

MATERIAL SAFETY DATA SHEET

OREMET-WAH CHANG

P. O. BOX 460 ALBANY OREGON 97321

SECTION 1 Revised: 9/11/96 Number: 490 Page 1 of 3

PRODUCT: Nickel-Titanium Base Alloys

24 HOUR EMERGENCY ASSISTANCE

OREMET-WAH CHANG

541-926-4211

SYNONYMS: Shape Memory Alloy, Superelastic Alloy

CHEMICAL FAMILY: Metal-base Alloys

CHEMTREC
800-424-9300

HMIS HAZARD RATING: HEALTH = *0 FIRE = 0 REACTIVITY = 0

KEY: 0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe; * = Chronic Hazard

SECTION 2 INGREDIENTS

CHEMICAL COMPONENTS	%	C.A.S. NO.	OSHA EXPOSURE LIMITS (mg/m ³)	
			TWA	STEL
Nickel, Ni	35-60	7440-02-0	1	--
Titanium, Ti	20-50	7440-32-6	5 as respirable TiO ₂ dust	--
Iron, Fe	0-6	7439-89-6	10 as Fe ₂ O ₃	--
Hafnium, Hf	0-40	7440-58-6	0.5 as Hf	--
Copper, Cu	0-15	7440-50-8	1.0 as dust	2.0 as fume
Vanadium, V	0-10	7440-62-2	0.05 as V ₂ O ₅	--
Niobium, Nb	0-20	7440-03-1	--	--
Boron, B	0-1	7440-42.8	--	--

Section 3: PHYSICAL DATA

BOILING POINT @ 760 MM HG: N. Ap.
 VAPOR DENSITY (AIR = 1): N. Ap.
 SPECIFIC GRAVITY (H₂O = 1): 5.8 - 7.5
 PH OF SOLUTIONS: N. Ap.
 FREEZING/MELTING POINT: Above 1000°C
 SOLUBILITY (WEIGHT % IN WATER): Insoluble
 BULK DENSITY: 360 - 470 lb/ft.³
 % VOLATILE BY VOLUME: Nonvolatile
 VAPOR PRESSURE: 0 at 20°C
 EVAPORATION RATE: None
 HEAT OF SOLUTION: N. Ap.
 APPEARANCE AND ODOR: Metallic silver-gray odorless solids

SECTION 4. REACTIVITY DATA

STABILITY: Stable
HAZARDOUS POLYMERIZATION: Will not occur
CONDITIONS TO AVOID: Acids and strong oxidizing agents
INCOMPATIBILITY (MATERIALS TO AVOID): Nickel-titanium base alloys are attacked by hydrofluoric acid or hydrofluoric-nitric mixtures. Bromine and iodine solutions in methanol attack the alloys.
HAZARDOUS DECOMPOSITION PRODUCTS: Nickel-titanium alloys do not decompose. The above reactions with incompatible materials will generate liquids containing nickel ions in solution that are considered carcinogenic.

SECTION 5. FIRE AND EXPLOSION HAZARD DATA

IGNITION POINT: Not known.
FLAMMABLE LIMITS IN AIR (% BY VOLUME): N. Av.
EXTINGUISHING MEDIA: Dry table salt, sand, or Type D fire extinguisher.
FIRE FIGHTING PROCEDURES: If alloys of small sizes, i.e., foil or fine wire, become ignited, it is advisable to allow the material to burn out. Fires can be controlled by smothering with dry table salt, sand, or using Type D dry-powder fire extinguishing material. Do not use water.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Toxic fumes may be evolved in a fire. Firemen should wear self-contained breathing apparatus in enclosed areas.

SECTION 6. HEALTH HAZARD DATA

Routes of Entry

Inhalation: Yes (dust)
Ingestion: No
Skin Absorption: No
Skin/Eye Contact: No

Target Organs: None known

Toxicity Data: These alloys are non-toxic. The binary NiTi alloys are used for medical applications within the human body. However, if the alloys are acid-dissolved or treated chemically to form water-soluble compounds of nickel, then the possibly toxic behavior of the resulting water-soluble materials must be considered in any handling, processing, or disposal procedures.

Corrosive: No

Carcinogen: Not in solid form. Only if Ni ions formed by acid dissolution.

Sensitizer: No

Comments: None

Acute Effects from Exposure: None known

Chronic Effects from Exposure: None Known

References: Plunkett, Handbook of Industrial Toxicology, 2nd Ed.
 NIOSH, Registry of Toxic Effects of Chemical Substances
 ITI, Toxic and Hazardous Industrial Chemical Safety Manual
 CRC Handbook of Chemistry and Physics, 61st Ed.
 Sax, Dangerous Properties of Industrial Materials, 7th Ed.
 Encyclopedia of Occupational Health and Safety, 3rd Ed.
 Patty's Industrial Hygiene and Toxicology, 3rd Ed., Vol. 2A
 OSHA Occupational Health Guidelines for Chemical Materials
 UMETCO MSDS for Vanadium Pentoxide

SECTION 7. EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Normal procedure for inert dust.
EYE CONTACT: Normal procedure for foreign object.
SKIN CONTACT: N. Ap.
INGESTION: N. Ap.

SECTION 8. EMPLOYEE PROTECTION

RESPIRATORY PROTECTION: Wear appropriate NIOSH-approved respirator if dust or fume exposure levels are exceeded.
PROTECTIVE CLOTHING: None
EYE PROTECTION: Safety glasses if potentially exposed to flying particles.
ADDITIONAL PROTECTIVE MEASURES: None

SECTION 9. SPECIAL PROCEDURES

PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORAGE: Normally none. Thin foils may have sharp edges.

SECTION 10. ENVIRONMENTAL PROTECTION

SPILL OR LEAK PROCEDURES: N. Ap.
WASTE DISPOSAL: Fine nonrecyclable scrap should be placed in a sealed container and should be disposed of in an EPA-approved landfill.
ENVIRONMENTAL HAZARDS: None in alloy form.

SECTION 11. TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION CLASSIFICATION: Metal Alloy

D.O.T PROPER SHIPPING NAME

D.O.T. I.D. NUMBER

N. Ap.

N. Ap.

SECTION 12. OTHER REGULATORY CONTROLS

Section 313 Supplier Notification: This product contains the following chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (40 CFR 372): CAS #7440-62-2, Vanadium (fume or dust), 0-10% by weight. CAS #7440-51-8 Copper, 0-15% by weight. CAS #7440-02-0, Nickel, 35-60% by weight.

In addition to the ingredients listed in Section 2, this product contains the following chemicals considered by the State of California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as causing cancer or reproductive toxicity and for which warnings are now required: Nickel, Copper, Vanadium (fume or dust)

The Comprehensive Environmental Response, Compensation, and Liability Act of 1990, Sec102 (40 CFR 302) requires that any "release" into the "environment" of these hazardous substances contained in a product in excess of the "reportable quantity" in any 24-hour period must be immediately reported to the National Response Center (800-424-8802). Reporting is not required under certain circumstances such as a federally permitted release or the release of certain metal solid particles with a diameter larger than 100 micrometers: Nickel and compounds, 35-60% by weight, reportable quantity, 1 lb.; copper and compounds 0-15% by weight

The Superfund Amendments and Reauthorization Act of 1986 (40 CFR 355) specifies certain emergency planning and notification requirements if these extremely hazardous substances are present in concentrations of greater than 1% at a facility in amounts greater than the threshold planning quantity: None

If this product is discarded as a waste, it would be identified with the following hazardous waste classification under the Resource Conservation and Recovery Act (40 CFR 261). The act specifies requirements for the management and disposal of hazardous wastes: Not regulated