PHOENIX

SAFETY DATA SHEET

Complies with OSHA Standard 29 CFR 910.1200

MTA, Molybdenum Titanium Alloy Arch Wires

1. Product and Company Identification

Product Name: Titanium and Titanium Alloys, Arch Wires
Manufacturer Name: Phoenix Orthodontics
Manufacturer Address: 3250 Palladian Village Drive
Marietta, GA 30066
Business Phone: 770-643-8896
Emergency Phone: 770-643-8896
Revision Date: December 22, 2019

2. Hazards Identification

GHS (Globally Harmonized System) Classification: In its present form, the material is not classified according to the Globally Harmonized System (GHS) and is not considered hazardous according to the OSHA Hazard Communication Standard 2012 (29 CFR 1910.1200). “Massive” metal products are generally classified as “articles” and do not constitute hazardous materials in solid form. May form combustible dust concentrations in air during processing.

GHS Signal Word: None

GHS HAZARD PICTOGRAMS	GHS HAZARD	GHS CLASSIFICATION	GHS HAZARD STATEMENTS
None	None	None	None

Hazards Not Otherwise Classified: Processes such as burning, melting, welding, cutting, sawing, brazing, grinding, machining, milling, etching, oxidizing, electro polishing, etc. can generate hazardous metal powders, fumes, and/or ions. The powders, fumes, and/or ions can present hazards such as acute and chronic toxicity, flammability, pyrophoricity, self-heating capabilities, carcinogenicity, and water reactivity.

3. Composition/Information on Ingredients

CHEMICAL	CAS/EC NUMBER	WT%	GHS Hazard Codes
Molybdenum, Mo	7439-98-7	10-37	HNOS Combustible Dust
Tin, Sn	7440-31-5 231-141-8	0-8	HNOS Combustible Dust
Titanium, Ti	7440-32-6 231-142-3	50-99	 GHS02 Flammable Solid = Cat#1, H228 (dust) HNOS Combustible Dust
Zirconium, Zr	7440-67-7 231-176-9	0-15	 GHS02 Flammable Solid = Cat#1, H228 (dust) HNOS Combustible Dust

Components may be regulated, have exposure limits, and/or other regulatory requirements.

4. First Aid Measures

Eye Contact: Gently flush particulate with copious amounts of water for 15 minutes to ensure that no articles remain in eye. Avoid rubbing that might scratch the eye. Seek medical attention if irritation persists.

Skin Contact: If irritation develops, wash skin thoroughly with soap and water. Seek medical attention if necessary.

Inhalation: Remove from exposure to fresh air. If discomfort persists, consult physician.

Ingestion: If significant amounts of dust are ingested, consult a physician. Do not induce vomiting.

Most Important Symptoms/Effects (acute and delayed): Can cause allergic skin reactions. Can cause gastrointestinal effects if swallowed. During processing (cutting, milling, grinding, melting, or welding), emitted byproducts can cause irritations, difficulty in breathing, coughing, and wheezing.

Indication of Immediate Medical Attention and Special Treatment: Notes to physician: May cause sensitization by skin contact or inhalation. Treat symptomatically.

5. Fire Fighting Measures

Not flammable in the product form as distributed, but processing can create dust and/or finely divided particles that are flammable.

Suitable Extinguishing Media: Treat as a Class D Combustible metal fire or smother with sodium choride salt. Do not use water on molten metals as an explosive characteristic is caused by the hydrogen and steam generated by the reaction of water with the burning material.

Specific Hazards Arising From the Material: Intense heat. Very fine, high surface area material resulting from grinding, buffing, polishing, or similar processes of this product may ignite spontaneously at room temperature and/or form combustible dust-air mixtures. Keep particles away from all ignition sources, including heat, sparks, and flames. Prevent dust accumulations to minimize combustible dust hazard. See “Section 2. Hazards Identification.”

Hazardous Combustion Products: Toxic metal and metallic oxide fumes may be evolved from fires involving finely divided alloy. Particle size and dispersion in air determine reactivity.

Special Firefighting Instructions: Firefighters should wear self-contained MSHA/NIOSH-approved (or equivalent) breathing apparatus and full protective gear.

6. Accidental Release

Environmental Precautions: Prevent entry of material into soil, waterways, drains, and sewers. Prevent exposure of material to weather (snow, rain) to avoid leaching dissolved metals and/or residuals into the environment. See “Section 12. Ecological Information” for additional information.

Cleanup: Collect by vacuuming, by sweeping or by wet mopping to prevent spreading of dust. Avoid inhalation of dusts. Do not allow entry to sewers.

7. Handling and Storage

Handling: Handle in accordance with good industrial hygiene and safety practice. Do not get in eyes. Avoid contact with skin and clothing for long periods of time. See “Section 8. Exposure Controls/Personal Protection” for recommended personal protective equipment. Wash and rinse after handling and before eating, drinking, chewing gum, or using tobacco. Remove and was contaminated clothing before reuse, particularly after processing.

Storage: Keep dust and/or small particles away from heat, sparks, and flame that are capable of ignition. Close containers and/or maintain adequate distance from all ignition sources. Depending on particle size, ignition sources can include pilot lights, electric motors, and static electricity. Prevent dust accumulation to minimize combustible dust hazard. Properly label container.

8. Exposure Controls/Personal Protection

CHEMICAL	CAS NUMBER	OSHA PEL 8hr TWA (mg/m^3)	AGIH TLF 8hr TWA (mg/m3)
Molybdenum, Mo	7439-98-7	Soluble = 5 Soluble = 15	Inhalable = 10 Respirable = 3 Soluble = 5 Insoluble = 10
Tin, SN	7440-31-5	2	—
Titanium, Ti	7440-32-6	—	—
Zirconium, Zr	7440-67-7	5 STEL = 10	5

Exposure Guidelines: Follow all applicable exposure limits. Keep formation of airborne particulate and fumes to a minimum. Exposure controls and personal protection can vary depending on process and/or application.

Engineering Controls: Local and/or general exhaust ventilation should be used to keep worker exposure below applicable exposure limits during welding, burning, grinding, melting, sawing, brazing, buffing, polishing, or other similar heat-generating processes which may generate airborne contaminants. Prevent accumulation of small particulate that might ignite. Collect chips and grinds for recycling where feasible.

Personal Protective Equipment: Processes performed on material should be evaluated (risk assessment) to establish need for suitable equipment to protect worker from exposure to hazards above stated limits.

Skin & Body Protection: Suitable for protection against physical injury and skin contact during handling and processing. For example, fire resistant clothing may be appropriate during hot work with product. Cut-resistant gloves and/or protective clothing may be appropriate when sharp surfaces are present. Chemical-resistant, impervious gloves may be appropriate if material is wet.

Eye/Face Protection: Safety glasses or goggles should be worn when there is a probability of airborne particles and/or elevated levels or dust or fume.

Respiratory Protection: Use NIOSH/MSHA approved respirators when particulates, fumes, and/or gasses are generated and if exposure limits are exceeded or irritation is experienced.

9. Physical and Chemical Properties

Physical State:	Solid
Color:	Metallic gray or silver gray
Appearance:	Various product forms (wire, billet, rod, cores, ingot, etc.)
Odor:	Odorless
Solubility in Water:	Not water soluble.
pH:	Not applicable.
Flash Point:	Not applicable
Boiling Point: * (°C @ 760 mm Hg):	Not applicable
Melting Point (varies with composition)	Not applicable
Decomposition Temp (°C):	Not applicable
Evaporation Rate:	Not applicable
Vapor Density (air=1, @20°C):	Not applicable
Vapor Pressure (mmHG @20°C):	Not applicable
Density (varies with composition):	Not applicable
Percent Volatile Organic Compound (VOC):	None

10. Stability and Reactivity

Stability: Stable under ordinary conditions of storage and transport.

Conditions to Avoid: Dust formation and dust accumulation during various processing.

Hazardous Decomposition Products: Reacts with mineral acid, inorganic acids and oxidizers to form hydrogen gas (flammable) and to form dissolved metal ions that are to be prohibited from waterways. Melting and/or burning can produce toxic metal fumes.

Hazardous Polymerization: Will not occur.

Incompatible Materials: May react with acids like hydrofluoric acid and oxidizers. Reaction will vary with specific alloy composition when in the presence of chlorine, bromine, halocarbons, carbon tetrachloride, and Freon when heated above 200-deg.

11. Toxicological Information

Likely Routes of Exposure:

Eyes:	High concentration of dust may cause irritation to the eyes.
Skin:	Prolonged skin contact with dust may cause skin irritation to sensitive individuals.
Inhalation:	Inhalation of metal particulate or elemental oxide fumes generated during welding, burning, grinding, machining, melting, sawing, brazing, buffing, polishing, or sweeping may pose acute or chronic health effects.
Ingestion:	Ingestion of metal particulate may cause acute gastrointestinal effects.

LETHAL DOSE TOXICITY BY INDIVIDUAL COMPONENT

(Oral & Inhalation tests prefer rat. Dermal test prefer rat or rabbit.)

Chemical	CAS Number	LD_{50} Oral (mg/Kg bw)	LD_{50} Dermal (mg/Kg bw)	LC_{50} Inhalation (mg/L)
Molybdenum, MO	7439-98-7	—	—	—
Tin, Sn	7440-31-5	—	—	—
Titanium, Ti	7440-32-6	> 5000	—	—
Zirconium, Zr	7440-67-7	—	—	—

HAZARD INFORMATION (Carcinogen, Specific Target Organ Toxicity – Repeat & Single Exposure, Reproductive Toxicity, Germ Cell Mutagenic, Skin Sensitizer, etc.)

Chemical	Carcinogenicity				GHS Classifications (Hazard Codes & abbreviations given in "Section #16 Other Info")
	ACGIH	IARC	NIOSH	NTP	
Molybdenum, Mo CAS #7439-98-7 EC #231-107-2	—	—	—	—	HNOS Combustible Dust
Tin, SN CAS #7440-31-5 EC #231-141-8	A4	—	—	—	HNOS Combustible Dust
Titanium, Ti CAS #7440-32-6 EC #231-142-3	—	—	—	—	 GHS02 Flammable Solid = Cat#1, H228 (dust) HNOS Combustible Dust
Zirconium, Zr CAS #7440-67-7 EC #231-176-9	Zr & compounds = A4	—	—	—	 GHS02 Flammable Solid = Cat#1, H228 (dust) HNOS Combustible Dust

ACGIH Carcinogen: **A1** = Confirmed in humans **A2** = Suspected in humans
A3 = Confirmed in animals with unknown relevance to humans
A4 = Not classifiable in humans **A5** = Not suspected
IARC Human Carcinogen: 1 = Yes **2** = Probably **2B** = Possibly **3** = Not classifiable in humans
NIOSH Carcinogen: Entry in box = Yes is potential occupational carcinogen
NTP Carcinogen: K = Known to be **R** = Reasonably anticipated
OSHA: Yes = OSHA regulated as carcinogen (29CFR part 1910 Subpart Z)

Specific Health Effects and Other Hazards of Individual Components

Molybdenum (Mo): Available toxicology data contain no evidence that an acute exposure to a high concentration of molybdenum would impede escape or cause any irreversiblehealth effects within 30 minutes. Mining and metallurgy workers chronically exposed to 60 to 600 g Mo/m3 reported an increased incidence of nonspecific symptoms that included weakness, fatigue, headache, anorexia, and joint and muscle pain. Animal studies involving ingestion (6000 mg Mo/kg) and inhalation (30,000 mg Mo/m3 for 4 weeks or 12,000 mg MoO2/m3 for 1 hour) showed no changes and/or fatalities. Molybdenum trioxide is an irritant to the eyes and mucous membranes. Fine particles can mix with air to explode. Reacts violently with oxidants, halogens and concentrated nitric acid causing fire.

Titanium (Ti): A mild pulmonary effect generally regarded as a nuisance dust.

Tin (Sn): Irritates eye (redness, pain), skin, and respiratory system (cough). Animal testing revealed vomiting, diarrhea, paralysis with muscle twitching, and cancerous lung tumors. Reactive with chlorine, turpentine, acids, and alkalis. Dry fine particles can ignite spontaneously and/or form explosive mixtures on contact with air.

Zirconium (Zr): Short term exposure may cause mechanical irritation to eyes. Long term exposure might affect lungs. Considered to have a low order of toxicity. Skin rash has been associated with exposure to deodorants containing zirconium. Reacts with borax, carbon tetrachloride when heated, and explosively when heated with alkali metal hydroxides.

12. Ecological Information

Enviromental Ecotoxicity: No data available on this material in its solid state, however, individual components of the material have been found to be toxic to the environment.
Physical: No information found.

Persistence and Degradability:	No data available
Bio accumulative Potential:	No data available
Mobility in Soil:	No data available
Other Adverse Effects:	Dissolved metals can be dangerous to drinking water aquifer even in small qualities.

Ecotoxicity:
Titanium 96 hr. LC50 Oncorhynchus mykiss > 100 mg/L
Molybdenum: 96 hr. LC50 Pimephales promelas 609.1 mg/L
Zirconium: 96 hr. LC50 Danio rerio > 100 mg/L, 48 hr. EC50 daphnia magna > 100 mg/L
Tin: 96 hr. LC50 Pimephales promelas > 12.4 ug/L
Persistence and degradability: Biodegradation is not applicable to inorganic compounds.
Bioaccumulative potential: No data available
Mobility in soil: No data available
Other adverse effects: No data available

13. Disposal Considerations

Waste Disposal Methods: Recycle when possible. When disposed of as a waste, it would be considered hazardous waste when chromium constituent is present. Wastes must be tested using methods described in 40 CFR Part 261. It is the generator's responsibility to determine if the waste meets applicable definitions of hazardous wastes. Dispose of waste material according to Local, State, Federal and Provincial Environmental Regulations.

Packaging Disposal: Dispose of containers in compliance with local, state, and federal regulations. When possible, use metal containers and recycle along with metal material.

14. Transport Information

SHIPPING INFORMATION	AS MATERIAL PRODUCT OR RECYCLABLE	AS DISPOSED WASTE, IT COULD BECOME (when chromium present):
Regulated	Not regulated by DOT or RCRA	Regulated by DOT and RCRA

15. Regulatory Information

The Clean Air Act, the Clean Water Act and Resource Conservation & Recovery Act may apply to the processing of metal particulates and air emissions.