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INVESTIGATION OF RELEASE AND DETERIORATION OF CHRYSOTILE FIBRES IN CORRUGATED ASBESTOS-CEMENT ROOFING SHEETS

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Asbestos sheets have gained popularity as roofing materials in Sri Lanka due to their affordability and durability. The objective of the research is to assess the deterioration of asbestos sheets under tropical conditions and their environmental impact. Samples were collected from Giriulla, Sri Lanka, which experiences a dry climate with slightly acidic rainfall. The collected samples of rainwater directly and rainwater that passed through the asbestos cement sheets during different rainfall events were analysed to measure total hardness and Mg^{2+} concentration using the EDTA titrimetric method and atomic absorption spectrometry, respectively. The findings indicated that the Mg^{2+} concentration in the surface runoff water collected from the roof was higher than that of the direct rainwater in two rainfall events. In another rainfall event, the Mg^{2+} concentration was almost equal in both types of samples. This suggests that the asbestos cement sheets contribute to an increased presence of Mg^{2+} in the runoff water from the roof. The rainwater collected from the surface runoff of the asbestos sheet roofing contained an average of $(6.62 \pm 0.14) \times 10^4$ fibres per square meter per litre. These fibres were observed to have lengths ranging from 40µm to a few millimetres. It is inferred that the dispersal of these fibres into the surrounding areas is facilitated by rain and wind. The optical microscopic imagery of the surface of asbestos sheets also revealed that fibres can be easily removed from the surface of asbestos sheets. The current study suggests that fibrous materials can easily detach from the cement matrix of degraded asbestos sheets upon contact with rainwater and subsequently be released into the environment. These fibres are particularly susceptible to inhalation, which can lead to severe health issues. Applying a sealer as a preventive measure can be recommended to mitigate the deterioration of asbestos sheets.

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Keywords: Asbestos-cement sheets, Chrysotile fibres, Total hardness