

Health Effects of Crystalline Silica

Silica occurs virtually everywhere on the earth's surface. Crystalline silica is in most of the rocks found in the earth's crust and in gravels, sands and soils. Industrial sand contains a very high percentage of silica, in the form of quartz, and is distinguished by its high degree of purity. Industrial sand must meet stringent quality requirements for its use in ceramic products and the health effects caused by its inhalation in a number of industries are of concern.

It is essential to provide a safe and healthful workplace for workers exposed to crystalline silica. Each workplace is different and only the users of the material can know and implement the appropriate controls, protections, policies and procedures to protect workers and customers from the respiratory health effects of crystalline silica. Occupational exposure to crystalline silica occurs by breathing silica-containing dusts and inhalation of excessive amounts of these dusts is a serious health concern. The primary and most commonly known health hazard is **silicosis**, a fibrotic lung disease (development of scar tissue in the lungs) which can be progressive and disabling, and can lead to death.

There are three different types of silicosis. **Chronic silicosis** may result from prolonged inhalation of excessive levels of respirable silica dust, and may take many years of exposure to develop. **Accelerated silicosis** may occur in a relatively shorter period of time from the inhalation of intense excessive levels of respirable silica dust. **Acute silicosis** develops rapidly and has been reported in occupations such as sand blasting and drilling through silica-containing rock. Cases of acute silicosis and complicated cases of chronic silicosis and accelerated silicosis can be fatal.

The occurrence of lung cancer caused by crystalline silica exposure continues to be studied. In 1997, the International Agency for Research on Cancer upgraded its classification of inhaled crystalline silica from occupational sources as carcinogenic to humans. Designated a Group 1 agent, the IARC sites sufficient evidence of carcinogenicity in humans. The human studies reviewed by the IARC included inhalation resulting from workplace exposures. In the overall evaluation, the IARC noted that carcinogenicity was not detected in all industrial circumstances studied, and may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs.

Safety and health programs, policies and procedures should be implemented and enforced to control silica hazards in the workplace and include:

- wearing a NIOSH-approved respirator when working around silica dust;
- warning and training workers concerning hazards;
- crystalline silica dust sampling;
- engineering controls;
- good housekeeping; and
- medical surveillance of workers focusing on respiratory health.

These programs, policies and procedures must be designed to fit the specific needs of the workplace. For further information on such programs, contact the National Institute for Occupational Safety and Health at (800)35-NIOSH.