

SAFETY DATA SHEET (SDS)

SECTION 1: IDENTIFICATION

Product Name: Sand (Whole Grain)

Common Names: Sand, quartz sand, silica sand.

Trade Names: Silica Sand, Industrial Sand, Colorado Silica Sand®, Arena Sand, Artificial Turf Sand, Crystalline Silica, Quartz, Sand, Traction Sand, Frac Sand or Blends.

Recommended Uses and Restrictions on Use: Refractories, oil and gas well proppants, fiberglass and ceramics, hydraulic fracturing sand, water and wastewater treatment, construction materials, cement, non-skid surfaces, fillers, refractories, fiberglass and ceramics, golf course sand, artificial athletic sands, volleyball courts, playgrounds, horse arenas/tracks and insecticides. ***Do not use for abrasive blasting.*** This safety data sheet and the information contained herein exclude consideration of potential hazards of abrasive blasting

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SECTION 2: HAZARD IDENTIFICATION

GHS Classification: 1A Carcinogen

Signal Word: DANGER

Hazard Statement: May cause cancer through prolonged or repeated exposure by inhalation.

Precautionary Statements:

- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Wear protective respirator if prolonged or repeated exposure to dust will occur.
 - Do not breathe dust.
 - Maintain adequate ventilation when using this product.
 - Do not eat, drink, or smoke when using this product.
 - Wash hands thoroughly after handling.
- Wear protective eyewear to avoid irritation to the eyes.



- If exposed or concerned: Get medical advice.
- Store locked up.
- Dispose of contents to trash in a manner that limits fugitive dust.

Inhalation: In addition to causing cancer, prolonged exposure to respirable crystalline silica causes silicosis, a fibrosis (scarring) of the lungs, which is a permanent and progressive condition that may lead to death. Silicosis may aggravate or increase the risk of tuberculosis, scleroderma, nephrotoxicity, bronchitis, emphysema, and asthma. Actions taken to control hazards related to respirable crystalline silica are adequate to control hazards from microorganisms that may be also present in some products.

Eye Contact: A mechanical irritant which can cause moderate eye irritation. This product may cause abrasion to the cornea. Avoid wearing contact lenses when working with product.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name, Chemical Compound	CAS Number	Typical % By Weight
Crystalline Silica (Quartz)	14808-60-7	70.0 – 99.5
Aluminum Oxide	1344-28-1	0.0 – 19.0
Iron Oxide	1309-37-1	0.0 – 2.0
Potassium Oxide	12136-45-7	0.0 – 12.0
Calcium Oxide	1305-78-8	0.0 – 1.1
Titanium Oxide	13463-67-7	0.0 – 0.7

SECTION 4: FIRST AID MEASURES

Inhalation: No specific first-aid is necessary since adverse health effects associated with exposure to crystalline silica (quartz) result from chronic exposure. In case of gross inhalation, remove the person to fresh air, give artificial respiration if needed and seek medical attention.

Eye Contact: Wash immediately with water. If irritation persists, seek medical attention.

Skin Contact: First aid is not required.

Ingestion: First aid is not required.

SECTION 5: FIRE FIGHTING MEASURES

This product is not flammable, combustible or explosive. Hazardous polymerization will not occur.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Spills: Use of dustless methods (water or HEPA-A type Vacuum) to clean up if possible. Avoid breathing dust. See personal protective equipment (PPE) specified in EXPOSURE CONTROL/PERSONAL PROTECTION SECTION 8.

Waste Disposal Methods: This product is not considered a hazardous waste and may be disposed of in accordance with the details listed in SECTION 13.

SECTION 7: HANDLING AND STORAGE

Precautions During Handling and Use: Do not breathe dust. Use adequate ventilation and/or dust collection methods. Avoid breakage of bagged material or spills of bulk material that could produce fugitive dust. Wash or vacuum clothing which becomes dusty. If concentrations exceed applicable standards, then use proper respiratory protection. Avoid contact with eyes. The wearing of contact lenses is not recommended. See SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION.

Storage Requirements: Store and handle material in a manner that does not expose material to wind.

Special Sensitivity or Incompatibility: Avoid contact with strong acids and oxidizers. See SECTION 10. STABILITY AND REACTIVITY.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits	ACGIH TLV (mg/m ³)	OSHA PEL* (mg/m ³)	CalOSHA PEL (mg/m ³)	NIOSH IDLH (mg/m ³)	NIOSH REL (mg/m ³)
Respirable crystalline silica:	0.025	0.05*	0.05*	50	0.05
Respirable nuisance dust:	3	5	5	-	-
Total nuisance dust:	10	15	10	-	-
Aluminum Oxide	-	-	10	-	-
Iron Oxide	5	10	5	2,500	5
Calcium Oxide	2	5	2	25	2

*OSHA includes an Action Level that is half of the PEL at 0.025 mg/m³. Employers in general industry with workers exposed above the Action Level must comply with the requirements of 29 CFR §1910.1053 – Respirable Crystalline Silica. Specific industries such as mining, maritime, or construction should consult industry-specific regulations on this topic.

Engineering and Administrative Controls: Use sufficient general or local exhaust ventilation to reduce the level of respirable crystalline silica to below the PEL. Use designed ventilation systems and/or wet methods to control product in workplace air, if necessary. General industry and construction may not use administrative controls to reduce employee exposure. Other industries should consult their governing regulations. Use personal protection equipment (PPE) as a last resort to control exposure.

Respiratory Protection: NIOSH/MSHA approved respirators must be provided if airborne concentration exceeds the Action Level, and must be used if airborne concentration exceeds PEL. It is a violation of federal safety laws (OSHA) for employers to require workers to use this material without providing full respiratory protection (See 29 CFR 1910.134, 29 CFR 1910.1000, 29 CFR 1910.94). In general, a NIOSH/MSHA approved air purifying respirator with HEPA cartridges or supplied air is recommended. Refer to ANSI standard Z88.2 (2015) “American National Standard for Respiratory Protection” for complete guidance on proper respirator selection and fit.

Eye Protection: Wear safety glasses with side shields or goggles to protect eyes from dust and particulate. Wearing of contact lenses is not recommended because dust can get under the lenses and cause abrasion of the cornea.

Skin Protection: Clothing should reflect good industrial hygiene practices. Protection recommended for workers suffering from dermatitis or sensitive skin. Wearing gloves and washing hands after use are recommended to avoid inhaling particles.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	This product is a white, silver, gray, tan, or granular sand, crushed or ground to a fine powder.
Odor:	None
Odor threshold:	Not Applicable
pH:	Not Applicable
Melting point/freezing point:	3110 °F (1710 °C)
Initial Boiling Point:	4046 °F (2230 °C)
Flash point:	Not Applicable
Evaporation rate:	Not Applicable
Flammability:	Not Applicable
Upper/lower flammability limits:	Not Applicable
Vapor pressure:	Not Applicable
Vapor density:	Not Applicable
Relative density (H ₂ O = 1):	2.65
Solubility:	Insoluble in water
Partition coefficient:	Not Applicable
Auto-ignition temperature:	Not Applicable
Decomposition temperature:	Not Applicable
Viscosity:	Not Applicable

SECTION 10: STABILITY AND REACTIVITY

Reactivity:	Inert
Chemical stability:	Stable
Possibility of hazardous reactions:	Contact with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride may cause fires and/or explosions.
Conditions to avoid:	Crushing this material will increase the respirable fraction and related hazards.
Incompatible materials:	Contact with strong acids or oxidizing agents such as molten

magnesium, fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, or hydrofluoric acid may cause fires or generation of corrosive gases.

Hazardous decomposition products: Silica will dissolve in hydrofluoric acid and produce a corrosive gas, silicon tetrafluoride.

SECTION 11: TOXICOLOGICAL INFORMATION

Likely routes of exposure: Inhalation and eye contact.

Acute effects of exposure:

Inhalation: Inhalation of dust may cause respiratory tract irritation. Symptoms of exposure may include cough, sore throat, nasal congestion, sneezing, wheezing, and shortness of breath.

Acute Silicosis can occur with exposure to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis is fatal.

Ingestion: Ingestion is an unlikely exposure route. Swallowed dust may irritate the mouth and throat.

Skin contact: No adverse effects are expected.

Eye irritation: This product can cause moderate eye irritation and may cause abrasion to the cornea.

Chronic effects of exposure:

Silicosis: Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of the initial exposure. The progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that the lung lesions appear earlier and the progression is more rapid.

Chronic silicosis is the most common form of silicosis, and can occur after many years (10 to 20 or more) of prolonged repeated inhalation of relatively low levels of airborne respirable crystalline silica dust. It is further defined as either simple or complicated silicosis.

Simple silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF).

Complicated silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath, wheezing, cough and sputum production. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease (corpumonale).

Cancer: It is widely accepted that respirable crystalline silica can cause lung cancer as demonstrated below.

IARC - The International Agency for Research on Cancer (“IARC”) concluded that there is *sufficient evidence* in humans for the carcinogenicity of crystalline silica in the form of quartz or cristobalite. Crystalline silica in the form of quartz or cristobalite dust causes cancer of the lung. There is *sufficient evidence* in experimental animals for the carcinogenicity of quartz dust. There is *limited evidence* in experimental animals for the carcinogenicity of tridymite dust and cristobalite dust. Crystalline silica in the form of quartz or cristobalite dust is *carcinogenic to humans (Group 1)*. (IARC Monograph 100C, 2011) (*emphasis added*)

NTP – The National Toxicology Program, in its Sixth Annual Report on Carcinogens, concluded that “silica, crystalline (respirable)” may reasonably be anticipated to be a carcinogen, based on sufficient evidence in experimental animals and limited evidence in humans. The most recent Fourteenth Annual Report on Carcinogens lists “Silica, Crystalline (Respirable Size)” as *known to be human carcinogen* (emphasis added).

OSHA – In 2016 OSHA released their Final Rule to Protect Workers from Exposure to Respirable Crystalline Silica. In the Final Rule, OSHA states “OSHA has determined that employees exposed to respirable crystalline silica at the previous permissible exposure limits face a significant risk of material impairment to their health. The evidence in the record for this rulemaking indicates that workers exposed to respirable crystalline silica are at increased risk of developing silicosis and other non-malignant respiratory diseases, lung cancer, and kidney disease. This final rule establishes a new permissible exposure limit of 50 micrograms of respirable crystalline silica per cubic meter of air (50 µg/m³) as an 8-hour time-weighted average in all industries covered by the rule. It also includes other provisions to protect employees, such as requirements for exposure assessment, methods for controlling exposure, respiratory protection, medical surveillance, hazard communication, and recordkeeping.”

There is substantial literature on the issues of the carcinogenicity of crystalline silica, which the reader should consult for additional information. A summary of the literature is set forth in “Exposure to crystalline silica and risk of lung cancer; the epidemiological evidence”, Thorax, Volume 51, pp. 97-102 (1996). The official statement of the American Thoracic Society on the issue of silica carcinogenicity was published in “Adverse Effects of Crystalline Silica Exposure”, American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997). The official statement concluded that “The available data support the conclusion that silicosis produces increased risk for bronchogenic carcinoma. The cancer risk may also be increased by smoking and other carcinogens in the workplace. Epidemiologic studies provide convincing evidence for increased cancer risk among tobacco smokers with silicosis. Less information is available for never-smokers and for workers exposed to silica but who do not have silicosis. For workers with silicosis, the risks for lung cancer are relatively high and consistent among various countries and investigators. Silicosis should be considered a condition that predisposes workers to an increased risk of lung cancer.” Id. at 763.

Scleroderma: There is evidence that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of scleroderma, an immune system disorder manifested by a fibrosis (scarring) of the lungs, skin and other internal organs. Recently, the American Thoracic Society noted that “there is persuasive evidence relating scleroderma to occupational silica exposures in setting where there is appreciable silicosis risk.” The following may be consulted for additional information on silica, silicosis and scleroderma (also known as progressive systemic sclerosis): Occupational Lung Disorders, Third Edition, Chapter 12, entitled “Silicosis and Related Diseases”, Parkes, W. Raymond (1994). “Adverse Effects of Crystalline Silica Exposure”, American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997).

Tuberculosis: Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to persons with tuberculosis or tuberculosis bacteria. Individuals with chronic silicosis have a three-fold higher risk of contracting tuberculosis than similar individuals without silicosis. The following may be consulted for further information: Occupational Lung Disorders, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994). "Adverse Effects of Crystalline Silica Exposure", American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997). Silica Sand (Brady, Colorado Springs, Riverside, Bakersfield)

Nephrotoxicity (kidney disease): Several studies have suggested that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of kidney disorders. The following may be consulted for additional information on silica, silicosis and nephrotoxicity: Occupational Lung Disorders, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994). "Further evidence of human silica nephrotoxicity in occupationally exposed workers", British Journal of Industrial Medicine, Vol. 50, No. 10, pp. 907-912 (1993). "Adverse Effects of Crystalline Silica Exposure", American Journal of Respiratory and Critical Care Medicine, Volume 155, pp. 761-765 (1997). "Kidney Disease and Silicosis", Nephron, Volume 85, pp. 14-19 (2000).

Arthritis: There are recent studies suggesting that exposure to respirable crystalline silica or that the disease silicosis is associated with the increased incidence of arthritis. The following may be consulted for additional information on silica exposure and arthritis: American Journal of Industrial Medicine, Volume 35, pp. 375-381 "Connective Tissue Disease and Silicosis", Rosenman KD; Moore-Fuller M.; Reilly MJ. (1999). Environmental Health Perspective, Volume 107, pp. 793-802 "Occupational Exposure to Crystalline Silica and Autoimmune Disease", Parks CG; Conrad K; Cooper GS. (1999).

Non-malignant respiratory diseases: Section 3.5 of the NIOSH Special Hazard Review cited below provides information concerning the association between exposure to crystalline silica and chronic bronchitis, emphysema and small airways disease. There are studies that disclose an association between dusts found in various mining occupations and non-malignant respiratory diseases, particularly among smokers. It is unclear whether the observed associations exist only with underlying silicosis, only among smokers, or result from exposure to mineral dusts generally (independent of the presence or absence of crystalline silica, or the level of crystalline silica in the dust). Sources of information: The *NIOSH Hazard Review - Occupational Effects of Occupational Exposure to Respirable Crystalline Silica* published in April 2002 summarizes and discusses the medical and epidemiological literature on the health risks and diseases associated with occupational exposures to respirable crystalline silica. *The NIOSH Hazard Review* is available from NIOSH - Publications Dissemination, 4676 Columbia Parkway, Cincinnati, OH 45226, or through the NIOSH web site, www.cdc.gov/niosh/topics/silica, then click on the link "NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica".

For a more recent review of the health effects of respirable crystalline silica, the following may be consulted for additional information: *Fishman's Pulmonary Diseases and Disorders*, Fourth Edition, Chapter 57. "Coal Workers' Lung Diseases and Silicosis".

Numerical measures of toxicity: Crystalline Silica (quartz): LD50 oral rat >22,500 mg/kg.

Carcinogenicity: This product contains respirable crystalline silica which is classified as a Class 1A carcinogen by IARC. It is considered carcinogenic by the NTP, OSHA, MSHA, and the State of California under Proposition 65.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity: This product is not known to be ecotoxic (i.e. there is no data which suggests that this product is toxic to birds, fish, invertebrates, microorganisms or plants).

Bioaccumulative potential: Silica is not bioaccumulative.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Methods: This product is not classified as a hazardous waste and may be landfilled. If this product is contaminated with hazardous materials, then place the waste in a properly labeled, suitable waste container. Contaminated material must be disposed of in accordance with federal, state and local regulations using the proper waste classification.

SECTION 14: TRANSPORT INFORMATION

US DOT Shipping Name: Not Regulated **DOT LABEL:** None **UN/NA Number:** None

This product not listed as a hazardous substance by U.S. Department of Transportation.

SECTION 15: REGULATORY INFORMATION

TSCA/CEPA Status: Components of this product are included in the TSCA and CEPA Chemical Inventories.

CERCLA: Not applicable.

RCRA: Not applicable.

SARA Title III:

Section 302 Extremely Hazardous: Not applicable.

Section 311/312 Hazard Categories: Reportable as a hazardous substance. Check with your Local Emergency Planning Committee for reportable quantities.

Section 313 Toxic Chemicals: Not applicable.

Clean Air Act: Silica (respirable, crystalline) is not a hazardous air pollutant (HAP) regulated under the Act.

FDA: Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3)(xxvi).

California Proposition 65: ⚠️ WARNING, respirable size airborne particles of crystalline silica are known to the State of California to cause cancer.

California Risk Factors: California has established a chronic non-cancer Relative Exposure Level (REL) of 3 $\mu\text{g}/\text{m}^3$ for silica (crystalline, respirable). RELs are defined as the concentration at which no adverse noncancer health effects are anticipated even in sensitive members of the general population, with continuous exposure over a significant fraction of a lifetime. Unlike cancer health effects, noncancer health effects are generally assumed to have thresholds for adverse effects such that injury from a pollutant will

not occur until exposure to that pollutant has reached or exceeded a certain concentration (i.e., threshold) and/or dose.

California has not adopted a Cancer Potency Factor (CPF) for environmental exposure to silica (crystalline, respirable). In 2005, OEHHA adopted the Toxicity Summary for respirable crystalline silica (http://oehha.ca.gov/air/chronic_rels/silica_final.html) which states: "In 1997, IARC classified respirable crystalline silica in Class 1, a Known Human Carcinogen, based on occupational epidemiologic studies. However, chronic RELs are not based on cancer endpoints. Further, there is no approved cancer potency factor for silica." In 2012 OEHHA grouped carcinogens listed under Proposition 65 into four priority lists for the development of safe harbor levels. Silica (respirable, crystalline) is on the third priority list. See also the Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA, March 2015).

SECTION 16: OTHER INFORMATION

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