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Health Information Cabot Aerogel Product(s)

Cabot Corporation's Aerogel products are surface modified synthetic amorphous silica—not crystalline silica. The product line includes: Translucent Aerogel; Aerogel Beads; Fine Particle Aerogel; and IR Opacified Aerogel Products. The aerogel products are not nanometer sized particles; the particles used in most applications are large, ranging in size from 0.5 to 4 mm. Cabot also manufactures and sells finer grades into the coatings market that range in size from 8 to 200 microns.

Recent news articles have linked “silica” to silicosis, lung cancer and other pulmonary diseases. The single term “silica” (CAS No. 7631-86-9) refers to a variety of substances. All have the elemental composition SiO_2 , however, included in the one term are crystalline forms and a wide variety of amorphous forms.

These recent press articles do not differentiate between crystalline silica and synthetic amorphous silica. Although chemically identical, crystalline silica and synthetic amorphous silica are structurally very different, with dramatic differences in their health implications.

The crystalline forms of silica, quartz, tridymite, and cristoballite if inhaled as fine particles (dust) can have potentially serious long-term effects which may result in the disease, “silicosis”. Silicosis is manifested by progressively more severe inflammation and formation of fibrotic tissue in the lung, which serves the function of encysting the silica particles, reducing lung function.

Occupational exposure to crystalline silicas has been studied for well over 50 years and silicosis has been a recognized disease condition for nearly 80 years. Numerous studies have been performed and have determined that silicosis is caused solely by exposure to crystalline silicas.

The amorphous silica forms include precipitated silica, pyrogenic (fumed) silica, and silica gels (including aerogels). A study involving 165 workers exposed to synthetic amorphous silica dust for an average of 8.6 years showed no correlation in pulmonary function with either the dose of synthetic amorphous silica or total years of exposure. Of the 143 workers in the study with serial radiographs and exposure only to synthetic amorphous silica, none had radiographic pneumoconiosis. The authors concluded that respiratory symptoms in workers were correlated with smoking but not with synthetic amorphous silica exposure. Serial pulmonary function values and chest radiographs were not adversely affected by long-term exposure to synthetic amorphous silica.¹



The major health related difference between the two forms of silica is that crystalline silica persists in the lung while synthetic amorphous silica is rapidly removed by the lung's natural defense mechanisms.²

With respect to cancer as a risk of exposure to amorphous silica, the International Agency for Research on Cancer (IARC) stated: "They (amorphous silica compounds) are generally less toxic than crystalline silica and are cleared more rapidly from the lung."³ IARC did not identify amorphous silicas as either an animal or human carcinogen in its most recent review. McLaughlin and others have drawn similar conclusions.⁴

In summary, amorphous silica compounds are markedly different in their potential health effects than crystalline silicas. Comparisons to asbestos and other hazards are not appropriate in light of decades of occupational health research.

This information is being provided as of the date hereof. Please refer to Cabot's website – www.cabot-corp.com - for any updates to this information.

¹ Wilson, R.K., Stevens, P.M., Lovejoy, H.B., Bell, Z.G., Richie, R.C. *Respiratory Effects of Inhaled Amorphous Silica*. In: *Health Effects of Synthetic Silica Particulates*, Ed. D. D. Dunnom, American Society for Testing and Materials, STP 732, pp. 185-198, 1981.

² *Occupational studies confirm this observation. Merget et al, summarized studies of amorphous silica conducted over the past 50 years; both pyrogenic and precipitated types of amorphous silica have not been associated with pneumoconiosis in workers. Merget, R et al. Health hazards to inhalation of amorphous silica, Ach Tox 2002; 75: 625-34.*

³ *IARC has classified amorphous silica as a Group 3 substance. A Group 3 substance "is not classifiable as to its carcinogenicity to humans". IARC, Monograph 68, p 210, 1997.*

⁴ *McLaughlin JK et al, "Amorphous silica: A review of health effects from inhalation exposure with particular reference to cancer.", J. Toxicology Environ Health 1997; 50: 553-66.*

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