

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **Silicon Ingots/Pieces, Enriched Silicon Ingots/Pieces**
Chemical Formula Si
Molecular Weight 28.09
CAS No. 7440-21-3
EINECS/ELINCS No. 231-130-8
Supplier Address* ISOFLEX USA
PO Box 29475
San Francisco CA 94129
United States
Telephone +1 415-440-4433
Fax +1 415-563-4433
Emergency Phone Number (both supplier and manufacturer) Infotrac/ +1 800-535-5053
*May include subsidiaries or affiliate companies/divisions
Email iusa@isoflex.com
Website www.isoflex.com
Preparation Information ISOFLEX USA
Product Safety
+1 415-440-4433

2. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance: Dark silver-gray ingots/pieces. Flammable solid. Moisture-sensitive. Warning! May cause central nervous system depression. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. Chronic inhalation of crystalline silica may lead to fibrotic lung disease, silicosis or cancer.

Target Organs: Central nervous system, lungs

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

Health Hazard = 1 Flammability = 0 Reactivity = 0



HMIS Ratings: (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health Hazard = 0 Flammability = 1 Physical Hazard = 1

HEALTH HAZARD	0
FLAMMABILITY	1
PHYSICAL HAZARD	1

Potential Health Effects

<i>Eye</i>	May cause chemical conjunctivitis and corneal damage
<i>Skin</i>	May cause irritation and dermatitis; may cause cyanosis of the extremities
<i>Ingestion</i>	May cause gastrointestinal irritation with nausea, vomiting and diarrhea, ingestion of large amounts may cause CNS depression
<i>Inhalation</i>	Aspiration may lead to pulmonary edema. Contains crystalline silica, which may lead to respiratory abnormalities and silicosis. Inhalation of dusts causes severe irritation of the upper respiratory tract, gastrointestinal disturbances, albuminuria, gradual loss of weight, and increasing weakness. May cause burning sensation in the chest.
<i>Chronic</i>	Chronic inhalation of dust may lead to silicosis. May cause silicosis-disabling pulmonary fibrosis characterized by fibrotic changes and miliary nodules in the lungs, dry cough, shortness of breath, emphysema, decreased chest expansion and increased susceptibility to tuberculosis.
Hazard Symbols	F
Risk Phrases	11

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name:	Silicon
CAS No.:	7440-21-3
Chemical Formula:	Si
Molecular Weight:	28.09

4. FIRST AID MEASURES

<i>Eye Exposure</i>	Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
<i>Dermal Exposure</i>	Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
<i>Ingestion Exposure</i>	Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
<i>Inhalation Exposure</i>	Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
<i>Notes to Physician</i>	Treat symptomatically and supportively.

5. FIREFIGHTING MEASURES

<i>General Information</i>	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Dusts at sufficient concentrations can form explosive mixtures with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. May be ignited by friction, heat, sparks or flame. May react violently or explosively on contact with water. May re-ignite after fire is extinguished.		
<i>Suitable Extinguishing Media</i>	Use water spray to cool fire-exposed containers. Use dry sand, Met-L-X powder, or G-1 graphite powder. Do NOT get water inside containers. DO NOT USE WATER, CO ₂ OR FOAM DIRECTLY ON FIRE ITSELF. Use dry sand, graphite powder, dry sodium chloride-based extinguishers.		
<i>Flash Point</i>	Not applicable		
<i>Autoignition Temperature</i>	> 150 °C (> 302.00 °F)		
<i>Explosion Limits</i>			
<i>Lower</i>	Not available		
<i>Upper</i>	Not available		
<i>NFPA Rating (estimated)</i>	Health: 1	Flammability: 0	Instability: 0

6. ACCIDENTAL RELEASE MEASURES

<i>Personal Precautions</i>	Cleanup personnel should wear appropriate respiratory protective equipment when addressing fine material. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition.
<i>Environmental Precautions</i>	Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
<i>Methods for Cleaning Up</i>	<i>Land Spill:</i> Silicon Metal spilled on the land represents minimal hazard. Avoid the use of compressed air to maneuver spills or leaks of fine material. Fine material should be swept up or vacuumed using explosion-proof equipment. Keep dry material and wet material separated. Place cleaned up material in disposal container. Avoid repackaging wet materials in sealed containers. <i>Water Spill:</i> Remove spilled product from water body by dipping or other appropriate means. Avoid repackaging wet materials in sealed containers.

7. HANDLING AND STORAGE

<i>Handling</i>	Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue (liquid and/or vapor) and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not allow contact with water. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Keep from contact with moist air and steam.
<i>Storage</i>	Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammable-area. Store protected from moisture.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

Exposure Limits

ACGIH

10 mg/m³ TWA

NIOSH

10 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable dust)

OSHA - Final PELs

15 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable fraction)

OSHA - Vacated PELs

Silicon: 10 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable fraction)

Personal Protective Equipment

Eye

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Hand/Body

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respirators

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical State

Solid

Form

Ingots/pieces

Color

Dark silver-gray

Odor

Odorless

Safety Data

Solubility (Water):

Insoluble in water

Boiling Point:

2355 °C

Freezing/Melting Point:

1410 °C

Melting Point:

~1440 °C

Specific Gravity (water = 1):

~2.3

Molecular Formula:

Si

Molecular Weight:

28.09

10. STABILITY AND REACTIVITY

Conditions to Avoid

Silicon metal powders or fines can explode or deflagrate and should be handled to prevent fines from becoming airborne in concentration that exceed the Minimum Explosive Concentration. Silicon particles suspended in air can cause dust deflagrations. Avoid generating sparks and other ignition sources (e.g. welding) in areas with high dust concentrations. Addition of wet material to molten metal may cause explosions.

Materials to Avoid

Acids and strong bases

Hazardous Decomposition Products

Contact with acids may result in the generation of silane gas (SiH₄), a spontaneously combustible gas. Highly flammable hydrogen gas (H₂) may be formed if silicon metal comes in contact with moisture, acids or bases. A reaction with hydrofluoric acid (HF) or nitric acid (HNO₃) leads to the formation of toxic gases such as silicon tetrafluoride (SiF₄) or nitrous oxide gases (NO_x). Wet product will form highly flammable hydrogen gas if added to molten metal, due to decomposition of water.

11. TOXICOLOGICAL INFORMATION

RTECS No. VW0400000
CAS No. 7440-21-3

LD50/LC50

Draize test - Rabbit - Eye 3 mg Mild
Oral LD50 - Rat 3160 mg/kg

Acute Effects

Inhalation Finely divided dust may irritate and dehydrate mucous membranes.
Skin Contact Dust may irritate the skin.
Eye Contact Dust may irritate and lead to dryness.
Ingestion Dust may irritate and dehydrate mucous membranes.
Chronic Effects This material is not known to be a reproductive toxin, teratogen or mutagen.

Carcinogenicity

IARC No component of this product present at levels greater than or equal to 0.1% is identified as a probable, possible or confirmed human carcinogen by IARC.

ACGIH No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

12. ECOLOGICAL INFORMATION

Toxicity No data available

Persistence and Degradability No data available

Bioaccumulative Potential No data available

Mobility in Soil No data available

Results of PBT and vPvB Assessment PBT/vPvB assessment not available, as chemical safety assessment not required/not conducted

Other Adverse Effects No data available

13. DISPOSAL CONSIDERATIONS

Product Avoid repacking wet material in sealed containers. Dispose of in accordance with applicable federal, state, and local regulations. Silicon metal is not a listed RCRA Hazardous Waste (40 CFR 261). Burn in a chemical incinerator equipped with an afterburner and scrubber, but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated Packaging Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)	<i>Not Dangerous Goods</i>
IMDG	<i>Not Dangerous Goods</i>
IATA	<i>Not Dangerous Goods</i>

15. REGULATORY INFORMATION

REACH Number	A registration number is not available for this substance, as the substance or its uses are exempted from registration, the annual tonnage does not require a registration, or the registration is envisaged for a later registration deadline.
SARA 302 Components	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards	Fire Hazard
Massachusetts Right to Know Components	Silicon / CAS No. 7440-21-3 / Revision Date 2007-03-01
Pennsylvania Right to Know Components	Silicon / CAS No. 7440-21-3 / Revision Date 2007-03-01
New Jersey Right to Know Components	Silicon / CAS No. 7440-21-3 / Revision Date 2007-03-01
California Prop. 65 Components	This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

<i>Prepared By</i>	ISOFLEX USA PO Box 29475 San Francisco CA 94129 United States
<i>Issuing Date</i>	December 17, 2014
<i>Revision Date</i>	July 29, 2021
<i>Revision Number</i>	2
<i>Revision Note</i>	Required review and update

ISOFLEX USA's Commonly Used Abbreviations and Acronyms*

ACGIH	American Conference of Governmental Industrial Hygienists
ADR	European Agreement Concerning the International Carriage of Dangerous Goods by Road
AICS	Australian Inventory of Chemical Substances
ALARA	As Low As Is Reasonably Achievable

AMU	Atomic Mass Unit
ANSI	American National Standards Institute
BLS	Basic Life Support
BOD5	Biochemical Oxygen Demand
CAM	Continuous Air Monitor
CAS	Chemical Abstracts Service (division of the American Chemical Society)
CEN	European Committee for Standardization
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLP	Classification, Labelling and Packaging (European Union)
COD	Chemical Oxygen Demand
CPR	Controlled Products Regulations (Canada)
CWA	Clean Water Act (USA)
DAC	Derived Air Concentration (USA)
DOE	United States Department of Energy (USA)
DOT	United States Department of Transportation (USA)
DSL	Domestic Substances List (Canada)
EC50	Half Maximal Effective Concentration
ECL	Korean Existing Chemicals List
EINECS	European Inventory of Existing Commercial Chemical Substances
EHS	Environmentally Hazardous Substance
ELINCS	European List of Notified Chemical Substances
EMS	Emergency Response Procedures for Ships Carrying Dangerous Goods
EPA	Environmental Protection Agency (USA)
EPCRA	Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986
GHS	Globally Harmonized System
HMIS	Hazardous Materials Identification System (USA)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IBC	Intermediate Bulk Containers
ICAO	International Civil Aviation Organization
IDLH	Immediately Dangerous to Life or Health
IECSC	Inventory of Existing Chemical Substances Produced or Imported in China
IMDG	International Maritime Code for Dangerous Goods
LC50	Lethal concentration, 50 percent
LD50	Lethal dose, 50 percent
LDLO	Lethal Dose Low
LOEC	Lowest-Observed-Effective Concentration
MARPOL	International Convention for the Prevention of Pollution from Ships
MSHA	Mine Safety and Health Administration (USA)
NCRP	National Council on Radiation Protection & Measurements (USA)
NDSL	Non-Domestic Substances List (Canada)
NFPA	National Fire Protection Association (USA)
NIOSH	National Institute for Occupational Safety and Health (USA)
NOEC	No Observed Effect Concentration
N.O.S.	Not Otherwise Specified
NRC	Nuclear Regulatory Commission (USA)
NTP	National Toxicology Program (USA)
OSHA	Occupational Safety and Health Administration (USA)
PBT	Persistent Bioaccumulative and Toxic Chemical
PEL	Permissible Exposure Limit
PICCS	Philippines Inventory of Chemicals and Chemical Substances
PIH	Poisonous by Inhalation Hazard
RCRA	Resource Conservation and Recovery Act (USA)
RCT	Radiation Control Technician
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Europe)
RID	Regulations Concerning the International Transport of Dangerous Goods by Rail
RQ	Reportable Quantity
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendments and Reauthorization Act (USA)

SNUR	Significant New Use Rule (TSCA)
TDG	Transportation of Dangerous Goods (Canada)
TIH	Toxic by Inhalation Hazard
TLV	Threshold Limit Value
TPQ	Threshold Planning Quantity
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
UN	United Nations (Number)
VOC	Volatile Organic Compound
vPvB	Very Persistent Very Bioaccumulative Chemical
WGK	Wassergefährdungsklassen (Germany: Water Hazard Classes)
WHMIS	Workplace Hazardous Materials Information System

*One or more of the above-listed items may not appear in this document.

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