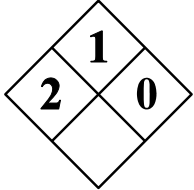


MATERIAL SAFETY DATA SHEET

FERROVANADIUM

Transportation Emergencies (U.S.): (800) 424-9300 (CHEMTREC)
Transportation Emergencies (Canada): (613) 996-6666 (Collect)(CANUTEC)

| Section 1. Hazardous Ingredients | LD ₅₀ | % | CAS No. |
|--|------------------|--|--|
| Iron, elemental | 30 gm/kg | 14 – 17 | 7439-89-6 |
| Vanadium, elemental | | 80 – 84 | 7440-62-2 |
| NOTE: Contains vanadium, which when present as dust or fume is subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR Part 372. | | | |
| Section 2. Preparation Information | | | |
| Responsibility for MSDS Preparation: Masterloy Products Company (613) 822-1010 | | | |
| Prepared November 15, 1989 Reviewed and Revised December 11, 2013 Supersedes June 23, 2011 | | | |
| Section 3. Product Information | | | |
| Product Name: FERROVANADIUM | | CAS No. 12604-58-9 | Product Use: Alloying of iron and steel |
| Manufacturer/Supplier: | | Masterloy Products Company 5663 Doncaster Road Ottawa, ON Phone (613) 822-1010 (8:00 a.m. – 5:00 p.m. Mon. – Fri. EST) FAX (613) 822-0249 | |
| Section 4. Physical Data | | | |
| Boiling Point: | Not applicable | Specific Gravity (H₂O=1): | 6.6 |
| Melting Range: | 2700 – 2800 °F | Vapor Pressure: | Not applicable |
| pH: | Not applicable | Vapor Density: | Not applicable |
| Odor Threshold: | Not applicable | Evaporation Rate: | Not applicable |
| Odor and appearance: Gray odorless metallic solid, lumps to powder. | | | |
| Coefficient of Water/Oil Distribution: Not applicable. | | | |
| Section 5. Fire and Explosion Hazard Data | | | |
| Flash Point: Not applicable | | Flammable Limits: Not applicable | |
| Lower Explosive Limit: Not applicable | | Upper Explosive Limit: Not applicable | |
| Autoignition Temperature: Not applicable | | Extinguishing Media: Sand or dry powder | |
| Conditions of Flammability: Powder smaller than 325 mesh may be ignited, but only weakly propagates flame. | | | |
| Hazardous Combustion Products: Not applicable | | | |
| Explosion Data – Sensitivity to Impact: Not applicable | | | |
| Explosion Data – Sensitivity to Static Discharge: Not applicable | | | |
|  NFPA Code | | | |
| Section 6. Reactivity Data | | | |
| Conditions Under Which Product is Chemically Unstable: None known. Powder (smaller than 200 mesh) in contact with moisture during prolonged storage may generate hydrogen gas. | | | |
| Substance or Class of Substances With Which Product is Incompatible: Strong acids, oxidizers. | | | |
| Conditions of Reactivity: None known. | | | |
| Hazardous Decomposition Products: None known. | | | |

FERROVANADIUM

Section 7. Health Hazard Data/Toxicological Properties

OSHA PEL: 1 mg/m³ Total Dust **ACGIH TLV:** 1 mg/m³ Total Dust TWA, 3 mg/m³ STEL.

WHMIS CLASS (Canada): B6

Routes of Entry: Lungs (breathing) - Yes Eyes – No Ingestion - No Skin – No

Carcinogen: OSHA - No NTP - No IARC – No ACGIH – A4, Not classifiable as a human carcinogen

Effects of Overexposure:

Short Term: Dust (less than 100 mesh) produces only slight irritation to the respiratory tract and eyes. The back of the tongue may become greenish-gray after four hours of exposure to fine dust. No systemic effects have been demonstrated. Oral doses do not appear to be absorbed by the body.

Long Term: Long term exposure to dust concentrations higher than recommended exposure limits may cause delayed lung injury.

Medical Conditions Aggravated: Workers with existing lung problems may be more susceptible to the effects of this material.

Toxicologically synergistic products: If fine dust is present and high temperatures exist, as when charging to a furnace, may form highly irritating vanadium pentoxide. The OSHA PEL for vanadium pentoxide is 0.1 mg/m³ (ceiling limit) if present as fume. The ACGIH TLV is 0.05 mg/m³ as respirable dust or fume. If fine dust is present, keep protected from contact with moisture, and keep away from flames, heat, and sparks. Use special precautions such as inert atmosphere if crushed to fine sizes, especially if 50% or more is less than 200 mesh.

Toxicity Data: For iron, rat, oral LD₅₀ 30 g/kg

Teratogenicity: None found

Mutagenicity: None found.

Reproductive Toxicity: None found.

Section 8. Preventive Measures

Respiratory Protection: If dust limits exceed recommended exposure limits, use of an approved dust respirator is recommended until feasible engineering controls are completed.

Ventilation: Local exhaust ventilation is recommended to control dust to below applicable exposure limits.

Eye Protection: If high dust concentrations exist wear tight-fitting goggles.

Other Protective Equipment: Optional. Leather gloves are recommended.

Steps To Be Taken In Case Material Is Released Or Spilled: If uncontaminated, sweep up or collect, and reuse as product. If contaminated, collect in a suitable container.

Waste Disposal Method: Can be disposed of in an approved disposal facility, in accordance with applicable federal, state or provincial, and local regulations. The nature and extent of contamination, if any, may require use of specialized disposal methods.

Storage Requirements: Store in a dry area, away from acids and strong oxidizers.

Handling Procedures and Equipment: Optional. Use special precautions, such as inert atmosphere, if crushed to fine sizes if 50% or more is less than 200 mesh.

DOT Identification: Not regulated by DOT

Transport Canada: Not regulated.

Section 9. First Aid Measures

First Aid: Eyes - Flush thoroughly with running water. See a physician if irritation persists.

Skin - Wash thoroughly with soap and water.

Inhalation - Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.