MATERIAL SAFETY DATA SHEET
OSHA HAZARD COMMUNICATION RULE

CHEMICAL IDENTITY

<table>
<thead>
<tr>
<th>LABEL IDENTITY</th>
<th>BARIUM TITANATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORMULA</td>
<td>BaTiO3</td>
</tr>
<tr>
<td>CHEMICAL FAMILY</td>
<td>Metal Titanate</td>
</tr>
<tr>
<td>CAS REGISTRY NUMBER</td>
<td>12047-27-7, LISTED ON TSCA.</td>
</tr>
</tbody>
</table>

HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
<th>CAS NUMBER</th>
<th>%</th>
<th>TLV</th>
<th>OSHA/PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>12047-27-7</td>
<td>99.9</td>
<td>0.5mg/m³ (asBa)</td>
<td>0.5mg/m³</td>
</tr>
<tr>
<td>1304-28-5</td>
<td>NA</td>
<td>0.5mg/m³</td>
<td>0.5mg/m³</td>
</tr>
<tr>
<td>13463-67-7</td>
<td>NA</td>
<td>10mg/m³</td>
<td>10mg/m³</td>
</tr>
</tbody>
</table>

PHYSICAL AND CHEMICAL PROPERTIES

COLOR, FORM AND ODOR: White powder, pieces or pressed, odorless
BOILING POINT: NA
DENSITY (gm/cc): 5.95
VAPOR PRESSURE @ 20°: NA
% VOLATILE BY VOLUME (%): NA
REACTION WITH WATER: None
EVAPORATION RATE (H2O=1): NA
SOLUBILITY IN WATER: Insoluble
MELTING POINT: 1654°C
OTHER: Soluble in hot water, aqua regia, HNO3, insoluble in dilute acid

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: NA
AUTOIGNITION TEMPERATURE (°C): NA
FLAMMABILITY: Non-flammable
EXTINGUISHING MEDIA: Non-flammable. This material is not combustible nor will it support combustion.
SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus to avoid dust generated during fire fighting.
UNUSUAL FIRE & EXPLOSION HAZARDS: Non-flammable
HEALTH HAZARD INFORMATION

TOXICITY DATA: No data. Toxic hazard rate for Barium Titanate: Unknown. Animal experiments show low toxicity. Toxic hazard rate for Titanium compounds: This material is physiologically inert. There are no reported cases where Titanium compounds have caused intoxication.

HMIS RATING:
- HEALTH: 2
- FLAMMABILITY: 0
- REACTIVITY: 0
- PERSONAL PROTECTION: E

ROUTES OF ENTRY
- INHALATION: Yes
- SKIN: Yes
- INGESTION: Yes

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:
- Lung Disorders

EFFECTS OF OVEREXPOSURE (acute and chronic):
- INHALATION: barium compounds may cause local irritation to the nose, throat and mucous membranes. Long term exposure to Barium compounds can lead to baritosis, a benign pneumoconiosis.

CARCINOGENICITY: No
NTP: No
IARC MONOGRAPHS: No
OSHA REGULATE: No

EMERGENCY FIRST AID PROCEDURES:
- INGESTION: do not induce vomiting, seek medical attention immediately.
- INHALATION: remove individual from exposure to fresh air, seek medical attention.
- SKIN CONTACT: wash affected area with soap & water, seek medical attention.
- EYE CONTACT: flush eyes with copious amounts of water, seek medical attention.

REACTIVITY DATA

STABILITY
- CONDITIONS CONTRIBUTING TO UNSTABILITY: Stable
- INCOMPATIBILITY (MATERIALS TO AVOID): None known
- HAZARDOUS DECOMPOSITION PRODUCTS: Acids
- HAZARDOUS POLYMERIZATION: Ba fumes upon thermal decomposition
- CONDITIONS TO AVOID: Will Not Occur
- CONDITIONS TO AVOID: None known
SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Try to keep material dry and away from acid. Sweep or scoop spilled material. Handle with adequate ventilation. For nuisance dust, see OSHA 29 CFR 1910-94; Ventilation: See CFR 1910-1000 (air contaminants.) Respirators may be required.

WASTE DISPOSAL METHOD:
Waste containing more than 0.2% soluble Barium is hazardous. This material may contain more than 0.2% soluble if pH is low. It can be rendered non-hazardous by mixing with excess sulfate to form insoluble barium sulfate. Dispose of in accordance with local, state and federal regulations.

SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION
NIOSH approved respirator is required if TLV and PEL exposure limits are exceeded.
Recommended
Recommended
NA
NA
Required
Safety glassed required
None necessary

LOCAL EXHAUST
MECHANICAL (general)
SPECIAL
OTHER
PROTECTIVE GLOVES
EYE PROTECTION
OTHER PROTECTIVE EQUIPMENT

SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING/STORAGE:
Store in tightly closed container, store in cool, dry place away from acids, wash hands and face thoroughly after handling and before meals.

TRANSPORTATION REQUIREMENTS
DOT CLASS: Not Classified
UN NUMBER: 1564
IMCO CLASS: 6.1
OTHER: ND

PRECAUTIONARY LABELING
NONE

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NA= NOT APPLICABLE
ND= NO DATA FOUND