



Engineering Sciences Section – 2009

C15 Variation of Refractive Index and Elemental Composition Within a Mineral Wool Product

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After attending this presentation, attendees will understand the terminology of glass fibers and the variation of elemental composition between fibers in a single product sample.

This presentation will impact the forensic community by showing how single mineral wool fibers can not be easily classified as a single glass fiber product.

Using glass fibers as trace evidence presents quite a challenge to the microscopist. The optical properties and the elemental composition of mineral wool fibers (non-continuous glass fibers made from rock (basalt) and/or slag) can vary considerably within a single insulation product. Relying on the optical and elemental composition of one fiber (or even several fibers) found as trace evidence can lead to an incorrect determination as to the mineral wool product type and its source of manufacture.

After attending this presentation, attendees will gain an understanding of the types of glass fibers that are manufactured as insulation and routinely found in everyday residential dust. The definitions of glass or vitreous fiber products that are manufactured and used as insulation will be explained. Examples will be presented that show the overlap in optical properties and elemental compositions amongst glass fibers that are different products with those manufactured from different starting materials. The differences in the reported elemental composition between slag and rock wools (slag and rock wools are mineral wools manufactured from rock and from slag) over the last forty years will be presented. One explanation for the reported differences is the large overlapping range in the elemental compositions of slag wool, rock wool, and mineral wool glass fiber insulation products. The range of optical properties and elemental composition of mineral wool glass fiber insulation products purchased and measured recently will be presented.

Mineral wool, slag wool, and rock wool fibers are excellent insulating materials that are found in ceiling tiles, paper-backed roll insulations and blown insulation products. Glass fibers do not burn and they have not been linked to carcinogenic activity since the beginning of their manufacture. Slag wool and rock wool fibers have optical and elemental properties that overlap between mineral wool product types making the classification of single fibers found as trace evidence as a particular product type difficult, if not impossible. A case study where the iron content of mineral wool fibers was considered as a marker for the classification of mineral wool fibers originating from the destruction of the World Trade Center towers will be presented as an example of just how difficult the characterization of these fiber types can be.

Mineral Wool, SEM-EDS, PLM