

Kyanite Mining Corporation: Mullite MSDS (Material Safety Data Sheet)

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Mullite
Chemical Name: Mixture - Primarily aluminum silicates
Preparation Date: 02-11-05
Revision Date: 02-11-05
Supplier: Kyanite Mining Corporation
 30 Willis Mountain Plant Lane
 Dillwyn, VA 23936
URL: www.kyanite.com
**Telephone Number and
 Emergency Telephone Number:** (434)983-4322

2. INGREDIENTS: COMPOSITION INFORMATION¹

Ingredient	% Weight	OSHA PEL ²	ACGIH TLV ²	LD ₅₀ /LC ₅₀ Route/Species
Mullite CAS No.: 1302-93-8 Formula: Al ₆ O ₁₃ Si ₂	75-85	15 mg/m ³ (total) 5 mg/m ³ (respirable)	None Established	No Data
Glass (amorphous silica) CAS No.: 7631-86-9 Formula: SiO ₂	5-10	80 mg/m ³ / % SiO ₂ or 20 mppcf	10 mg/m ³ (inhalable) ³ 3 mg/m ³ (respirable) ³	No Data
Quartz CAS No.: 14808-60-7 Formula: SiO ₂	1-5	30 mg/m ³ / % SiO ₂ +2 (total) 10 mg/m ³ / % SiO ₂ +2 (respirable)	0.05 mg/m ³ (respirable)	No Data
Kyanite CAS No.: 1302-76-7 Formula: Al ₂ O ₅ Si	1-5	15 mg/m ³ (total) 5 mg/m ³ (respirable)	None Established	No Data
Cristobalite CAS No.: 14464-46-1 Formula: SiO ₂	1-5	30 mg/m ³ / % SiO ₂ +2 (total) 10 mg/m ³ / % SiO ₂ +2 (respirable)	0.05 mg/m ³ (respirable)	No Data

- ¹ Composition information is based on sample analysis. As this is a naturally occurring substance, composition may vary. The laboratory accuracy for sample analysis was within +/- 2-3 percent weight. Mullite may also contain ~1% TiO₂. The titanium dioxide is not present as a "free" agent but is in a complex bound to other components.
- ² Refer to individual country, state, or provincial regulations for limits that may be more stringent than those listed. Quartz and cristobalite are on the ACGIH Notice of Intended Changes with a proposed TLV of 0.025 mg/m³.
- ³ Value is for particulate matter containing no asbestos and < 1% crystalline silica.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

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3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Odorless granular or powder mineral product that is light gray to white in color. Chronic (long-term) health hazard. This product contains crystalline silica. Repeated inhalation of dusts containing crystalline silica over time can cause lung disease and cancer. Avoid dust creation. Do not inhale dusts from this product. Use a vacuum or wet clean-up methods to remove dusts.

Target Organs: Lungs

Skin: Irritation is not expected.

Eye: Chemical irritation is not expected. Dusts and particles may scratch the eyes.

Inhalation: Inhalation of high dust concentrations may cause coughing and mild respiratory irritation. Repeated dust inhalation over time can have long-term health effects (See chronic).

Chronic (Long-term) Health Effects: Repeated inhalation of dusts containing crystalline silica over time can cause progressive fibrotic lung disease (silicosis) and increase the risks of developing respiratory cancer. Lung injury may progress even if the worker is removed from exposure. Silicosis can result in death from cardiac failure or the destruction of lung tissue. The extent and severity of lung damage depends on a variety of factors including particle size, percentage of silica, natural resistance, dust concentration, and length of exposure. Aluminum silicates and amorphous silica may also cause milder lung fibrosis.

Medical Conditions Aggravated by Exposure: Inhalation of dusts may aggravate pre-existing lung disease. People that develop silicosis are more likely to develop tuberculosis. Smoking and exposure to crystalline silica increases the risks of lung damage. Chronic obstructive pulmonary disease and autoimmune related diseases have been linked to crystalline silica exposure.

Signs and Symptoms of Overexposure: The short-term or immediate effects of dust inhalation are expected to be coughing and mild respiratory irritation. Scratching or physical damage to the eyes can cause irritation, pain, redness, tears, blurred vision, and light sensitivity. There may be no symptoms during the early stages of chronic silicosis. As the disease progresses, the symptoms include tiredness, shortness of breath, severe cough, and characteristic x-rays. Shortness of breath upon exertion is one of the most common symptoms and limited chest expansion is the most common physical sign.

Carcinogenicity: **NTP:** Yes **IARC:** Yes (Group 1) **OSHA:** Yes

IARC and NTP classify respirable crystalline silica as a confirmed or known human carcinogen. Although OSHA has not promulgated a specific standard for crystalline silica, materials that contain $\geq 0.1\%$ crystalline silica should be treated as a confirmed carcinogen for hazard communication purposes (29 CFR 1910.1200).

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4. FIRST AID MEASURES

Eyes: Dusts and particles may cause physical abrasion. Do not rub eyes. Rinse eyes with lukewarm water for at least 15 minutes. Open and close the eyelids during rinsing to remove all dusts and particles. If irritation persists, seek medical attention.

Skin: None required.

Ingestion: None required for small amounts. If substantial quantities are ingested, give 4-8 ounces of water or milk to dilute and seek medical advice.

Inhalation: Immediate effects are not expected. If high concentrations of dust are inhaled, remove to fresh air. If breathing problems occur, a certified professional should administer oxygen or artificial respiration as indicated and obtain immediate medical attention.

5. FIRE FIGHTING MEASURES

Flammable Properties:	Not flammable	
Flashpoint:	Not Applicable	
Flammable Limits:	LEL: Not Applicable	UEL: Not Applicable
NFPA Hazard Classification:		
Health: 0	Flammability: 0	Instability: 0

Extinguishing Media: Any. Use media appropriate for surrounding fire.

Fire and Explosion Hazards: Product is not flammable or combustible. It will not burn.

Hazardous Decomposition Products: None known.

Fire Fighting Instructions: Firefighters should wear a NIOSH approved full-facepiece self-contained breathing apparatus (SCBA) operated in positive pressure mode and full turnout or bunker gear.

6. ACCIDENTAL RELEASE MEASURES

Isolate area of spill and deny entry to unauthorized and/or unprotected personnel. Do not walk through or scatter spilled material. Use wet clean-up methods (wiping, mopping, etc.) or a vacuum to remove small amounts. The vacuum must be equipped with a filtration system sufficient to remove and prevent the recirculation of crystalline silica (a vacuum equipped with a high-efficiency particulate air filter (HEPA) filter is recommended). For large spills, use a fine water spray or mist to control dust creation and carefully scoop or shovel into a clean, dry container for later reuse or disposal. Completely remove all dusts to prevent recirculation of crystalline silica into the workplace. **DO NOT USE DRY SWEEPING OR COMPRESSED AIR TO CLEAN SPILLS.** Clean-up personnel must wear appropriate protective equipment including respiratory protection (See Section 8).

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7. HANDLING AND STORAGE

Store in a dry area in closed containers. Storage and work areas should be periodically cleaned to minimize dust accumulation. Plant processes should be designed to control airborne dusts at or below acceptable exposure guidelines. DO NOT use compressed air or dry sweeping to remove dust from work area. Dusts should be removed using vacuum or wet clean-up methods (wet towels, use of mists, etc.).

Under dusty conditions, employees should wear coveralls or other suitable work clothing. Contaminated clothing must be vacuumed before removal and respiratory protection should be the last article of clothing removed. DO NOT REMOVE dusts from clothing by blowing or shaking. Practice good housekeeping. Wash thoroughly after handling. Launder contaminated clothing before re-wearing. Do not take silica contaminated clothing home.

Comply with OSHA Hazard Communication Rule 29 CFR 1910.1200, and applicable federal, country, state, provincial, or local laws and regulations during storage, use, and disposal of this product. For further information, consult the current American Society for Testing and Materials (ASTM) standard practice, "Standard Practice for Health Requirements Relating to Occupational Exposure to Crystalline Silica".

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection: Under normal working conditions, at or below acceptable exposure guidelines, none is required. Appropriate respirator selection is dependent upon the magnitude of exposure. Wear NIOSH approved respiratory protection in accordance with 29 CFR Part 134.

Eyes: Safety glasses with side shields or goggles to prevent dust and particles from entering the eyes.

Skin: Protective gloves are recommended.

Engineering Controls: Use local exhaust and general ventilation as necessary to control air contaminants at or below acceptable exposure guidelines. Collection systems must be designed and maintained to prevent the accumulation and recirculation of respirable silica into the workplace. Additional controls to limit exposure to crystalline silica may include but are not limited to: wet processes, installation of dust collection systems, dust control additives, enclosed work processes, and automated processes.

Other: Where there is a potential exposure to crystalline silica, the following warnings should be readily visible and posted near entrances and accessways to work areas: WARNING! FREE SILICA WORK AREA. Unauthorized persons keep out. The following warning should be posed within the work area where potential exposure may occur: WARNING! FREE SILICA WORK AREA. Avoid breathing dust. May cause delayed lung injury (silicosis). (NIOSH Criteria Document, Occupational Exposure to Crystalline silica, pg. 5, 1974)

A medical surveillance program should be implemented in accordance with NIOSH recommendations and other applicable federal, state, local or provincial requirements.

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9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid mineral
Appearance:	Light gray to white in color
Odor:	Odorless
Solubility in Water:	Insoluble
Specific Gravity (H₂O = 1)	2.9-3.0
Melting Point:	P.C.E. 36-37
Boiling Point:	Not Applicable
% Volatile:	0
Evaporation Rate:	Not Applicable
Vapor Density:	Not Applicable
Vapor Pressure:	Not Applicable
pH:	Not Applicable

10. STABILITY AND REACTIVITY

Stability: Stable

Reactivity/Incompatibility: Silica is incompatible with strong oxidizers.

Hazardous Decomposition Products: Quartz may convert to cristobalite at high temperature (> 1470 °C). Kyanite will decompose to form mullite and cristobalite at high temperatures (~ 1450 °C).

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

Eye: Particulate matter may cause physical injury to the eye.

Skin: Skin irritation is not expected.

Inhalation: Immediate effects of dust inhalation may include coughing and minor transient respiratory irritation. Acute silicosis has been reported following exposure to extremely high crystalline silica exposures particularly when the particle size of the dust is very small.

Ingestion: Product is relatively non-toxic.

Chronic: Silicosis is a progressive fibrotic pneumoconiosis that greatly decreases the ability of the lungs to provide oxygen (decreased pulmonary capacity). Three types of silicosis have been identified. Acute silicosis can occur several weeks or months following exposure to very high levels of crystalline silica and can result in death in months or within several years. Accelerated silicosis can occur 5-10 years after exposure to higher levels of crystalline silica. Chronic silicosis is the most common type and usually occurs after 10 or more years of exposure to low levels of crystalline silica.

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Chronic (continued): Similar aluminum silicate minerals such as kaolin have been found to cause lung fibrosis in the absence of crystalline silica. The disease is not as severe as silicosis but can cause respiratory symptoms and changes. Crystalline silica exposure appears to enhance the severity of the disease. Amorphous silica may also have a mild fibrotic effect.

Animal studies indicate that cristobalite has a greater potential to produce fibrosis than quartz. Cristobalite produces a more severe response than quartz and fibrosis elicited is diffuse rather than nodular.

Other: Silica particles less than 10 μm are considered respirable; however, particles retained in the lungs are generally much smaller. A median diameter of particles retained in the lungs has been cited as 0.5-0.7 μm .

12. ECOLOGICAL INFORMATION

This product is an ecologically inert material. It does not contain ozone depleting substances and is not expected to exert an ecotoxic effect or bioconcentrate in the food chain.

13. DISPOSAL CONSIDERATIONS

Dispose of according to applicable federal, state, provincial, and local regulations.

14. TRANSPORT INFORMATION

U.S. Department of Transportation (DOT): Not classified.

15. REGULATORY INFORMATION

Canadian WHMIS Classification: D2A

EPCRA Section 302 (EHSs): This product does not contain ingredients subject to reporting requirements of 40 CFR Part 355, Appendices A and B (Extremely Hazardous Substances).

CERCLA, Section 304: This product does not contain ingredients subject to state and local reporting under Section 304 of SARA Title III as listed in 40 CFR Part 302, Table 302.4.

SARA 313 Reporting Requirements: This product does not contain ingredients subject to the reporting requirements of Section 313 SARA, and Section 6607 of the Pollution Prevention Act.

SARA Hazard Category: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and by definition meets the requirements of the following category: Chronic Health Hazard

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California Proposition 65: This product contains crystalline silica, an ingredient known to the State of California to cause cancer.

TSCA (Toxic Substances Control Act): All Ingredients contained in this product are on the TSCA inventory.

16. OTHER INFORMATION

KEY:

ACGIH:	American Conference of Governmental Industrial Hygienists
CAS:	Chemical Abstracts Service
(C):	Ceiling Limit
DOT:	Department of Transportation
IARC:	International Agency for Research on Cancer
NFPA:	National Fire Protection Association
NIOSH:	National Institute for Occupational Safety and Health
NTP:	National Toxicology Program
OSHA:	Occupational Safety and Health Administration
PEL:	Permissible Exposure Limit
SARA:	Superfund Amendment and Reauthorization Act
TLV:	Threshold Limit Value

Disclaimer:

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied is made with respect to the information contained herein. This information is solely for your consideration and interpretation.