

EXHIBIT 7

DigitalFire.Com Library, Quartz, Crystalline Silica Toxicity

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Quartz Toxicity on Clayart

## Quartz, Crystalline Silica Toxicity

Rare Earth Compounds Toxicity  
Refractory Ceramic Fibers  
Rubidium and Cesium Toxicology  
Rutile Toxicology

## Quartz, Crystalline Silica Toxicity

Quartz, silica, and flint are non-toxic materials having no known adverse health effects from ingestion. However, it does pose considerable hazards with respect to long term inhalation.

CAS: 14808-60-7 Silica: ACGIH TLV & OSHA PEL: 0.1 mg/cubic meter 8 hr. TWA, Respirable Dust. By comparison iron oxide is considered a safe-to-use material at a TLV of 5.0, kaolin is 2.0, barium carbonate is 0.5, quartz is 0.1-0.05.

Silica is contained in many ceramic minerals (e.g. feldspar), including its pure form of flint. Inhalation over long periods will cause silicosis where fibrosis of the lungs causes shortness of breath and can lead to death in severe cases. Over exposure to silica weakens the body's defense mechanisms.

Because of the abundance of silica, potential hazards are widespread. NIOSH in the US has estimated that 3.2 million workers in the USA are exposed to silica dust. Industries affected are quarrying, mining, steel, iron, metal foundries, abrasive blasting, construction, glass and ceramics, paint and pigments, granite and stone industries.

The primary health risk is the inhalation of "respirable" particles smaller than 10 micrometers (about 1/2500th of an inch). Generally, the smaller the particles are, the greater hazard and potential injury to the lungs. Dust particles larger than these are not capable of penetrating the defense mechanisms of the lung. Prolonged exposure may cause delayed chronic lung disease-silicosis. Chronic silicosis may take many years of exposure to develop, but with acute exposure rapid development can occur. In latter stages of silicosis, known as complicated or conglomerate silicosis, lung function may be reduced, resulting in symptoms of shortness of breath.

Quartz rock can be calcined so that it breaks down and grinds much easier. When this is done the material poses a much greater health risk.

The International Agency for Research on Cancer (IARC) has determined from a review of human epidemiology studies that there is limited evidence for the carcinogenicity of crystalline silica.

In the USA, occupational exposure is regulated by OSHA and under the laws of some states. The mining industry is regulated by the Mine Safety and Health Administration (MSHA). In 1992 the permissible exposure limit based on an 8-hour time weighted average concentration of respirable silica is .1 milligrams of quartz per cubic meter of air. OSHA and ASTM agree on this figure.

Studies have been somewhat mixed in results, even where when confounding exposures of other carcinogens including radon and tobacco are involved.

Findings on cancer risks associated with silica dust have made it necessary in some states that material safety data sheets reference the findings of IARC.

Silica can be used and handled safely with appropriate work practices and the avoidance of prolonged exposure. Dust concentrations past the limit are invisible to the naked eye, so employers must monitor workers using approved sampling methods.

See Crystalline Silica Q&A from National Industrial Sand Association, 900 Spring Street, Silver Spring, MD 20910.  
See The American Ceramic Society Bulletin Aug 2000 Page 60 for information on the Crystalline Silica Work Group of ACerS.

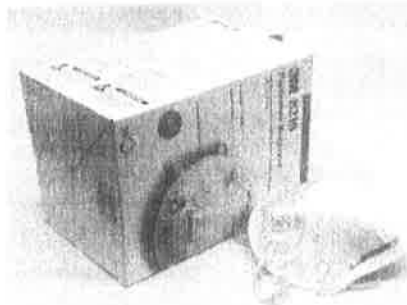


- The secret to cool bodies and glazes is a lot of testing.
- The secret to know what to test is material and chemistry knowledge.
- The secret to learning from testing is documentation.
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Silicosis and Screening  
 Silver Compounds Toxicology  
 Sodium Azide Toxicology  
 Sodium Carbonate Toxicology  
 Sodium Silicate Powder Toxicology  
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 Uranium and Ceramics  
 Vanadium and Compounds Toxicology  
 Zeolite  
 Zinc Compounds  
 Zirconium Compounds Toxicity  
 Zirconium Encapsulated Stains

## N95 Particulate Respirator mask



*This designation is an international standard for a general purpose respirator to filter out respirable quartz particles (which cause silicosis). Use one of these when working in a area where ventilation is insufficient to remove all of the dust. Use it also in circumstances where there is temporary generation of large quantities of dust. Do not wear this as a substitute for keeping floors and working areas clean.*

### Out Bound Links

- (URLs) Quartz MSDS at ilo.org  
[http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/\\_icsc08/icsc0808.htm](http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/_icsc08/icsc0808.htm)
- (UHLS) quartz on wikipedia  
<http://en.wikipedia.org/wiki/Quartz>

### In Bound Links

- (Hazards) Feldspar  
The hazards of this material in the ceramic industry and process
- (Materials) Clay 232  
Kil 232
- (Materials) Hymod Blue - English Ball Clay
- (Materials) Alberta Slip - Albany slip substitute  
Archie Bray Slip
- (Materials) Min-U-Sil 40 - 400 mesh silica  
MinUSil
- (Materials) C-1 Clay - Plastic, White, Wall Tile  
C1 Clay
- (Materials) Goldart - Cream Burning Stoneware  
Cedar Heights Goldart
- (Materials) Fireclay  
Fire Clay
- (Materials) Primas FA-200 Feldspar
- (Materials) Quartz - SiO<sub>2</sub>
- (Materials) PV Clay - Al<sub>2</sub>Si<sub>2</sub>O<sub>5</sub>(OH)<sub>4</sub> - White burning plastic feldspar  
Plastic Vitrox, P.V. Clay, P. V. Clay, Plas Vitrox
- (Materials) Silica - SiO<sub>2</sub> - Quartz, Flint
- (Materials) Clay 220  
Kil 220
- (Materials) Clay 215  
Kil 215
- (Materials) Clay 216  
Kil 216
- (Materials) Clay 220  
Kil 220
- (Materials) Clay 222  
Kil 222
- (Materials) Flint - SiO<sub>2</sub> - Silica
- (Materials) Clay 244  
Kil 244
- (Materials) Clay 233  
Kil 233
- (Materials) Novacite Silica I - Microcrystalline Novaculite  
Whetstone
- (Materials) 49'er Ball Clay - California Ball Clay
- (Materials) Hymod Prima - English Ball Clay
- (Materials) Bentonite  
Montmorillonite, Bentonite USA
- (Materials) Big Horn CE 200 Bentonite - Wyoming Bentonite
- (Materials) NAT Dry Milled Fireclay - Buff Burning Plastic Fireclay
- (Materials) #1 Q-Rok - 30 mesh silica
- (Materials) APG Missouri Fireclay - Buff Burning Plastic Fireclay  
AP Green, A.P., A. P., APG Fire, APGFC
- (Materials) Hymod AT Ball Clay - Dorset brown burning high strength ball clay
- (Materials) Hymod KC - English Ball Clay
- (Materials) Hyplas 71 Ball Clay - Devon medium strength low iron ball clay
- (Materials) Hyplas 64 Ball Clay - Ball Clay  
Hy Plas 64
- (Materials) Imco 400 Fireclay - Fireclay

## Imco 400

- (Materials) J-4 Ball Clay
- (Materials) HA-5 Ball Clay
- (Materials) MB Ball Clay
- (Materials) OSML Ball Clay
- (Materials) SB Ball Clay
- (Materials) CTS Ball Clay
- (Materials) JASS Ball Clay
- (Materials) 3380 Ball Clay
- (Materials) Clay 246
- (Materials) Clay 261
- (Materials) Feldspar 632  
Feldspat 632
- (Materials) Feldspar 635  
Feldspat 635
- (Materials) Feldspar 645  
Feldspat 645
- (Materials) Feldspar 661  
Feldspat 661
- (Materials) Kaolin 111  
Kaolen 111
- (Materials) Kaolin 113  
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- (Materials) Kaolin 114  
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- (Materials) Kaolin 115  
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- (Materials) Kaolin 143  
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- (Materials) Kaolin 151  
Kaolen 151
- (Materials) Kaolin 171  
Kaolen 171
- (Materials) Quartz 741  
Kuvars 741
- (Materials) Quartz 761  
Kuvars 761
- (Materials) Quartz 762  
Kuvars 762
- (Materials) Flint Pebbles
- (Materials) Sil-o-spar - Potash/sodium/calcium Feldspar
- (Materials) Edgar Glass Sand
- (Hazards) Quartz Toxicity on Clayart  
Quartz is one of the most dangerous materials used in ceramics, yet it is irreplaceable. It is the most abundant mineral on earth, we must learn to use it safely.
- (Hazards) Ball Clay  
Hazards of using ball clays in ceramics.
- (Materials - Lung damage) Crystalline Silica - SiO<sub>2</sub>  
Quartz
- (Project) Ceramic Hazards  
A wide range of materials are used in ceramics and they present a many hazards. These hazards are often not well understood by engineers and technicians (they focus their efforts on using the material...
- (Hazards) Bentonite Toxicity  
The hazards of bentonite clay in the ceramic process
- (Glossary) Respirable Crystalline Silica  
Respirable Crystalline Silica (RCS) refers to particles sufficiently small to stay air-born long enough to be inhaled and go deep into the lungs where they become lodged. Extended exposures to lower concentrations or less frequent exposures to higher concentrations can cause silicosis. The World ...

By **Tony Hansen**   

## Feedback, Suggestions

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Subject

Feedback at ceramic\_hazard\_quartz\_crystalline\_silica\_toxicity\_251.htm

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