706	59016.47	58587.93						
CONTROL		56880.8	57645	56670.4	57732.07	897.9713	58630.04	56834.1						
DILUTION	PPM	PERCENT OF REAL VALUE										QUENCH		
		5 MIL	5 MIL	5 MIL	5 MIL	AVG	100-AVG	STD	+STD	-STD				
1	181.4501	29.43494	29.01611	28.85121	29.10075	70.89925	0.30093	71.20018	70.59832					
0.9	163.3051	34.20664	34.44533	34.68402	34.44533	65.55467	0.238689	65.79336	65.31598					
0.8	145.1601	40.67826	40.42952	40.22409	40.44396	59.55604	0.227427	59.78347	59.32861					
0.7	127.0151	46.82493	45.97168	47.21466	46.87042	53.32958	0.635733	53.96531	52.69384					
0.6	108.8701	53.64991	54.74566	55.01241	54.46932	45.53068	0.722061	46.25274	44.80861					
0.5	90.72506	62.20113	62.29432	62.92136	62.47227	37.52773	0.391701	37.91943	37.13603					
0.4	72.58004	69.36838	70.83585	70.32521	70.17648	29.82352	0.744955	30.56847	29.07856					
0.3	54.43503	78.71327	78.03462	79.36317	78.70369	21.29631	0.664327	21.96064	20.63198					
0.2	36.29002	86.03295	85.5864	86.15212	85.92383	14.07617	0.296228	14.3744	13.77795					
0.1	18.14501	92.06426	91.97973	92.54025	92.19475	7.805252	0.302186	8.107438	7.503067					
0.05	9.072506	94.78614	96.1819	94.76432	95.24412	4.755878	0.812215	5.568093	3.943663					
0	0	102.1789	101.9326	101.4493	101.8536	-1.85362	0.371147	-1.48247	-2.22477					
CONTROL		98.52549	99.84919	101.6253	100	0								

1 MIL QUENCH		REGRESSION LINE, QUENCH CURVES		
Regression Output:		DILUTIO	PPM	5 ML
Constant	0	1	181.4501	10.73001
Std Err of Y Est	9.732366	0.9	163.3051	9.657008
R Squared	0.975385	0.8	145.1601	8.584007
No. of Observations	12	0.7	127.0151	7.511006
Degrees of Freedom	11	0.6	108.8701	6.438005
X Coefficient(s)	16.91053	0.5	90.72506	5.365005
		0.4	72.58004	4.292004
				29.42275

TABLE B15 - DATA FOR FIGURE A1-1, CONTINUED

Std Err of Coef.	0.484023	0.3	54.43503	3.219003	22.06706
		0.2	36.29002	2.146002	14.71137
5 ML QUENCH		0.1	18.14501	1.073001	7.355687
Regression Output:		0.05	9.072506	0.5365	3.677844
Constant		0	0	0	0
Std Err of Y Est		0	0	0	0
R Squared		3.312959	CONTROL		
No. of Observations		0.997148			
Degrees of Freedom		12			
		11			
X Coefficient(s)	2.4668				
Std Err of Coef.	0.022958				

TABLE B16 - DATA FOR FIGURE A1-2

Correlation Test, Scintillation Machine Internal Quench Techniques

TSIE and SIS

QUENCH TEST, AQUEOUS, 8/28/84, FILE: QUEAQ2

1 mL Humic Acid Solution Added to 19 mL Scintillation Cocktail

dilution	PPM	DPM										QUENCH			
		1 MIL	1 MIL	1 MIL	1 MIL	1 MIL	AVG	STD	+STD	-STD		100-AVG	STD	+STD	-STD
1	181.4501	51900.8	51458.2	51853.8	51737.6	243.108	51980.71	51494.49							
0.9	163.3051	52110.4	51972	52928.4	52336.93	516.8784	52853.81	51820.05							
0.8	145.1601	52900	52904	52433	52745.67	270.7847	53016.45	52474.88							
0.7	127.0151	53865.8	53844.4	53355	53621.73	256.1533	53877.89	53365.58							
0.6	108.8701	54487.2	54182.8	53088.4	53912.8	732.1444	54644.94	53180.66							
0.5	90.72508	54990	54781.4	54688.8	54813.4	162.9735	54976.37	54650.43							
0.4	72.58004	55205.8	54717.4	55417.6	55113.6	359.09	55472.69	54754.51							
0.3	54.43503	56106.6	55840.6	55332.4	55893.2	389.7711	56082.97	55303.43							
0.2	36.29002	55239.2	55920.6	55888.8	55682.87	384.5554	56067.42	55298.31							
0.1	18.14501	56926.2	56790.2	56547.6	56754.67	191.7849	56946.45	56562.88							
0.05	9.072508	57094.2	57337.8	56869.2	57033.73	338.3765	57372.11	56895.36							
0	0	57407.8	57255.8	57801	57488.2	281.3519	57769.55	57206.85							
CONTROL		56880.8	57645	58670.4	57732.07	897.9713	58630.04	56834.1							

PERCENT OF REAL VALUE

dilution	PPM	QUENCH										QUENCH			
		1 MIL	1 MIL	1 MIL	1 MIL	1 MIL	AVG	100-AVG	STD	+STD	-STD				
1	181.4501	89.89843	89.13279	89.81802	89.61675	10.38325	0.421094	10.80435	9.96216						
0.9	163.3051	90.26249	90.02276	91.67938	90.65488	9.345124	0.895306	10.24043	8.449819						
0.8	145.1601	91.63019	91.63711	90.82128	91.36286	8.637141	0.469037	9.106178	8.168104						
0.7	127.0151	93.30309	92.91959	92.41831	92.88033	7.119671	0.443693	7.563364	6.675978						
0.6	108.8701	94.37944	93.81753	91.95652	93.3845	6.615503	1.268176	7.883679	5.347327						
0.5	90.72508	95.25036	94.88903	94.69399	94.94446	5.055538	0.282293	5.337831	4.773245						
0.4	72.58004	95.62415	94.77818	95.99102	95.46445	4.53555	0.621994	5.157544	3.913556						
0.3	54.43503	97.18446	96.37729	95.84344	96.4684	3.531602	0.675138	4.20674	2.856464						
0.2	36.29002	95.68201	96.86229	96.8072	96.4505	3.549501	0.686104	4.215604	2.883397						
0.1	18.14501	98.60413	98.36856	97.94834	98.30701	1.692993	0.332198	2.025192	1.360795						
0.05	9.072508	98.89513	98.31708	98.15897	98.79039	1.209611	0.586115	1.795726	0.623495						

TABLE B16 - DATA FOR FIGURE A1-2. CONTINUED

0 0 99.43832 99.17504 100.1194 99.57759 0.422411 0.487341 0.909752 -0.06493
 CONTROL 98.52549 99.84919 101.6253 100 0 1.555412 1.555412 -1.55541

ppm	% Q	TSIE			log TSIE			SIS		
		1	2	3	1	2	3	1	2	3
181.4501	10.38	157	157	157	2.20	2.20	2.20	33.772	33.748	33.699
163.3051	9.35	161	164	163	2.21	2.21	2.21	34.372	34.924	34.744
145.1601	8.64	174	172	174	2.24	2.24	2.24	36.187	36.075	36.087
127.0151	7.12	191	192	170	2.27	2.27	2.27	38.653	38.805	35.571
108.8701	6.62	207	207	205	2.31	2.31	2.31	40.982	40.916	41.094
90.72506	5.06	220	219	221	2.34	2.34	2.34	42.56	42.508	42.264
72.58004	4.54	234	234	233	2.37	2.37	2.37	44.69	44.02	44.663
54.43503	3.53	252	248	251	2.40	2.40	2.40	47.224	46.719	46.868
36.29002	3.55	269	268	269	2.43	2.43	2.43	49.852	49.352	49.353
18.14501	1.69	287	287	287	2.46	2.46	2.46	52.257	52.565	52.061
9.072506	1.21	298	299	300	2.48	2.48	2.48	54.151	54.319	54.249
0	0.42	317	317	320	2.50	2.50	2.50	56.978	56.718	57.689
										57.12833

SIS results				log TSIE results				TSIE			
Regression Output:				Regression Output:				Regression Output:			
Constant	23.21806	Constant	0.583512	Constant	77.51511	Constant	0.403458	Constant	18.68863		
Std Err of Y Est	0.583512	Std Err of Y Est	0.971282	Std Err of Y Est	0.583512	Std Err of Y Est	0.98627	Std Err of Y Est	0.543594		
R Squared	0.971282	R Squared	12	R Squared	0.98627	R Squared	12	R Squared	0.975077		
No. of Observations	12	No. of Observations	10	No. of Observations	12	No. of Observations	10	No. of Observations	12		
Degrees of Freedom	10	Degrees of Freedom	10	Degrees of Freedom	10	Degrees of Freedom	10	Degrees of Freedom	10		
X Coefficient(s)	-0.40835	X Coefficient(s)	-30.782	X Coefficient(s)	-0.05875	X Coefficient(s)	0.00297	X Coefficient(s)	-0.05875		
Std Err of Coef.	0.022204	Std Err of Coef.	1.148489	Std Err of Coef.	0.00297	Std Err of Coef.	0.00297	Std Err of Coef.	0.00297		

Correlation Test, Scintillation Machine Internal Quench Techniques

TSIE and SIS

QUENCH TEST, AQUEOUS, 8/28/84, FILE: QUEAQ2

5 mL Humic Acid Solution Added to 15 mL Scintillation Cocktail

DPM

TABLE B16 - DATA FOR FIGURE A1-2. CONTINUED

DILUTIO	PPM	5 MIL	5 MIL	5 MIL	AVG	STD	+STD	-STD
5	181.4501	16993.4	16751.6	16656.4	16800.47	173.7332	16974.2	16626.73
4.5	163.3051	19748.2	19886	20023.8	19886	137.8	20023.8	19748.2
4	145.1601	23484.4	23340.8	23222.2	23349.13	131.2985	23480.43	23217.83
3.5	127.0151	27033	26540.4	27258	26943.8	367.0217	27310.82	26576.78
3	108.8701	30973.2	31605.8	31759.8	31446.27	416.861	31863.13	31029.41
2.5	90.72506	35910	35863.8	36325.8	36066.53	226.1372	36292.67	35840.4
2	72.58004	40047.8	40895	40600.2	40514.33	430.0776	40944.41	40084.26
1.5	54.43503	45442.8	45051	45818	45437.27	383.5299	45820.8	45053.74
1	36.29002	49668.6	49410.8	49737.4	49605.6	172.1733	49777.77	49433.43
0.5	18.14501	53150.6	53101.8	53425.4	53225.93	174.4579	53400.39	53051.48
0.25	9.072506	54722	55527.8	54709.4	54986.4	468.9085	55455.31	54517.49
0	0	58990	58847.8	58568.8	58802.2	214.2706	59016.47	58587.93
CONTROL		56880.8	57645	56670.4	57732.07	897.9713	58630.04	56834.1

PERCENT OF REAL VALUE

DILUTIO	PPM	5 MIL	5 MIL	5 MIL	AVG	QUENCH			+STD	-STD
						100-AVG	STD	STD		
1	181.4501	29.43494	29.01611	28.85121	29.10075	70.89925	0.30093	71.20018	70.59832	
0.9	163.3051	34.20664	34.44533	34.68402	34.44533	65.55467	0.238889	65.79336	65.31598	
0.8	145.1601	40.67826	40.42952	40.22409	40.44396	59.55804	0.227427	59.78347	59.32861	
0.7	127.0151	46.82493	45.97168	47.21466	46.67042	53.32958	0.635733	53.96531	52.69384	
0.6	108.8701	53.64991	54.74566	55.01241	54.46932	45.53068	0.722061	46.25274	44.80861	
0.5	90.72506	62.20113	62.29432	62.92136	62.47227	37.52773	0.391701	37.91943	37.13603	
0.4	72.58004	69.36838	70.83585	70.32521	70.17648	29.82352	0.744955	30.56847	29.07856	
0.3	54.43503	78.71327	78.03462	79.36317	78.70369	21.29631	0.664327	21.96064	20.63198	
0.2	36.29002	86.03295	85.5864	86.15212	85.92383	14.07617	0.298228	14.3744	13.77795	
0.1	18.14501	92.08426	91.97973	92.54025	92.19475	7.805252	0.302186	8.107438	7.503067	
0.05	9.072506	94.78614	96.1819	94.76432	95.24412	4.755878	0.812215	5.568093	3.943663	
0	0	102.1789	101.9326	101.4493	101.8536	-1.85362	0.371147	-1.48247	-2.22477	
CONTROL		98.52549	99.84919	101.6253	100	0				

dilut ppm % Q TSIE 1 2 3 avg SIS 1 2 3 avg log tsie

TABLE B16 - DATA FOR FIGURE A1-2. CONTINUED

5	181.4501	70.89925	12.1	12.2	12.2	12.16667	12.315	12.419	12.285	12.343	1.085172
4.5	163.3051	65.55467	15.9	16.5	16.3	16.23333	13.159	13.166	13.036	13.12033	1.210408
4	145.1601	59.55604	21.6	21.2	21.8	21.53333	14.109	14.165	14.206	14.16	1.333111
3.5	127.0151	53.32958	27.9	28.1	28.9	28.3	15.301	15.259	15.266	15.27533	1.451786
3	108.8701	45.53068	36.3	36.1	36.4	36.26667	16.734	16.683	16.718	16.71167	1.559508
2.5	90.72506	37.52773	46.2	47.1	47.5	46.93333	18.28	18.339	18.444	18.35433	1.671481
2	72.58004	29.82352	61.6	60.8	61.7	61.36667	20.587	20.674	20.698	20.653	1.787933
1.5	54.43503	21.29631	80.8	82.4	81	81.4	23.675	23.61	23.565	23.61667	1.910624
1	36.29002	14.07617	110	110	110	110	28.071	27.989	28.102	28.054	2.041393
0.5	18.14501	7.805252	161	162	161	161.3333	35.747	35.857	35.983	35.85567	2.207724
0.25	9.072506	4.755878	200	202	201	201	42.111	42.152	41.98	42.081	2.303196
0	0	-1.85362	269	268	268	268.3333	52.375	52.273	52.243	52.297	2.428675

SIS results

Regression Output:

Constant	77.3875	Constant
Std Err of Y Est	11.0268	Std Err of Y Est
R Squared	0.824597	R Squared
No. of Observations	12	No. of Observations
Degrees of Freedom	10	Degrees of Freedom

X Coefficient(s)	-1.77884	X Coefficient(s)
Std Err of Coef.	0.259438	Std Err of Coef.

log tsle results

Regression Output:

Constant	133.517	Constant
Std Err of Y Est	2.291002	Std Err of Y Est
R Squared	0.992428	R Squared
No. of Observations	12	No. of Observations
Degrees of Freedom	10	Degrees of Freedom

X Coefficient(s)	-56.8769	X Coefficient(s)
Std Err of Coef.	1.571017	Std Err of Coef.

TABLE B17 - DATA FOR TABLE A1.4

SEP-PAC QUENCH TEST

Sep-Pak Technique run as usual with 0 ppm water used for sample, colle
spike 10 uL acetone/phenanthrene solution, add 10 mL Scintillation Cockt

8/30/94 FILE:QUESEP

MACH EFF.

	DPM	ADJUST	% ACTUAL	AVG	STD
CONTROL	61813.4	64773.5513			
	61783.4	64742.1146	AVG		
	63266.2	66295.9237	65270.5299		
ETHACE	63306.6	66338.2584	101.635851		
	63620.6	66667.2954	102.139964		
	63832	66888.819	102.479357	102.0851	0.424425
MeCl2	49487.8	51857.6967	79.4503995		
	49185.4	51540.8153	78.9649101		
	49395	51760.4527	79.3014133	79.23891	0.248707
CONTROL	69352.9	72674.1067			
	70246.5	73610.4998	AVG		
	70025.9	73379.3356	73221.3141		
1:1	53290.4	55842.3976	76.2652218		
	53507	56069.3702	76.5752035		
	53754.2	56328.4083	76.9289776	76.5898	0.332119

TABLE B18 - DATA FOR FIGURE A1.5

Quench Curve				
9/13/94 File: quesol2				
Methylene Chloride Quench				
control	DPM Run	avg		
	1	29847.67		
	2	28199.67		
	3	29975		
		29340.78		
1 mL	DPM Run	avg	% actual	std
	1	28230.6		
	2	27137.4		
	3	28512		
		27960	95.294	2.474897
2 mL	DPM Run	avg	% actual	std
	1	26547.53		
	2	26286.87		
	3	26668.53		
		26500.98	90.32132	0.664761
3 mL	DPM Run	avg	% actual	std
	1	25197.87		
	2	24675.8		
	3	24923.8		
		24932.49	84.97556	0.89003
4 mL	DPM Run	avg	% actual	std
	1	23115.33		
	2	23225.47		
	3	23610.33		
		23317.33	79.46976	0.885786
5 mL	DPM Run			

TABLE B18 - DATA FOR FIGURE A1.5. CONTINUED

	avg	% actual	std
1	22282.93		
2	21660.47		
3	22205		
	22049.47	75.14956	1.155832

Methylene Chloride Quench			
ml	% Actual	Std	
0	0	0	
1	4.71	2.47	
2	9.68	0.66	
3	15.02	0.89	
4	20.53	0.89	
5	24.85	1.16	

Regression Output:			
Constant		0	
Std Err of Y Est		0.31169	
R Squared		0.998916	
No. of Observations		6	
Degrees of Freedom		5	
X Coefficient(s)	5.009091		
Std Err of Coef.	0.042028		

Regression Line			
Methylene Chloride Quench Curve			
mL	Quench		
0	0		
1	5.00927		
2	10.01854		
3	15.02781		
4	20.03708		
5	25.04635		

SOLVENT QUENCH			
Ethyl Acetate Quench			
control	DPM Run		File: quesol2
	avg		
1	29331.2		
2	29801.13		
3	30088.2		
	29740.18		
1 mL	DPM Run		

Ethyl Acetate			
mL	% actual	% quench	

TABLE B18 - DATA FOR FIGURE A1.5. CONTINUED

		avg	% actual	std			
2 mL	1	29240.67			0	100	0
	2	29667.8			1	99.22357	0.77643
	3	29619.33			2	99.32811	0.67189
		29509.27	99.22357	0.786388	3	99.44355	0.55845
DPM Run					4	98.85908	1.14092
3 mL	1	29348.8			5	99.2705	0.7295
	2	29371.73					
	3	29900.53					
		29540.36	99.32811	1.049536			
DPM Run							
4 mL	1	29237.33					
	2	29537.27					
	3	29949.47					
		29574.69	99.44355	1.202207			
DPM Run							
5 mL	1	29132.07					
	2	29142.13					
	3	29928.4					
		29400.87	98.85908	1.536255			
DPM Run							
SOLVENT QUENCH	1	29482.4					
	2	29658.47					
	3	29430.8					
		29523.22	99.2705	0.397584			
1:1 METHYLENE CHLORIDE:ETHYL ACETATE RATIO SERIES				1:1 RATIO			
9/8/94 FILE: QUESOL2				MIL % ACTU STD + STD - STD			
				0 100 0 100 100			

TABLE B18 - DATA FOR FIGURE A1.5. CONTINUED

CONTR0		DPM RUN		3 AVG		1:1 RATIO		% QUENCH			
	1	2		3 AVG	% ACTU	STD	MIL	% QUEN	STD	+ STD	- STD
1	15516.8	15693.2		15627	15612.33			0	0	0	0
2	15573.8	15534.2		15732.4	15613.47			1	2.868687	0.10254	2.766147
3	15671.2	15676		15555.4	15634.2			2	6.828852	0.963643	5.865209
1:1 RATIO				15620				3	9.600085	0.435543	9.164543
1 MIL	1	15215	15189.6	15160.4	15188.33		15171.91	4	12.67037	0.325145	12.34522
	2	15136.4	15234.4	15142.4	15171.07			5	15.03642	0.728781	14.30764
	3	15182.4	15095.8	15190.8	15156.33						
2 MIL	1	14616.2	14591.4	14758.6	14655.4		15171.91	0	0	0	0
	2	14368.8	14419.4	14353.2	14380.47			1	2.868687	0.10254	2.971227
	3	14662.6	14613.8	14596	14624.13			2	6.828852	0.963643	7.792495
3 MIL	1	14065.6	14027.4	14060.8	14051.27		14553.33	3	9.600085	0.435543	10.03563
	2	14119.2	14120.6	14128.8	14122.87		93.17115	4	12.67037	0.325145	12.98551
	3	14245.6	14109	14207.2	14187.27		0.963643	5	15.03642	0.728781	15.7652
4 MIL	1	13646.8	13628.6	13481.4	13585.6						
	2	13637	13649.6	13668.2	13651.6			Regression Output:			
	3	13669.4	13669.6	13717.4	13685.47			Constant			0
5 MIL	1	13166	13085.4	13172.6	13141.33		14120.47	Std Err of Y Est			0.404562
	2	13321.4	13430	13308.4	13353.27		90.39991	R Squared			0.995053
	3	13367.4	13256.6	13334	13319.33		0.435543	No. of Observations			6
								Degrees of Freedom			5
								X Coefficient(s)			3.112549
								Std Err of Coef.			0.054551
								% QUENCH REGRESSION LINE			
								1:1 RATIO			
								MIL		% QUENCH	
								0		0	
								1		3.112549	
								2		6.225099	
								3		9.337648	
								4		12.4502	

TABLE B18 - DATA FOR FIGURE A1.5. CONTINUED

5 15.56275

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