SAFETY DATA SHEET

CHEMALLOY CO. LLC
P.O. BOX 350
BRYN MAWR, PA 19010-0350

CHEMICAL NAME: Iron Titanate
COMMON/TRADE NAME: Ilmenite

SECTION 1 - IDENTIFICATION

Product Identifier Iron Titanate
Other Name(s) Ilmenite
Recommended use Manufacturing and Welding
Restrictions for use Commercial use only, not for human consumption
Manufacturer Name Chemalloy Company LLC
Address PO Box 350
Bryn Mawr, PA 19010

Telephone (610) 527-3700
Fax No. (610) 527-3878
Emergency Phone (800) 424-9300 (Chemtrec)
Contract No. CCN 4453

SECTION 2 - HAZARD(S) IDENTIFICATION

Hazardous Classification per 29CFR 1910.1200
Carcinogenicity (Category 1B)
Specific target organ toxicity - single exposure (Category 3 - Respiratory Organs)
Specific target organ toxicity - repeated exposure (Category 2 - Respiratory & Nervous System)
100% of ingredients consists of unknown acute toxicity

Other Hazards not classified None Known

Signal Word DANGER

Hazard pictograms

Hazard Statements
May cause cancer by inhalation.
May cause respiratory irritation
May cause damage to respiratory or nervous systems

Precautionary Statements
Prevention Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Wear protective gloves/protective clothing/eye protection/face protection.
Do Not breathe dust, fume, gas, mist, vapors or spray.
Use only in a well-ventilated area or outdoors.

Response If inhaled: Move person to fresh air and keep comfortable.
Seek medical advice/attention if feeling unwell, exposed or concerned.

Storage Store in a well-ventilated place in properly labelled, tightly sealed appropriate packaging.
Prohibit access to unauthorized use.

Disposal Dispose of contents/container in accordance with local, state and federal regulations.

SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Formula</th>
<th>CAS No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium Dioxide</td>
<td>TiO₂</td>
<td>13463-67-7</td>
<td>&gt; 58 % and &lt; 64 %</td>
</tr>
<tr>
<td>Iron Oxide</td>
<td>Fe₂O₃</td>
<td>1309-37-1</td>
<td>&gt; 30 % and &lt; 38 %</td>
</tr>
<tr>
<td>Aluminum Oxide</td>
<td>Al₂O₃</td>
<td>1344-28-1</td>
<td>&gt; 0.9 % and &lt; 2.5 %</td>
</tr>
<tr>
<td>Manganese Oxide</td>
<td>MnO</td>
<td>1344-43-0</td>
<td>&gt; 1.0 % and &lt; 1.6 %</td>
</tr>
<tr>
<td>Silicon Dioxide</td>
<td>SiO₂</td>
<td>14808-60-7</td>
<td>&gt; 0.6 % and &lt; 1.5 %</td>
</tr>
</tbody>
</table>

Common Names/Synonyms Ilmenite

SDS 46.0 page 1 of 4
SECTION 4 - FIRST AID MEASURES

In case of inhalation  If inhaled: Move person to fresh air and keep comfortable. Seek medical advice/attention if feeling unwell, exposed or concerned. If victim is not breathing, and if assistance is trained, administer CPR.

In case of skin contact  If after contact, skin becomes irritated, remove contaminated clothes from victim. Wash the contaminated area with plenty of warm water and soap (for 15 minutes). If symptoms persist, seek medical attention and report substance contacting skin.

In case of eye contact  Flush eyes immediately with plenty of flowing water for 15 minutes holding eyelids open. If symptoms persist, seek medical attention and report substance irritating eyes.

In case of ingestion  Obtain immediate medical attention and report substance ingested. Do not give an unconscious victim anything to eat or drink, or try to induce vomiting.

Symptoms & Effects -acute  May cause irritation of the respiratory system

Symptoms & Effects -chronic  Longtime overexposure may cause silicosis or cancer due to the silica content, also chronic overexposure to aluminum oxide may cause pneumoconiosis and neurotoxicity.

Immediate Medical Care  Treat symptomatically.

SECTION 5 - FIREFIGHTING MEASURES

Extinguishing media  Substance is not flammable or combustible, in case of fire use extinguishing media appropriate for the surrounding environment (i.e. ABC dry chemical)

Special hazards arising from substance or mixture  None Known

Special protective equipment & precautions for firefighters  Firefighters should wear full protective clothing and NIOSH approved self-contained breathing apparatus.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment, and emergency procedures  For non-emergency personnel: keep unprotected people away, allow only well trained personnel wearing suitable protective clothing to respond to the incident.

For emergency responders: Avoid eye and skin contact. Do not inhale dust particles, and avoid the formation of dust.

Methods and materials for containment and clean-up  Collect the spilled material in mechanical way, then place into a suitable, closed, properly labelled chemical waste container for disposal. During disposal wear suitable personal protective equipment.

Environmental precautions  Dispose of spillage and waste (product/packaging) in accordance with all applicable environmental laws.

SECTION 7 - HANDLING AND STORAGE

Precautions for safe handling  Observe conventional hygiene precautions, and after work hours, wash hands thoroughly. Avoid the direct contact with the product.

Do not eat or smoke in the workplace.

Ensure adequate ventilation and avoid formation of dust.

Use Personal Protective Equipment as detailed in Section 8.

Emptied containers may contain residues of product, which may be hazardous.

Conditions for Safe Storage, including any incompatibilities  Keep product dry in suitable packaging, properly labeled and away from acids.

Keep product away from food, beverages, luxury goods, feed, and pharmaceuticals.

Follow all instructions on warning labels.

Precautions against fire and explosion  No special measures are required, substance will not burn.
SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits

<table>
<thead>
<tr>
<th>Hazardous Component</th>
<th>CAS NO.</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium Dioxide</td>
<td>13463-67-7</td>
<td>15.0 mg/M³ TWA (Total Dust)</td>
<td>10.0 mg/M³ TWA</td>
</tr>
<tr>
<td>Iron Oxide</td>
<td>1309-37-1</td>
<td>15.0 mg/M³ TWA (Total Dust)</td>
<td>5.0 mg/M³ TWA (Respirable Particles)</td>
</tr>
<tr>
<td>Aluminum Oxide</td>
<td>1344-28-1</td>
<td>15.0 mg/M³ TWA (Total Dust)</td>
<td>1.0 mg/M³ TWA (Respirable Particles)</td>
</tr>
<tr>
<td>Manganese Oxide</td>
<td>1344-43-0</td>
<td>5.0 mg/M³ (Ceiling as Mn)</td>
<td>0.02 mg/M³ TWA (Respirable Particles as Mn)</td>
</tr>
<tr>
<td>Silicon Dioxide</td>
<td>14806-60-7</td>
<td>0.1 mg/M³ TWA (Respirable Dust)</td>
<td>0.025 mg/M³ TWA (Respirable Particles)</td>
</tr>
</tbody>
</table>

Personal Protection Requirements

Respiratory: NIOSH approved respirators should be used when mechanical controls are not feasible.
Hand: Protective gloves are recommended for handling this material.
Eye: ANSI approved eye protection is recommended when handling this material.
Other/Clothing: Appropriate work place clothing should be worn when handling this material.
Engineering Controls: Local exhaust/ventilation should be used when feasible to control dust levels below acceptable occupational exposure limits.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>PHYSICAL STATE/APPEARANCE</th>
<th>ODOR</th>
<th>ODOR THRESHOLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black to brown-red powder</td>
<td>No odor</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>MELTING PT</td>
<td>INITIAL BOILING PT</td>
</tr>
<tr>
<td>No data available</td>
<td>Approx. 1402°C</td>
<td>No data available</td>
</tr>
<tr>
<td>FLASH PT</td>
<td>EVAPORATION RATE</td>
<td>FLAMMABILITY (solid, gas)</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>Not Applicable</td>
<td>Non Flammable</td>
</tr>
<tr>
<td>UEL / LEL</td>
<td>VAPOR PRESSURE</td>
<td>VAPOR DENSITY</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY/RELATIVE DENSITY</td>
<td>SOLUBILITY (water)</td>
<td>PARTITION COEFFICIENT</td>
</tr>
<tr>
<td>4.3 to 5.0 (H₂O = 1)</td>
<td>Very Slight</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>AUTO IGNITION TEMPERATURE</td>
<td>DECOMPOSITION TEMPERATURE</td>
<td>VISCOSITY</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>No data available</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

SECTION 10 - STABILITY AND REACTIVITY

Reactivity None Known
Chemical Stability Stable at normal temperature & general work conditions
Possibility of Hazardous Reactions None Known
Conditions to Avoid None Known
Incompatible Materials None Known
Hazardous Decomposition Products None known

SECTION 11 - TOXICOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>ACUTE TOXICITY</th>
<th>LD₅₀ (Inhalation-rat)</th>
<th>LD₅₀ (oral-rat)</th>
<th>ATE CALCULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>None Known</td>
<td>No Data Available</td>
<td>No Data Available</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>SKIN CORROSION/IRRITATION</td>
<td>SERIOUS EYE DAMAGE/EYE IRRITATION</td>
<td>SKIN SENSITIZATION</td>
<td></td>
</tr>
<tr>
<td>None Known</td>
<td>None Known</td>
<td>None Known</td>
<td></td>
</tr>
<tr>
<td>GERM CELL MUTAGENICITY</td>
<td>CARCINOGENICITY (IARC, NTP, OSHA, ACGIH)</td>
<td>REPRODUCTIVE TOXICITY</td>
<td></td>
</tr>
<tr>
<td>None Known</td>
<td>Category 1B: ACGIH classifies SiO₂ as a suspected human carcinogen</td>
<td>None Known</td>
<td></td>
</tr>
<tr>
<td>STOT-SINGLE EXPOSURE</td>
<td>STOT-REPEATED EXPOSURE</td>
<td>ASPIRATION HAZARD</td>
<td></td>
</tr>
<tr>
<td>Category 3 - Respiratory</td>
<td>Category 2 - Respiratory</td>
<td>None Known</td>
<td></td>
</tr>
</tbody>
</table>

Likely Routes of Exposure inhalation
SECTION 11 - TOXICLOGICAL INFORMATION (cont.)

Symptoms related to Physical, Chemical, Toxicological Characteristics
May cause irritation of the respiratory system

Immediate and Delayed effects from short-term and long-term exposure
Longtime overexposure may cause silicosis or cancer due to the silica content, also chronic overexposure to aluminum oxide may cause pneumoconiosis and neurotoxicity.

SECTION 12 - ECOLOGICAL INFORMATION

ECOTOXICITY

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 (fish)</td>
<td>No Data Available</td>
</tr>
<tr>
<td>EC50 (crustaceans)</td>
<td>No Data Available</td>
</tr>
<tr>
<td>NOEC (algae)</td>
<td>No Data Available</td>
</tr>
</tbody>
</table>

Persistence and Degradability
No data available

Bioaccumulative potential
No data available

Mobility in Soil
No data available

Other Adverse Effects
No data available

SECTION 13 - DISPOSAL CONSIDERATIONS

Handling for Disposal
Handle in accordance with good industrial hygiene and safety practice. Refer to protective measures listed in Sections 7 and 8.

Methods of Disposal
Dispose of spillage and waste (product/packaging) in accordance with all local/regional national/international regulations.

SECTION 14 - TRANSPORT INFORMATION

Proper Shipping Name
This material is not regulated by 49 CFR.

UN Number
none

Hazard Class
none

Packing Group
none

SECTION 15 - REGULATORY INFORMATION

TSCA Information
This chemical appears on the Toxic Substances Control Act (TSCA) inventory.

SARA Title III: Sec 302 Extremely Hazardous Substances, 40 CFR 355
There are no extremely hazardous substances present in this material.

SARA Title III: Sec 311 and 312, MSDS Requirements
This material is subject to the reporting requirements for this regulation. Threshold planning quantity: 10,000 lbs.

SARA Title III: Sec 313, Toxic Chemicals Notification
This material is not subject to the annual reporting requirements for this regulation.

SECTION 16 - OTHER INFORMATION

Revision History
05/21/2015 - SDS formatted to 16-part GHS format, Supersedes 09/15/2012 MSDS revision

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