

## SAFETY DATA SHEET

### 1. SUBSTANCE AND SOURCE IDENTIFICATION

**Product Identifier**

**SRM Number:** 68c  
**SRM Name:** Standard Ferromanganese (powder form)  
**Other Means of Identification:** Not applicable.

**Recommended Use of This Material and Restrictions of Use**

This Standard Reference Material (SRM) is intended primarily for use in checking chemical methods of analysis and in calibration with instrumental methods of analysis. A unit of SRM 68c consists of powder (between 0.15 mm and 0.25 mm).

**Company Information**

National Institute of Standards and Technology  
 Standard Reference Materials Program  
 100 Bureau Drive, Stop 2300  
 Gaithersburg, Maryland 20899-2300

Telephone: 301-975-2200  
 FAX: 301-948-3730  
 E-mail: SRMMSDS@nist.gov  
 Website: <https://www.nist.gov/srm>

Emergency Telephone ChemTrec:  
 1-800-424-9300 (North America)  
 +1-703-527-3887 (International)

### 2. HAZARDS IDENTIFICATION

**Classification**

**Physical Hazard:** Not classified.  
**Health Hazard:** Not classified.

**Label Elements**

**Symbol:** No symbol.  
  
**Signal Word:** No signal word.  
**Hazard Statement(s):** Not applicable.  
**Precautionary Statement(s):** Not applicable.  
**Hazards Not Otherwise Classified:** Not applicable.  
**Ingredients(s) with Unknown Acute Toxicity:** Not applicable.

### 3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

**Substance:** High-Carbon Ferromanganese

**Other Designations:** Manganese alloy, base; Ferro manganese; exothermic ferromanganese.

Components are listed in compliance with OSHA's 29 CFR 1910.1200. The material contains trace amounts of other elements; for the actual values see the NIST Certificate of Analysis.

Hazardous Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Ferromanganese	12604-53-4	603-116-5	100
<i>Individual Component(s)</i>			
Manganese	7439-96-5	231-105-1	80
Iron	7439-89-6	231-096-4	12
Carbon	7440-44-0	231-153-3	6.7

---

## 4. FIRST AID MEASURES

---

### Description of First Aid Measures:

**Inhalation:** If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration or oxygen by qualified personnel. Seek immediate medical attention.

**Skin Contact:** Wash skin with soap and water.

**Eye Contact:** Flush eyes with water for at least 15 minutes. If necessary, seek medical attention.

**Ingestion:** If adverse effects occur after ingestion, seek medical treatment.

**Most Important Symptoms/Effects, Acute and Delayed:** May cause mechanical irritation.

**Indication of any immediate medical attention and special treatment needed, if necessary:** If any of the above symptoms are present, seek medical attention if needed.

---

## 5. FIRE FIGHTING MEASURES

---

**Fire and Explosion Hazards:** Negligible fire hazard in bulk form. Dust/air mixtures may ignite or explode. Avoid generating dust. See Section 9, "Physical and Chemical Properties" for flammability properties.

### Extinguishing Media:

Suitable: Dolomite, dry powder from metal fires, dry sand, graphite, soda ash, sodium chloride.

Unsuitable: Water.

**Specific Hazards Arising from the Chemical:** None listed.

**Special Protective Equipment and Precautions for Fire-Fighters:** Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH approved self-contained breathing apparatus (SCBA).

**NFPA Ratings** (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 1

Fire = 1

Reactivity = 0

---

## 6. ACCIDENTAL RELEASE MEASURES

---

**Personal Precautions, Protective Equipment and Emergency Procedures:** Any accumulated material on surfaces should be removed and properly disposed of. Use suitable protective equipment; see Section 8, "Exposure Controls and Personal Protection".

**Methods and Materials for Containment and Clean up:** Collect spilled material in appropriate container for disposal. Keep out of water supplies and sewers. Keep unnecessary people away, isolate hazard area and deny entry.

---

## 7. HANDLING AND STORAGE

---

**Safe Handling Precautions:** Minimize dust generation and accumulation on surfaces. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. See Section 8, "Exposure Controls and Personal Protection". Avoid contact with incompatible materials (see Section 10, "Stability and Reactivity").

**Storage:** Store and handle in accordance with all current regulations and standards.

---

## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

---

Exposure Limits			
Components	OSHA (PEL)	ACGIH (TLV)	NIOSH (REL)
Manganese	Ceiling: 5 mg/m <sup>3</sup> (fume)	TWA: 0.02 mg/m <sup>3</sup> (respirable fraction) TWA: 0.1 mg/m <sup>3</sup> (inhalable fraction)	TWA: 1 mg/m <sup>3</sup> (fume) STEL: 3 mg/m <sup>3</sup> IDLH: 500 mg/m <sup>3</sup>

No occupational exposure limits available for iron and carbon.

**Engineering Controls:** Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

**Personal Protection:** In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

**Respiratory Protection:** If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

**Eye/Face Protection:** Wear splash resistant safety goggles with a face shield. An eye wash station should be readily available near areas of use.

**Skin and Body Protection:** Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Chemical-resistant gloves should be worn at all times when handling chemicals.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

---

### Descriptive Properties

**Appearance (physical state, color, etc.)**

**Molecular Formula**

**Molar Mass (g/mol)**

**Odor**

**Odor threshold**

**pH**

**Evaporation rate**

**Melting point/freezing point**

**Density (specific gravity, water = 1)**

**Vapor Pressure**

**Vapor Density (air = 1)**

**Viscosity (cP)**

**Solubility(ies)**

**Partition coefficient (n-octanol/water)**

**Nominal Particle Size**

### Thermal Stability Properties

**Autoignition Temperature**

**Thermal Decomposition**

**Initial boiling point and boiling range**

**Explosive Limits, LEL (Volume %)**

**Explosive Limits, UEL (Volume %)**

**Flash Point**

**Flammability (solid, gas)**

### Ferromanganese

red to gray fine powder

varies

not available

not available

not available

not available

not available

1325 °C (2417 °F)

7

not available

not available

not available

insoluble in water; soluble in molten steel

not available

between 150 µm and 250 µm

not available

not available

not available

not available

not available

flammable

not available

---

## 10. STABILITY AND REACTIVITY

---

**Reactivity:** Stable at normal temperatures and pressure.

**Stability:**  Stable  Unstable

**Possible Hazardous Reactions:** None listed.

**Conditions to Avoid:** Avoid generating dust. Avoid contact with water. Avoid heat, flames, sparks, and other sources of ignitions. Avoid contact with incompatible materials.

**Incompatible Materials:** Combustible materials, acids, bases, metals, oxidizing materials, halogens, and peroxides.

**Fire/Explosion Information:** See Section 5, "Fire Fighting Measures".

**Hazardous Decomposition:** Thermal decomposition will produce oxides of iron and manganese compounds.

**Hazardous Polymerization:**  Will Occur  Will Not Occur

---

## 11. TOXICOLOGICAL INFORMATION

---

**Route of Exposure:**  Inhalation  Skin  Ingestion

**Symptoms Related to the Physical, Chemical and Toxicological Characteristics:** May cause mechanical irritation.

## Potential Health Effects (Acute, Chronic, and Delayed)

**Inhalation:** Acute exposure may result in mechanical irritation. Repeat exposure to manganese fumes or respirable dust may result in “manganism”, characterized by headache, restlessness, spasm or pain; psychosis may follow which may include hallucinations, uncontrolled laughing or crying; kidney function, liver function, respiratory function may be affected. Repeat exposure to iron may cause mottling of the lungs (siderosis) with bronchitis.

**Skin Contact:** Acute exposure may cause mechanical irritation. Chronic exposure to manganese has shown sensitivity in guinea pigs.

**Eye Contact:** May cause irritation or conjunctivitis.

**Ingestion:** Ingestion of sufficient amounts of manganese may result in gastrointestinal irritation. Prolonged ingestion of manganese has produced lethargy, edema, and decreased movement of eyes and eyelids.

## Numerical Measures of Toxicity

**Acute Toxicity:** Not classified.

Manganese, Rat, Oral LD50: 9 g/kg.

Iron, Rat, Oral LD50: 984 mg/kg; 750 mg/kg.

Carbon, Rat, Oral LD50: >10 000 mg/kg.

**Skin Corrosion/Irritation:** Not classified.

Manganese, Rabbit, Skin: 500 mg/kg (24 h) – mild.

**Serious Eye Damage/Eye Irritation:** Not classified.

Manganese, Rabbit, Eyes: 500 mg/kg (24 h) – mild.

**Respiratory Sensitization:** Not classified.

**Skin Sensitization:** Not classified.

**Germ Cell Mutagenicity:** Not classified.

**Carcinogenicity:** Not classified.

**Listed as a Carcinogen/Potential Carcinogen**                       **Yes**                       **No**

Ferromanganese and components iron, carbon, and manganese are not listed by OSHA, IARC, or NTP as a carcinogen/potential carcinogen.

Mutagenic: Manganese, Rat: 25 mg/kg.

Tumorigenic: Manganese, Rat, Intramuscular, TDLo: 400 mg/kg (1 year).

Iron, Rat, Intratracheal, TDLo: 450 mg/kg (15 weeks).

**Reproductive Toxicity:** Not classified.

Manganese, Rat, Oral, TDLo: 90 mg/kg (18 days); 50 mg/kg (20 days).

Carbon, Rat, subcutaneous TDLo: 167 mg/kg (pregnant 8 days).

**Specific Target Organ Toxicity, Single Exposure:** No data available.

**Specific Target Organ Toxicity, Repeated Exposure:** No data available.

**Aspiration Hazard:** Not applicable.

---

## 12. ECOLOGICAL INFORMATION

---

**Ecotoxicity Data:** No data available for this high-carbon ferromanganese material.

**Persistence and Degradability:** No data available.

**Bioaccumulative Potential:** No data available.

**Mobility in Soil:** No data available.

**Other Adverse effects:** No data available.

---

## 13. DISPOSAL CONSIDERATIONS

---

**Waste Disposal:** Dispose of waste in accordance with all applicable federal, state, and local regulations.

---

## 14. TRANSPORTATION INFORMATION

---

**U.S. DOT and IATA:** Not regulated by DOT or IATA.

---

## 15. REGULATORY INFORMATION

---

### U.S. Regulations:

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.  
SARA Title III Section 302 (40 CFR 355.30): Not regulated.  
SARA Title III Section 304 (40 CFR 355.40): Not regulated.  
SARA Title III Section 313 (40 CFR 372.65): Manganese, 1 % de minimis concentration.  
OSHA Process Safety (29 CFR 1910.119): Not regulated.  
SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH: No  
CHRONIC HEALTH: No  
FIRE: Yes  
REACTIVE: No  
PRESSURE: No

### State Regulations:

California Proposition 65: Not listed.

**U.S. TSCA Inventory:** The components (manganese, iron, and carbon) are listed.

**TSCA 12(b), Export Notification:** Not listed.

**Canadian Regulations:** WHMIS Information is not provided for this material.

---

## 16. OTHER INFORMATION

---

**Issue Date:** 27 July 2018

**Sources:** ChemADVISOR, Inc., SDS, *Ferromanganese*, 19 June 2014.

### Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	NRC	Nuclear Regulatory Commission
ALI	Annual Limit on Intake	NTP	National Toxicology Program
CAS	Chemical Abstracts Service	OSHA	Occupational Safety and Health Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	PEL	Permissible Exposure Limit
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
DOT	Department of Transportation	REL	Recommended Exposure Limit
EC50	Effective Concentration, 50 %	RM	Reference Material
EINECS	European Inventory of Existing Commercial Chemical Substances	RQ	Reportable Quantity
EPCRA	Emergency Planning and Community Right-to-Know Act	RTECS	Registry of Toxic Effects of Chemical Substances
IARC	International Agency for Research on Cancer	SARA	Superfund Amendments and Reauthorization Act
IATA	International Air Transport Association	SCBA	Self-Contained Breathing Apparatus
IDLH	Immediately Dangerous to Life and Health	SRM	Standard Reference Material
LC50	Lethal Concentration, 50 %	STEL	Short Term Exposure Limit
LD50	Lethal Dose, 50 %	TLV	Threshold Limit Value
LEL	Lower Explosive Limit	TPQ	Threshold Planning Quantity
MSDS	Material Safety Data Sheet	TSCA	Toxic Substances Control Act
NFPA	National Fire Protection Association	TWA	Time Weighted Average
NIOSH	National Institute for Occupational Safety and Health	UEL	Upper Explosive Limit
NIST	National Institute of Standards and Technology	WHMIS	Workplace Hazardous Materials Information System

**Disclaimer:** Physical and chemical data contained in this SDS are provided only for use in assessing the hazardous nature of the material. The SDS was prepared carefully, using current references; however, NIST does not certify the data in the SDS. The certified values for this material are given in the NIST Certificate of Analysis.

Users of this SRM should ensure that the SDS in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail [srmmsds@nist.gov](mailto:srmmsds@nist.gov); or via the Internet at <https://www.nist.gov/srm>.