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## 1. PRODUCT AND MANUFACTURER IDENTIFICATION

Product names:

**ChemKlenz™**

Manufacturer:

**NanoScale Corporation  
1310 Research Park Drive  
Manhattan, KS 66502  
(785) 537-0179**

Product Information:

**(877) 327-8228  
24-Hour Chemtrec Emergency Number  
U.S. (800) 424-9300  
International (703) 527-3887**

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## 2. CHEMICAL COMPOSITION AND EXPOSURE LIMITS

<u>Component</u>	<u>CAS Number</u>	<u>OSHA PEL</u>	<u>ACGIH TLV</u>
Titanium Dioxide	13463-67-7	15 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>
Magnesium Oxide	1309-48-4	15 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>

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## 3. HAZARD IDENTIFICATION AND EMERGENCY OVERVIEW

**Appearance and Odor:** Fine white odorless powder

**Routes of Exposure:** Eye and skin contact, inhalation.

**Eye Contact:** May cause physical eye irritation.

**Skin Contact:** May cause irritation.

**Inhalation:** May be irritating to mucous membranes and upper respiratory tract.

**Acute Health Effects:** May cause physical irritation of the skin and eyes, with redness and swelling, cough, and sneezing.

**Signs and symptoms of overexposure:** Acute effects include irritation of mucous membranes and upper respiratory tract. Exposure may cause diarrhea.

#### 4. FIRST AID MEASURES

**Skin:** In case of skin contact flush with copious amounts of water for at least 15 minutes, remove contaminated clothing and shoes.

**Inhalation:** If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration.

**Eyes:** In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating eyelids with fingers. Seek medical attention.

**Ingestion:** If swallowed, wash out mouth with water provided that person is conscious. Seek medical attention.

For internal contact via wounds, flush wound with water.

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#### 5. FIRE-FIGHTING MEASURES

ChemKlenz is non-flammable, combustible, or explosive. May emit toxic fumes at temperatures greater than 2800°C. The formulation may be exposed to water, carbon dioxide, dry chemical, and foam-extinguishing agents as necessary during fire-fighting operations.

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#### 6. ACCIDENTAL RELEASE MEASURES

A spill of ChemKlenz poses hazards similar to other nuisance dusts.

Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, using the appropriate protective equipment. Avoid generating dusty conditions, provide adequate ventilation.

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#### 7. HANDLING AND STORAGE

Store in sealed containers to avoid slow reactions with carbon dioxide and moisture in air.

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#### 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

As with any nuisance dust, the use of NIOSH approved respirators is recommended in cases where prolonged exposure is expected or exposure is above the PEL. Mechanical ventilation of work areas is recommended when prolonged exposure to dust may be present. Workers should wash exposed skin thoroughly after any possible exposure.

ChemKlenz can adsorb moisture and natural oils from the surface of the skin during prolonged exposure. Prolonged contact should be avoided by wearing suitable protective gloves and clothing.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance:** White powder

**Odor:** Odorless

**Bulk Density:** 0.7 g/cc

**Surface Area:**  $\geq 268 \text{ m}^2/\text{g}$

**Typical Moisture Content:**  $\leq 3.1\%$

**Typical Loss on Ignition:**  $\leq 10.4\%$

**pH:** 11.5

**Particle Size:** mean = 4.8  $\mu\text{m}$

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## 10. STABILITY AND REACTIVITY

**Stability:** Stable under normal temperature and pressure

**Hazardous Polymerization:** None

**Incompatibility:** Exothermic reaction with strong acids and oxidizing agents, phosphorus pentachloride, trichlorides, and chlorine. Will adsorb  $\text{CO}_2$  from air.

**Decomposition Products:** None

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## 11. TOXICOLOGICAL INFORMATION

### Irritancy:

LD<sub>50</sub> Dermal (rabbit) > 5 g/kg

LD<sub>50</sub> Oral (rabbit): > 2 g/kg

Inhalation (rats) TWA = 825 mg/m<sup>3</sup>/four hours: nontoxic

Eye (rabbit): slightly irritating, EPA Cat. III

Sensitizer: non-sensitizer

**Teratogen:** No

**Mutagen:** No

Chronic TiO<sub>2</sub> dust inhalation exposure (250 mg/m<sup>3</sup> for 6hrs/day, 5day/week for 2 years) can be a potential carcinogen to rats. The authors of this study concluded that based on the excessive dust loading and overwhelmed clearance mechanism in the lungs of rats exposed chronically at 250 mg/m<sup>3</sup>, the biological relevance of lung tumors to man appears to be negligible.

A number of epidemiology studies evaluating > 20,000 TiO<sub>2</sub> industry workers in Europe and the United States have been reported. Workers employed for at least six months in TiO<sub>2</sub> production were assessed using company records and quality controls, taking into account the different manufacturing procedures used at the sites as well as the actual relative levels of exposure to respirable TiO<sub>2</sub>. Exposure categories such as job site, title, and calendar years on the job were examined. Findings from each of the studies were similar, in that the authors concluded that the results did not suggest a carcinogenic effect of TiO<sub>2</sub> dust on the human lung, and mortality from other chronic diseases, including other

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respiratory diseases, was not associated with exposure to TiO<sub>2</sub> dust. Based upon the results of these studies, NanoScale Corporation concludes that titanium dioxide will not cause lung cancer or chronic respiratory disease in humans at concentrations experienced in the workplace.

**Carcinogen status:** OSHA – No, NTP – No, ACGIH (TiO<sub>2</sub>) – Group 3; Not classifiable as a human carcinogen. IARC (TiO<sub>2</sub>) – 2B; possibly carcinogenic to humans

Although the three animal studies reviewed by IARC showed evidence of tumors it is important to note that these studies tested pigmentary and ultrafine titanium dioxide. As stated in the IARC *draft* monograph, volume 93, primary particle sizes for pigmentary titanium dioxide are typically between 0.2 and 0.3 μm. Ultrafine grades range from 10-50 nm. NanoScale's NanoActive® Titanium Dioxide particles are larger and do not fall into the pigmentary or ultrafine classifications. Also, as realized in studies reviewed by NIOSH, the toxicity seems to be more related to the particle size rather than the chemical itself.

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## 12. ECOLOGICAL INFORMATION

None available.

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## 13. DISPOSAL CONSIDERATIONS

ChemKlenz may be diluted in large amounts of water. Hydrolysis may generate heat.

Not regulated as a hazardous waste under Federal RCRA. In some cases where ChemKlenz neutralizes the chemical spill, the material cleaned up will no longer be considered hazardous waste.

Disposal should be in accordance with applicable local, state and federal regulations.

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## 14. TRANSPORT INFORMATION

The chemicals formulated in ChemKlenz are not subject to the U.S. DOT hazardous chemical shipping regulations.

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## 15. REGULATORY INFORMATION

**TSCA:** Components are listed in the TSCA inventory.

**SARA (Title 313):** No reporting requirements.

**CERCLA RQ:** None.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

**16. OTHER INFORMATION**

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guide. NanoScale Corporation makes no warranty with respect hereto and disclaims all liability from reliance thereon. The information is intended for use by persons with professional knowledge of the subject matter or with access to such persons. Persons receiving this information are urged to conduct their own assessment of the suitability and completeness of the information for their particular application.