Abstract

The great change in the water level of the Mekong River in each season creates the variation in many environmental factors including polycyclic aromatic hydrocarbons (PAHs). Seasonal monitoring of PAHs in water samples from 10 sampling stations along Thai-Laos Mekong River in April 2003-January 2004 from Golden Triangle to Klonghim were analyzed. Quantitative analysis of the 16 priority PAHs namely, naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, dibenzo(a,h)anthracene, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene were performed. Each PAH was extracted from water sample using SPE C18-column and eluted by hexane. The amount of each PAH was determined by EPA 8310 using HPLC-UV. The results show that there are variations of type of PAHs in each station of various seasons. The total PAHs in dry season (April 2003) was in the range of 0.0090-1.6184 ppm, and rain season (August 2003) was in the range of 0.0376-1.2541 ppm and cold season (January 2004) was in the range of 0.4351-1.5193 ppm. Although the PAHs concentration in water is low but it does not taken into account the bioaccumulation factors which range from 69-29,000 for the PAHs analyzed.

Introduction

PAHs are ubiquitous pollutants in environment, consisting of two or more fused benzene rings in linear, angular or cluster arrangement. PAHs in the atmosphere can be polluted in many kinds of environmental sample such as soil, rain, river etc., which many are known to be carcinogenic agents. The toxicity of the PAHs in environment depends on the types and quantity of each PAHs. The results of this report is to examine the distribution and seasonal variation of the PAHs in water in the Mekong River, Thailand from 2003-2004.

Materials and Methods

Analysis of PAHs by HPLC

500 ml of water from the Mekong River was passed successively through activated SPE-C18 column with a flow rate of 2 ml/min. The column was then eluted by hexane with a flow of 1 ml/min. The extract was evaporated to dryness in a rotary evaporator at 20-30 °C and the residue was transferred quantitatively into a volumetric flask using acetonitrile. Analysis of 16 PAHs in the extracts were performed by HPLC-DAD (EPA 8310) using the standard addition method.

Results and Discussion

Figure 1 shows standard chronograms of 16 PAHs from the separation using EPA 8310 method. The total PAHs observed in surface water in dry season (April, 2003) was in the range of 9.0-61.1 ppb. In rainy season (August, 2003) was in the range of 37.6-125.5 ppb and cold season (January, 2004) was in the range of 43.1-151.9 ppb. It shows that Mekong water is quite dirty compared surface water in Antarctica, 0.05-0.60 µg (Weaver and Bicego, 1987). By comparing the results with the previous year, it is found that the Mekong water is increasing in the concentration of PAHs (Bangkedphol et al., 2003). From the results, the distribution of various PAHs was affected by the changing in season. In summer (April, 2003), the concentration of PAHs in almost station was higher than other seasons.

Conclusion

This work shows the distribution of PAHs in the Mekong river at various locations and seasons. It seems that there is a seasonal variation associated with rain and temperature.

References


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