Safety Data Sheet

Version 1.2
Revision Date 10/20/2024

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	**Silane (0.0001%-47.49%) in Hydrogen; Enriched in Si-28**
Chemical Formula	$^{28}SiH_4$ in H_2 (Mixture)
Molecular Weight	32.11 (Silane) + 2.016 (Hydrogen)
CAS No.	Silane (7803-62-5) / Hydrogen (1333-74-0)
EC No.	Silane (232-263-4) / Hydrogen (215-605-7)
UN No.	UN 1954
Recommended Uses	Semiconductor purposes, test gas/calibration gas
Synonyms	None
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 Number	Infotrac/ +1 800-535-5053
Email	iusa@isoflex.com
Website	www.isoflex.com
Preparation Information	ISOFLEX USA Product Safety +1 415-440-4433

2. HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

GHS-US Classification

Pyrophoric Gas	H250	Catches fire spontaneously if exposed to air
Flammable Gases Category 1	H220	Extremely flammable gas
Gases Under Pressure	H280	Contains gas under pressure; may explode if heated

Full text of H statements: See Section 16

GHS Label Elements (Including Precautionary Statements)

Hazard Pictograms

Signal Word (GHS-US): Danger

Hazard Statements (GHS-US):

H220 – Extremely flammable gas

H250 – Catches fire spontaneously if exposed to air

H280 – Contains gas under pressure; may explode if heated

OSHA-H01 – May displace oxygen and cause rapid suffocation

OSHA-HG04 – May form explosive mixtures with air

Precautionary Statements (GHS-US):

P202 – Do not handle until all safety precautions have been read and understood.

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

P222 – Do not allow contact with air.

P271 – Use only outdoors or in a well-ventilated area.

P280 – Wear eye protection, face protection, protective gloves, protective clothing.

P308+P313 – If exposed or concerned: Get medical advice/attention.

P377 – Leaking gas fire: Do not extinguish unless leak can be stopped safely.

P403 – Store in a well-ventilated place.

P501 – Dispose of contents/container in accordance with local/regional/national/international regulations.

P304+P340 – If inhaled: Remove person to fresh air and keep comfortable for breathing.

P381 – Eliminate all ignition sources if safe to do so.

CGA-PG02 – Protect from sunlight when ambient temperature exceeds 52°C/125°F.

CGA-PG05 – Use a back flow preventive device in the piping.

CGA-PG06 – Close valve after each use and when empty.

CLG-PG10 – Use only with equipment rated for cylinder pressure.

CGA-PG14 – Approach suspected leak area with caution.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Name	CAS No.	Volume %	GHS-US Classification
Hydrogen	1333-74-0	52.51-99.9999	Flam. Gas 1, H220 Press. Gas (Comp.), H280
Silane	7803-62-5	0.0001-47.49	Pyr. Gas, H250 Flam. Gas 1, H220 Press. Gas (Liq.), H280 Acute Tox. 4 (Inhalation: Gas), H332

4. FIRST AID MEASURES

Eye Contact	Adverse effects not expected from this product.
Skin Contact	Adverse effects not expected from this product.
Ingestion	Ingestion is not considered a potential route of exposure.
Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice.

Most important symptoms and effects (acute and delayed)

Eye Contact	Adverse effects not expected from this product.
Skin Contact	Adverse effects not expected from this product.
Ingestion	Ingestion is not considered a potential route of exposure.
Inhalation	May displace oxygen and cause rapid suffocation.
Intravenous Administration	Not known.
Chronic Symptoms	Adverse effects not expected from this product.

Immediate medical attention and special treatment, if necessary

If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

5. FIREFIGHTING MEASURES

Flammable Properties	Flammable
Suitable Extinguishing Media	Use extinguishing media appropriate for surrounding fire.
Unsuitable Extinguishing Media	Do not use water jet to extinguish.

Specific Hazards Arising from the Chemical

Fire Hazard	This product is flammable.
Explosion Hazard	Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. May form flammable/explosive vapor-air mixture. In use may form pyrophoric vapor-air mixture.
Reactivity	Catches fire spontaneously if exposed to air.
Hazardous Combustion Products	Silica dust (inert – but may irritate respiratory tract and eyes)

Firefighting Instructions	In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.
Protective Equipment and Precautions for Firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH-approved or equivalent, full-protective gear. Do not enter fire area without proper protective equipment, including respiratory protection.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Ensure adequate ventilation.
For Non-Emergency Personnel	Protective equipment: Wear protective equipment consistent with the site emergency plan. Emergency procedures: Evacuate personnel to a safe area. Close doors and windows of adjacent premises. Keep containers closed. Mark the danger area. Seal off low-lying areas. Keep upwind.

For Emergency Responders	Protective equipment: Standard protective clothing and equipment (e.g., Self-Contained Breathing Apparatus) for firefighters. Equip cleanup crew with proper protection. Emergency procedures: Evacuate and limit access. Ventilate area. Remove ignition sources. Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering atmospheres of unknown contaminant concentration until proven to be safe.
Environmental Precautions	Try to stop release if without risk.
Methods for Containment	Try to stop release if without risk.
Methods for Cleaning Up	Dispose of contents/container in accordance with local/regional/national/ international regulations.

7. HANDLING AND STORAGE

Precautions for Safe Handling

Additional Hazards When Processed	Pressurized container: Do not pierce or burn, even after use. Use only with equipment rated for cylinder pressure. Close valve after each use and when empty. Handle empty containers with care because residual vapors are flammable. In use, may form flammable vapor-air mixture.
Precautions for Safe Handling	Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Use only non-sparking tools.
Hygiene Measures	Do not eat, drink or smoke when using this product.

Conditions for Safe Storage (Including Any Incompatibilities)

Technical Measures	Comply with applicable regulations. Proper grounding procedures to avoid static electricity should be followed.
Storage Conditions	Do not expose to temperatures exceeding 52 °C/125 °F. Keep container close when not in use. Protect cylinders from physical damage; do not drag, roll, slide or drop. Store in well-ventilated area.
Incompatible Products	None known.
Incompatible Materials	Oxidizing materials. Air.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control Parameters

Silane (7803-62-5)		
ACGIH	ACGIH TWA (ppm)	5 ppm
NIOSH	NIOSH REL (TWA) (mg/m^3)	7 mg/m^3
NIOSH	NIOSH REL (TWA) (ppm)	5 ppm
Hydrogen (1333-74-0)		
ACGIH	Remark (ACGIH)	Simple Asphyxiant

Exposure Controls	Refer to local regulations for restriction of emissions to the atmosphere. See Section 13 for specific methods for waste gas treatment.
Engineering Controls	Ensure exposure is below occupational exposure limits (where available). Provide adequate general and local exhaust ventilation. Systems under pressure should be checked regularly for leakages. Oxygen detectors should be use when asphyxiating gases may be released. Consider the use of a work permit system e.g. for maintenance activities. Product to be handled in a closed system and under strictly controlled conditions. Preferably use permanent leak-tight installations (e.g. welded pipes).

Personal Protective Equipment

Eye/Face Protection	Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection
Skin and Body Protection	Wear suitable protective clothing, e.g. lab coats, overalls or flame-resistant clothing.
Hand Protection	Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand Protection
Respiratory Protection	None necessary during normal and routine operations. See Sections 5 & 6.
Thermal Hazard Protection	None necessary during normal and routine operations.
Other Information	Wear safety shoes while handling containers. 29 CFR 1910.136: Foot Protection

---

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	Gas
Color	Colorless
Odor	Repulsive

Safety Data

pH	No data available
Melting point	No data available
Freezing point	No data available
Boiling point	No data available
Flash point	No data available
Relative evaporation rate	No data available (butyl acetate=1)
Flammability (solid, gas)	See Section 2
Vapor pressure	No data available
Relative vapor density at 20°C	No data available
Relative density	No data available
Relative gas density	Lighter than or similar to air
Solubility (water)	No data available
Log Pow	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity, kinematic	No data available
Viscosity, dynamic	No data available
Explosion limits	No data available
Explosive properties	Without adequate ventilation, formation of explosive mixtures may be possible.
Oxidizing properties	None

10. STABILITY AND REACTIVITY

Reactivity	Catches fire spontaneously if exposed to air.
Chemical Stability	Stable under normal conditions.
Possibility of Hazardous Reactions	Can form explosive mixture with air.
Incompatible Materials	Oxidizing materials. Air.
Conditions to Avoid	None under recommended storage and handling conditions (see Section 7).
Hazardous Polymerization	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11. TOXICOLOGICAL INFORMATION

Likely routes of exposure Inhalation

Acute toxicity Not classified

Silane (7803-62-5)	
LC50 inhalation rat (ppm)	9500 ppm/4h
ATE US (gases)	9500.00 ppmV/4h
Hydrogen (1333-74-0)	
LC50 inhalation rat (ppm)	820000 ppm/4h
ATE US (gases)	820000.00 ppmV/4h

Skin corrosion/irritation	Not classified
Serious eye damage/irritation	Not classified
Respiratory or skin sensitization	Not classified
Germ cell mutagenicity	Not classified
Carcinogenicity	Not classified
Reproductive toxicity	Not classified
Specific target organ toxicity	Not classified (single exposure)
Specific target organ toxicity	Not classified (repeated exposure)
Aspiration hazard	Not classified
Symptoms/effects after inhalation	May displace oxygen and cause rapid suffocation.
Symptoms/effects after skin contact	Adverse effects not expected from this product.
Symptoms/effects after eye contact	Adverse effects not expected from this product.
Symptoms/effects after ingestion	Ingestion is not considered a potential route of exposure.
Symptoms/effects upon intravenous administration	Not known
Chronic symptoms	Adverse effects not expected from this product.

12. ECOLOGICAL INFORMATION

Toxicity No additional information available.

Persistence and degradability

Silane (7803-62-5)	
Persistence and degradability	Not applicable for inorganic gases.
Hydrogen (1333-74-0)	
Persistence and degradability	No ecological damage caused by this product.

Bioaccumulative potential

Silane (7803-62-5)	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No data available.
Hydrogen (1333-74-0)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No ecological damage caused by this product.

Mobility in soil

Silane (7803-62-5)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.
Hydrogen (1333-74-0)	
Ecology - soil	No ecological damage caused by this product.

Effect on ozone layer No known effects from this product.

Effect on global warming No known effects from this product.

GWPmix comment No known effects from this product.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods: Contact supplier if guidance is required. Do not discharge into any place where its accumulation could be dangerous. Ensure that the emission levels from local regulations or operating permits are not exceeded. Waste gas should be flared through a suitable burner with flash back arrestor. Do not discharge into areas where there is a risk of forming an explosive mixture with air.

Product/packaging disposal: Refer to the CGA Pamphlet P-63 “Disposal of Gases” available at www.cganet.com for more guidance on suitable disposal methods.

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name	Compressed gas, flammable, n.o.s.
Hazard Class	2.1 – Class 2.1 – Flammable gas 49 CFR 173.115
Hazard Labels	2.1 – Flammable gas
	
Subsidiary Class	None
UN No.	UN1954
Transport Document Description	UN1954 Compressed gas, flammable, n.o.s. (Silane, Hydrogen), 2.1
DOT Packaging Non Bulk (49 CFR 173.xxx)	302;305
DOT Packaging Bulk (49 CFR 173.xxx)	314;315
DOT Symbols	G – Identifies PSN requiring a technical name
DOT Packaging Exceptions (49 CFR 173.xxx)	306
DOT Quantity Limitations Passenger Aircraft/Rail (49 CFR 173.27)	Forbidden
DOT Quantity Limitations Cargo Aircraft Only (49 CFR 175.75)	150 kg
DOT Vessel Stowage Location	D – The material must be stowed “on deck only” on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded.
DOT Vessel Stowage Other	40 – Stow “clear of living quarters”
Other Information	No supplementary information available.

TDG

Transport Document Description	UN1954 Compressed gas, flammable, n.o.s., 2.1
UN No.	UN1954
Proper Shipping Name	Compressed gas, flammable, n.o.s.
Primary Hazard Classes	2.1 – Class 2.1 – Flammable Gas.
Special Provisions	16 – (1) The technical name of at least one of the most dangerous substances that predominantly contributes to the hazard or hazards posed by the dangerous goods must be shown, in parentheses, on the shipping document following the shipping name in accordance with clause 3.5(1)(c)(ii)(A) of Part 3 (Documentation). The technical name must also be shown, in parentheses, on a small means of containment or on a tag following the shipping name in accordance with subsections 4.11(2) and (3) of Part 4 (Dangerous Goods

	Safety Marks). (2) Despite subsection (1), the technical name for the following dangerous goods is not required to be shown on a shipping document or on a small means of containment when Canadian law for domestic transport or an international convention for international transport prohibits the disclosure of the technical name: (a)UN1544, ALKALOID SALTS, SOLID, N.O.S. or ALKALOID, SOLID, N.O.S.; (b)UN1851, MEDICINE, LIQUID, TOXIC, N.O.S.; (c)UN3140, ALKALOID SALTS, LIQUID, N.O.S. or ALKALOIDS, LIQUID, N.O.S.; (d)UN3248, MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S.; or (e)UN3249, MEDICINE, SOLID, TOXIC, N.O.S. An example in Canada is the “Food and Drugs Act.” (3) Despite subsection (1), the technical name for the following dangerous goods is not required to be shown on a small means of containment: (a)UN2814, INFECTIOUS SUBSTANCE, AFFECTING HUMANS; or (b)UN2900, INFECTIOUS SUBSTANCE, AFFECTING ANIMALS. SOR/2014-306
ERAP Index	3 000
Explosive Limit and Limited Quantity Index	0.125 L
Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index	Forbidden
Passenger Carrying Ship Index	Forbidden

IMDG/IMO

Transport Document Description	UN 1954, COMPRESSED GAS, FLAMMABLE, N.O.S., 2
UN No.	1954
Proper Shipping Name	COMPRESSED GAS, FLAMMABLE, N.O.S.
Class	2 - Gases
Limited Quantities	0

IATA

Transport Document Description	UN 1954 COMPRESSED GAS, FLAMMABLE, N.O.S., 2.1
UN No.	1954
Proper Shipping Name	COMPRESSED GAS, FLAMMABLE, N.O.S.
Hazard Class	2

15. REGULATORY INFORMATION

US Federal Regulations

Silane (7803-62-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Hydrogen (1333-74-0)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

International Regulations

CANADA

Silane (7803-62-5)
Listed on the Canadian DSL (Domestic Substances List)
Hydrogen (1333-74-0)
Listed on the Canadian DSL (Domestic Substances List)

EU Regulations

Silane (7803-62-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Hydrogen (1333-74-0)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

National Regulations

Silane (7803-62-5)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDA (Ingredient Disclosure List)
Listed on INSQ (Mexican National Inventory of Chemical Substances)
Listed on the TCSI (Taiwan Chemical Substance Inventory)
Hydrogen (1333-74-0)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on INSQ (Mexican National Inventory of Chemical Substances)
Listed on the TCSI (Taiwan Chemical Substance Inventory)

US State Regulations

Silane (7803-62-5)
US – Massachusetts – Right to Know List
US – New Jersey – Right to Know Hazardous Substance List
US – Pennsylvania – RTK (Right to Know) List
Hydrogen (1333-74-0)
US – Massachusetts – Right to Know List

US – New Jersey – Right to Know Hazardous Substance List
US – Pennsylvania – RTK (Right to Know) List

16. OTHER INFORMATION

Full text of H-phrases

H220	Extremely flammable gas
H250	Catches fire spontaneously if exposed to air
H280	Contains gas under pressure; may explode if heated
H332	Harmful if inhaled

Prepared By	ISOFLEX USA PO Box 472615 San Francisco CA 94147 United States
Issuing Date	January 27, 2022
Revision Date	October 20, 2024
Revision Number	2
Revision Note	Update 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
ALARA	As Low As Is Reasonably Achievable
AMU	Atomic Mass Unit
ANSI	American National Standards Institute
BLS	Basic Life Support
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)
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
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
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
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
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendments and Reauthorization Act (USA)
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.

General Disclaimer

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between ISOFLEX USA (or any of its affiliates and subsidiaries) and the purchaser.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. ISOFLEX shall not be held liable for any damage resulting from handling or from contact with the above product.