

UNDERSTANDING ALTERATION PHENOMENA OF ASBESTOS-CEMENT SHEETS IN SRI LANKA

**R.K.D.S. Samaradiwakara^{1,2*}, C.P. Galagoda¹, H.M.T.G.A. Pitawala^{1,2},
M.M.M.G.P.G. Mantilaka¹ and D.G.G.P. Karunaratne³**

¹*Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka*

²*Department of Geology, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka*

³*Department of Chemical and Process Engineering, Faculty of Engineering, University of Peradeniya, Peradeniya, Sri Lanka*

**samaradiwakararkds@gmail.com*

Asbestos-cement sheets are one of the major roofing solutions in Sri Lanka, although asbestos fibres may enter the human body by inhalation leading to fatal diseases, such as mesothelioma, asbestosis and lung cancers. The objective of the present study was to understand the alteration processes on the surface of the asbestos sheets which may lead to the release of mineral fibres into the atmosphere. Fifteen samples were collected from asbestos roofing sheets having different alteration levels in Kandy and Colombo urban areas where different climatic conditions are experienced. Samples were scrapped carefully from the surfaces of asbestos sheets. X-ray diffraction and optical microscopic analyses were carried out in order to characterize the samples. Calcite, quartz, feldspar and chrysotile are the common minerals found in the studied samples. The cement material consists of calcite and portlandite. They may have been subjected to alteration, and both aragonite and calcite have been formed as secondary products. In contrast to the samples collected outside, those from inside of houses do not show any alteration products of calcite. It may be due to the low exposure to the environment. However, chrysotile is present in both samples collected from inside and outside of roofs. The fibres released from the inside surface of the roof or ceiling may cause more hazardous effects as they tend to deposit in the household due to lack of ventilation. Highly altered asbestos sheets are characterized by visible layers of fibres, and they can be easily removed from the cement matrix. It indicates that such fibrous materials can be blended with the atmosphere. Moderately altered sheets also have partially enclosed bundles of fibres which were seen in the cement matrix under microscopic analysis. There are no significant differences in terms of mineralogical compositions in the samples of both areas. Rapid alterations and physical processes occur on the surface of the roofs under the tropical climatic conditions resulting in the release of hazardous asbestos fibres into the environment. Therefore, the present study suggests that roofing sheets are one of the major anthropogenic sources of atmospheric pollution. Proper preventive measures, such as the introduction of effective coating or sealer on the surface of the roof, frequent maintenance of the roofs and encouragement to install wood ceilings, can be considered to prevent this issue.

Financial assistance from the National Research Council (Grant No. AB 19-004) and Ministry of Industry and Trade, Russia is acknowledged.

Keywords: Alteration, Asbestos-cement sheets, Atmospheric pollution, Fibres