

# MATERIAL SAFETY DATA SHEET



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## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: **SMZ® Inoculant**

Product Code: FI6002

Synonyms/Trade Names: Zirconium Ferrosilicon, Ferrosilicon, FeSi

CAS No.: 8049-17-0

MANUFACTURER

Elkem Metals Company, L.P.

P.O Box 266

Pittsburgh, PA 15230

(412) 299-7200

EMERGENCY TELEPHONE NUMBERS:

CHEMTREC (800) 424-9300

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## 2. COMPOSITION/INFORMATION ON INGREDIENTS <sup>1</sup>

	wt. %	CAS Registry #
Silicon (Si)	52 to 72	7440-21-3
Iron (Fe)	48 to 28	7439-89-6
Zirconium (Zr)	<5.0	7440-67-7
Aluminum (Al)	<2.0	7429-90-5
Calcium (Ca)	<3.0	7440-70-2
Barium (Ba)	<1.0	7440-39-3
Chromium (Cr)	<0.5	7440-47-3
Nickel (Ni)	<0.1	7400-02-0

OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200):

	EXPOSURE LIMITS 8 hrs. TWA (mg/m <sup>3</sup> )	
	OSHA PEL	ACGIH TLV
Silicon	15(total) 5 (respirable)	10(total)
Zirconium	5	5 (10 STEL)
Aluminum	15	10
Barium	0.5	0.5

<sup>1</sup> Elemental analysis of the alloy. The manufacturer can provide a more detailed analysis, including other trace elements.

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## 3. HAZARDS IDENTIFICATION

The product does not represent a hazard to health, safety or environment when handled and stored as advised. (See Section 7). Flammable and noxious gases may be formed in contact with moisture, acids or bases. (See Section 10 and 11). Dust of SMZ® Inoculant suspended in air may under certain conditions cause dust explosions. (See Section 10).

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## 3. HAZARDS IDENTIFICATION (Con't)

### POTENTIAL HEALTH EFFECTS:

This product contains chromium in the metallic state. The International Agency for Research on Cancer has determined that chromium and certain chromium compounds are “casually associated with cancer in humans” but “the compounds responsible for the carcinogenic effect in humans cannot be specified”. This requires that chromium in all forms be identified as carcinogenic under OSHA. The American Conference of Governmental Industrial Hygienists has reviewed the available data and concluded that specific water soluble and insoluble hexavalent chromium compounds are carcinogenic to humans. (Also see section 11.)

NIOSH/OSHA “Guide for Chemical Hazards” conclusions are consistent with ACGIH; however, NIOSH recommended that all hexavalent chromium compounds be considered carcinogenic until proven otherwise. No recommendations have been made by ACGIH or NIOSH to include chromium metal or chromous and chromic salts as carcinogenic.

SMZ® Inoculant may contain small quantities of nickel. The International Agency for Research on Cancer has determined that nickel and certain nickel compounds are “probably carcinogenic to humans” but the nickel compounds responsible for the effect have not been specified. This requires that nickel in all forms be identified as carcinogenic under OSHA. The American Conference of Governmental Industrial Hygienists has reviewed the available data and concluded that not all forms of nickel are carcinogenic. The American Industrial Hygiene Association has also concluded that there is no epidemiological evidence of increased risk of respiratory cancer in the refining of oxide ores or “in any other specifically nickel occupational exposures”.

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## 4. FIRST AID MEASURES

### INHALATION:

Irritation caused by dust: Move exposed individual to fresh air. See a physician on persistent feeling of discomfort. Phosphine/arsine intoxication: Seek medical attention. (See Section 11).

### SKIN CONTACT:

Wash skin with water and/or a mild detergent.

### EYE CONTACT:

Rinse eyes with water/saline solution. See a physician on persistent feeling of discomfort.

### INGESTION:

Remove the person affected from dust-exposed area. See inhalation.

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## 5. FIRE FIGHTING MEASURES

### EXTINGUISHING MEDIA:

Use dry sand, CO<sub>2</sub> or dry powder to extinguish fires involving SMZ® Inoculant. Dry SMZ® Inoculant in the form of granules is not combustible. SMZ® Inoculant-dust suspended in air may under certain conditions cause dust explosions. (See Section 10.)

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## 6. ACCIDENTAL RELEASE MEASURES

Avoid handling that generates dust build-up. Material in the form of dust should be collected in suitable containers. Damp product must be kept away from dry, and must not be collected and stored in closed containers. Dry dust can be swept up or vacuumed with non-sparking equipment.

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## 7. HANDLING AND STORAGE

### HANDLING:

Avoid handling that generates dust build-up. Avoid inhalation of dust. (See Section 8). Avoid ignition sources (e.g. welding) in areas with high dust concentrations. Addition of wet product to molten metal may cause explosions. (See Section 10.)

### STORAGE:

SMZ® Inoculant must be kept in a dry and well ventilated place, and away from acids and bases.

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye protection, eye flushing facilities and protective gloves are recommended. Ensure adequate ventilation. Wear an appropriate particulate respirator in accordance with 29 CFR 1910.134 or CSA Standard Z94.4-M1982 for dust exposure that may exceed exposure limits. If exposure to phosphine and arsine is suspected (see section 10), or if adequate ventilation is not possible, then a self-contained breathing apparatus or an air supplied respirator is recommended.

### OCCUPATIONAL EXPOSURE LIMITS (OSHA and ACGIH):

	8hr TWA mg/m <sup>3</sup>	
	OSHA PEL	ACGIH TLV
Total inhalable dust	15	10
Respirable dust	5	3
Phosphine gas (PH <sub>3</sub> )	0.4	0.42
Arsine gas (AsH <sub>3</sub> )	0.2	0.16

The low occupational exposure limit for arsine gas is due to the evidence for carcinogenicity in humans of inorganic arsenic compounds in general (IARC). Exposure levels for dust do not cover possible arsine/phosphine absorption from dust deposited on mucous membranes.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid Granules, Powder or Lump
Color:	Silvery gray, metallic surface
Odor:	Odorless
Solubility (Water):	Insoluble to slightly soluble.
Melting Point (°C):	Approx. 1200
Specific Gravity (water = 1):	Approx. 4.5

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## 10. STABILITY AND REACTIVITY

### CONDITIONS TO AVOID:

Avoid generating sparks and other ignition sources (e.g. welding) in areas with high dust concentrations. SMZ® Inoculant-particles suspended in air at concentrations above 100-300 g/m<sup>3</sup> can cause dust explosions. For a given particle size, the ignition sensitivity and the violence of explosion decrease with decreasing Si/Fe ratio. Addition of wet material to molten metal may cause explosions.

### MATERIALS TO AVOID:

Water/humidity, acids and bases.

### HAZARDOUS DECOMPOSITION PRODUCTS:

Highly flammable hydrogen gas (H<sub>2</sub>) and the highly flammable and very toxic gases phosphine and arsine (garlic-like smell), both heavier than air, may be formed if SMZ® Inoculant comes in contact with moisture, acids or bases. A reaction with hydrofluoric acid (HF) or nitric acid (HNO<sub>3</sub>) leads to the formation of toxic gases such as silicon tetrafluoride (SiF<sub>4</sub>) or nitrous oxide gases (NO<sub>x</sub>). Wet product will form highly flammable hydrogen gas if added to molten metal, due to decomposition of water.

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## 11. TOXICOLOGICAL INFORMATION

### ACUTE EFFECTS:

#### INHALATION:

Finely divided dust may irritate and dehydrate mucous membranes. Phosphine/arsine may be absorbed from dust deposited on mucous membranes. The toxic mechanism for phosphine is not clear. Phosphine irritates exposed mucous membranes, depresses the central nervous system (CNS) and can cause edema of the lungs. Acute, non-fatal poisoning with phosphine gives temporary effects, among others headache, malaise, vomiting, stomach pains, cough, and difficulty in breathing. Symptomatic treatment: Corticosteroids, prophylactic for edema of the lungs.

#### SKIN CONTACT:

Dust may irritate the skin.

#### EYE CONTACT:

Dust may irritate and lead to dryness.

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## 11. TOXICOLOGICAL INFORMATION (Con't)

### INGESTION:

Dust may irritate and dehydrate mucous membranes. Possible phosphine/arsine absorption.

### CHRONIC EFFECTS:

Prolonged exposure (years) to phosphine may lead to chronic effects such as difficulty in movement and speech problems. Epidemiological studies in the Norwegian ferroalloy industry, have neither shown an increased rate of mortality, nor an increased incidence of cancer.

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## 12. ECOLOGICAL INFORMATION

SMZ® Inoculant is not characterized as dangerous for the environment.

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## 13. DISPOSAL CONSIDERATIONS

Avoid repackaging wet material in sealed containers. Dispose of in accordance with applicable federal, state, and local regulations. SMZ® Inoculant is not a listed RCRA Hazardous Wastes (40 CFR 261).

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## 14. TRANSPORT INFORMATION

### DOT (DEPARTMENT OF TRANSPORTATION):

Proper Shipping Name: Ferrosilicon

Hazard Class: Not regulated

I.D. Number and Initials: Not regulated

Packing Group: Not regulated

Label(s): Not regulated

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## 15. REGULATORY INFORMATION

### OSHA (Occupational Safety and Health Administration)

Hazardous by definition of hazardous communication standard (29 CFR 1910.1200)

### TSCA (Toxic Substance Control Act):

Components of this product are listed on the TSCA Inventory.

### CERCLA (Comprehensive Response Compensation, and Liability Act):

SMZ® Inoculant is not listed in 40 CFR 302.4.

### RCRA (Resource Conservation/Recovery Act):

SMZ® Inoculant is not a listed hazardous waste.

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## 15. REGULATORY INFORMATION (Con't)

SARA TITLE III (Superfund Amendments and Reauthorization Act):

311/312 Hazard Categories:

Immediate Health, Delayed Health, Fire.

313 Reportable Ingredients:

Chromium, Nickel

CALIFORNIA PROPOSITION 65:

This product contains chemical(s) known to the State of California to cause cancer:

Nickel

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## 16. OTHER INFORMATION

APPLICATION OF SMZ® INOCULANT:

Additive to metal in steel plants and iron foundries for production of steel, other metals and foundry products.

Literature references are available upon request from the manufacturer.

THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET RELATES TO THIS SPECIFIC MATERIAL. IT MAY NOT BE VALID FOR THIS MATERIAL IF USED IN COMBINATION WITH ANY OTHER MATERIALS OR IN ANY PROCESS. IT IS THE USER'S RESPONSIBILITY TO VERIFY THE SUITABILITY AND COMPLETENESS OF THIS INFORMATION FOR THE PARTICULAR USE INTENDED.