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Dr. Stephen D. Gettings, Ph.D.
Director - Toxicology
The Cosmetic, Toiletry, and Fragrance Association
1101 17th Street, NW
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Washington DC 20036-4702

Dear Dr. Gettings:

I received and have critically reviewed your manuscript *Talc: Occurrences, Characterization and Consumer Applications*. I believe that the paper is well written and I have made only a few comments and suggested corrections on the MS. I have one major comment - that is the description of the talc crystal structure could be improved. On the back of page 3 I have given my own description (from: *A Definition for Talc*, ASTM Pub. 834, paper enclosed). The paragraph on the top of page 13 is well done and I agree with the entire statement.

In regard to my opinion of whether chrysotile asbestos is commonly or uncommonly associated with cosmetic grade talc, I offer the following statement:

> Many talc-bearing rocks form from ultramafic rocks, the central core of which is composed of serpentinite surrounded, successively, by shells of talc-carbonate rock and talc-bearing steatite (steatite is synonymous with soapstone). Usually a thin wall schistose rock, composed essentially of chlorite, separates the steatite from the country rock. The serpentinite is composed mostly of the non-fibrous serpentine minerals lizardite and antigorite, but small amounts of chrysotile asbestos may also occur within the serpentinite. The talc-carbonate and steatite shells, which surround the serpentinite core, contain abundant talc but do not contain asbestos. In the mining of the talc ore the serpentinite core is avoided, thus preventing asbestos contamination. Careful mining procedures and careful beneficiation by modern methods ensure minimal, if any, contamination by asbestos.

I hope my review and the above statement will be of assistance to you. Please let me know if I may be of any further help.

Very sincerely,

Malcolm Ross

Malcolm Ross, Ph.D.
Research Mineralogist

Enclosures (2): the paper *A Definition of Talc* and the reviewed manuscript.

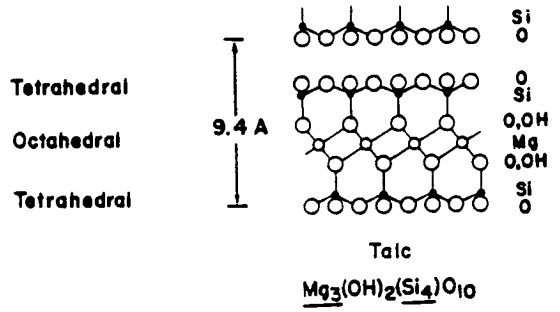

FIG. 1—*A b-axis projection of the crystal structure of talc,* $Mg_3Si_4O_{10}(OH)_2$. *The a-axis is horizontal.*

Crystal Structure

The crystal structure of talc is composed of composite sheets lying parallel to the plane of the *a* and *b* axes and repeating every 9.4 Å in the direction of the *c*-axis. These sheets consist of three sublayers—a layer of edge-linked $MgO_4(OH)_2$ octahedra sandwiched between two identical layers of corner-linked SiO_4 tetrahedra. The apical oxygen atom positions of the tetrahedral layers are shared with one of the oxygen atom positions of the octahedral layer. A schematic representation of the structure of talc is shown in Fig. 1. Small amounts of aluminum can substitute for silicon in the tetrahedral positions and small to moderate amounts of aluminum, Fe^{3+}, Fe^{2+}, and manganese for magnesium in the octahedral positions.