



Allegheny Technologies
Specialty Materials That Make Our World

MATERIAL SAFETY DATA SHEET
WAH CHANG
PO BOX 460 - ALBANY, OREGON - 97321

SECTION 1: Revised: 7/20/2006 Product Number: 490

PRODUCT: NICKEL-TITANIUM BASE ALLOYS

SYNONYMS: Shape Memory Alloy, Superelastic Alloy

CHEMICAL FAMILY: Metal-base Alloys

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

HMIS RATING: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic

24 HOUR EMERGENCY ASSISTANCE
WAH CHANG
An Allegheny Technologies Company
541-926-4211
CHEMTREC
800-424-9300

SECTION 2. COMPOSITION, INGREDIENTS INFORMATION

CHEMICAL COMPONENTS	%	C.A.S. NO.	OSHA/ACGIH EXPOSURE LIMITS	
			mg/m ³ or ppm*	
			<u>PEL</u>	<u>TLV</u>
Nickel, Ni	35-60	7440-02-0	1	1.5
Titanium, Ti	20-50	7440-32-6	10 (as Oxide)	10 (as oxide)
Iron, Fe	0-6	7439-89-6	10 (as Fe ₂ O ₃)	5 (as Fe ₂ O ₃)
Hafnium, Hf	0-40	7440-58-6	0.5	0.5
Copper, Cu	0-15	7440-50-8	1 (Dust), 0.1 (Fume)	1 (dust), 0.2 (fume)
Vanadium, V	0-10	7440-62-2	0.05 (as V ₂ O ₅)	0.05 (as V ₂ O ₅)
Niobium, Nb	0-20	7440-03-1	10 (PNOR)	10 (PNOS)
Boron, B	0-1	7440-42-8	10 (as oxide)	10 (as oxide)

PNOR = Particles Not Otherwise Regulated. PNOS = Particles Not Otherwise Specified.

SECTION 3. HAZARDS IDENTIFICATION

ROUTES OF ENTRY

INHALATION: Yes (Dust)
INGESTION: No
SKIN ABSORPTION: No
SKIN/EYE CONTACT: No

N. Ap. = Not Applicable

N. Av. = Not Available

SECTION 4. FIRST AID MEASURES

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

SECTION 5. FIRE FIGHTING MEASURES

IGNITION POINT: N.Av.
FLAMMABLE LIMITS: 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, allow the material to burn out. Control fires 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 need to wear self-contained breathing apparatus in enclosed areas.

SECTION 6. ACCIDENTAL RELEASE MEASURES

SPILL OR LEAK PROCEDURES: Sweep up spilled solids. Keep finely divided material away from any source of ignition and cleaned up immediately.

SECTION 7. HANDLING AND STORAGE

PRECAUTIONS TO TAKE DURING HANDLING AND STORAGE:

Normally none. This solid may have sharp edges.

SECTION 8. EXPOSURE CONTROL; PERSONAL PROTECTION

RESPIRATORY PROTECTION: Wear appropriate NIOSH approved respirator for dust or fume exposure.

PROTECTIVE CLOTHING: None

EYE PROTECTION: Safety glasses if potentially exposed to flying particles

ADDITIONAL PROTECTIVE MEASURES: None

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

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/ft³
 % VOLATILE BY VOLUME: Nonvolatile
 VAPOR PRESSURE: 0 @ 20°C
 EVAPORATION RATE: N.Ap.
 HEAT OF SOLUTION: N.Ap.
 APPEARANCE AND ODOR: Metallic Silver-gray odorless solids

SECTION 10. STABILITY AND REACTIVITY

STABILITY: Stable

HAZARDOUS POLYMERIZATION: Will not occur

CONDITIONS TO AVOID: Acids and strong oxidizing agents

INCOMPATIBILITY (Materials to Avoid): Nickel-nitric mixtures. Bromine 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 11. TOXICOLOGICAL INFORMATION

TARGET ORGANS: None known

TOXICITY DATA: These alloys are non-toxic. The binary NiTi alloys are used for medical application 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 MCDS for Vanadium pentoxide

SECTION 12. ECOLOGICAL PROTECTION

ENVIRONMENTAL HAZARDS: None. As an alloy, this material is non-toxic

SECTION 13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Comply with Federal, State, and Local requirements for waste disposal. Fine, non-recyclable scrap may be considered a hazardous flammable solid

SECTION 14. TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION CLASSIFICATION:

Metal Alloy

D.O.T PROPER SHIPPING NAME

N.Ap.

PACKING GROUP

D.O.T. I.D. NUMBER

N.Ap.

HAZARD CLASS

LABELS REQUIRED

NORTH AMERICAN EMERGENCY RESPONSE GUIDE NUMBER

SECTION 15. REGULATORY INFORMATION

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): Nickel, Copper and Vanadium if applicable

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: None

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: None

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: If applicable D001 Flammable Solid

Components on Canadian "Ingredient Disclosure List": All components listed on the Canadian List

TSCA (Toxic Substances Control Act): Components of this product listed on the TSCA Inventory are: All chemical components are listed on the TSCA inventory

SECTION 16. OTHER INFORMATION

None

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