Silica is the generic name for the various forms of silicon dioxide and may occur in crystalline and non-crystalline (amorphous) forms. It occurs naturally and is produced synthetically and includes materials such as silica gel, fumed silica, amorphous silica, silicon dioxide, and silicic acid.

**HAZARD**

Crystalline silica is a potentially aggressive lung damaging form of silica, particularly when present as an airborne dust. The respirable fraction (<10 microns) is able to reach the lower bronchioles of the lung and is linked to a number of respiratory diseases (e.g. silicosis). Materials containing crystalline silica include shale, sandstone, concrete, bricks and manufactured stone. Significant levels of airborne dust are most likely to occur when materials or products in the workplace are cut, sanded, drilled or during any other activities which create fine dust.

Safe Work Australia has published exposure limits for both crystalline and non-crystalline forms of airborne silica dust. All silica products should be used with caution.

Non-crystalline forms of silica (silica gel, silica coatings on TLC plates) are amorphous in structure and do not pose the same risks as crystalline silica. The levels of risk arising from inhalation of amorphous silica when undertaking routine tasks such as filling chromatography columns are low because amorphous silica is not considered hazardous, the particles are predominantly non-respirable and the exposure time is relatively short.

**GHS CLASSIFICATION**

<table>
<thead>
<tr>
<th>Crystalline silica (silicon dioxide)</th>
<th>Silica gel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcinogenicity: Category 1A, May cause cancer via inhalation</td>
<td>Not classified as hazardous</td>
</tr>
<tr>
<td>Specific Target Organ Toxicity (Repeated Exposure): Category 1</td>
<td>Not classified as a dangerous good</td>
</tr>
<tr>
<td>Not classified as a dangerous good</td>
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</tbody>
</table>

Crystalline silica is in Schedule 14 of the WHS regulations which outline health monitoring requirements.

Crystalline silica is known to be a human carcinogen by the International Agency in Cancer Research (IARC).

**MANAGEMENT**

- Eliminate tasks that generate dust. Airborne dust is most likely to occur when materials or products containing silica in the workplace are cut, sanded or drilled. In all cases when handling silica products, every reasonable effort must be made to minimise the generation of silica dust.

- Substitute products with high amounts of crystalline silica with safer products. Powder alumina (aluminium oxide) is often used as a substitute for silica in chromatography.

If silica is used within the workplace the most effective controls involve containment, ventilation and suppression of silica dust. Capture and remove crystalline silica dust at the source.

- Isolate areas where crystalline silica dust may be produced and restrict access to minimise the number of people who could potentially be exposed.

- Handle silica only in a ventilated space. For example: prepare chromatography columns in a fume hood or under a local area ventilation e.g. Nederman arm).

- Develop a housekeeping program to prevent the accumulation of dust.

- Do not dry sweep or use compressed air to clean up silica dust. Wet wipe or use a vacuum with HEPA filter to clean surfaces.
When working outside a suitably ventilated or contained area, respiratory protection must be worn. The selection of respiratory protection depends on the forms of silica used and how dust is generated.

- A P1 dust mask (lowest level of protection) may be suitable for activities such as dry packing chromatography columns, emptying dry columns or transferring dry silica.
- A P3 full face respirator maybe required for activities generating small amounts of crystalline silica dust.

These activities should be risk assessed to determine the most appropriate form of PPE.

EMERGENCY AND FIRST AID RESPONSE

- If there has been an identified exposure to respirable crystalline silica dust health monitoring must be provided to the person/s exposed. For any exposure to silica dust, a Riskware incident must be submitted.

A significant spill would be indicated by the generation of a dust cloud. Evacuate the local area and allow the dust to dissipate through natural ventilation.

Minor Spill

- During clean-up of any minor spill wear lab coat, gloves, eyewear and appropriate respiratory protection.
- Maximise ventilation to the area during a clean up after a spill.
- Dampen spills with water mist to minimise the formation of dust. Continue to dampen the spill if this assists in reducing dust levels.
- Scoop wet silica into a waste container, clearly label, place in fume hood overnight with lid off to allow solvent or wetting agent to dry off.

First Aid

- Inhalation: Remove affected person(s) to fresh air and keep at rest position comfortable for breathing.
- Eye exposure: Carefully rinse affected eye with water for several minutes. Remove contact lenses. Seek medical assistance if eye irritation persists.

FURTHER REFERENCES

2. Workplace exposure standards for chemicals Safework Australia [accessed June 2018].