Laboratory Safety Bulletin

Phone: 519-253-3000 Ext. 3523 • E-mail: ccc@uwindsor.ca • Web: www.uwindsor.ca/ccc
Location: Essex Hall / B-37 • Hours: 8:30 am to 4:30 pm (M-F)

DESIGNATED SUBSTANCE: SILICA

What is so hazardous about Silica?

In its natural form silica exists as colorless, white, black, purple and green crystals. Did you know that there are two forms of silica, crystalline and amorphous? Crystalline silica (2-3 µm or smaller) is hazardous and is commonly found in the form of quartz in most rock types and sometimes in the form of cristobalite and tridymite in volcanic rocks (Fig. 1). Repeated exposure to crystalline silica dust for 1-2 years can be carcinogenic and can cause silicosis of the lungs. Currently, silicosis is not treatable. Amorphous silica is commonly found in the laboratory in the form of silica gel (white powder) used in chromatography. The chemical, physical and toxicological properties of amorphous silica are not fully clear. Therefore, it is recommended that amorphous silica be handled with the same level of care as its crystalline form.

SiO_2

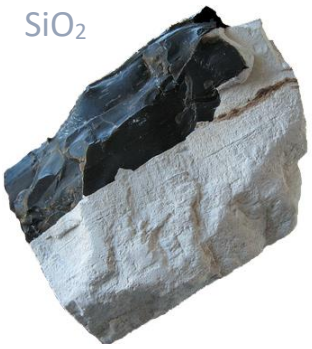

Figure 1

Hazard Classification – Silica

WHMIS

NFPA

Health: 2
Flammability: 0
Reactivity: 0
Specific:

How does Silica affect your lungs?

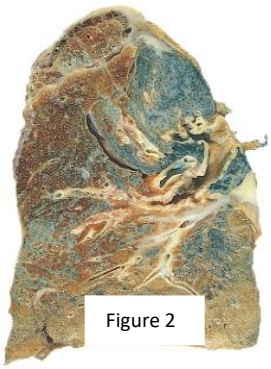

Figure 2

Silica is mainly hazardous in its dust form. The contacts of silica with skin, eyes, and mouth have been shown to cause temporary irritation following short term exposure. When silica dust enters the respiratory system, during long term exposure (1 year), it scars the lungs causing silicosis (blue colour in Fig. 2). Silicosis normally progresses by repeated exposure to small concentrations of silica dust over 10-20 years. However, "acute" silicosis develops with exposure to high concentrations of silica dust for 1-2 years. Silicosis may continue to develop after removing yourself from exposure to silica dust. There is no proven treatment for silicosis and progression of this disease normally results in death by some other means such as blood circulatory failure, tuberculosis, or lung cancer. People with repeated exposure to silica dust therefore have a high probability to develop lung cancer, thus classifying silica as a carcinogen.

How do you work safely with Silica?

Always work with Silica in a fume hood or a well ventilated environment. If a well ventilated environment is not available, wear appropriate respiratory equipment. Avoid generating dust. Do not rely on sight to determine if dust is in the air. To avoid dust settling on your clothes and body, protect yourself with a laboratory coat, safety goggles, and gloves (latex or nitrile).

Silica is incompatible with numerous materials. Strong oxidizing agents such as fluorine, chlorine trifluoride and oxygen difluoride react violently with silica and can explode. Hydrofluoric acid will react with silica. Heating a mixture of wet silica with powdered magnesium may cause a violent explosion. Silica in the form of sand will react with burning sodium; therefore, it should not be used to combat flammable metal fires.

First Aid Procedures:

Inhalation: If respiratory symptoms are noticed when working with silica, have victim move to fresh air. Seek medical advice.

Eye Contact: Do not rub eyes. Flush eyes gently in an eye wash station for a minimum of 5 minutes. Have victim look in all directions (up, down etc.) If particle still remains hold eyelids open over eye wash station for another 5 minutes or until particle is removed. **DO NOT** attempt to manually remove any silica particle from eyes. If irritation persists seek medical attention.

Skin Contact: No serious health effects are expected. If mild irritation does occur, flush with lukewarm water for 5 minutes or until the removal of the chemical. Seek medical attention if needed.

Where do you store Silica and its empty containers?

Silica must be stored in an appropriately labeled UN approved pail or any other container that will not cause silica to dust when opened. Keep the containers closed when not in use. Post warning signs around the area of storage. Return empty labeled containers to the Chemical Control Centre for disposal.

What happens if Silica is spilled?

Be careful of silica dust. Ventilate the area of the spill to remove any airborne dust. Do not rely on sight to tell if silica is airborne. Do not dry-sweep the spilled silica. Moisten the solid slightly with water. Collect and place solid into a labeled plastic waste container. Any remaining residue should be moistened again and then carefully swept up and placed in the waste container. Make arrangements to return the container to the Chemical Control Centre for appropriate disposal.

This lab safety bulletin is not a complete source on the safe handling of silica at the University of Windsor. You should always check the SDS of your silica containing product at www.uwindsor.ca/msds before you work.

For more information on silica please visit the Chemical Control Centre's University of Windsor Designated Substance Program at www.uwindsor.ca/ccc or by phone (ext. 3523).

For more information on spills please see the University of Windsor's Spill Response Manual at www.uwindsor.ca/ccc.

References:

1. *Silica Gel, 200-400 Mesh & 60 Angstrom,* Material Safety Data Sheet, Sigma-Aldrich, Aldrich – 288594, Oakville ON 2006.
2. Cheminfo (2007), *Chemical Profile – Silica, quarts,* Canadian Centre for Occupational Health and Safety, Retrieved April 23, 2007 from http://ccinfoweb2.ccohs.ca/cheminfo/Action.lasso?il.html&-op=eq&CHEMINFO+RECORD+NUMBER=79E&-search
3. Euphro (2007, Sep). Figure 1: *Cristobalite.* Retrieved July 11, 2008, from http://www.flickr.com/photos/euphro/1322002763/in/set-72157601865056079/
4. Kumar et al. Figure 2: *Basic Pathology (8E), Saunders, May 2007.*
5. *Silica - Designated Substances,* Chemical Control Centre, University of Windsor ON 2007.