

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Tetraethyl Orthosilicate
Chemical Formula	Si(OC ₂ H ₅) ₄
Molecular Weight	208.33 g/mol
CAS No.	78-10-4
EC No.	201-083-8
Identified Uses	Laboratory chemicals, Synthesis of substances
Supplier Address*	ISOFLEX USA PO Box 472615 San Francisco CA 94147 United States
Telephone	+1 415-440-4433
Fax	+1 415-563-4433
Emergency Phone (both supplier and manufacturer)	Infotrac/ +1 800-535-5053
Email	*May include subsidiaries or affiliate companies/divisions iusa@isoflex.com
Website	www.isoflex.com
Preparation Information	ISOFLEX USA Product Safety +1 415-440-4433

2. HAZARDOUS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226

Acute toxicity, Inhalation (Category 4), H332

Eye irritation (Category 2A), H319

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Warning

Hazard statement(s)

H226 Flammable liquid and vapor.

H319 Causes serious eye irritation.

H332 Harmful if inhaled.

H335 May cause respiratory irritation.

Precautionary statement(s)

P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.

P233 Keep container tightly closed.

- P240 Ground/bond container and receiving equipment.
 P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
 P242 Use only non-sparking tools.
 P243 Take precautionary measures against static discharge.
 P261 Avoid breathing mist or vapors.
 P264 Wash skin thoroughly after handling.
 P271 Use only outdoors or in a well-ventilated area.
 P280 Wear protective gloves/ eye protection/ face protection.
 P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing.
 Rinse skin with water/ shower.
 P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 Call a POISON CENTER/ doctor if you feel unwell.
 P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes.
 Remove contact lenses, if present and easy to do. Continue rinsing.
 P337 + P313 If eye irritation persists: Get medical advice/ attention.
 P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
 P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
 P403 + P235 Store in a well-ventilated place. Keep cool.
 P405 Store locked up.
 P501 Dispose of contents/ container to an approved waste disposal plant.

Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name: Tetraethyl orthosilicate
 Synonyms: Tetraethoxysilane, Orthosilicic acid tetraethyl ester
 CAS No: 7631-86-9
 Chemical Formula: $\text{Si}(\text{OC}_2\text{H}_5)_4$
 Molecular Weight: 208.33 g/mol

Component	Classification	Concentration
tetraethyl silicate		
	Flam. Liq. 3; Acute Tox. 4; Eye Irrit. 2A; STOT SE 3; H226, H332, H319, H335	<= 100%

4. FIRST AID MEASURES

General advice Show this safety data sheet to the doctor in attendance.
If inhaled After inhalation: fresh air.
In case of skin contact In case of skin contact: Take off immediately all contaminated clothing.
 Rinse skin with water/ shower.
In case of eye contact After eye contact: rinse out with plenty of water. Call in ophthalmologist.
 Remove contact lenses.
If swallowed After swallowing: immediately make victim drink water (two glasses at most).
 Consult a physician.

Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

Extinguishing media

Suitable extinguishing media Carbon dioxide (CO₂) foam dry powder

Unsuitable extinguishing media For this substance/mixture no limitations of extinguishing agents are given.

Special hazards arising from the substance or mixture

Carbon oxides

Silicon oxides

Combustible

Vapors are heavier than air and may spread along floors.

Forms explosive mixtures with air at elevated temperatures.

Development of hazardous combustion gases or vapors possible in the event of fire.

Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

Further information

Under fire conditions, material may decompose to form flammable and/or explosive mixtures in air. Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

Environmental precautions

Do not let product enter drains. Risk of explosion.

Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material. Dispose of properly. Clean up affected area.

Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling

Work under hood. Do not inhale substance/mixture. Avoid generation of vapors/aerosols.

Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Hygiene measures

Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance. For precautions see section 2.2.

Conditions for safe storage, including any incompatibilities

Storage conditions

Store under nitrogen. Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Moisture sensitive.

Storage class

Storage class (TRGS 510): 3: Flammable liquids

Specific end use(s)

Apart from the uses mentioned in section 1, no other specific uses are stipulated.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Ingredients with workplace control parameters

Component	CAS No.	Value	Control parameters	Basis
tetraethyl silicate	78-10-4	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
		TWA	10 ppm 85 mg/m ³	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 850 mg/m ³	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	10 ppm 85 mg/m ³	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Exposure controls

Appropriate engineering controls

Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses.

Skin Protection

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves.

Body Protection

Flame retardant antistatic protective clothing.

Respiratory Protection

Required when vapors/aerosols are generated.

Control of environmental exposure

Do not let product enter drains. Risk of explosion.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

a) Appearance	Form: liquid Color: colorless
b) Odor	No data available
c) Odor Threshold	No data available
d) pH	No data available
e) Melting/freezing point	Melting point: -82.5 °C (-116.5 °F) at ca.1,013 hPa
f) Boiling point/range	168 °C 334 °F
g) Flash point	45 °C (113 °F) - closed cup - DIN 51755 Part 1
h) Evaporation rate	No data available
i) Flammability (solid/gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 23 %(V) Lower explosion limit: 1.3 %(V)
k) Vapor pressure	< 1 hPa at 20 °C (68 °F)
l) Vapor density	7.19 - (Air = 1.0)
m) Density	0.934 g/mL at 25 °C (77 °F)
Relative density	No data available
n) Water solubility	1.49 g/l at 23 °C (73 °F) at 7 hPa - soluble
o) Partition coefficient n-octanol/water	log Pow: 3.18 at 40 °C (104 °F) - Bioaccumulation is not expected.
p) Autoignition temp	222 °C (432 °F) at 960.8 hPa
q) Decomposition temp	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	None

Other safety information

Relative vapor density 7.19 - (Air = 1.0)

10. STABILITY AND REACTIVITY

Reactivity	Vapor/air-mixtures are explosive at intense warming.
Chemical stability	The product is chemically stable under standard ambient conditions (room temperature). May decompose on exposure to moist air or water.
Possibility of hazardous reactions	No data available
Conditions to avoid	Heating
Incompatible materials	Rubber, various plastics
Hazardous decomposition products	In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - male and female - > 2,500 mg/kg
(OECD Test Guideline 423)

Symptoms: Irritations of mucous membranes in the mouth, pharynx, esophagus and gastrointestinal tract.

LD50 Oral - Rat - 6,270 mg/kg

Remarks: (RTECS)

LC50 Inhalation - Rat - male - 4 h - 10 mg/l - vapor

(OECD Test Guideline 403)

Remarks: (Regulation (EC) No 1272/2008, Annex VI)

Symptoms: mucosal irritations, Cough, Shortness of breath, Inhalation may lead to the formation of edemas in the respiratory tract., Possible damages:., damage of respiratory tract

LD50 Dermal - Rabbit - 5,878 mg/kg

Remarks: (RTECS)

Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation - 4 h

(OECD Test Guideline 404)

Serious eye damage/eye irritation

Remarks: Causes serious eye irritation.

(Regulation (EC) No 1272/2008, Annex VI)

Respiratory or skin sensitization

Buehler Test - Guinea pig

Result: Negative

(OECD Test Guideline 406)

Germ cell mutagenicity

Test type: Ames test

Test system: Salmonella typhimurium

Metabolic activation: With and without metabolic activation

Method: Mutagenicity (Salmonella typhimurium - reverse mutation assay)

Result: Negative

Carcinogenicity

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

NTP: No ingredient 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 on OSHA's list of regulated carcinogens.

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure

May cause respiratory irritation.

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

Repeated dose toxicity - Rat - male and female - Gavage - NOAEL (No observed adverse effect level) - 10 - 50 mg/kg

RTECS: VV9450000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Systemic effects:

After uptake of large quantities:

Tiredness, narcosis

Damage to: Kidney

Other dangerous properties cannot be excluded.

Handle in accordance with good industrial hygiene and safety practice.

Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION**Toxicity**

Toxicity to fish Semi-static test LC50 - *Danio rerio* (zebra fish) - > 245 mg/l - 96 h
(Regulation (EC) No. 440/2008, Annex, C.1)

Toxicity to daphnia and other aquatic invertebrates Flow-through test EC50 - *Daphnia magna* (Water flea) - > 75 mg/l - 48 h
(OECD Test Guideline 202)

Toxicity to algae Static test ErC50 - *Pseudokirchneriella subcapitata* - > 100 mg/l - 72 h
(OECD Test Guideline 201)

Toxicity to bacteria Static test EC50 - activated sludge - > 100 mg/l - 3 h
(OECD Test Guideline 209)

Persistence and degradability

Biodegradability Aerobic - Exposure time 28 d
Result: 98 % - Readily biodegradable.
(Directive 67/548/EEC Annex V, C.4.A.)

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

Endocrine disrupting properties No data available

Other adverse effects No data available

13. DISPOSAL CONSIDERATIONS**Waste treatment methods****Product**

Waste material must be disposed of in accordance with national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

14. TRANSPORT INFORMATION**DOT (US)**

UN number: 1292 Class: 3 Packing group: III

Proper shipping name: Tetraethyl silicate

Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG

UN number: 1292 Class: 3 Packing group: III EMS No: F-E, S-D

Proper shipping name: TETRAETHYL SILICATE

Marine pollutant: Yes

IATA

UN number: 1292 Class: 3 Packing group: III

Proper shipping name: Tetraethyl silicate

15. REGULATORY INFORMATION**SARA 302 Components**

This material does not contain any components with a section 302 EHS TPQ.

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, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

tetraethyl silicate CAS No. 78-10-4 / Revision Date 2007-03-01

Pennsylvania Right To Know Components

tetraethyl silicate CAS No. 78-10-4 / Revision Date 2007-03-01

16. OTHER INFORMATIONPrepared By ISOFLEX USA
PO Box 472615
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Revision Note Required review and update of supplier address

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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