SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT and SYNONYMS: Titanium 6AI-4V Powder, Ti-6/4 Alloy Powder
MOLECULAR FORMULA: Ti-6Al-4V
CHEMICAL FAMILY: Titanium Alloys
HMIS HAZARD RATING:

<table>
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<tr>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
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<td>0</td>
<td>3</td>
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KEY: 0=Minimum; 1-Slight; 2-Moderate; 3-Serious; 4-Severe; *-Chronic Hazard

SECTION 2 - INGREDIENTS/HAZARDS INFORMATION

CHEMICAL COMPONENTS
- Ti
- Aluminum, Al
- Vanadium V
- Tin, Sn

C.A.S. NO.
- Ti: 7440-32-6
- Aluminum, Al: 7429-90-5
- Vanadium V: 7440-62-2
- Tin, Sn: 7440-31-5

%:
- Ti: 80-99
- Aluminum, Al: 0-8
- Vanadium V: 0-10
- Tin, Sn: 0-1

OSHA EXPOSURE LIMITS (mg/m³):
- Ti: 10 - as TiO₂ (tot dust)
- Aluminum, Al: 15, metal dust
- Vanadium V: 0.05, as V₂O₅
- Tin, Sn: 2 as SnO₂

SEC.302 (EHS)/SEC.304 RQ/SEC.313
- No/No/No
- No/No/Yes
- No/No/Yes
- No/No/No

TSCA LISTED: Yes

SECTION 3 - PHYSICAL DATA

BOILING POINT: above 2020°C
VAPOUR DENSITY: N.Av.
SPECIFIC GRAVITY: 4.4~6.6 gm/cc.
MELTING POINT: Above 1500°C
SOLUBILITY (WT. % IN WATER): Insoluble
BULK DENSITY: 270~410 lb/ft³
% VOLATILE BY VOLUME: Nonvolatile
VAPOR PRESSURE: 0 @ 20°C
APPEARANCE AND ODOR: Silver Grey Metallic Powder, Odorless

SECTION 4 - FIRE AND EXPLOSION HAZARD DATA

IGNITION POINT:
- Varies from 200°C to above 500°C depending on particle size.
- Fine particles, such as 5 micron powder may autoignite at room temperature.

FLAMMABILITY:
- Flammable for fine particle size
EXTINGUISHING MEDIA: Dry sand, salt or Type D fire extinguisher
FIRE FIGHTING PROCEDURES: Wear NIOSH/MSHA authorized self-contained breathing apparatus with full protective clothing to provide contact with skin and eyes. Fumes from fire are hazardous and Isolate runoff to ensure ventilation. If powders become ignited it is suggested to allow the material to burn out. Small fire can be smothering with above extinguishing media.

UNUSUAL FIRE & EXPLOSION HAZARDS:
Do not spray water on burring materials as a violent explosion may occur. This explosive characteristic is caused by the hydrogen and stream generated by the reaction of water with the burning material. Carbon Dioxide is not effective in extinguishing burring titanium. The Fire hazard increases with finer particles.

SECTION 5 - REACTIVITY DATA
STABILITY: ( ) Unstable (x) Stable
HAZARDOUS POLYMERIZATION: ( ) May occur (x) Will not occur
CONDITIONS TO AVOID: keep away from sources of ignition, heat, flames, sparks and static electricity. Any material with a dimension of less than 0.001 inch is flammable.
INCOMPATIBILITY - MATERIALS TO AVOID: MINERAL ACIDS, STRONG OXIDIZING AGENTS, HALOGENS, CARBON DIOXIDE. Burns in chlorine gas above 200°C. Dissolves in hydrofluoric acid; hydrofluoric-nitric acid mixture; ignite in cold fluorine and above 200°C will react strongly with chlorine, bromine and halocarbons.
HAZARDOUS DECOMPOSITION PRODUCTS: Will not decompose. However, the above reactions with incompatible materials will generate reaction products such as flammable hydrogen, toxic fumes of nitrogen oxide, or corrosive metal halide vapors.

SECTION 6 - HEALTH HAZARD DATA
ROUTES OF ENTRY:
INHALATION: (x) SKIN/ABSORPTION: ( )
INGESTION: ( ) SKIN/EYE CONTACT: ( )
ACUTE EFFECTS OF EXPOSURE: None
CHRONIC EFFECTS OF EXPOSURE: None known
TARGET ORGANS: None known
TOXICITY DATA: Nontoxic in metallic form. However, if the alloy is dissolved in chemically form, handling of such materials should take into consideration of the possible carcinogenicity of some chromium (VI) compounds and the inhalation toxicity of vanadium oxide dust and fumes.
CORROSIVE: No
CARCINOGENICITY: None recorded. However, refer to toxicity data.
SENSITIZER: None recorded
COMMENTS: Grinding of the alloys produces significant volumes of fine oxide dusts. The health hazards of combined oxides containing vanadium are not well known. Adequate ventilation and respiratory protection should be mandatory when dealing alloys containing these elements.
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: None recorded
RECOMMENDED EXPOSURE LIMITS: Refer to "Section II"  LD50/LC50: Non recorded.

SECTION 7 - EMERGENCY AND FIRST AID PROCEDURES:
INHALATION: Remove victim to fresh air, administer oxygen.
SKIN CONTACT: Take off contaminated clothing; brush material off skin; wash affected area with soap and water, seek medical attention if irritation insist.
EYE CONTACT: Flush eyes with water for 15 minutes. Seek medical attention if necessary.

SECTION 8 - EMPLOYEE PROTECTION
RESPIRATORY PROTECTION: Wear appropriate NIOSH approved dust respirator if dust of fume exposure levels might be exceeded. Have adequate ventilation in the working environment.
PROTECTIVE CLOTHING: Protective gear recommended
PROTECTIVE GLOVES: Use of gloves recommended
EYE PROTECTION: Use safety glasses with side shields during mechanic operations, such as crushing, blending, compacting or spraying.

SECTION 9 - HANDLING AND ENVIRONMENTAL PROTECTION
PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORAGE: Store in sealed cans or bottles and stay in cool, dry, clean area away from heat, flames, sparks or any source of ignition.
OTHER PRECAUTIONS: Do not accumulate large quantities of titanium fines or residues as they are a fire hazard. Dispose of these materials daily.
SPILL OR LEAK PROCEDURES: Wear appropriate protective tools specified in Section 8. Isolate the area and insure proper ventilation. Vacuum up spill and place in a closed container for safe disposal. Take care not to raise dust. Stay aware of fire hazard.
WASTE DISPOSAL: Dispose of in accordance with local, state and federal regulations. Fine, non-recyclable scrap should be burned in small quantities under controlled conditions. The resultant titanium oxide is inert and may be deposited in a landfill. However, metallic oxide containing more than three percent vanadium oxide must be sent to an approved hazardous waste disposal site.
ENVIRONMENTAL HAZARDS: None recorded.
SECTION 10 - TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION (DOT):
NO Specific D.O.T. regulations for solid and coarse powders - nonhazardous.

DOT CLASSIFICATION FOR PARTICLE SIZE FINER THAN -80MESH:
D.O.T. PROPER SHIPPING NAME: Metal Powder, flammable, n.o.s.
D.O.T. ID NUMBER: UN3089
PACKING GROUP: III
HAZARD CLASS: 4.1
LABELS REQUIRED: Flammable Solid
EMERGENCY RESPONSES D.O.T. NO. 170

SECTION 11 - OTHER COMMENTS

THE ABOVE INFORMATION PROVIDED REPRESENTS THE BEST OF OUR KNOWLEDGE. EMPLOYERS SHOULD USE THIS INFORMATION AS A SUPPLEMENT TO OTHER INFORMATION, SUCH AS NEW SAFETY STANDARDS AND GOVERNMENT REGULATION, ETC., GATHERED BY THEM TO ENSURE PROPER USE AND PROTECT THE HEALTH AND SAFETY OF EMPLOYEES. PHELLY MATERIALS MAKES NO WARRANTY, EITHER EXPRESSED NOR IMPLIED, WITH RESPECT TO THE CONTINUING ACCURACY OF THE INFORMATION FURNISHED HEREIN, AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON.

* N.Av. - Not Available N.Ap. - Not Applicable N.E - Not Established