SEASONAL VARIATION OF VOLATILE POLY AROMATIC HYDROCARBONS FROM DIFFERENT SOURCES

Submitted By

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A thesis submitted in Partial Fulfillment

Of

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In

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2017

APPROVAL SHEET

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Acknowledgements

I would like to express my deep gratitude to Professor Dr. Mahmoud Hewahy, my research supervisor, for his patient guidance, enthusiastic encouragement and useful critiques of this research work. I would also like to thank Professor Dr. Mostafa Hassan Ragab, for his advice and assistance. My grateful thanks are also extended to Dr. Ashraf Zahran for his help in doing the data analysis, all EEAA teams who helped me in the site measurement.

I would also like to extend my thanks to the technicians of the laboratory of for their help in offering me the resources in running the program.

Finally, I wish to thank my family for their support and encouragement throughout my study.

Abstract

Understanding the seasonal variations of polycyclic aromatic hydrocarbons (PAHs) concentrations in ambient air in urban/rural or industrial regions is important to the effective control of air pollution in these regions. Based on an approximately a year round dataset, an intensive sampling program was conducted in this study, where a series of air samples was collected during this period at the four different function sites in South Al-Tabbin city.

A total of 48 atmospheric samples were collected by high volume active air sampler. The gaseous and particulate phases of PAHs were extracted and analyzed using GC/MS together. The total air concentrations of 16 USEPA PAHs in the study area ranged from 76.48 ± 19.44 μg/m^3 to 26995.86 ± 2835.91 μg/m^3, with an average concentration of 7085.08 ± 773.98 μg/m^3. Seasonal trends of PAH concentrations were observed with high concentration in winter and low in summer where the average concentration of PAHs in winter were ~1.6 times higher than that in summer.

The diagnostic ratio analysis was employed to determine the primary PAH sources at different function sites. The analysis indicated that different sources influence the concentration of PAHs in the function sites where coal, oil combustions, vehicle emission, and industrial processes are the main sources. Particularly, the traffic vehicle exhaust was the largest contributor for RA. Meanwhile, PAHs were predominantly from coal and oil combustions for the industrial areas (CK, TIMS and AAS).

According to BaP equivalent concentration, the potential health risks of PAHs at the two industrial sites are ~ 7.6 and ~ 4.3 times, respectively, those for residential area.

The averaged value of total BaPeq in the atmosphere of the south of El-Tabbin city is 9364 ng/m^3 in 2014. The lifetime lung cancer risk from PAH exposure by inhalation in people living

in vicinity to industrial complexes is estimated by applying the BaP equivalents (BaPeq) for PAHs and the World Health Organization unit risk for BaP (UR = 8.7×10^{-5}).

The total estimated average lifetime lung cancer risk due to PAH exposure in the study area is 1.2×10^{-2} (1.2 additional cases per 100 people exposed) while the annual cases of lung cancer that could be attributed to this PAH exposure is ~ 17. The estimated risk was higher than values recommended by the World Health Organization as well as higher than the threshold value of 10^{-3} that is considered an indication of definite risk.

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