

Number Concentrations And Size Distributions Of Nanoparticles During The Use Of Hand Tools In Refurbishment Activities

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Abstract

Hand tools, such as a sledgehammer, are widely used in refurbishment activities; nonetheless, there is very little knowledge on nanoparticle generation. We measured particle number size distributions (PSDs) and concentrations (PNCs) in the 10–420 nm using a NanoScan scanning mobility particle sizer (SMPS) during the use of hand tools (i.e., sanding and removal of wall) in a real indoor refurbishment environment. Results indicated that refurbishment activities from removal of wall increased average PNCs by ~ 6 times over the background while it was ~ 1.5 times higher than sanding. The highest total PNC was 1.9×10^5 particles cm^{-3} that corresponded to removal of wall activities. For sanding activities, PNC was lower as the coat of the plaster was probably slightly wet. Moreover, comparison between the two principal activities showed a similar peak in the accumulation mode (~ 65 nm), with a monomodal pattern. Results suggest that removal of wall activities emitted nanoparticles with a 59% of contribution in the Aitken mode. According to these data, it can be inferred that the application of hand tools in refurbishment activities generates lower total PNC than using electromechanical equipment. This study may contribute to our understanding of nanoparticle generation in refurbishment activities.

Keywords

Indoor Environment; Nanoparticle Exposure; Nanoparticles; Particle Number Concentration; Particle Size Distribution; Refurbishment