

# Ferromanganese, High Carbon



## Safety Data Sheet

### Section 1: Identification

#### 1.1 Product Identifier

Product Name: Ferromanganese, High Carbon  
 Product Form: Solid  
 Chemical Family: Metal Alloy  
 CAS Number: 12604-53-4 (for Ferromanganese)  
 Molecular Formula: See **Section 3.1**.  
 Molecular Weight: Varies. See **Section 3.1**.

#### 1.2 Other Means of Identification

Synonyms: DLANA389

#### 1.3 Recommended Uses

Recommended Use: Alloy

#### 1.4 Manufacturer, Importer, or Responsible Party

Responsible Party: Defense Logistics Agency Strategic Materials  
 8725 John J. Kingman Road  
 Fort Belvoir, Virginia 22060-6223  
 (571) 767-5525

#### 1.5 Emergency Phone Number

Emergency Phone Number: (800) 424-9300 (CHEMTREC)  
 (703) 527-3887 (CHEMTREC INTERNATIONAL)

### Section 2: Hazard(s) Identification

#### 2.1 Classification of Chemical per OSHA CFR 1910.1200

Skin Irritation: Category 2  
 Eye Irritation: Category 2B  
 Respiratory Sensitization: Category 1A  
 Carcinogenicity: Category 1A  
 Reproductive Toxicity: Category 1A  
 Target Organ- Prolonged: Category 1 (Immune and Nervous Systems)  
 Flammable Gas Emitter (Water): Category 3

#### 2.2 Label Elements

Signal Word: DANGER



Symbol(s):

Hazard Statements:

Causes skin and eye irritation. Causes eye irritation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause cancer. May damage fertility or the unborn child. Causes damage to the immune system and nervous system through prolonged or repeated exposure. In contact with water releases flammable gas.

Precautionary Statements:

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves, protective clothing, eye protection, and face protection. Wash thoroughly after handling. Do not breathe dust, fume, vapors, and spray. In case of inadequate ventilation, wear respiratory protection. Do not eat, drink, or smoke when using this product. Handle under inert gas. Protect from moisture.

Response: If on skin, wash with plenty of water. If skin irritation occurs, get medical advice and/or attention. Take off contaminated clothing and wash it before reuse. If in eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice and/or attention. If inhaled and breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms, call a doctor. If exposed or concerned, get medical advice and/or attention. Get medical advice and/or attention if you feel unwell. In case of fire: Use dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride to extinguish.

Storage: Store locked up. Store in a dry place. Store in a closed container.

Disposal: Dispose of contents in accordance with local, regional, national, and international regulations.

### 2.3 Other Hazards

Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode. Contact with water or moist air may generate flammable and/or toxic gases.

### 2.4 Unknown Acute Toxicity

Does not apply to this product.

## Section 3: Composition / Information on Ingredients

### 3.1 Composition

Chemical Name: Ferromanganese, High Carbon

Composition: 75.06%-76.88% Mn

The health and physical hazards information provided in this SDS are for its major component. High Carbon Ferromanganese contains other elements in addition to Mn. For concentrations of other components, see the Certificates of Analysis for each lot.

### 3.2 Common Names/Synonyms

Synonyms: See **Section 1.2** for common names and synonyms.

### 3.3 CAS Number/Unique Identifiers

CAS Number: 12604-53-4 (for Ferromanganese)

### 3.4 Impurities/Stabilizing Additives

No data available.

## Section 4: First-Aid Measures

### 4.1 Description of First-Aid Measures

Inhalation:	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.
Skin Contact:	Wash skin with soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.
Eye Contact:	Flush eyes with plenty of water for at least 15 minutes. Get immediate medical attention.
Ingestion:	Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Get medical attention.

### 4.2 Most Important Symptoms/Effects, Acute and Delayed

Inhalation (Acute):	Irritation, changes in body temperature, nausea, vomiting, diarrhea, and headache.
Inhalation (Chronic):	Irritation, loss of appetite, difficulty breathing, disorientation, difficulty speaking, sleep disturbances, emotional disturbances, hallucinations, mood swings, tremors, muscle cramps, loss of coordination, hearing loss, visual disturbances, lung damage, blood disorders, kidney damage, liver damage, nerve damage, and cancer.
Skin Contact (Acute):	Irritation.
Skin Contact (Chronic):	Irritation and cancer.
Eye Contact (Acute):	Irritation.
Eye Contact (Chronic):	Irritation.
Ingestion (Acute):	Gastrointestinal irritation, nausea, vomiting, and diarrhea.
Ingestion (Chronic):	Drowsiness and cancer.

### 4.3 Indication of Immediate Medical Attention/Special Treatment

Seek immediate medical attention if inhaled, exposed to eyes, and/or ingested.

## Section 5: Fire Fighting Measures

### 5.1 Suitable Extinguishing Media

Dolomite, dry powder for metal fires, dry sand, graphite, soda ash, and sodium chloride.

### 5.2 Specific Hazards

Negligible fire and explosion hazard. Dust/air mixtures may ignite or explode. Contact with water or moist air may generate flammable and/or toxic gases.

### 5.3 Special Protective Equipment and Precautions

Protect container from physical damage. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Do not allow water to enter the containers. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

## Section 6: Accidental Release Measures

### 6.1 Personal Precautions, Protective Equipment, and Emergency Procedures

Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to

RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800) 424-8802 (USA) or (202) 426-2675 (USA). Keep out of water supplies and sewers. Keep all unauthorized people away, isolate hazard area, and deny entry. Personal protective equipment is discussed in **Section 8.3**.

## 6.2 Methods and Materials for Containment and Cleaning Up

Collect spilled material in appropriate container for disposal.

## Section 7: Handling and Storage

### 7.1 Precautions for Safe Handling

High standard of personal cleanliness and hygiene is essential. Adequate sanitary facilities, clothing, and time must be provided so that compulsory showering after work is completed. A change of clothes and ban on eating and smoking at work place can be effective. Personal protective equipment is discussed in **Section 8.3**.

### 7.2 Conditions for Safe Storage

Store in accordance with all current regulations and standards. See original container for storage recommendations. Keep separated from incompatible substances. Incompatible materials are identified in **Section 10.5**.

## Section 8: Exposure Controls / Personal Protection

### 8.1 Exposure Limits

Exposure Limits:

Manganese, Manganese and Compounds (as Mn)

OSHA PEL Ceiling:	5 mg/m <sup>3</sup> (metal) (fume) (compounds)
ACGIH TWA (2013):	0.02 mg/m <sup>3</sup> (metal and inorganic compounds) (respirable fraction)
ACGIH TWA:	0.1 mg/m <sup>3</sup> (metal and inorganic compounds) (inhalable fraction)
NIOSH REL TWA (10 hours):	1 mg/m <sup>3</sup> (metal) (fume) (compounds)
NIOSH REL STEL:	3 mg/m <sup>3</sup> (metal) (fume) (compounds)
IDLH:	500 mg/m <sup>3</sup> (metal) (fume) (compounds)
DFG MAK:	0.5 mg/m <sup>3</sup> (inhalable fraction) (metal and inorganic compounds)
UK WEL TWA:	0.5 mg/m <sup>3</sup> (metal) (inorganic compounds)

**ACGIH Excursion Limit Recommendation:** Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded.

Arsenic

OSHA PEL TWA:	10 µg (As)/m <sup>3</sup>
ACGIH TWA:	0.01 mg/m <sup>3</sup>
NIOSH REL Ceiling:	0.002 mg/m <sup>3</sup> 15 minute(s)
IDLH:	5 mg/m <sup>3</sup>
UK WEL TWA:	0.1 mg/m <sup>3</sup>

### 8.2 Appropriate Engineering Controls

Ventilation: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

### 8.3 Individual Protection Measures

Eye Protection: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Clothing: Wear appropriate chemical resistant clothing.

Gloves: Wear appropriate chemical resistant gloves.

Respirator:

Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.

10 mg/m <sup>3</sup> :	<ol style="list-style-type: none"> <li>1. Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100 or P100.</li> <li>2. Any supplied-air respirator.</li> </ol>
25 mg/m <sup>3</sup> :	<ol style="list-style-type: none"> <li>1. Any supplied-air respirator operated in a continuous-flow mode.</li> <li>2. Any powered air-purifying respirator with a high-efficient particulate filter.</li> </ol>
50 mg/m <sup>3</sup> :	<ol style="list-style-type: none"> <li>1. Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.</li> <li>2. Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode.</li> <li>3. Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.</li> <li>4. Any self-contained breathing apparatus with a full facepiece.</li> <li>5. Any supplied-air respirator with a full facepiece.</li> </ol>
500 mg/m <sup>3</sup> :	<ol style="list-style-type: none"> <li>1. Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode.</li> </ol>
Unknown Concentrations/IDLH:	<ol style="list-style-type: none"> <li>1. Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.</li> <li>2. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.</li> </ol>
Escape:	<ol style="list-style-type: none"> <li>1. Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.</li> <li>2. Any appropriate escape-type, self-contained breathing apparatus.</li> </ol>

## Section 9: Physical and Chemical Properties

### 9.1 Appearance

Physical State: Solid  
Physical Description: Hard, dense lumps, bricks, briquettes or pellets.

### 9.2 Odor

No data available.

### 9.3 Odor Threshold

No data available.

### 9.4 pH

Not applicable.

### 9.5 Melting/Freezing Points

Melting Point: No data available.  
Freezing Point: No data available.

### 9.6 Initial Boiling Point and Boiling Range

Not applicable.

### 9.7 Flash Point

No data available.

**9.8 Evaporation Rate**

Not applicable.

**9.9 Flammability**

No data available.

**9.10 Upper/Lower Explosive Limits**

No data available.

**9.11 Vapor Pressure**

Not applicable.

**9.12 Vapor Density**

Not applicable.

**9.13 Relative Density**

No data available.

**9.14 Solubility(ies)**

No data available.

**9.15 Partition Coefficient**

No data available.

**9.16 Auto-Ignition Temperature**

No data available.

**9.17 Decomposition Temperature**

No data available.

**9.18 Viscosity**

No data available.

## Section 10: Stability and Reactivity

**10.1 Reactivity**

Contact with water or moist air may form flammable and/or toxic gases or vapors.

**10.2 Chemical Stability**

Stable at normal temperatures and pressures.

**10.3 Possibility of Hazardous Reactions**

Manganese

Aluminum (Dust):

Forms explosive mixtures with air.

Ammonium Nitrate (Fused):

Violent or explosive reaction.

Bromine Pentafluoride:

Violent reaction and possible ignition.

Carbon Dioxide:

Ignites.

Chlorine:

Ignites.

Fluorine:

Incandescent reaction.

Hydrogen Peroxide:

Violent decomposition and/or ignition.

Nitric Acid:

Incandescent reaction and feeble explosion.

Nitrogen Dioxide:

Ignition.

Oxidizers (Strong):

Fire and explosion hazard.

Phosphorus:

Incandescent reaction when heated.

Sulfur Dioxide:

Burns brilliantly on warming.

Carbon

Alkali Metals:	Contact may result in an exothermic reaction with ignition or an explosion.
Ammonium Nitrate:	Possible explosion when heated.
Ammonium Perchlorate:	Possible explosion on heating.
Bromates:	Contact is likely to result in ignition or an explosion.
Calcium Hypochlorite:	Possible explosion on heating.
Chlorates:	Contact is likely to result in ignition or an explosion.
Chlorine Monoxide:	Explodes.
Chromates:	Incompatible.
Dichlorine Oxide:	Explosion reaction.
Halogens:	Contact of carbon with any halogen is liable to result in ignition or an explosion.
Interhalogens:	Contact of carbon with any interhalogen is liable to result in ignition or an explosion.
Iodates:	Contact is likely to result in ignition or an explosion.
Iodine Pentoxide:	Explodes when warmed.
Metal Nitrates:	Contact is likely to result in ignition or an explosion.
Nitric Acid:	Violent reaction.
Nitrogen Oxide:	Ignition with incandescence.
Nitrogen Trifluoride:	Explosion at reduced temperatures.
Oils (Unsaturated):	Fire and explosion hazard.
Oxides:	Contact with many oxides is likely to result in ignition or an explosion.
Oxidizers (Strong):	Fire and explosion hazard.
Oxosalts:	Contact is likely to result in ignition or an explosion.
Oxygen:	May result in ignition or an explosion.
Oxygen Difluoride:	Possible explosion.
Ozone:	Fire hazard.
Peroxides:	Contact is likely to result in ignition or an explosion.
Peroxyformic Acid:	Violent oxidation.
Peroxyfuroic Acid:	Explosive decomposition.
Potassium Permanganate:	Ignition on heating.
Sodium Sulfide:	May undergo spontaneous heating.
Trixygen Difluoride:	Ignition with possible explosion.

**10.4 Conditions to Avoid**

None reported.

**10.5 Incompatible Materials**

Metals, oxidizing materials, halogens, peroxides, combustible materials, acids, reducing agents, and water.

Safe storage of the material is discussed in **Section 7.2**.

**10.6 Hazardous Decomposition Products**

Thermal Decomposition Products:            Miscellaneous Decomposition Products

## Section 11: Toxicological Information

**11.1 Likely Routes of Exposure**

Routes of entry include inhalation, skin contact, eye contact, and ingestion.

**11.2 Symptoms**

See **Section 4.2** for symptoms related to the physical, chemical, and toxicological characteristics.

**11.3 Short and Long Term Effects**

Inhalation

Acute Exposure (Manganese):

Dust or fumes may be irritating to the mucous membranes. Occupational exposure to dust or fumes has been reported to cause upper respiratory tract problems, black mucous membrane discharge from the nose, and neurological damage. Metal fume fever, an influenza-like illness, may occur

due to the inhalation of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns. Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur. Tolerance to fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours.

Acute Exposure (Carbon):

Chronic Exposure (Manganese):

Inhalation of dust may cause slight mucous membrane irritation.

If sufficient quantities of manganese dust or fumes are inhaled and absorbed, systemic poisoning known as "manganism", a Parkinsonian-like syndrome may occur. It is characterized initially by anorexia, asthenia, headache, insomnia or somnolence, irritability, restlessness, and spasm or pain in the muscles. Manganese psychosis may follow with uncontrollable behavior, unaccountable laughing or crying, visual hallucinations, confusion and euphoria. Sexual excitement followed by impotence may occur. These symptoms may disappear with the onset of true neurological manifestations of slow, slurred and irregular speech, monotonous tone, double vision, impaired hearing, and difficulty with fine motor movements, and disturbances in gait and balance with frequent propulsion or retropulsion. Mask-like face, decreased movement of the eyelids and eyes and tremors of the upper extremities and head may also occur. Other signs and symptoms may include urinary bladder disturbances, excessive salivation and sweating, hematological changes, vasomotor disorders, decreased pulmonary function, kidney and possibly liver damage. Removal from exposure shortly after onset of symptoms usually results in improvement, although there may be residual disturbances in gait and speech. Once manganism is well established it becomes irreversible and progressive, but not fatal. An increased incidence of bronchitis and pneumonitis has been reported in studies of workers exposed to manganese dust and fume, and although these effects have been confirmed by animal experiments, they may represent an aggravation of a pre-existing condition. Allergic diseases of the respiratory tract have also been reported in one study.

Chronic Exposure (Carbon):

Repeated or prolonged exposure may cause irritation and pulmonary disorders. Lung damage may result if sufficient exposure occurs.

Skin Contact

Acute Exposure (Manganese):

Acute Exposure (Carbon):

Chronic Exposure (Manganese):

Chronic Exposure (Carbon):

500 mg applied to the skin of rabbits caused mild irritation.

Contact may cause irritation.

Sensitization has been reported in guinea pigs.

Repeated or prolonged contact may cause mechanical irritation.

Eye Contact

Acute Exposure (Manganese):

Acute Exposure (Carbon):

Chronic Exposure (Manganese):

Chronic Exposure (Carbon):

Ingestion

Acute Exposure (Manganese):

Acute Exposure (Carbon):

Chronic Exposure (Manganese):

Dust or fumes may be irritating to the eyes. 500 mg applied to the eyes of rabbits caused mild irritation.

Contact with dust may cause mechanical irritation. May also cause conjunctivitis.

Fumes may cause conjunctivitis.

Repeated or prolonged exposure may cause mechanical irritation.

Extremely large doses may cause gastrointestinal irritation and possibly systemic toxicity.

Extremely large doses may produce gastrointestinal disturbances.

Manganese poisoning has been reported in persons drinking manganese-contaminated well water. Prolonged ingestion of manganese in water has produced lethargy, edema, and decreased movement of the eyes and eyelids.

Chronic Exposure (Carbon):

No data available.

Format: GHS

Language: English (US)

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**11.4 Numerical Measures of Toxicity****Manganese****Irritation Data:**

500 mg/24 hour(s) skin-rabbit mild

500 mg/24 hour(s) eyes-rabbit mild

**Toxicity Data:**

2,300 µg/m<sup>3</sup> inhalation-man TCL<sub>0</sub>; 9 gm/kg oral-rat LD<sub>50</sub>; 3,709 mg/m<sup>3</sup>/6 hour(s)-13 week(s) intermittent inhalation-rat TCL<sub>0</sub>; 180 mg/kg/30 day(s) intermittent intraperitoneal-rat TDL<sub>0</sub>; 210 µg/m<sup>3</sup>/5 year(s) intermittent inhalation-man TCL<sub>0</sub>; 0.3 mg/m<sup>3</sup>/5 hour(s)-26 week(s) intermittent inhalation-rat TCL<sub>0</sub>; 0.3 mg/m<sup>3</sup>/5 hour(s)-26 week(s) intermittent inhalation-monkey TCL<sub>0</sub>; 0.7 mg/m<sup>3</sup>/24 hour(s)-22 week(s) continuous inhalation-rat TCL<sub>0</sub>; 0.7 mg/m<sup>3</sup>/24 hour(s)-22 week(s) continuous inhalation-mouse TCL<sub>0</sub>; 250 mg/m<sup>3</sup>/1 year(s) intermittent inhalation-human TCL<sub>0</sub>; 0.5 mg/m<sup>3</sup>/39 week(s) intermittent inhalation-human TCL<sub>0</sub>; 200 mg/kg/20 day(s) intermittent oral-rat TDL<sub>0</sub>; 216 mg/kg/15 week(s) intermittent intraperitoneal-rat TDL<sub>0</sub>; 144 mg/kg/5 week(s) intermittent intraperitoneal-rat TDL<sub>0</sub>; 24 mg/kg/5 week(s) intermittent unreported-rat TDL<sub>0</sub>; 72 mg/kg/5 week(s) intermittent unreported-rat TDL<sub>0</sub>; 57.6 mg/kg/4 week(s) intermittent intraperitoneal-rat TDL<sub>0</sub>; 0.71 mg/m<sup>3</sup>/2 hour(s)-10 day(s) intermittent inhalation-rat; 5.25 mg/kg/21 day(s) intermittent oral-rat; 185 mg/kg/37 day(s) continuous oral-rat TDL<sub>0</sub>.

**Acute Toxicity Level:**

Slightly Toxic (ingestion)

**Target Organs:**

Nervous System

**Conditions Aggravated By Exposure:**

History of alcoholism, blood system disorders, liver disorders, nervous system disorders, and respiratory disorders.

**Tumorigenic Data:**400 mg/kg intramuscular-rat TDL<sub>0</sub>/1 year(s) intermittent**Mutagenic Data:**

Dominant lethal test - rat intraperitoneal 25 mg/kg

**Reproductive Effects Data:**

50 mg/kg oral-rat TDL<sub>0</sub> 20 day(s) post pregnancy continuous; 322.5 mg/kg oral-mouse TDL<sub>0</sub> 43 day(s) male; 1,290 mg/kg oral-mouse TDL<sub>0</sub> 43 day(s) male; 0.71 mg/m<sup>3</sup> inhalation-rat TCL<sub>0</sub> 15-16 day(s) pregnant female continuous; 0.71 mg/m<sup>3</sup> inhalation-rat TCL<sub>0</sub> multigenerations; 90 mg/kg oral-rat TDL<sub>0</sub> 18 day(s) post pregnancy continuous

**Additional Data:**

Symptoms may depend on a combination of contributing factors including genetic predisposition, age, nutrition, anemia or alcohol.

**Carbon****Toxicity Data:**

>5 gm/kg oral-rat LD; >5 gm/kg intraperitoneal-rat LD; >5 gm/kg subcutaneous-rat LD; >5 gm/kg oral-mouse LD; >5 gm/kg intraperitoneal-mouse LD; >5 gm/kg subcutaneous-mouse LD; 440 mg/kg intravenous-mouse LD<sub>50</sub>; >5 gm/kg oral-dog LD; >5 gm/kg intraperitoneal-dog LD; >5 gm/kg subcutaneous-dog LD

**Reproductive Effects Data:**167 mg/kg subcutaneous-rat TDL<sub>0</sub> 8 day(s) pregnant female continuous**Arsenic****Toxicity Data:**

7,857 mg/kg/55 year(s) oral-man TDL<sub>0</sub>; 4 mg/kg oral-child TDL<sub>0</sub>; 763 mg/kg oral-rat LD<sub>50</sub>; 13,390 µg/kg intraperitoneal-rat LD<sub>50</sub>; 145 mg/kg oral-mouse LD<sub>50</sub>; 46,200 µg/kg intraperitoneal-mouse LD<sub>50</sub>; 300 mg/kg subcutaneous-rabbit LD<sub>0</sub>; 10 mg/kg intraperitoneal-guinea pig LD<sub>0</sub>; 300 mg/kg subcutaneous-guinea pig LD<sub>0</sub>; 144 mg/kg oral-mouse LD<sub>50</sub>; 1,000 mg/kg intraperitoneal-mouse LD<sub>50</sub>; 5 mg/kg oral-rat TDL<sub>0</sub>; 1,360 mg/kg/17 day(s) intermittent oral-rat TDL<sub>0</sub>; 280 mg/kg/4 week(s) continuous oral-mouse TDL<sub>0</sub>; 0.35 mg/kg/5 week(s) continuous oral-mouse TDL<sub>0</sub>.

**Local Effects:****Irritant:**

Inhalation, skin, and eye.

**Acute Toxicity Level:**

Moderately Toxic (ingestion)

**Target Organs:**

Immune (sensitizer) and Nervous System

**Conditions Aggravated By Exposure:**

Diabetes, heart or cardiovascular disorders, immune system disorders or allergies, kidney disorders, liver disorders, nervous system disorders, skin disorders, and allergies

**Tumorigenic Data:**76 mg/kg oral-man TDL<sub>0</sub>/12 year(s) intermittent; 75 mg/kg implant-rabbit

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Mutagenic Data:	TDL <sub>o</sub> Cytogenetic analysis - human unreported 4,286 µg/kg; cytogenetic analysis - mouse oral 280 mg/kg 8 week(s); sister chromatid exchange - human oral 0.211 mg/L 15 year(s); cytogenetic analysis - human oral 0.211 mg/L 15 year(s); DNA damage - human lung 5 µmol/L; cytogenetic analysis - human lung 5 µmol/L; DNA damage - mouse fibroblast 5 nmol/L 24 hour(s); cytogenetic analysis - human lymphocyte 131.90 µg/L; micronucleus test - other fish multiple 451.40 ppb 15 day(s)-continuous
Reproductive Effects Data:	605 µg/kg oral-rat TDL <sub>o</sub> 35 week(s) pre pregnancy continuous; 580 µg/kg oral-rat TDL <sub>o</sub> 30 week(s) pre pregnancy/1-20 day(s) pregnant female continuous 187 mg/kg oral-mouse TDL <sub>o</sub> 8-18 day(s) pregnant female continuous

**11.5 Carcinogen Status**

Arsenic	
OSHA:	Carcinogen
NTP:	Known Human Carcinogen
IARC:	Human Sufficient Evidence, Animal Limited Evidence, Group 1
ACGIH:	A1-Confirmed Human Carcinogen

An increased incidence of urinary bladder, skin, lung, liver, and kidney cancer has been associated with inorganic arsenic compounds through medical treatment, contaminated drinking water, arsenical pesticide residues or occupational exposure. Cancers at other sites have also been reported, but a clear association has not been confirmed.

## Section 12: Ecological Information

**12.1 Ecotoxicity**

No data available.

**12.2 Persistence and Degradability**

No data available.

**12.3 Bioaccumulative Potential**

No data available.

**12.4 Mobility in Soil**

No data available.

**12.5 Other Adverse Effects**

No data available.

## Section 13: Disposal Considerations

Dispose in accordance with all applicable regulations.

## Section 14: Transport Information

**14.1 UN Number**

UN Number: Not applicable.

**14.2 UN Proper Shipping Name**

UN Proper Shipping Name: Not applicable.

**14.3 Transport Hazard Class(es)**

Format: GHS  
Language: English (US)

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U.S. Department of Transportation:	No classification assigned.
CA Transportation/Dangerous Goods:	No classification assigned.
Land Transport ADR:	No classification assigned.
Land Transport RID:	No classification assigned.
Air Transport IATA:	No classification assigned.
Air Transport ICAO:	No classification assigned.
Maritime Transport IMDG:	No classification assigned.

**14.4 Packing Group**

No classification assigned.

**14.5 Environmental Hazards**

No data available.

**14.6 Transport in Bulk**

No data available.

**14.7 Special Precautions**

No data available.

## Section 15: Regulatory Information

**US Regulations**

CERCLA 102A/103 (40 CFR 302.4):	Arsenic: 1 lbs. RQ (solid metal particles < 100 micrometer diameter (0.004 inches)) Phosphorus, White: 1 lbs. RQ Chromium: 5,000 lbs. RQ (solid metal particles < 100 micrometer diameter (0.004 inches)) Lead: 10 lbs. RQ (solid metal particles < 100 micrometer diameter (0.004 inches))
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**SARA Title III**

Section 302 (40 CFR 355.30):	Not regulated.
Section 304 (40 CFR 355.40):	Not regulated.
Sections 311/312 (40 CFR 370.21):	Yes (Chronic, Reactive)
Section 313 (40 CFR 372.65):	Yes (Arsenic, Manganese and Compounds {as Mn})

OSHA Process Safety: Not regulated.

**State Regulations**

California Proposition 65:	Arsenic: Cancer (Feb 27, 1987) Lead: Cancer (Oct 01, 1992); Developmental toxicity (Feb 27, 1987); Male reproductive toxicity (Feb 27, 1987); Female reproductive toxicity (Feb 27, 1987)
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**National Inventory Status**

U.S. Inventory (TSCA):	Listed on inventory.
TSCA 12(b) Export Notification:	Not listed.

## Section 16: Other Information

*The information in this Safety Data Sheet meets the requirements of the United States Department of Labor OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION and regulations promulgated thereunder (29 CFR 1910.1200 et. seq.). This document is intended only as a guide to the appropriate precautionary material handling by a person trained in, or supervised by a person trained in, chemical handling. Exposure to this chemical may have serious adverse health effects. This chemical may interact with other substances. Since the potential uses are so varied, all of the potential hazards of use or interaction with other chemicals or materials cannot be identified on this Safety Data Sheet. The user should recognize that this chemical can cause injury, especially if improperly handled, precautionary measures are not followed,*

*and personal protective equipment not worn. Read and understand all precautionary information prior to use. The Defense Logistics Agency (DLA) shall not be held liable for any damage resulting from handling or from contact with the above chemical.*

References:

ChemAdvisor, Inc. *Material Safety Data Sheet: Ferromanganese, High Carbon*. Revision Date: March 13, 2008. (as provided by the Defense Logistics Agency.)

American Conference of Governmental Industrial Hygienists. *2013 TLVs® and BEIs®, ACGIH® Publication #0113*. 2013.

US Department of Transportation. *Emergency Response Guidebook*. 2012

Centers for Disease Control and Prevention. *NIOSH Pocket Guide to Chemical Hazards*, <http://www.cdc.gov/niosh/npg/>.

National Institute of Health, Toxicology Data Network. <http://toxnet.nlm.nih.gov/>

NOTE: No data available: no data for this topic found using references listed.

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