

Determination of Source and Assessment Toxicity on Organic and Inorganic Extracts of PM_{2.5} near a Coal Fired Power Plant in Klang, Malaysia

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ABSTRACT

Available evidence suggests that both elemental carbon (EC) and secondary inorganic aerosols are associated with adverse health effects. The pathogenicity of particulate matter (PM) is determined by their size, composition, origin, solubility and their ability to produce reactive oxygen species. PM_{2.5} can penetrate deeply into the lung, irritate and corrode the alveolar wall, and consequently impair lung function. Previous study also indicates that PM_{2.5} emitted from coal combustion cause decrease in viability, increase global DNA methylation, and cause oxidative DNA damage at cellular level. PM_{2.5} monitoring is progressively added to Malaysia air monitoring program. However, current monitoring coverage of PM_{2.5} is still limited. A study was conducted in an area near to the coal power plant in Klang, Malaysia. This study aims to determine the source and assess the genotoxicity of organic and inorganic extracts of PM_{2.5}. Four sampling stations locations in Klang where three stations are located within 5 km radius of the coal plant while one station is located about 6 km away from the plant. PM_{2.5} is collected using High Volume Sampler (HVS) 24 hours daily, twice per week for each sampling station throughout 2018. Inorganic composition of PM_{2.5} will be analysed with Inductively Coupled Plasma – Mass Spectrometry (ICP-MS). Organic compounds from the air samples will be extracted through sonication and solid phase extraction (SPE). Positive Matrix Factorisation (PMF) will be conducted to determine the source of organic and inorganic pollutants residing within PM_{2.5}. The extraction will be exposed to V79 cells to assess its cytotoxicity in MTT Assay and genotoxicity in Alkaline Comet Assay. Extractions will be analysed through Gas Chromatography – Mass Spectrometry (GC-MS) to identify the organic components that could influence the genotoxic and cytotoxic effects. American Meteorological Society and U.S. Environmental Protection Agency Regulatory Model (AERMOD) and Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) will also be conducted to study the influence of meteorology towards PM_{2.5}. The study is still ongoing.