Title : PARTICLE SIZE DISTRIBUTION PATTERNS: A CASE STUDY OF INDOOR AIR UNDER VARIOUS CONDITIONS

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ABSTRACT

Indoor air quality has been identified as heavily influenced by particle size distribution, with fine particle often representing the most significant component of the air we breathe. Very fine particle, particularly those of 0.3 μm to 1 μm, are of primary concern due to their high particle number and ability to remain for extended periods. The objective of this study is to measure particle size distribution and analyze the influence of human activity and ventilation influence particles across different size ranges. Three different indoor locations, including a classroom, a dormitory and a library, were selected to study particle size distribution using a particle size analyzer (Optical Particle Sizer, OPS model 3330). Particle sizes ranging from 0.3 μm to 10 μm were measured and classified into 13 size bins (0.3μm, 0.4μm, 0.55 μm, 0.7 μm, 1 μm, 1.3 μm, 1.6 μm, 2.5 μm, 3 μm, 4 μm, 5.5 μm, 7 μm, 10μm). The results show that the highest particle number concentrations were observed at 0.3 μm (50.97±30.72 #/cm³), 0.4 μm (11.88±7.59 #/cm³), and 0.55 μm (1.61±0.99 #/cm³), together accounting for more than 99% of the total particle counts. The classroom exhibited the highest particle number concentrations for PM0.3 (86.33±12.80 #/cm³), PM0.4 (19.76±5.36 #/cm³), and PM0.55 (2.62±0.62 #/cm³), whereas the dormitory (PM0.3 (35.78±14.47 #/cm³), PM0.4 (8.09±4.01 #/cm³), and PM0.55 (1.27±0.52 #/cm³)) and the library showed lower particle counts

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(PM0.3 (30.82±5.71#/cm³), PM0.4 (5.52±1.14 #/cm³), and PM0.55 (0.69±0.13 #/cm³)). Elevated peaks observed in the classroom and dormitory were associated with human activities such as walking, opening doors, and teaching. In contrast, particle concentrations in the library peaked at night, likely due to the air purifiers being turned off. In conclusion, $PM_{\mathbf{1}}$ dominated particle number concentrations, and particle size distribution varied with human activities across indoor environments.

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