

# Silica and your health



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## What is silica?

Silica (silicon dioxide) is a naturally occurring mineral composed of silicon and oxygen. Silica and silicate compounds make up 90% of the earth's crust. Crystalline or free silica is the form which is most likely to produce harmful effects. The three most common types of crystalline silica are quartz, tridymite and cristobalite. However, in most rocks crystalline silica makes up only a fraction of the total silica containing materials. Other forms of silica are silica combined with other elements (silicates) and amorphous silica. In general, these forms of silica are much less likely to cause disease, apart from the fibrous silicates such as asbestos.

## How can silica affect my health?

A single short-term exposure to dust containing a high concentration of silica can irritate the eyes, nose, throat and lungs. Essentially all dusts can have this effect. However, such exposure would not cause permanent injury.

Repeated and prolonged exposure over many years to relatively high concentrations of crystalline silica in the air is known to cause a lung disease called silicosis. Such exposure may occur for instance when rocks containing crystalline silica are ground up during mining or quarrying operations. The disease may also occur following short-term exposure to extremely high concentrations. Such exposures are extremely unlikely to occur today given modern work practices.

Silicosis occurs when crystalline silica is deposited in the air sacs of the lungs where gas exchange occurs. The deposited silica causes

inflammation, which results in scarring and eventually reduced lung capacity. The risk and the severity of damage is related to the size and shape of the particles, the concentration of particles and the length of time the person is exposed. Silicosis can only be caused by exposure to crystalline silica particles which are in the respirable size range. That is, the particles need to have diameters less than approximately 7 micrometers (1 micrometer is 1 millionth of a meter).

## What are the symptoms of silicosis?

Silicosis can vary in severity from mild to severe. Typically, the symptoms do not develop until after twenty or more years of constant exposure. The early symptoms are shortness of breath, a dry cough and a general feeling of unwellness. As the disease progresses the symptoms may become more severe. Silicosis may be complicated by heart failure because the heart has to work harder to pump blood through the scarred lung tissue. Another common complication is increased susceptibility to lung infections, particularly tuberculosis.

## Is there any treatment?

There is no effective treatment for silicosis. Treatment is aimed at relieving symptoms, managing complications and preventing infections.

## Can silica cause cancer?

Amorphous silica is not regarded as a cancer causing agent. However, the potential for crystalline silica in the form of quartz or cristobalite to

cause lung cancer is well documented. The International Agency for Research on Cancer (IARC) considers that long-term occupational exposure to quartz and cristobalite can be associated with lung cancer. However, there is no evidence to indicate that exposure at levels below the national exposure standards set for the different forms of crystalline silica (see below) will cause cancer or silicosis. General community (non-occupational) exposure to crystalline silica is typically well below the national exposure standards and consequently, such exposures are unlikely to present significant risks to public health.

#### How might I be exposed to silica?

Exposure to potentially harmful levels of silica is typically a hazard for some occupations including those associated with mining, quarrying, foundries, sandblasting, the construction of roads and tunnels, and manufacturing of stone, clay and glass products. The exposure of the general community to respirable crystalline silica is typically very low.

#### What are the exposure standards for crystalline silica?

National exposure standards have been set at levels which should not affect the health of nearly all workers who are working an eight hour day for five days a week for a working lifetime. The Australian standards are as follows:

- Quartz 0.2 mg/m<sup>3</sup>
- Cristobalite 0.1 mg/m<sup>3</sup>
- Tridymite 0.1 mg/m<sup>3</sup>

The exposure standards only refer to particles of crystalline silica in the respirable size range i.e. particles with diameters less than approximately 7 micrometers.

#### How can the risk of being exposed to crystalline silica be reduced?

Exposure to harmful levels of crystalline silica dust is not expected to occur outside the workplace. Within the workplace, exposure can be reduced by changes in work practices, engineering controls to achieve dust containment and suppression, and the use of personal protection equipment.

#### Selected references

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#### For more information, contact your local public health network



**Central Public Health Unit Network** servicing Brisbane Northside, Longreach, Redcliffe, Rockhampton, Sunshine Coast, Wide Bay.

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For medical advice, contact your doctor, hospital or health clinic.

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