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Identification of dangerous fibers: some examples in Northern Italy

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The presence of asbestiform minerals has to be foreseen in the planning of infrastructural activities: Asbestos can be a component of sedimentary rocks or of mafic and ultra mafic metamorphic rocks. Surveys and core drilling, in addition to providing important information on the quality of the rock and its geotechnical characteristics, allow for a prediction of the presence of asbestiform minerals in the areas affected by mining or infrastructural activities. During the excavation, workers can be exposed to the asbestos risk, therefore, the control of the air quality and of the excavated materials are fundamental for the safety of involved people.
In this work some problems we met in the analysis of airborne filters and bulk samples from sites in northern Italy are presented. The asbestos fibers present in rocks as accessory minerals, are often different in habit and dimension from the well-known asbestos fibers used as industrial minerals and moreover can be erroneously identified as minerals morphologically and chemically similar present in the same rock or environment. In the case of tunnel muck it could be contaminated by substances used for the excavation that could modify colours and optical properties of asbestos minerals. In the PCOM (Phase Contrast Optical Microscope) analysis chrysotile, sepiolite and antigorite, due to their different refraction index, when the fibers have dimension > 0,5 micron and aren't contaminated by lubricant can be easely identified even if the morphology of chrysotile is very similar to that of sepiolite.
In Electron Scanning Microscope (SEM) the discrimination between chrysotile and antigorite on the airborne filters is not always possible because the fibers of thin dimensions show similar habit and spectrum.
In the case of the tremolite amphibole, morphology changes from prismatic to fibrous depending on its origin (p.eg. Monastero, Val Grana, Verrayes, Brachiello). Both prismatic and asbestiform tremolite (Gamble and Gibbs, 2007; Addison and McConnel, 2007) may show inhalable elements with width less than 3 micron, length more than 5 micron and width length ratio 1:3, whose dangerousness (fiber coming from fibrous tremolite or the cleavage fragments coming from prismatic tremolite) could be different and it is object of epidemiologic studies.