MATERIAL SAFETY DATA SHEET
CERAMIC RUTILE
TAM Product ID 54429
Revision No. 2
April, 1996

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification
TAM Ceramics Product Identification Number: 54429

Tradenames and Synonyms
Rutile, TiO₂, titanium oxide, titanic anhydride, Titania GE Material D4C9, ASTM D476, TIPURE (DuPont), TRONOX (Kerr-McGee)

Company Identification

MANUFACTURER
TAM CERAMICS, INC.
4511 Hyde Park Blvd.
Niagara Falls, NY 14305-0067

PHONE NUMBERS
Product Information 1-716-278-9400
Transport Emergency CHEMTREC: 1-800-424-9300
Safety/Health Information 1-716-278-9423
COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>Material</th>
<th>CAS Number</th>
<th>%</th>
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<tbody>
<tr>
<td></td>
<td>TITANIUM DIOXIDE</td>
<td>13463-67-7</td>
<td>&gt;94</td>
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<tr>
<td></td>
<td>MOISTURE</td>
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HAZARDS IDENTIFICATION

Potential Health Effects
SUMMARY OF RISKS: Hazard with TiO₂ is that of a nuisance dust. It is inert, practically non-toxic, and chemically non-irritating. Skin contact with TiO₂ has shown no adverse effects (other than drying and possible particulate abrasion). Eye contact with pure material has shown no specific effects other than general particulate irritation in the eye. Not absorbed by the body. Ingestion of 16 oz. has caused no apparent harm or distress. (Readily eliminated within 24 hours.) Excessive exposure above the TLV can give mild pulmonary irritation.

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: Consider pre-placement screening with emphasis on chronic respiratory problems. (Afflicted workers are at an increased risk from severe, prolonged exposure.)

Target Organs
None identified.

Primary Entry Route
None identified.

Carcinogenicity Information
This product is not considered a carcinogen by IARC.

FIRST AID MEASURES

Inhalation
If inhaled, immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Skin Contact
Wash affected area with soap and water. Get medical help.
Eye Contact
Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Get medical help if irritation persists.

Ingestion
Contact physician if large amount ingested.

SEEK MEDICAL ASSISTANCE FOR FURTHER TREATMENT, OBSERVATION, AND SUPPORT AFTER FIRST AID.

FIRE FIGHTING MEASURES

Flammable Properties
Noncombustible.

Extinguishing Media
Use that which is suitable for surrounding fire. Does not burn or support combustion. No fire or explosion hazard with material itself.

Unusual Fire or Explosion Hazards
None.

Fire Fighting Instructions
Firefighters should wear self-contained breathing apparatus where TiO₂ dust can be released.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)
NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Accidental Release Measures
Clean-up personnel to wear NIOSH-approved respiratory protection. Spills can be removed by vacuuming up or wet sweeping, keeping airborne dust at a minimum. Pick up and place in a closed container for disposal or reclamation.
HANDLING AND STORAGE

Handling (Personnel)
Practice good housekeeping to prevent accumulation of dust. Avoid excessive dusting during cleanup and handling. Practice good personal hygiene. Keep material off of your clothes and equipment. Avoid transferring material from hands to mouth while eating, drinking, or smoking.

Storage
Store in closed containers in a cool, dry, well-ventilated area.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls
Provide adequate general and local exhaust ventilation in the workplace to keep airborne particulate at a minimum.

Personal Protective Equipment
Eye/Face Protection
Wear dust resistant goggles when handling this material.

Respirators
Under dusty conditions above the TLV but below 150 mg/m³, use an approved dust respirator (MSA #66 CM 73053 type filter has been recommended). Above 150 mg/m³ use an air supplied or self-contained breathing apparatus. A full facepiece is needed above 150 mg/m³, and a positive pressure air-supplied system is needed above 750 mg/m³.

Protective Clothing
Wear gloves, aprons, coveralls, etc. as required to prevent prolonged or repeated contact with skin. (Use of lotions and barrier creams may be desirable).

Workplace Considerations
Ventilation
Use local exhaust ventilation where dust is generated to maintain airborne levels below the TLV. (Exhaust filter system may be required to avoid environmental contamination.)

Safety Stations
Make eyewash stations available in areas of use and handling.
Contaminated Equipment
Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Particles can adhere to contact lenses and cause corneal damage.

Exposure Guidelines
8-hr. TWA 15 mg/m$^3$ as total dust (titanium dioxide). [Current OSHA PEL. ACGIH (1983) TLV for nuisance particulate is 30 mppcf or 10 mg/m$^3$ of total dust, or 5 mg/m$^3$ of respirable dust; STEL 20 mg/m$^3$ (15 minute period).]

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data
- Vapor Pressure: Not volatile
- Vapor Density: Not volatile
- Melting Point: ~1560 C, ~1840 C
- Evaporation Rate: Not found
- Solubility in Water: Insoluble
- Odor: Odorless
- Form: Crystals or powder
- Color: White (Natural materials may be colored by impurities.)
- Specific Gravity: ~3.8, ~4.3

Stability and Reactivity
Chemical Stability
Material is stable in closed containers at room temperature under normal storage and handling conditions.

Incompatibility with Other Materials
Violent reaction with lithium around 200$^\circ$ C.

Reduction of oxide by heating with aluminum, calcium, magnesium, potassium, sodium, or zinc is accompanied by incandescence.

Decomposition
None.

Polymerization
Polymerization will not occur.
DISPOSAL CONSIDERATIONS

Waste Disposal
Unsalvageable waste may be buried as inert solid in an approved landfill. Follow federal, state, and local regulations. AQUATIC TOXICITY TLm 96: Over 1000 ppm.

REGULATORY INFORMATION

EPA TSCA Status: All ingredients in this product are listed on the EPA Toxic Substances Control Act Chemical Substance Inventory

INFORMATION

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. Component percentages are typical based on historical production performance. TAM Ceramics does not make any expressed or implied warranty that future production will continue to possess these typical properties.

Responsibility for MSDS
TAM Ceramics, Inc.
4511 Hyde Park Blvd.
Niagara Falls, NY 14305-0067

Russ Steiger
Manager of Health, Safety, & Environmental
Telephone (716) 278-9423
Fax (716) 285-3026

End of MSDS