Physicochemical Characteristics of Airborne Microplastics: A Study of a Coastal Area

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Abstract

Airborne microplastics (AMPs) have gained increasing attention in recent years due to their potential adverse effects on human health and the environment. This study investigated the presence of AMPs in fallout samples collected at Universiti Malaysia Terengganu. Atmospheric fallout samples were collected over a seven-month period (December 2022 to June 2023) using a passive sampler. Quantification and characterization of AMPs based on shape, size and colour were conducted through visual inspection using a stereomicroscope. Polymer type and surface morphology were further analysed using Attenuated Total Reflectance-Fourier Transform Infrared Spectroscopy (ATR-FTIR) and Scanning Electron Microscopy with Energy Dispersive X-ray Spectroscopy (SEM-EDS), respectively. The average deposition flux of MPs was 35.73 particles/m^2/day. AMPs were predominantly fibres (82%), with the majority being transparent in colour (31%), and most commonly falling within the 1.0 – 5.0 mm size range (53%). The primary polymer types identified included polyethylene terephthalate (PET), polypropylene (PP) and nylon. SEM images revealed surface features such as cracks, abrasions and attached particles, indicating weathering effects. As AMPs represent an emerging class of pollutants, further research is needed to better understand their sources, distribution and impacts towards environmental and health.

Keywords: Microplastics; Airborne; Coastal area; Polymer.