CBMS325 / CBMS825 CHEMICAL ANALYSIS II

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Tick whichever of the following is applicable:

☐ This assignment / laboratory report is entirely my own work and I have not worked with any other person in developing my answers / solutions.

☑ The final version of the submitted work is my own effort carried out without assistance from any other person, but I did work with the following other people at earlier stages:

Mark Richardson

Tamara Fernandez

I make this declaration in the knowledge that improper behaviour in the submission of academic work may result in disciplinary action without further warning.

Signature of student: _____

Submission time and date: 02/06/09.

Demonstration of Variability: Concentration of Polynuclear Aromatic Hydrocarbons (PAHs) in Soil.

Polycyclic aromatic hydrocarbons (PAHs) are chemical compounds that consist of fused aromatic rings and do not contain heteroatoms or carry substituents. They are produced as a result of incomplete combustion of hydrocarbons originating from oil, tar and coal. As a pollutant, they are of concern because some compounds have been identified as carcinogenic, mutagenic, and teratogenic. It is therefore that PAHs are closely monitored pollutant in the environment.

The aim of this study was the demonstration of the variability in the concentration of PHAs in a soil sample.

Experimental

For the demonstration of the variability in concentration of PAHs in soil samples, fifteen 10·g samples of soil originating from a single jar were analysed and the concentration of 15 different PAH species were determined. For the determination of the concentration of PHAs in each sample a solvent extraction was done fallowed by GC-MS detection.

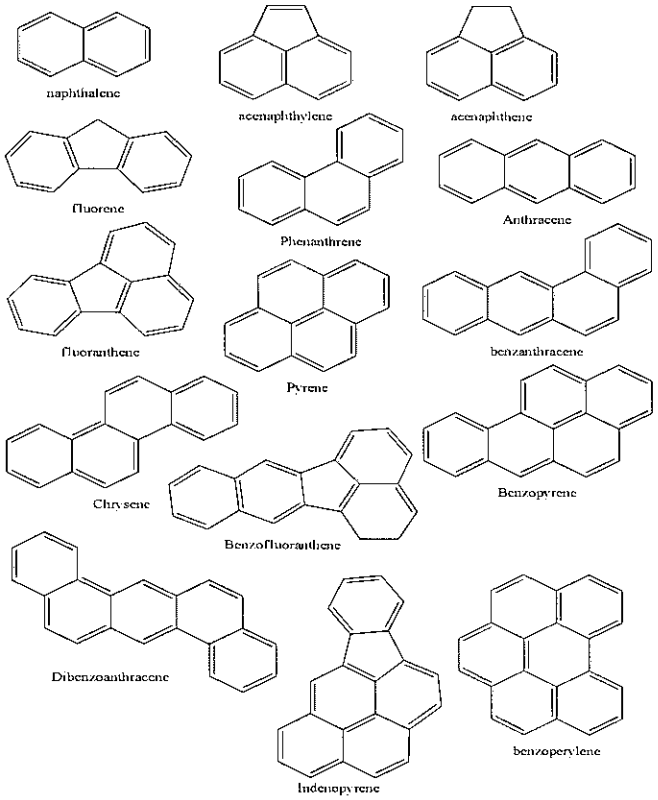

Fig 1. PAH species concentrations determined in this experiment.

Results

The results obtained in the experiment demonstrated that the concentration of the PHAs in each sample is considerably variable. The data presented in figure 2 show the variability of the concentration of each PHAs compound in each sample. Each sample in the graph has been identify with a different colour such that the variation in its concentration can be easily tracked between soil samples.

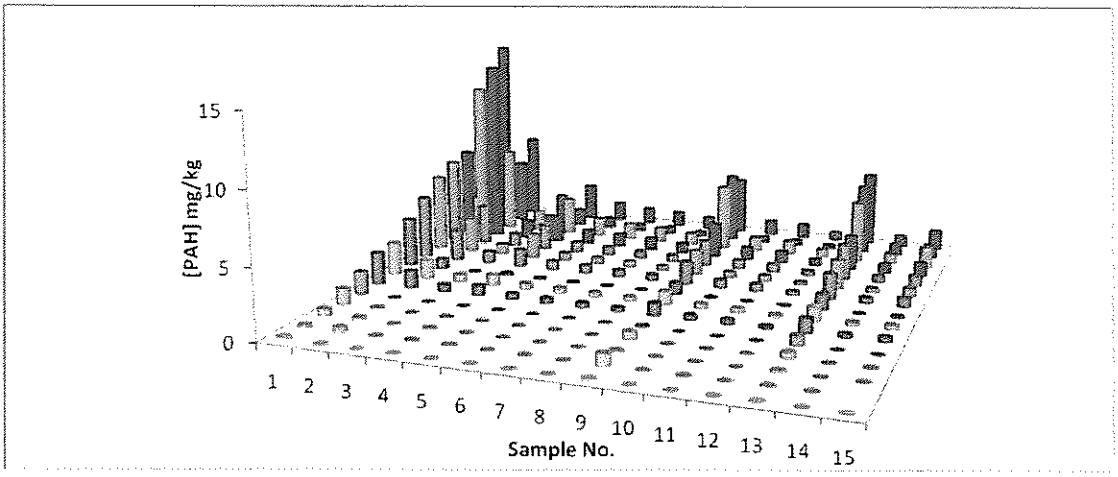

Figure 2: Graphical representation of all PAH analytes (coloured) for each of the fifteen (numbered) 10·g soil partitions.

To appreciate the variation between each sample the total average PAH content of the soil was calculated. A Grubb's test for detecting outliers was applied and samples 1, 2 and 13 were identified as outliers and eliminated from the data set. The data presented in figure3 showed the total PAHs concentrations in each sample without outliers.

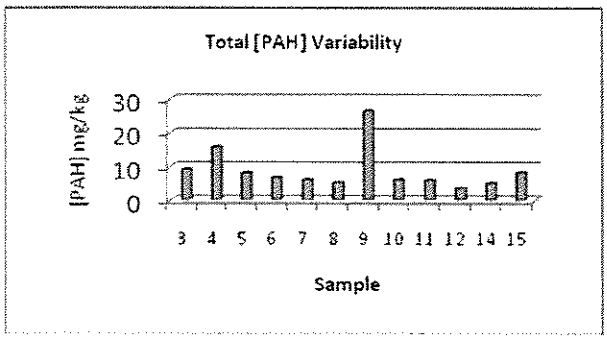

Figure 1.4: Total PAH variability without outliers.

In average the total PHAs concentration in the soil was determined to be 8.88±12.50 mg·kg^{-1} of soil with 95% confidence interval.

Conclusion

In overall from the experiment could be demonstrated that the variation on the concentration of PAHs in a soil sample can be significantly variable. it is therefore that further investigations need to be done in order to propose a new method of sampling , in which the soil can be collected in a way that the final sample to be analysed would be homogenous and representative.