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EH&S FACT SHEET
Environment, Health and Safety Information for the Berkeley Campus

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Working with Silica Gel

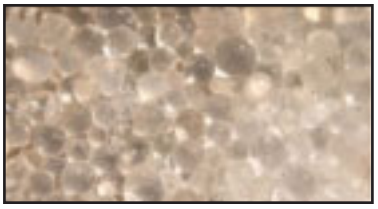
Many campus laboratory researchers work with silica gel and may be aware of health effects from the inhalation of silica. The object of this fact sheet is to differentiate the hazardous effects of overexposure to silica and explain the relatively non-hazardous nature of working with silica gel.

What is it?

Silica refers to a naturally occurring mineral that consists of silicon dioxide (SiO_2), which is formed by the chemical reaction of silicon and oxygen. Because oxygen and silicon are abundant elements, the natural formation of silica is quite common in the earth. Sand is a common example of naturally occurring silica.

Silica can be either crystalline or non-crystalline. Quartz is a common form of crystalline silica while diatomaceous earth is a common form of non-crystalline silica (amorphous). The form of silica depends upon the temperature and pressure when it was created. Non-crystalline and crystalline are chemically similar (both SiO_2) and both are solids at room temperature, and appear similar, but their physical forms and their internal structures are very different. Silica gel is precipitated amorphous silica, with a chemical formula of H_2O_3Si.

Silica quartz



Silica gel beads

Chromatography process

During the chromatography process in a laboratory, potential exposure to airborne amorphous silica occurs when handling and filling the chromatography columns with silica gel. This process is performed in short periods of time, perhaps 5 to 10 minutes per column. The size of the particles is typically 40-60 microns, which is larger than the respirable particle size of less than 10 micron. Negative health effects from inhalation of amorphous silica when filling chromatography columns are unlikely since the amorphous silica is not considered hazardous, the particles are not respirable, and exposure is relatively short.

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This photo is of a very small chromatography column being filled with silica gel. Many separatory columns are much larger, but the same material is used to pack the columns.

Inhalation of Crystalline Silica

Occupational exposure to airborne *crystalline* silica (such as during sand blasting, tunneling, or work in a quarry) does have hazardous health effects and can cause a number of respiratory diseases, and has even been classified as a human lung carcinogen. Inhalation exposure to respirable crystalline silica can cause silicosis, which in severe cases can be disabling, or even fatal. Silicosis may occur when respirable-sized crystalline silica dust is inhaled into lower reaches of the lung and causes the formation of scar tissue, thus reducing the person's ability to take in oxygen. For more information on health effects from exposure to crystalline silica please refer to OSHA Fact Sheet at www.osha.gov/OshDoc/data_General_Facts/crystalline-factsheet.pdf. The Office of Environment, Health & Safety (EH&S) is available to conduct exposure assessments and consult with you on proper procedures and safeguards if you are working with crystalline silica.

If you have any further questions on safety of working with silica gel or exposure to airborne silica at UC Berkeley, contact EH&S at 642-3073, or ehs@berkeley.edu.