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An insight into chemical and physical properties of atmospheric depositions in an Asbestos Roofing Factory in Sri Lanka

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Dust generated from manufacturing of asbestos related products may become a respiratory health hazard for the workers. Therefore, characterizing dust and the available asbestos in the atmosphere of an asbestos roofing factory can be used to co-relate with the possible health risks faced by the workers during their working hours. An asbestos roofing factory with two production sections was selected for the study. Five sampling sites were selected from each production section, which included: sheets loading area, broken sheets dumping area, sheets cutting area, and sites closer to pulverizing machine and cement silo. Deposition samples were collected using dry deposition sampling apparatus, once a week for 6 times (Total 30 samples). Samples were observed under SEM to visualize the physical properties and EDX (Energy Dispersive X-Ray Analyzer) was used to identify the composition of the atmospheric particles. The samples were analyzed for toxic heavy metals by acid digestion and subjected to ICP-OES searching for the trace metals in the atmospheric dust which may have been in the raw materials (Cd, Zn, Cr, Pb, Cu, As, Ni, Hg).

The samples observed under the SEM, confirmed the presence of asbestos fibers in the atmospheric depositions. From EDX, Mg, Si, Ca, Fe, S Al and K were observed as major elements in the composition of the atmospheric particles inside the factory. The average concentrations of the trace metals in the samples were; Cd- 2.74, Pb- 17.18, Ni- 46.68, Cr- 81.01, As- 7.12, Co- 6.77 and Cu- 43.04 mg/kg. However, Hg was not detected in the samples. Zn, Al, Mg and Fe were reported high in the deposition samples; 0.2-12, 1.9-4.8, 57-163 and 12-112 g/kg respectively. The presence of asbestos fibers and toxic heavy metals in the atmospheric depositions inside the factory implies necessity of strict safety concerns of the workers.

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Keywords: Asbestos, Deposition samples, Heavy metals, ICP-OES, SEM