

2.105 Composition, Source Apportionment and Health Risk Assessment of PM_{2.5} in Kuala Lumpur City Centre in 2015-2016.

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Abstract:

This study aims to determine the composition and health risk assessment of PM_{2.5} collected during seasonal cycles including haze episode in the Kuala Lumpur city centre. The samples were collected on quartz microfiber filter using a high volume air sampler (HVS) with the flow rate of 1.13 m³ min⁻¹ on a 24 h basis. The sampling campaign was conducted for a year, starting from June 2015 to May 2016. The composition of PM_{2.5} determined were water soluble ionic ions (WSII), trace metals, biomass tracers, black carbon and polycyclic aromatic hydrocarbons (PAHs). The possible sources of PM_{2.5} were apportioned using Positive Matrix Factorisation (PMF). The health risk was assessed according to United States Environmental Protection Agency (USEPA) methodology. The results showed that the annual PM_{2.5} concentrations was 30±26 µg m⁻³. About 38%,

19% and 7% of the daily samples exceeded the World Health Organization Guideline, USEPA Air Quality Standards and Malaysia Ambient Air Quality Standard (Interim I-2015), respectively. During haze episode, the $PM_{2.5}$ concentration measured was $72.3 \pm 37.8 \mu\text{g m}^{-3}$. From the inorganic compositions of $PM_{2.5}$, five factors were identified where the main source comes from mixed secondary inorganic aerosols (SIA) and biomass burning (37.9%). The source apportionment of the organic $PM_{2.5}$ revealed that the main source was released from gasoline emission (29.1%). The excess lifetime cancer risk (ELCR) and hazard index (HI) for trace metals inhalation exposure was the highest among the adult group ($4.56 \text{ E-}05$) and infant group ($\text{HI} = 2.128$), respectively. The incremental lifetime carcinogenic risk (ILCR) for PAHs inhalation exposure was the highest among the adult group ($1.42 \text{ E-}07$). Overall, this study revealed that more attention should be given to sensitive groups as they develop higher health risk than others.