DETERMINE THE EFFECTIVE MINIMUM AND MAXIMUM EXPOSURE TIMES FOR PASSIVE AIR QUALITY MONITORING SAMPLER FOR THE ANALYSIS OF AMBIENT NITROGEN DIOXIDE (NO2) AND SULFUR DIOXIDE (SO2) CONCENTRATIONS

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Abstract

Monitoring air quality using passive sampling is a widely used technique mainly due to its low cost and suitability to a wide range of environmental conditions under minimum supervision. The technique uses the Fick's first law of diffusion, where analytic molecules are allowed to flow freely from sample media to collection media over its concentration gradient, followed by absorbing in to medium specific for target pollutant. The pollutant concentration measured by the passive sampling technique depends on several factors; sample matrix, the chemical and physicochemical properties of target pollutant, geometry and aerodynamic features of sampling devise, and more importantly the meteorological conditions in sampling environment etc. The interplay of these factors has direct effect on the actual uptake of the target pollutant by the sampler, and they may often deviate from As Fick's first law as it is based on the assumption that air flow occur under steady state conditions. Therefore, influences of above factors are critical in accurate estimation of pollutant concentration. The sampling methodology, designing the sampling devise, a special attention is given, the resulting concentration variation due to meteorological parameters and other factors have been also been considered by introducing a correction factors in the calculation. Therefore in present world use of passive sampling techniques for air pollution monitoring is an evolving subject with continuous improvement on multiple aspects. However, the literature review suggest a gap in current knowledge on some important factors; the effective minimum and maximum exposure period of the passive sampler under varying environmental conditions, and studies on this are very much scares in Sri Lanka.

The objective of this study is to determine the effective minimum and maximum exposure periods of passive air samplers under different environmental conditions. A widely used Ogawa passive air sampler in the world was used to determine the effective minimum and maximum exposure period for the measurement of ambient concentration of NO2and SO2 using modified Ogawa methodology by the National Building

Research Organization. The passive samplers were exposed to the ambient air and analysed daily for 30 days. The results shows lowest coefficient of determination value and the lowest gradient in the linear regression line between the 7th day to 30th day for both SO_2 and NO_2. Accordingly, the effective minimum exposure period is considered as 7 days and the maximum period is 30 days. Further, the analysis shows that effective minimum exposure period has resulted a higher concentration and lower concentration than the actual concentration for minimum and maximum exposure periods respectively.

Key words: Passive Samplers, Exposure Levels, Ambient Concentrations